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HEARING TO REVIEW ANIMAL IDENTIFICATION SYSTEMS

HEARINGS

BEFORE THE

COMMITTEE ON AGRICULTURE
HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

MARCH 11, 2009

Serial No. 111–02



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HEARING TO REVIEW ANIMAL IDENTIFICATION SYSTEMS

WEDNESDAY, MARCH 11, 2009

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON LIVESTOCK, DAIRY, AND POULTRY,
COMMITTEE ON AGRICULTURE,
Washington, D.C.

The Subcommittee met, pursuant to call, at 10:00 a.m., in Room 1300, Longworth House Office Building, Hon. David Scott [Chairman of the Subcommittee] presiding.

Members Present: Representatives Scott, Costa, Kagen, Kratovil, Holden, Boswell, Baca, Markey, Minnick, Peterson (ex-officio), Neugebauer, Goodlatte, Rogers, King, Conaway, Smith, and Roe.

Staff Present: Claiborn Crain, Nathan Fretz, Alejandra Gonzalez-Arias, Chandler Goule, Scott Kuschmider, Robert L. Larew, John Riley, Rebekah Solem, Patricia Barr, John Goldberg, Tamara Hinton, Pete Thomson, and Jamie Mitchell.

OPENING STATEMENT OF THE HON. DAVID SCOTT, A REPRESENTATIVE IN CONGRESS FROM GEORGIA

The CHAIRMAN. This hearing on the Subcommittee on Livestock, Dairy, and Poultry to review animal identification systems, including the subject of efficient use of taxpayers' resources as required by clause 2(n) of House rule 11 will come to order.

The CHAIRMAN. I would like to begin by welcoming everyone to the first hearing of the Livestock, Dairy and Poultry Subcommittee in the 111th Congress. It is indeed a distinct honor and a privilege to have been selected to chair this very important Subcommittee. I look forward to working with such an illustrious and knowledgeable group of my fellow Members of Congress as we have on this Subcommittee as we move to complete our long and perhaps difficult agenda.

I would also like to welcome our distinguished witnesses. I greatly look forward to hearing your testimony and tapping into your expertise as we explore the topic of today's hearing, the National Animal Identification System.

The subject on the Subcommittee's agenda today is indeed a very complex one; and, at times, it will be difficult to navigate through. No issue is more emblematic of the difficulties we face moving forward as is animal ID. It is my hope, however, on this and further issues that we will be able to work together in a positive fashion to find common ground and to address the issues we face with decorum and mutual respect. The constituents, which we all serve, deserve no less from us.

Regarding the subject of today's hearing, I believe that a national animal ID system has myriad benefits. A mandatory system would let us know where infected animals are so that we could reroute transportation to prevent disease from spreading. It would also help protect producers against the spread of minor animal diseases as well as from the devastating economic effects of BFE, foot and mouth disease, and TB. Finally, it will save the government money and provide a vital tool in maintaining the security and integrity of the food supply, which is one of my greatest concerns as a Member of Congress, as the Chairman of this Subcommittee, and as a consumer, and certainly as a parent and a grandparent as we know and we plan for future generations in our country.

In fact, we are currently planning a joint hearing with the Committee on Homeland Security to discuss our preparedness for an initial or catastrophic outbreak and the ways in which that would jeopardize our food security in the United States due to a lack of mandatory animal ID system.

With respect to animal diseases, a robust NAIS with large-scale participation has a potential to expedite that trackback and not only prevent further corruption of the food chain but ultimately, lessen the economic impact of any such outbreak.

But there are, of course, considerable questions that need to be addressed before a national animal ID system can achieve its maximum value. The economic impact on small and mid-sized producers is very real and needs to be taken into consideration when determining whether or not to compel producers to participate in this system.

Additionally, I understand the privacy concerns that have been expressed to me, especially from some of our friends in the cattlemen's associations. Shielding proprietary business information and protecting farmers from unwarranted protests and business interruptions is crucial. However, I strongly believe that the benefits of a National Animal ID System in terms of animal health, public safety, and in maintaining the economic viability of our agriculture sector, domestically and through exports, far outweigh the potential costs.

In order to make this program worthwhile and effective, we need at least 97 percent participation; and it seems very unlikely that we will ever get there at that level under a voluntary system. We will hear on our third panel how successful a mandatory system is. But if any one of our panelists today has advice on how to convince producers to participate, short of compulsion, please feel free to share it with this group. Because we are far past time for this system to be fully up and running. The security of our food needs to be protected now, not somewhere down the road in the future.

I thank everyone for coming today and look forward to this discussion.

The CHAIRMAN. With that, I will turn to our Ranking Member, Mr. Neugebauer, for any comments he might wish to make.

[The prepared statement of Mr. Scott follows:]

SUBMITTED STATEMENT OF HON. DAVID SCOTT, A REPRESENTATIVE IN CONGRESS FROM GEORGIA

I would like to begin by welcoming everyone to the first hearing of the Livestock, Dairy and Poultry Subcommittee in the 111th Congress. It is indeed a distinct honor and a privilege to have been selected to chair this Subcommittee. I look forward to working with such an illustrious and knowledgeable group of Members, as we have on this Subcommittee, as we move to complete our long and perhaps difficult agenda. I would also like to welcome our distinguished witnesses. I greatly look forward to hearing your testimony and tapping into your expertise as we explore the topic of today's hearing, the National Animal Identification System.

The subject on the Subcommittee's agenda today is a complex one, and at times will be difficult to navigate through. No issue is more emblematic of the difficulties we face moving forward as is animal ID. It is my hope however, on this and future issues, that we will be able to work together in a positive fashion to find common ground and address the issues we face with decorum and mutual respect. The constituents we all serve deserve no less from us.

Regarding the subject of today's hearing, I believe NAIS has myriad benefits. A mandatory system would let us know where infected animals are, so that we could re-route transportation to prevent disease from spreading. It would help protect producers against the spread of minor animal diseases, as well as from the devastating economic effects of BSE, FMD and TB. Finally, it would save the government money and provide a vital tool in maintaining the safety and integrity of the food supply – which is one of my greatest concerns as a Member of Congress, as the Chairman of this Subcommittee, and as a consumer. In fact, we are currently planning a joint hearing with the Committee on Homeland Security to discuss our preparedness for an initial or catastrophic outbreak and the ways in which that would jeopardize our food security in the United States do to a lack of a mandatory animal ID system.

One of the chief problems during any outbreak of food-borne illness is to trace the source of that illness, whether it is confined to animals or has the potential to spread to humans, back to its source. With respect to animal diseases, a robust NAIS with large scale participation has the potential to expedite this trackback, and not only prevent further corruption of the food chain but also limit the potential for human illness and ultimately lessen the economic impact of any such outbreak.

But, there are of course considerable questions that need to be addressed before NAIS can achieve its maximum value. The economic impact on small and midsized producers is very real, and needs to be taken into consideration when determining whether or not to compel producers to participate in this system. Additionally, I understand the privacy concerns that have been expressed to me. Shielding proprietary business information and protecting farmers from unwarranted protests and business interruptions is crucial. However I strongly believe that the benefits of NAIS in terms of animal heath, public safety, and in maintaining the economic viability of our agricultural sector, domestically and through exports, far outweigh the potential costs.

In order to make this program worthwhile and effective, we need at least 97% participation, and it seems unlikely that we will ever get there under a voluntary system. We will hear on our third panel how successful a mandatory system is. But if any one of our panelists today has advice on how to convince producers to participate short of compulsion, please feel free to share it with the group, because we are far past time for this system to be fully up and running.

I thank everyone for coming today, and look forward to the discussion. With that I will turn to the Ranking Member, Mr. Neugebauer, for any comments he may wish to make.

OPENING STATEMENT OF THE HON. RANDY NEUGEBAUER, A REPRESENTATIVE IN CONGRESS FROM TEXAS

Mr. NEUGEBAUER. Thank you, Chairman Scott, for calling this Subcommittee hearing in the 111th Congress, our first together as Chairman and Ranking Member, on the topic of animal identification.

I expect we will hear from a lot of witnesses today that say that animal identification is a good thing. I expect we will hear about the benefits of improved disease monitoring, rapid traceback investigations in cases of animal disease outbreaks. Some will discuss the economic benefits of improved herd management and premiums

that some sellers enjoy as a result of having source-verified cattle to provide to a market that currently rewards such information.

This is all fine, and I am interested in learning more about it. However, I would also invite my colleagues to pay particular attention to the testimony of our witnesses who are concerned about the potential pitfalls of a mandatory animal identification system and the many unanswered questions there remain about just exactly what this system would entail.

For instance, what are the costs of a mandatory system? In the past, I have heard from the cattle sector alone that ongoing costs could be as much as $200 million a year. Will the benefits of a mandatory system outweigh the costs, or will it simply be a tax on the livestock sector?

A mandatory identification program will create tremendous amounts of data. Many of our constituents consider that to be proprietary. We have all heard stories about unintentional and intentional violations of private information. How will the data be protected? After many years of discussion, I have yet to hear a convincing explanation of how our constituents' information will be protected.

I have several questions about how the system will work: How often producers will need to report the movement of animals; what type of penalties would be associated with mandatory systems for producers found to be out of compliance. Taxpayers have spent almost $130 million on the National Animal Identification System. What has this money brought us, and what will be the final cost of the system?

We should also take time to learn from the experiences of livestock producers in Australia and Canada, who have both had mandatory ID systems. Have the systems improved market returns for their producers, and have they experienced improved herd health?

Thank you again, Mr. Chairman, for calling this hearing. I am certain my colleagues will have many more questions, and I look forward to today's give-and-take session.

The CHAIRMAN. Now I recognize the Chairman of the full Committee, Mr. Peterson.

OPENING STATEMENT OF HON. COLLIN C. PETERSON, A REPRESENTATIVE IN CONGRESS FROM MINNESOTA

Mr. PETERSON. Thank you, Mr. Chairman.

I want to congratulate you and Mr. Neugebauer on moving up to the leadership of this Subcommittee. We expect great things out of you; and we know you will do a great job leading this Subcommittee, as Mr. Boswell did so ably during his tenure before he moved on to another Subcommittee. So we appreciate your leadership, and I think you recognize there are lots of issues that have to be dealt with in this Subcommittee. So you guys are going to be busy.

So I thank you for calling this hearing today, and I want to acknowledge, as I said, your first hearing. I know that you guys will be a strong voice for animal agriculture in the 111th Congress.

Today's hearing is the first of multiple hearings our Committee will call to handle animal identification systems. This topic has been covered by this Committee several times since USDA estab-

lished the national identification system in 2004 as a way to enhance its animal health protection efforts. But here we are after 5 years, and it is sad to say that we really haven't made much forward progress.

NAIS has received $128 million from appropriated or loaned funds and has spent over $107 million to provide a traceback system in the event of an outbreak of a major animal disease. Yet many crucial aspects of the program show little promise of being substantially implemented.

Just 35 percent of the animal premises are presently registered. Only 5 percent of the cattle have NAIS-approved AIN tags; and almost none of the intermediate markets and slaughterhouses are enrolled in the program, which has hindered the bookend approach to traceability that the animal ID system was conceived.

Agency staff have told us that, without a change to a mandatory system or economic incentives to producers in the industry, the program probably would never be effective in providing the country with a reliable traceback system.

I can't believe that after 5 years we are still pretty much in the same place, despite the millions of dollars that have been thrown at this system. This Committee has lots of questions about how the money was spent by NAIS, by the states, by the industry partners, given the below-average results that we have seen to this point.

I still believe we need a mandatory animal ID system, and I have introduced bills in the past that would implement one, and I understand that some groups out there are still vigorously opposed to this idea. I would, however, caution those groups that when—and I think this is an issue of when, not if—a severe disease outbreak happens, don't come into my office and expect a government bailout because you were unwilling to move forward with this. You will not get a sympathetic ear from this Member if and when that happens.

I just think we have our head in the sand if we think that we are going to be able to avoid this completely. And I don't think the government should be in a position of having to bail people out if people don't want to take up this matter. We are not very good at that, given what we are doing with the banks and so forth. We probably will bail people out, but I am not going to be one of those that is going to be involved in that.

I think the stakeholders out there need to get together and resolve their differences and try to help us move this issue forward. I have said over the years that I would be willing to have the government pick up the costs of this system at the beginning to get it going. If we would have done this in the first place, the money that we would have spent would have gone a long ways to getting all of the tags and readers and databases in place. So we would like to figure out how this money was spent, and why we are in this position.

We have been asked by our leadership to look into ways to reduce spending and waste that's happened here. I think this is a case of one of those instances, and I hope that we don't allow that to go forward in the future.

I hope that we can examine why the current system hasn't worked, and why in my opinion why it won't work. Moreover, we

need to examine what can be done in the future to improve our animal health system in the event of a disease outbreak.

Once again, I appreciate today's witnesses being with us, I appreciate the leadership of the Chairman and Ranking Member, and I look forward to the testimony of our witnesses.

The CHAIRMAN. Thank you very much, Mr. Peterson.

[The prepared statement of Mr. Peterson follows:]

SUBMITTED STATEMENT OF HON. COLLIN C. PETERSON, A REPRESENTATIVE IN CONGRESS FROM MINNESOTA

Thank you, Chairman Scott, for calling this hearing today. I want to acknowledge your first hearing of the Livestock, Dairy, and Poultry Subcommittee. I know you will be a strong voice for animal agriculture in the 111th Congress.

Today's hearing is the first of multiple hearings this year our Committee will call to examine animal identification systems. This topic has been covered by this Committee several times since the USDA established the National Animal Identification System in 2004 as a way to enhance its animal health protection efforts.

Here we are after five years and it is sad to say that we really haven't made much forward progress.

NAIS has received $128 million from appropriated or loaned funds and has spent over $107 million to provide a trace-back system in the event of the outbreak of a major animal disease. Yet many of the crucial aspects of the program show little promise of being substantially implemented. Just thirty-five percent of animal premises are presently registered; only five percent of cattle have the NAIS-approved AIN tags; and almost none of the intermediate markets and slaughterhouses are enrolled in the program, which has hindered the bookend approach to traceability NAIS has conceived.

Agency staff have told us that without a change to a mandatory system, or economic incentives to producers and the industry, the program would never be effective in providing the country with a reliable trace-back system.

I can't believe after five years we are still in pretty much the same place despite the millions that have been spent on this system. This Committee has lots of questions about how the money was spent by NAIS, the states, and industry partners, given the below average results we have seen to this point.

I still believe we need a mandatory animal ID system, and I introduced bills in the past that would implement one. I also understand that some groups are still vigorously opposed to this idea.

I would, however, caution those groups that in the case of a severe disease outbreak, do not expect me to have a sympathetic ear when it comes to mitigating the economic costs of a market disruption. I think the stakeholders out there need to get together and resolve their differences, because I believe some people out there have their head in the sand if they don't understand the economic consequences of continuing to do what we have been doing.

I hope that through this series of hearings we can examine why the current system hasn't worked and won't work, and what can be done in the future to improve our animal health system in the event of a disease outbreak.

Once again, I appreciate today's witnesses for being here and I look forward to their testimony. Thank you, Chairman Scott, and I yield back.

The CHAIRMAN. Members, in light of the fact that we have three panels before us, the Chair would request that other Members submit their opening statements for the record so the witnesses may begin their testimony, and this will ensure that we have ample time for the witnesses to be heard and ample time for all of our questions.

The CHAIRMAN. With that, we certainly would like to welcome our first panel. The witness consists of Dr. John R. Clifford. Dr. Clifford is the Deputy Administrator to Veterinary Services, Animal and Plant Health Inspection Service, at the U.S. Department of Agriculture here in Washington.

Dr. Clifford, welcome; and you may begin your testimony.

STATEMENT OF DR. JOHN R. CLIFFORD, D.V.M., DEPUTY ADMINISTRATOR, VETERINARY SERVICES, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, U.S. Department OF AGRICULTURE, WASHINGTON, D.C.

Dr. CLIFFORD. Chairman Peterson, Subcommittee Chairman Scott, Ranking Member Neugebauer, thank you for the opportunity to testify before the Committee this morning.

As the chief veterinary officer of the United States and the representative to the World Organization for Animal Health, I have witnessed the growing importance of animal identification to individual countries and on the world stage. More and more countries are requiring identification systems as a prerequisite to trade. Identification systems also ensure countries can manage their own exotic diseases that do not recognize international borders and consequently pose risk to life of livestock and public health.

Traceability is a critical component the OIE reviews in determining the animal disease risk levels of member countries. Many wonder why the United States has not requested a negligible risk classification from the OIE. Frankly, unless we can demonstrate an effective animal ID system, it is highly unlikely that we will receive that classification.

I believe that it is the U.S.'s responsibility to play a leadership role in animal health matters. While we have done a good job on numerous fronts, I do not believe we have done our best when it comes to national animal ID. Frankly, I am disappointed by the 35 percent participation rate by producers.

My statement for the record explains several of the major challenges we face in building the system and the policy and operational changes made to address them. The result is that it can still take months for animal health officials to complete an animal disease investigation because records are often, at best, kept on paper. The lack of any official identification means that many more farms and ranches become part of a traceback, and without movement data we cannot identify potentially exposed animals.

A recent example, of 199 positive cases of bovine TB identified in the U.S. Between late 2003 and early 2008, over 84 percent of those animals did not have official USDA ID. That alone increased the amount of time and money AHPHIS and states spent in conducting tracebacks in 27 percent of the bovine TB investigations. The average time spent conducting a traceback was 199 days, an unacceptable level in today's world.

To date, we have obligated $118.9 million to implement NAIS based on the policy direction set forth in the program. Initially, we planned a voluntary program that would eventually become mandatory. However, in August of 2006, in response to various concerns, then-Secretary Johanns decided that NAIS would be entirely voluntary at the Federal level and would be technology neutral. As a result, USDA was required to identify and test new technologies and expend significant efforts in convincing producers to participate.

On the positive side, the efforts of the last 5 years have enabled us to build and link all the IT components of the system, standardize numbering systems so that we and our state partners have common frames of reference and test and deploy strategies for in-

creasing traceability in key sectors of the livestock industries. While we have much work to do in terms of traceability for cattle, today we have very high levels of traceability in swine, poultry and the sheep sectors.

Maintaining a functional system is not cheap. It is a bargain when you put it in perspective. Initial figures show that annual government and industry costs will exceed $200 million. This roughly translates into a half a cent increase for a pound of red meat. We know an FMD outbreak would cost billions of dollars in terms of industry losses and APHIS and state response efforts. The question we need to ask then is if the cost of NAIS is worth the investment in costs to industry and consumers when compared to the results we will achieve. I absolutely believe that it is.

In addition to dramatically improving our ability to effectively respond to animal health emergencies, NAIS will support the competitiveness of our livestock sector in international markets and consumer confidence in its food supply and its safety. APHIS has continued to move forward in building the system and implementing strategies laid out in the NAIS business plan. In doing so, we remain focused on program transparency and accountability.

Secretary Vilsack and his team are conducting a full review of past spending within the program, and we continue to look for ways to improve program oversight. I know that some of the Secretary's other priorities, include implementing NAIS in a way that is sensitive to the unique qualities of different species' groups, protecting producers' private information, and providing producers with clear information about the program. The Secretary is carefully weighing the range of policy options available to him, and APHIS is ready to act on his priorities.

We understand that the success of NAIS depends on strong collaborations with this Committee, producers, industry, and USDA; and we are committed to working with all of these key players in a transparent way that is responsive to the concerns of all stakeholders.

Thank you. I would be happy to answer any questions.

The CHAIRMAN. Thank you very much, Dr. Clifford. We appreciate your testimony.

[The prepared statement of Dr. Clifford follows:]

PREPARED STATEMENT OF JOHN R. CLIFFORD, D.V.M., DEPUTY ADMINISTRATOR, VETERINARY SERVICES, ANIMAL AND PLANT HEALTH INSPECTION SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

Chairman Scott, Ranking Member Neugebauer, and Members of the Subcommittee, thank you for the opportunity to testify before the Committee this morning. My name is Dr. John Clifford and I am the Deputy Administrator for Veterinary Services with the Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS). In this position, I also serve as USDA's Chief Veterinary Officer.

I appreciate the Committee's interest in our progress in implementing the National Animal Identification System (NAIS). We have expended significant resources, both financial and in staff time. While we have made progress, much remains to be done and we look forward to working with the Committee to reaching our goal of a modern, streamlined information system that helps producers and animal health officials respond quickly and effectively to animal disease events in the United states. NAIS is a long-term investment in emergency preparedness and response, competitiveness of our livestock sector in international markets, and consumer confidence in our food supply.

I would like to begin by giving you a brief overview of NAIS, including what we have been doing, the challenges we have faced, where we are now, and our plans to continue enhancing the program. Finally, I will conclude by reporting on how we have spent the dollars provided to us.

Before I start, I would like to mention that the Secretary is carefully weighing all of the options to determine how USDA and its partners can make NAIS more effective and successful. We understand that the success of NAIS depends on strong collaborations between this Committee, producers, industry and USDA. We are committed to redoubling our efforts in working with all of these key players in a transparent way and that is responsive to the concerns of all stakeholders.

NAIS History

The Animal Health Protection Act (AHPA) of 2002 authorizes USDA to take measures to detect, control, or eradicate livestock pests or diseases in the United States. When we do detect an outbreak, we must quickly determine its source so we can stop disease spread. We must identify all infected animals and all animals exposed to them. By tracing back from the infected animal detected, we can find any other infected or exposed animals and establish quarantines to ensure that they do not move. Once we set quarantine boundaries to arrest disease spread, we concentrate on treating or removing infected or exposed animals to eliminate the disease. The faster we can trace the path of the initially detected diseased animal, the faster we can establish the quarantine-and with more precision so that we do not needlessly prevent healthy, unexposed animals from moving in commerce--and commence treatment or removal.

Somewhat like the "Golden Hour" concept of emergency medicine for humans, for animal health we have found that being able to trace back from infected animals within 48 hours is vital in quickly containing and eliminating an incipient disease outbreak. To achieve such an ambitious goal, we must have a standardized animal identification system. For much of the second half of the 20th century, USDA conducted long term eradication programs for diseases like brucellosis and tuberculosis. We used animal identification systems for those programs. While certainly not the modern, standardized system we envision with NAIS, those systems did provide us with a solid base for trace back. The success of those programs led to a dramatic decline in the number of premises and animals registered in any identification program.

Recognizing the lack of standardization and the increasing void in animal identification that would hamper our response capabilities to a disease outbreak, USDA, states, and industry have been working cooperatively to develop a unified NAIS for several years. This work assumed greater urgency when we witnessed the heavy losses associated with the foot and mouth disease (FMD) outbreak in the United Kingdom in 2001. In 2003, a group of approximately 100 industry and government representatives--the National Identification Development Team--drafted the U.S. Animal Identification Plan. While the Team was still seeking support for the plan, the detection of a case of bovine spongiform encephalopathy (BSE) in the United States on December 23, 2003, brought even greater urgency. Within days, then-Secretary Veneman used her emergency authority to transfer $18.8 million to APHIS to accelerate NAIS implementation.

I should note that while we started NAIS with a focus on animal health, we also know that 75 percent of emerging animal diseases are zoonotic; that is, they can affect humans as well. Accordingly, a fully functional NAIS may also have tangential, but substantial, human health and food safety benefits.

Initially we envisioned a voluntary program that would eventually become mandatory. Also, we envisioned a system using standard technology. However in response to various concerns raised by some producers, small farmers, and some religious groups, then Secretary Johanns decided in August 2006 that NAIS would be entirely voluntary at the federal level. (States retained the option to make their participation mandatory, and several have done so.) Accordingly, we invested a great deal of effort-and money-in encouraging producers to voluntarily participate. I will provide more detail about those efforts later in my statement. Also, rather than establish a mandatory technology, we sought to make NAIS technology neutral, in hopes of stimulating competition that might lead to better pricing and more flexibility for voluntary participants.

NAIS Overview

I would like to give you a brief explanation of the three components that make up NAIS-premises registration, animal identification, and animal tracing. The first phase of NAIS involves producers registering their premises containing livestock and poultry with their local state or tribal authorities. Premises information is crit-

ical to protecting U.S. agriculture because it gives us the ability to plot locations within a radius of an infected premise and determine the potential magnitude of a contagious disease as well as the resources needed to contain it. Additionally, it provides the foundation to achieve both animal identification and tracing.

Just having a contact list of producers in a given area will help us respond quickly when an animal health emergency or significant disease event arises. These lists proved beneficial when a blizzard hit Colorado in January 2007. The State Department of Agriculture used the NAIS contact list to call ranchers, evaluate the well being of their livestock, and airdrop hay if needed.

Animal identification, the second component of NAIS, provides participating producers and owners with a uniform numbering system for their animals; both as individuals or as a group or lot of animals. The actual identification protocol is sensitive to the unique qualities of different species groups, and the way they are raised and processed. For example, while individual animal identification is important for cattle, lot identification is more practical for poultry. The uniform numbering system links producers' livestock or poultry to the animals' birthplace or premises of origin. This is a valuable tool for producers and owners whose animals go into commercial production or are moved frequently. Each identification number provides a unique number for animals and the location or premises.

The final NAIS component, animal tracing, is available through several Animal Tracking Databases (ATDs) maintained by states and private industry. Having states and industry maintain these ATDs is part of our plan to assure confidentiality for participants. The Federal government does not maintain this data; states and private entities do.

Key animal tracing information includes the animal identification number, the premises identification number, and the date the animal was moved in or out of a premises. We use a "bookends" analogy for individual-animal traceability. There is a "left bookend"—the birth record; "books on the shelf"—animal movement records; and a "right bookend"—the animal termination record. I want to emphasize that animal health officials will use the data only when an animal disease event warrants such use. This is another part of our commitment to protecting confidentiality.

Benefits of NAIS

Animal health officials in the United States and around the world have long recognized that an efficient and effective system for the identification of premises affected or potentially affected by livestock diseases is an essential component of any animal health program. While an animal identification system will not prevent the onset of a foreign animal disease such as FMD, a fully implemented NAIS will provide for rapid animal tracking and disease containment. These are critical in mitigating the risks posed by potential disease outbreaks.

Currently, it can take months for animal health officials to complete an investigation of an animal disease event because records are often, at best, kept on paper. Too often the lack of any official identification results in many more farms and ranches being part of a traceback as we are unable to determine the specific origin of the subject animal. Additionally, without movement data, we cannot determine potentially exposed animals. This exacerbates the traceback challenge.

For example, of the 199 positive cases of bovine tuberculosis identified in the United States between late 2003 and early 2008, over 84 percent of the animals did not have official USDA individual identification. As a result, USDA and state investigative teams spent substantially more time and money in conducting tracebacks, including an expanded scope of an investigation to identify suspect and exposed animals. The average time spent conducting a traceback involving 27 recent bovine tuberculosis investigations was 199 days. This is simply not acceptable.

With the rapid disease response capability that a successful NAIS will provide, we can limit the number of animal owners impacted by an outbreak and reduce the economic strain on owners and affected communities. In the case of an animal disease outbreak, NAIS would enable the United States to demonstrate that certain areas are free of disease, potentially limiting market closures. NAIS also helps to preserve the marketability of animals for domestic markets. Also, NAIS opens communication channels between animal health officials and animal owners, allowing the rapid sharing of information in the event of animal health concerns.

Cost is another issue we must carefully consider. We understand that NAIS implementation is not cheap; initial data from a cost-benefit analysis Kansas State University is conducting for USDA show that annual government and industry costs associated with achieving full preharvest traceability for cattle, swine, sheep, and poultry exceed $200 million annually. But we must compare this with the estimated billions of dollars in losses we would suffer from an FMD outbreak. The 2001 United Kingdom FMD outbreak cost $7.9 billion in losses and eradication costs. A 1997

FMD outbreak in swine in Taiwan cost $6.9 billion and wiped out its previously strong export market. To more definitively demonstrate the benefits of 48-hour traceability, we entered into a cooperative agreement with Kansas State University, to conduct a cost-benefit analysis of the NAIS program. The analysis is studying the benefits and costs of all components of NAIS across all industry/species sectors. The analysis is also seeking to determine the overall distribution of the system's benefits and costs among producers of various-sized herds, marketing firms, processors, consumers, and state and federal government agencies. The report is currently being finalized and we hope to be able to share it with the Committee soon.

In the global marketplace USDA recognizes that traceability-whether it be "farm to fork" traceability for food safety purposes, or traceability for animal disease purposes alone-is important to all producers and segments of the preharvest production chain for marketing purposes. Many of our international trading partners and competitors such as Brazil, the European Union, Australia, and Japan have adopted national identification systems. Establishing an internationally recognized system of traceability will enhance the competitiveness of U.S. exports of animals and animal products. In fact, our lack of a standardized, national animal identification system was one factor that prevented the United states from receiving "negligible risk" status (the best status possible under the rating system) for BSE from the World Organization for Animal Health (OIE). Receiving negligible risk status would not only enhance our ability to compete internationally, it would greatly support U.S. domestic price structures so that all producers-regardless of their interest in international marketing -would benefit when the United states expands its export markets.

Challenges

We have faced many challenges as we have worked to develop a robust NAIS. Most producers, industry groups, and state officials tend to see NAIS' value, but the debate continues over how to implement it. This has led to a disappointing participation rate of about 35 percent. Some state legislators have sought to restrict participation in the program. Further, we at USDA have made adjustments in the direction of NAIS, resulting in some confusion regarding producer participation.

Perhaps the producers' biggest concern has been protection of their information. I assure you that USDA takes NAIS privacy issues very seriously. We intentionally limited the type and quantity of information collected and maintained by the Federal government. USDA maintains only the premises registration information needed to enable effective trace back or notification in animal disease situations, as well as distribution/termination records of official identification devices, and will not have direct access to the animal tracking databases which contain animal movement records. Existing Federal law protects individuals' private information and confidential business information from disclosure-a fact that USDA has continually emphasized. We will use all of our existing authorities to protect private personal information or confidential business information provided by NAIS participants. We look forward to working with the Committee should you believe that we need additional statutory assurances of confidentiality.

To address all of these challenges, USDA is working to reach a better understanding with producers about NAIS. We have put tremendous emphasis on outreach, communication, and promotional efforts to encourage participation. We want to make sure that producers recognize and embrace the importance of participation and understand the myriad benefits that NAIS brings to the entire U.S. livestock sector.

NAIS Today

Infrastructure

The premises registration and animal identification infrastructures are fully operational. The animal tracing component, while operational, is in its final stage of development. We are building these systems using standardized data elements established through NAIS. The standards now in place will ensure long-term compatibility of systems, an invaluable, long-term benefit that has resulted from NAIS.

To date, we have registered over 500,000 premises, or approximately 35 percent of the estimated number of our Nation's livestock and poultry premises. Thirteen states have registration rates greater than 50 percent; however, seven of those states have some form of a mandatory program or a process for issuing the standardized premises identifier to the locations on record in their state.

The animal identification component, with nearly 30 identification devices available that incorporate the official Animal Identification Number, commonly referred to as the 840 AIN, is well established. We can use it to meet multiple needs for animal ID. Both visual-only and radio frequency tags are available. Over 5 million

AIN devices have been manufactured of which 2.6 million have reached farms and ranches throughout the United States.

Producers have access to several Animal Tracking Databases (ATDs) for reporting the movement of animals that they ship to or from their premises. About 20 organizations are working with USDA to provide ATDs; these systems vary in their level of operation and integration with USDA systems. The ATDs link to the Animal Trace Processing System (ATPS), which is in its final stage of development. The ATPS provides the conduit for communicating and receiving information from the ATDs when animal health officials conduct disease tracebacks. These information systems are vital to making it easier for producers, states, industry, and USDA to determine the scope of a disease situation, locate infected animals, and curtail any further spread of disease.

NAIS Business Plan

In August 2008, USDA published A Business Plan to Advance Animal Disease Traceability. We are using that plan to guide our efforts to increase NAIS' functionality. The plan articulates these key priorities for USDA in fulfilling the long term vision for NAIS and demonstrating greater accountability for the program:

- Prioritize implementation by species/sectors, taking into account where the greatest disease concerns and traceability opportunities exist
- Harmonize animal ID programs
- Standardize data elements of disease programs to ensure compatibility
- Integrate automated data capture technology with disease programs
- Partner with states, tribes, and territories
- Collaborate with industry
- Advance ID technologies

Secretary Vilsack has made it clear that NAIS should be implemented in a way that is sensitive to the unique qualities of different species and the way they are raised and processed. We have prioritized each species based on the need for improved traceability and developed supporting strategies that will work effectively for each species.

The Business Plan specifically provides benchmarks to guide the NAIS' progress towards the long-term goal of 48-hour traceback of affected or exposed animals in the event of an animal disease outbreak. Our immediate goal is to ensure that a minimum critical mass of producers is on board, which we estimate would be 70 percent of the animals in a specific species/sector that could be identified and traceable to their premises of origin. I must emphasize that while 70 percent would provide some measure of traceability, we really need to achieve higher participation rates, perhaps as high as 90 percent, to ensure the benefits of the system.

We must have data element standards to have compatible systems to communicate effectively among industry, state, and federal systems. For this reason, one of our key strategies is use of a standardized location identifier-the premises identification number-when recording locations that participate in activities related to a disease program and when responding to an animal disease event or outbreak. In an effort to proceed with establishing the standardized PIN, our Agency published a proposed rule on January 13, 2009, "Official Animal Identification Numbering Systems," (Docket No. APHIS-2007-0096) in the Federal Register and is inviting comments on the proposal through March 16, 2009. The proposed rule would establish the 7-character PIN as the standard location identifier.

USDA has also moved forward on another key strategy: integrating electronic data capture and reporting technologies into existing disease programs. By using NAIS-compliant identification devices that support automated data capture technology and by integrating handheld computers/readers to replace paper-based forms, animal health officials can electronically record and submit essential data to USDA's Animal Health and Surveillance Monitoring database and other animal health databases. The electronic collection of data increases the volume and quality of information and speeds data entry into searchable databases.

While NAIS' purpose is to provide critical animal health data, it can support industry-based marketing efforts. USDA's Agricultural Marketing Service (AMS) has capitalized on the NAIS 840 animal identification eartag as a producer-friendly, practical solution to meet the requirements of country-of-origin labeling. AMS is strongly encouraging the use of NAIS participation to identify animals involved in USDA Process Verified Programs and Quality Systems Assessment Programs. This will allow producers to use one animal numbering system and ID method for multiple uses, simplifying their recordkeeping and reducing the costs associated with

multiple ID tags. Producers who obtain a premises identification number for their operation and identify their animals using NAIS-compliant methods will be able to provide adequate information on the origin of their livestock to packers. Packers can rely upon this information for their origin claims on products.

Levels of Participation

The poultry industry, through the support of the National Poultry Improvement Plan (NPIP), continues to have a high level of traceability-estimated at more than 95 percent today. Premises are already well defined and industry organizations and leaders from the National Turkey Federation, National Chicken Council, United Egg Producers, and APHIS are merging existing records with NAIS.

The level of traceability in the pork industry has progressed well. Collaborative effort of the National Pork Board (NPB) and state and Federal animal health officials has led to an 80 percent increase in premise registration. The commercial swine industry utilizes group/lot identification extensively, thus premises information alone provides a high level of traceability.

We can trace most sheep back to the flock of origin due in large part to industry participation in the National Scrapie Eradication Program. An estimated 95 percent of sheep flocks are listed in the scrapie database.

The cattle industry remains our highest priority due to the lack of official identification. While interest and participation in NAIS have increased as a result of 840 AIN tags being readily available, the rate at which official identification is increasing in the cattle industry continues to concern us. The Business Plan includes goals to have 50 percent of the calves born after January 1, 2008, officially identified to their birth premises by October 2009 and 60 percent by October 2010. We initially anticipated that Country of Origin Labeling (COOL) would significantly increase the use of 840 AIN tags. However, a significant part of the industry appears to support using the paper affidavits to meet its compliance requirement. Therefore, we may have over-estimated the anticipated increase in use of 840 AIN tags resulting from COOL. Given our current strategies, it appears that achieving the traceability business plan goal for the cattle industry will be difficult.

Funding

As NAIS continues to progress, Secretary Vilsack and his team will be overseeing its continued development. The Secretary is starting with a full review of past spending within the NAIS program. We know accountability is essential to assure the American public that the Federal government is making the best and most efficient choices when it comes to their tax dollars. Accordingly, I would like to give you a brief overview of past funding activities.

We have obligated $118.9 million since 2004 to develop and implement NAIS. We invested nearly $18 million, or about 15 percent of total obligations, on development of high caliber information technology (IT) systems, which are critical in making NAIS a success. We used eighty percent of those IT funds to support premises registration; 14 percent for animal identification; and 6 percent for the tracing component, including building capability to ensure USDA can interact with state and private Animal Tracking Databases.

We worked closely with states, Tribes, and Territories and provided them with $55.5 million, or 47 percent of total obligations, to administer and deliver the program through cooperative agreements. These funds provided on-the-ground resources to conduct education and outreach efforts, administer premises registration activities, and support selected pilot projects/field trials to explore innovative methods of advancing NAIS. We worked through the states and others to allay the concerns expressed by producers and others about what they deemed too much intervention by the Federal government. Also, working through states we reduced the amount of information collected and maintained by USDA, thus advancing the goal of confidentiality.

USDA also entered into several cooperative agreements with non-profit industry organizations. These agreements support efforts to promote NAIS and increase participation in premises registration, and these efforts cost approximately $3.5 million.

The education and outreach efforts, through cooperative agreements with states, Tribes, Territories, and industry organizations, were part of the policy of persuading producers to participate in a voluntary system. We also used approximately $10.4 million, or about 9 percent, of the total obligations for national-level communications aimed at increasing producer awareness and understanding of, and participation in, NAIS.

The balance of the funding over the past 5 years supported the USDA staff leading the NAIS effort. This includes the many veterinarians, information specialists, statisticians and others involved in designing the program. It also includes the

APHIS veterinarians and other animal health professionals located throughout the United States. They worked closely with their state and industry counterparts to promote an understanding of and participation in NAIS.

We understand the importance of accountability in the NAIS program, and assure you that we continue to look for ways to improve program oversight. We have allocated funding in accordance with the strategic direction of the program. As we look to the future and take a hard look at program strategy, we will adjust the funding allocations as appropriate.

Conclusion

Thank you for the opportunity to testify before you today on this important issue. USDA recognizes that we must be able to quickly and effectively trace animals linked to a disease event in order to enable a quick response to eradicate or control the disease. Enhancing these capabilities through the NAIS strengthens our ability to protect the health of U.S. livestock and poultry, as well as the economic well-being of those industries.

Implementation of the NAIS has been one of my highest priorities as Chief Veterinary Officer. It is time to reassess our strategy to ensure that we achieve significant increases in participation rates to reach the critical mass we need for an effective program. As I stated in my introduction, the Secretary is carefully weighing all of the options to determine how USDA and its partners can make NAIS more effective and successful. We look forward to continued collaboration with the states, industry, producers, and the Committee to develop NAIS policy in a manner that invites and is responsive to the input of all stakeholders.

I'd be happy to answer any questions.

The CHAIRMAN. The Chair would like to remind Members that they will be recognized for questioning in the order of seniority for Members who were here at the start of the hearing. After that, Members will be recognized in the order of arrival. I certainly appreciate the Members' understanding of this.

Let me just start with a question or two right quick.

Dr. Clifford, if we had a disease outbreak today that was airborne, are we prepared to trace, track, and quarantine animals in 48 hours?

Dr. CLIFFORD. Let me give just a little bit of clarification on that because if a disease were airborne or easily passed through air, I think the critical component here is whether that disease has the ability to spread very rapidly and has a very short incubation period versus a long incubation period. When you talk about tuberculosis, that's a very long incubation period. With diseases like avian influenza, foot–and–mouth disease have very short incubation periods.

So, based upon today's standards, if we had a foot and mouth disease outbreak, we would not be able to get in front of that disease based upon its ability to spread and the speed of commerce. With avian influenza, though, with regards to the ability that we have and traceability within the commercial poultry sector, we would be able to get our hands around that very quickly and control that.

The CHAIRMAN. All right. But foot–and–mouth disease is one that we could not be able to track, correct?

Dr. CLIFFORD. It would obviously depend on how it entered and where it went and how quickly we were able to discover it. The fact is, with the ability of this disease to spread very rapidly, and if you take the example of TB, during the time it would take us to trace these, that disease can spread to many, states very rapidly.

The CHAIRMAN. Thank you very much.

Now, my other question is—I realize your testimony says that the Secretary is weighing all of the options to push animal ID forward. However, does the USDA support a mandatory system?

Dr. CLIFFORD. Sir, that decision would be left to the Secretary. As I indicated in my testimony, the Secretary is weighing those options.

I think, though, to say from APHIS's perspective, it is not an issue to me whether or not the system is voluntary or mandatory. It is an issue of having an effective system. This system currently as it is, with 35 percent producer participation, is not effective.

The CHAIRMAN. All right. Thank you very much.

Mr. Neugebauer.

Mr. NEUGEBAUER. Dr. Clifford, in your testimony you state that 35 percent of the premises have been registered. Do you have an idea of what percentage of the production that is?

Dr. CLIFFORD. No, sir; but I will see if I can determine that; and if I can, I will provide that for the record. USDA does not collect this information.

Mr. NEUGEBAUER. I think that will be helpful. Because you could have—35 percent of the premises may be a substantial part of the production, and so I think that would be helpful if you could furnish us that information.

Mr. NEUGEBAUER. One of the things that you stated in your testimony is that in case of an animal disease outbreak NAIS would enable the United States to demonstrate that certain areas are free of disease, potentially limiting market closures. In the post-BSE environment, we have been able to reopen some of the Asian markets, but our friends to the north, Canada, have not been able to open those. Those markets have not always opened up to them on the same basis that the U.S. is able to open up, and yet they have an animal ID, mandatory animal ID program. How has animal ID benefited Canada when you talk about market access?

Dr. CLIFFORD. Well, I think it has assisted Canada to help them with regards to market access traceability. And if you look at their recent findings with TB, for example—this is away from BSE—but with regards to TB, where we took months, weeks to find TB, they were able to do with their system in 19 days. And that is a significant event when you are talking about animal health; and that is really what we are talking about with this system with regards to animal traceability.

Mr. NEUGEBAUER. I get the traceback, but what I am saying is it didn't open up—it has not opened up markets for me, and that is part of your testimony. As we are going through this process, this is part of the debate; and I think this is an issue that we need to look at very carefully.

Dr. CLIFFORD. I think it does open up markets, and I think that it is important to open up markets. While BSE, frankly, has become more of an—oftentimes considered more of a political issue than a disease issue; because while it is a food safety concern—and we take that very seriously—we know how to control that disease. And a number of countries are still very concerned about that disease, and so BSE is one where there are difficulties even with the U.S. with regards to opening up those markets.

Mr. NEUGEBAUER. But, in this case, it did not necessarily help Canada?

Dr. CLIFFORD. I think that would be best for Canada to be able to respond to that.

Mr. NEUGEBAUER. A lot of people are conflicted in they think currently that the Secretary of Agriculture may have the statutory authority to implement a mandatory ID program. What is your opinion on that?

Dr. CLIFFORD. Yes; the Secretary has the statutory authority under the Animal Health Protection Act to make the program mandatory.

Mr. NEUGEBAUER. So if the Secretary decides to do that, we would not need legislation to implement that?

Dr. CLIFFORD. No, sir.

Mr. NEUGEBAUER. Many of my constituents are concerned about the amount of data that has been proposed to be collected in a number of these databases; and when I talk to different producer groups, some say that a limited amount of information should be kept; others say that the proponents of a mandatory ID want more data. How are we going to ensure, if we implement this system, that proprietary information is protected to the people that are furnishing this information?

Dr. CLIFFORD. We are very concerned about this issue with regards to confidentiality, and we take it very seriously. Actually, we collect very little data with regards to our system with the premises registration. It is really nothing more than a phone book within that system. In fact, some states may collect more data, but we don't keep those within our system.

With regard to the industry's concern, in fact, we went outside with animal-tracking systems and have connected with private-sector systems as well as state-sector systems so all of the animal-tracking data would be kept outside of the Federal government.

In addition, we have always protected producer data and have been able to protect that data thus far.

Mr. NEUGEBAUER. But USDA would be able to—if called upon, these outside entities— to furnish that data, would they have to furnish that to you?

Dr. CLIFFORD. Part of the agreement with the outside entities that we are connected to is that animal health officials would only use that data for purposes of an animal health event. And that is part of the agreement that we sign with those companies, yes, and the states.

Also, Ranking Member, I would just like to—your earlier question about the number of premises and what number or total that is with the number of animals in commerce, that is not data we collect. So, as I said, we will look into that, but I don't want this Committee to think that we have that data, because we don't. We don't have the number of animals people have. That is not in that database. It is a very limited amount of data there.

The CHAIRMAN. Chairman Peterson.

Mr. PETERSON. Thank you, Chairman.

It is my understanding, Dr. Clifford, that a cost-benefit analysis of NAIS was completed by Kansas State University and is in your possession for review; is that correct?

Dr. CLIFFORD. Yes, sir.

Mr. PETERSON. Can you provide that to the Committee?

Dr. CLIFFORD. Yes, sir. We are reviewing that document now, and we will provide that information through the Secretary and provide it to the Committee as soon as the Secretary has an opportunity to review that.

Mr. PETERSON. How long will that be?

Dr. CLIFFORD. We want to get it to you as quickly as possible and not delay. So we understand——

Mr. PETERSON. Is there any possibility you can summarize the conclusions, or does it have to go through the Secretary first?

Dr. CLIFFORD. I may be able to provide you a brief summary very soon, if that would be suitable.

Mr. PETERSON. You can't do that now?

Dr. CLIFFORD. Well, I think it is important that I articulate it in an appropriate way. And I will say, based upon the $200 million figure, under a mandatory system for both government and industry, you are looking at over $200 million for a mandatory system; and those numbers will vary depending upon the percentage of producers that participate in a mandatory system.

So, in other words, you are probably not going to reach 100 percent, but there are different cost levels between 90 percent and 100 percent and those types of figures. And then a bookend approach is typically something less than $200 million.

Mr. PETERSON. I don't want to get too much in the weeds here on what has happened, but a lot of the effort, I think, has been in trying to identify premises.

Dr. CLIFFORD. Yes, sir.

Mr. PETERSON. And have the states done that on your behalf? Is that basically what has been happening?

Dr. CLIFFORD. Well, actually, it has been more than states. It has been states. It has been our own folks. We have also done a lot of outreach effort. Under a voluntary system, you have to have more expenditures to reach out to——

Mr. PETERSON. But don't some states have a mandatory premise ID requirement?

Dr. CLIFFORD. A few states do, yes, sir; and a few states that didn't have a mandatory requirement went ahead and moved premises information that they had over to this system.

Mr. PETERSON. It has been suggested by some that we setup a system whereby we kind of set the parameters, set the standards, and then have the individual states actually carry this out on a state-by-state basis. Do you think that is a workable solution? Because the idea is that the producers are more comfortable with their state licensing people. They are used to working with them.

And could we set up some kind of mandatory system where we just set the—you have to use this kind of database, it is compatible, the readers and all of that, so that it all works together but actually let the states implement this. Has that been looked at, and is that a workable solution?

Dr. CLIFFORD. It is something we have looked at. I think that components of the system can be done that way.

As I mentioned earlier with regards to the animal-tracking components, we do feel that it is important to have a national premise identification component that is kept at the national level.

Mr. PETERSON. But what I am saying is, yes, we would keep it, certain of this information, the premises and stuff that we have to have. But instead of USDA or the Federal government, doing the work to have this tracked, to have the individual states do it and then you collect the information from them because you——

Dr. CLIFFORD. Well, that is actually the system now. The states now have the responsibility of getting that data into the system. And then they use our allocator system for the pin number, and they will also use our repository where that pin information is kept. And it is kept on a state-by-state basis.

Mr. PETERSON. Do you think the states have the ability—say the Secretary decided to make a mandatory system and the states then are required to implement a mandatory system and they are the ones that are required to set it up and make it happen within a certain period of time. Do you think that is a feasible thing that every state would be able to do this?

Dr. CLIFFORD. I think that in some cases the states would be, and in some states we would need to provide more assistance. I think it is really a larger picture than that. All of our cooperative animal health programs are cooperative with our state counterparts. Both of these components and the industry components are critical to our success in many of our disease programs; and I believe that a cooperative program is necessary and needed, sir.

Mr. PETERSON. Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman from Alabama, Mr. Rogers.

Mr. ROGERS. Thank you, Mr. Chairman.

You talked about the cooperative nature, and you said it depends on that. So you are saying the Department doesn't have a stick to force a state to participate. Is that implicit in that remark?

Dr. CLIFFORD. That is not what I intended in that remark.

But, basically, when we are talking about our cooperative disease programs, both the state and Federal government helped develop those programs together and implement them together.

Mr. ROGERS. So if the Secretary decided that he or she wanted to implement a mandatory ID program, you could compel the states to form whatever necessary infrastructure to do that, to implement it?

Dr. CLIFFORD. Our compelling—or our authority would lie in the interstate commerce of those animals. So it would be in the interstate and international commerce where we would compel them to abide by that, yes.

Mr. ROGERS. It felt like Chairman Peterson was getting to the point if the states could do it, whether or not you could make them, if they did not have the adequate infrastructure.

You said we have 35 percent participation now. You didn't know if it was just premises or if that included animals, with Mr. Neugebauer's question. Of that 35 percent, are they uniform ID systems? I have been led to believe that they are two or three different ID systems now that are in existence. Is that incorrect? Or are they uniform?

Dr. CLIFFORD. When you are talking about 35 percent with regards to ID systems, for example, the poultry and the pork sector would use group lot more. It is not about individual ID. The 35 percent, it represents a premise identification number. So then that number would be tied to individual ID or group lot.

And with regards to individual ID, there are many different ID devices that we have approved and a number of companies that have developed those devices in accordance with our requirements; and those devices are species specific. So, for example, you may have a special type, one for the pork industry, another one for cattle, and another one type for sheep and goats.

Mr. ROGERS. So if we decided to press or if the Department decided to press this animal ID to try to get the hundred percent participation, the current systems wouldn't have to be modified?

Dr. CLIFFORD. That is correct. The decision would need to be what approach we would take, and whether that would be a book-end-type approach or a 48-hour traceability approach where you have a totally integrated system. And the 48-hour traceability would require—because of the technology needs, to move to an RFID-type technology. So the producers would have to use that, with the exception of group lot identification. Those animals move in a group and lot and stay together. They don't require individual ID.

Mr. ROGERS. Thank you. That's all I have, Mr. Chairman.

The CHAIRMAN. The gentleman from Iowa, Mr. Boswell.

Mr. BOSWELL. Thank you very much, Mr. Chairman. I, too, thank you for having this meeting.

It was interesting, the discussions going on about what happened to our industry, and I say "our" because I am involved in it, too, as many of you know. If a disease would break out, then what would we do? And as one of my staff reminded me, I spent a lot of time in the military, and the military runs on its stomach. Where are we going to get our protein? Where are we going to get our food material if we should have a big shutdown?

So I think Chairman Peterson said it pretty succinctly. We have got to do deal with this. So I am going to leave that statement.

But I think I would ask this to our witness. So what are you recommending to the Secretary? You have got his ear. What are you suggesting he do?

Dr. CLIFFORD. I would leave that up to the Secretary. But I would recommend to the Secretary that if we are going to continue down this road the system needs to be effective; and in order for it to be effective, it has to have a high level of participation.

Mr. BOSWELL. Good non-answer. What are you going to recommend for him to do?

Dr. CLIFFORD. As I said, the system——

Mr. BOSWELL. No. Come on. Just give me an answer. What are you going to recommend?

Dr. CLIFFORD. Congressman, I think that it is important that I stick with my previous answer on this.

Mr. BOSWELL. Mr. Chairman, why don't you dismiss the witness? He doesn't want to talk with us.

The CHAIRMAN. The gentleman from Nebraska, Mr. Smith.

Mr. SMITH. If I might follow up. When do you expect to have a recommendation?

Dr. CLIFFORD. To the Department?

Mr. SMITH. Correct.

Dr. CLIFFORD. We have had some discussions already with the Secretary and provided some information, and I think that it will require some additional information, and the Secretary is reviewing that.

Mr. SMITH. So in terms of a time line for a recommendation, though—I mean, formulating the policy, I would assume that eventually the Department will come up with a decision with recommendations gathered along the way. When do you think the Department would be able to come up with the policy?

Dr. CLIFFORD. I can't answer that for the Secretary. That would be a decision for the Secretary's office to make on the direction we are going to go in the Department.

Mr. SMITH. Is there anyone else testifying today who might be able to answer?

Dr. CLIFFORD. I don't think so, sir.

Mr. SMITH. So your are representing the Department?

Dr. CLIFFORD. Yes, sir.

Mr. SMITH. But you can't really give——

Dr. CLIFFORD. I can't speak for the Secretary; no, sir.

Mr. SMITH. Okay. Let me proceed, then, to another topic here.

We know that there are examples in government where confidential information, very sensitive information, I would say, has inadvertently been distributed, not necessarily in the USDA but in other agencies; and I know that there is concern among many that information will be shared that shouldn't be, even if it is accidentally. I mean, you would have other agencies probably laying claim to the fact that they should have access, whether it is the EPA, whether it is Centers for Disease Control, Homeland Security, IRS. How do you think we could ensure that only USDA would have access to the information?

Dr. CLIFFORD. Actually, we have had a lot of information over the years with disease programs and animal ID; and we have always kept that information confidential except in a very compelling case. In a compelling case, sure, there are legal issues there that may require us to release that. But I don't believe that we would release that just because IRS or EPA or anyone else wanted to see that information.

Mr. SMITH. Can you speak to any of those safeguards and how that logistically works?

Dr. CLIFFORD. We wouldn't release it to them. This system was developed for animal health purposes. That is its intent, and that is our commitment to the industry.

Mr. SMITH. I think you alluded earlier that sometimes the ″disease issues″ become a political issue, whether it is with trade or other things.

What about the Freedom of Information Act? How would that apply or not apply to the information obtained and contained at USDA?

Dr. CLIFFORD. It can be requested under the Freedom of Information Act; and, obviously, we can be challenged under the Freedom of Information Act. To date, we have been able to protect that data.

Mr. SMITH. Unknown from this point forward?

Dr. CLIFFORD. All I can do is base it on past history, and we have been able to protect it to date.

Mr. SMITH. Is there a cause for concern about the future?

Dr. CLIFFORD. I think that because of the concern of the industry that, yes, we have concern about confidentiality issues. I think it is a very important issue. It is something that I think is an appropriate issue for this body to be discussing, as well as the Secretary.

Mr. SMITH. I realize you are not very comfortable speaking of your recommendations to the Secretary or what the Secretary might recommend ultimately or when. Is this part of your concern to voice to the Secretary?

Dr. CLIFFORD. The Secretary is very well aware of the confidentiality concerns of the producers' sect, yes; and he is also aware that we feel it is very important to be able to protect that data.

Mr. SMITH. So how do you think, moving forward, we should handle this issue?

Dr. CLIFFORD. I think that some of those decisions are going to have to be made, as I indicated, by Congress and by the Secretary as to how we move forward.

Mr. SMITH. The Secretary has the discretionary authority currently to implement a mandatory program?

Dr. CLIFFORD. Yes.

Mr. SMITH. But I hear you saying you are deferring to Congress for that?

Dr. CLIFFORD. I am not saying that at all. I think that it is an important point that needs to be discussed and addressed both at the Secretary level and by Congress. That is all I am saying. I mean, with regards to that issue. I am not saying who should take the lead or not.

Mr. SMITH. Okay. My time has expired. Thank you.

The CHAIRMAN. Thank you very much.

The gentleman from Maryland, Mr. Kratovil.

Mr. KRATOVIL. Let me ask it a different way. You certainly bring to the table a substantial insight into the costs and benefits of having an effective system, correct?

Dr. CLIFFORD. Yes.

Mr. KRATOVIL. Do you, based on your experience, believe that you can, in fact, have an effective system if it is not mandatory?

Dr. CLIFFORD. I think that, based upon the last several years, we have not been effective in signing premises up. So the current system is not working. So either it is going to have to be mandatory or provide an incentive for producers under a voluntary system to sign up.

Mr. KRATOVIL. And if it is not mandatory, what is the alternative in terms of a voluntary incentive that would thereby encourage and thereby make it effective?

Dr. CLIFFORD. It would either have to be an incentive of providing up-front resources potentially, that is one idea, as Chairman Peterson mentioned, to incentives within the market to drive this.

Some people have felt that the COOL rule would actually help drive animal ID. Thus far, we have not seen that boost for that.

Mr. KRATOVIL. I gather in making some sorts of recommendation to the Secretary, again bringing to the table your expertise, you have weighed both the costs and benefits of having a mandatory system. What do you see as the most legitimate criticism of a mandatory system? And if a system were imposed, what would USDA do to address whatever those legitimate concerns are?

Dr. CLIFFORD. That is a good question.

I think that would require some definite thought with regards to the concerns. The concerns that are obvious to us are confidentiality. We want to be able to protect the producers' information such as we have in the past, and we think that is a critical component to get their buy-in and support for this system.

There are also the cost factors. So I think that we—it would be prudent to look at ways where we can minimize that cost, especially to small farmers, small producers, in order to get to the level of participation that is needed.

There are also an area where a number of folks have raised concerns over the years, and hopefully we have addressed those properly, where people make assumptions that we want them or we require—them to register when their animals are not in commerce. It is really not the number of animals somebody owns; it is the question of whether those are in commerce.

So backyard-type poultry, if somebody has got a few small animals in their backyard, or a horse, we are not interested in those animals except to say we would recommend that they have their premises registered; which costs practically nothing for them to do that. Only because if there was a disease outbreak in that area, it is critically important to for us to know all of those animals of that species that are susceptible to that disease within that location because it helps us be more effective in our job and helps protect them as well.

Mr. KRATOVIL. So there are concerns that are raised either coming down from the Secretary or legislatively? There would be ways to deal with whatever those concerns are?

Dr. CLIFFORD. I think there would be a number of ways to address many of those concerns.

Mr. KRATOVIL. What states have mandatory systems? You mentioned a number of states have them.

Dr. CLIFFORD. When you are talking about mandatory, it is not necessarily mandatory across all species, but Wisconsin has mandatory premises identification. Michigan requires identification in their live cattle due to TB which requires, as a part of that, the official ID to be registered with the premise. And then, also, Indiana requires animals within the state that move to have premises registration; those that are going to sales, shows, exhibitions.

Mr. KRATOVIL. As part of those, have you looked at and evaluated those systems?

Mr. KRATOVIL. We have, as well as other states; and those are the states, when you look at the premises registered, that—there are 13 states that have more than 50 percent premises registered. That is 7 of those states.

Mr. KRATOVIL. Okay. Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman from Iowa, Mr. King.

Mr. KING. Thank you, Mr. Chairman.

Dr. Clifford, I thank you for your testimony and your responses to these questions.

My first question is just a clarification one. It seems to be endemic across the livestock identification vernacular, when I hear the word "premise" and the word "premises," can we clarify that that means one and the same thing? That we really mean premises?

Dr. CLIFFORD. Yes, it is premises. I am sorry.

Mr. KING. I wanted to make that point.

Dr. CLIFFORD. Sometimes that is my habit as well.

Mr. KING. Is the Department willing to endorse the idea of indemnifying a producer from liability that might be achieved through FOIA action? I mean, you can protect your information, but there is no guarantee on a FOIA. If there is a Freedom of Information Act that is filed and that information is divulged and it results in litigation, that would be the liability created for a producer. Because of potential mandatory ID, that could be a system that could be imposed by the Secretary. What is the Department's position on recommending statutory protection for those producers?

Dr. CLIFFORD. I don't think that we have discussed that with the Department. That is something that we would have to discuss with regards to the liability issue.

Mr. KING. I raise that point because I think that is the only way that we can protect producers if this process of livestock identification moves along. I think that we should be compelled, as a Committee, to take a very close look at how we protect producers that might be exposed by a mandatory livestock ID program through FOIA.

And another point would be, as I listen to you testify, we are talking about an animal ID or livestock ID system that is created for the purpose of controlling disease in case there is a disease outbreak and protecting the industry and food safety. Are there other tools that might be encompassed here that we haven't discussed, or is it a single mission?

Dr. CLIFFORD. Well, our mission has been for the animal health components. And that, also, when you have healthy animals, you are going to have a safer food supply. That has been our mission.

But there are other benefits that we have seen from this. For example, if you have a hurricane on a coastline or, more recently, snowstorms in Colorado, premises identification information was used by the state in order to contact producers in locations to see if there was a need in assistance for feed for their cattle.

Mr. KING. What about grade and yield, other breeding information, that kind of data that breeders keep and it is their intellectual property that they may or may not want to provide availability to other breeders, producers, or perhaps their customers? Is there any provision that you have envisioned that would allow producers to use this as a marketing tool and a way to improve the production of the livestock?

Dr. CLIFFORD. They could certainly use the system as an identification device for their own personal use. We would not want their personal business information that you had described and would

not house that, but they could certainly use the system to track those things with regards to their own personal animals, absolutely.

Mr. KING. As far as a sophisticated type of a system, that would not and—very unlikely—could not be housed within USDA. If the vision were the vision of utilizing animal identification for all of the menu list of purposes that it might be useful for, we can't do it within USDA then?

Dr. CLIFFORD. We do not want that information.

Mr. KING. I have one final question here, and that is the goal of a 48-hour traceability, as part of your testimony—I will just say my goal is a little different than that. I think you can get a truck anywhere in America in 48 hours. So if it is disease eradication and control or the spread of it, I would think that with the modern technology that we have we should be able to do real time. I will just say, let us just put this out here for a different vision.

We started out with 48-hour discussion some years ago. I will submit today let us talk about the time frame of click-of-the-mouse, rather than 48 hours. If you are going to build a software, you might as well do it click-of-the-mouse. I know it takes longer to get the notices out there some places where you have to use telephones and people. But at least to do the traceback, I am going to suggest that should be instantaneous; and I would appreciate your opinion on that.

Dr. CLIFFORD. I would like to explain it in this way. During an outbreak situation with a disease like foot-and-mouth disease that, with the speed of commerce can spread very rapidly, when we talk about 48-hour traceability, what it really means is for us to be able to sit down at the keyboard, just like you say, and in realtime get that information about, in a full traceability system, where we know where those animals potentially have been and whether animals have been exposed.

So we immediately, from that point, would start contacting those markets, those slaughter facilities, those truckers, those farmers and ranchers and say, "Halt," so that you are not putting commerce on hold as a whole and trying to stop commerce across all the U.S. So you are trying to stop commerce where you know the disease is likely to be. And then you immediately send resources in there and draw down, with the potential to shrink that.

Mr. KING. Thank you, Dr. Clifford.

Thank you, Mr. Chairman. I yield back.

The CHAIRMAN. The gentleman from Wisconsin, Mr. Kagen.

Mr. KAGEN. Thank you, Mr. Chairman.

And thank you, Dr. Clifford, for being here this morning and answering almost all of our questions. We do have some concerns.

I always ask myself three questions about anything that is coming forward, whether it be in business or here in government. The first question is, will it work? The second question is whether or not it is going to be good for both business and for consumers alike. And finally, is it the right thing to do?

On all three of these questions, I would gather your answer would be yes, you believe a mandatory animal ID system across the country is best for business, that it is going to work, it is going to be good for consumers, and it is the right thing to do.

Am I correct that you would agree with those presumptions of your answers?

Dr. CLIFFORD. Yes, I do. And, in fact, the system we have built to date—and that is one of the definite good things that have come out of that—has provided the foundation to do just that.

Mr. KAGEN. Well, you are aware of the Wisconsin Livestock Identification Consortium, aren't you?

Dr. CLIFFORD. Yes.

Mr. KAGEN. And would you hold that up as a national model of something you might want to attain?

Dr. CLIFFORD. I think they have been very effective in what they have done.

Mr. KAGEN. So we could use the Wisconsin model as something for the country?

Dr. CLIFFORD. Oh, the Wisconsin system actually is the system that we have developed at USDA.

Mr. KAGEN. So you developed it by imitation, something that happens here in Congress as well.

Dr. CLIFFORD. Well, it was a joint effort with the IT system, is what I am saying. We have further expanded upon that.

Mr. KAGEN. Right. With regard to whether or not things will work out the way you would like it to, maybe you could fill in a few blanks that I have in my head about the RFID system. How expensive is that, per head? Does it really provide you with the best technology available? What would it cost me if I am milking cows, per head?

Dr. CLIFFORD. It will cost in the range of $3 to $5 per head right now. And we are talking about labor cost as well as costs for the reader. Those are some of the things—for small producers, we can try to look at reducing some of those costs. I think the costs over time, as well, will decrease as more of this technology is used.

So that is kind of a range. And I think that some of that data and information and more specific to that range could be in the cost-benefit analysis, once we provide that to you all.

I think it is important to note that, if you are going to 48-hour traceability, you have to have the speed of commerce. The technology needs to be developed to be able to meet the speed of commerce, because if we don't, if we are slowing down commerce, it is not going to be utilized and it is not going to be effective. So it is critical for that use.

Mr. KAGEN. My final question to you is, can we afford not to institute a mandatory animal ID system?

Dr. CLIFFORD. Again, I would have to state that those are policy decisions for the Secretary. But regardless, we need an effective system. In order to have an effective system, it is either going to need to be mandatory or have appropriate incentives for the producers to participate.

Mr. KAGEN. Well, I look forward to working with you and other Members of this Committee to fashion a system that is going to be good for our producers and consumers alike in keeping not just the health of our economy but the health of our people and our livestock in mind.

Thank you very much.

I yield back.

The CHAIRMAN. The gentleman from Tennessee, Mr. Roe?

The gentleman from Texas, Mr. Conaway?

Mr. CONAWAY. Thank you, Mr. Secretary—I am sorry—Mr. Chairman.

The CHAIRMAN. Thanks for the promotion.

Mr. CONAWAY. I wanted to start a rumor that you are joining the administration and get that kicked out there. Just kidding.

It never occurred to me—I have one horse who is a big, fat pasture pet, rarely ever leaves my property. It didn't occur to me until you just said that I am contributing to those who use this 35 percent compliance registration of premises, that I am contributing to that issue by not registering my premises. Did you really intend for me to register my premises?

Dr. CLIFFORD. Can you repeat, sir, what you have again?

Mr. CONAWAY. One fat horse.

Dr. CLIFFORD. No. I did not intend for you to register your premise. What I did say, though, is it is recommended only from a standpoint because if there is a disease occurrence within that location——

Mr. CONAWAY. So the registration requires me to tell you how many head I have?

Dr. CLIFFORD. No.

Mr. CONAWAY. Okay. If we don't know how many places or premises there are, how do we know only 35 percent of them have been registered?

Dr. CLIFFORD. When we talk about premises, we use that estimate based on the National Agricultural Statistical Service. And that estimate is based on 1.4 million premises in the U.S. that have farm income of at least $1,000.

Mr. CONAWAY. Okay. If there was an event and you had to do the trace-back, once that event is over, do you purge that data collected during the trace-back efforts from the system?

Dr. CLIFFORD. No, we don't. We keep that data.

Mr. CONAWAY. So that would be additional data——

Dr. CLIFFORD. It is important data for our analysis.

Mr. CONAWAY. But it was over, it is done, we know it all happened. You keep that data?

Dr. CLIFFORD. Absolutely.

Mr. CONAWAY. The Secretary has the authority to mandate a system. What recommendations are you going to make for changes to the FOIA?

You are pretty confident right now under the voluntary system that you can protect producer data under a voluntary system. If we go to a mandatory system and collect additional data and have new requirements in place, what recommendations are you going to make to change FOIA or to put protections in that allows our producers to know that, under the mandatory program, your answer is still the same, that you have complete confidence that the information ought to be made available?

Dr. CLIFFORD. Well, again, I would answer that based on history. And the history, as far as——

Mr. CONAWAY. Okay, but the history is going to be different. I mean, under a mandatory system the future is going to be different than it used to be.

Dr. CLIFFORD. It may be. But I am also not an attorney, so I don't know that I can answer the question about the FOIA rule per se, and I don't have a full concept of the FOIA laws.

But I will say, under mandatory systems of disease-eradication programs and information that we have had for years and years and years, we have been able to protect that data from release.

Mr. CONAWAY. Okay. Is this issue overplayed? Are producers just—don't want to comply with the overall deal because they believe their data is at risk? Are they overstating their concerns?

Dr. CLIFFORD. I think it is nothing more than a phonebook, but it is still their right.

Mr. CONAWAY. Under a mandatory system, though, you think they are concerned?

Dr. CLIFFORD. Again, even in a mandatory system, the premises identification is really nothing more than a location.

Mr. CONAWAY. On your incentive program to help the voluntary system out, I think under the farm bill we pay organic farmers $750 a year to maintain that status. Is this as important as organic farming?

Dr. CLIFFORD. This is very important.

Mr. CONAWAY. Is this more important or less important?

Dr. CLIFFORD. I am not going to judge that relative to organic farming. It is for animal health.

Mr. CONAWAY. Let's talk about food safety then. Is this issue more important or less important than organic farming?

Dr. CLIFFORD. This issue is extremely important to animal health and food safety.

Mr. CONAWAY. All right. And so, for $750 a year, we help people maintain their organic status. Are you recommending that we pay $750 a year to register premises?

Dr. CLIFFORD. I am not recommending that. But I am stating that there would be some incentive for a mandatory system, one or the other.

Mr. CONAWAY. Well, since we are in the $750 range, do you think $750 a year would be plenty of incentive to send you my name and address and the fact that I have one fat horse?

Dr. CLIFFORD. That is a judgment call for the individual. And I think it is——

Mr. CONAWAY. Well, I am looking forward to whatever advice you are going to give the Secretary. I understand we have you jammed up, and it is easy to whack you about the head and shoulders on this, because you really can't tell us these answers. But value judgments on these issues are something we hope we can look to you and your squad to help us with. Because we are all on the same side. We all want safe food, and we want the commerce to flourish, we want access to foreign markets, all those things. We are all on the same side.

So, thank you, Dr. Clifford. Appreciate you coming.

The CHAIRMAN. The gentleman from California, Mr. Baca?

Mr. BACA. Thank you very much, Mr. Chairman.

Thank you for being here, Dr. Clifford.

One of the questions that I have, in your testimony you state that USDA has provided states, tribes, and territories with $55.5

million, which comes out to be 47 percent of the total cost administered and delivered to NASA at the program.

Do states and tribes and territories contribute to the remaining 53 percent of the costs? That is question number one. And how much of the cost is incurred by the producers?

Dr. CLIFFORD. With regards to clarification on that question, are you talking about under a mandatory system or our current system?

Mr. BACA. The current system.

Dr. CLIFFORD. So, under the current system, the money we provide to the states in cooperative agreements and to the tribes, that money is there to be able to do two things primarily. One is to set the foundation and provide the support and infrastructure needed to register premises and to move NAIS forward.

The second component is—and a lot of these dollars are being spent for the outreach component in a voluntary system that has not been that effective. So that dollar amount, if under the current system were to continue, would either need to be continued or reduced to just support a basic infrastructure to support the current system, because it has not been effective in signing up producers.

Mr. BACA. How much of that cost, though, is incurred by the producers?

Dr. CLIFFORD. The costs that are incurred by the producers for premises registration are nominal. You can go online and sign up your premises or send in an application to the state. There is very little cost for signing up your premise.

Where the cost would occur to the producer is if they are using individual animal ID with their animals and the application of that animal ID, and that can be—RFID technology can range from $3 to $5 per animal. If you are putting in just a tag with non-RFID, it can be up to a cost of 50 cents to a dollar or even less in some cases, looking at the cost as well as for the labor needed to apply that.

Mr. BACA. Okay. And following up with that last comment, you said, when looking at the amount of funding each state receives and the number of premises each state has registered, the cost per registration varies from as little as $10 to as much as $800 per premise.

Can you account for the vast difference in the cost effectiveness of cooperative agreement funding?

Dr. CLIFFORD. Well, the cooperative agreement funding, as I indicated, about half of that has been provided to support the basic infrastructure, and the other half has been to do a lot of this outreach. So it depends upon how that outreach was done. And it would be agreement by agreement. So, in some cases, people went door to door. In other cases, they may have been doing phone or mailings and those types of things.

Mr. BACA. Is there a better scale that can be developed to bring that narrow gap? Because it surely varies between $10 to $800.

Dr. CLIFFORD. Well, when you say $800, it is because that particular state was not effective in being able to sign up those premises. In states where it was, that dollar amount per premises comes down substantially. And, for example, in the State of Wisconsin,

you had a mandatory premises identification, in 2004 their cost per premise was $128. In 2005 that cost went down to $17 per premise.

So those variables are directly dependent on their success in signing people up. If they are successful, those costs are going to come down on a per-premise basis. If they are not successful, they are going to climb.

Mr. BACA. Okay, thank you.

I yield back the balance of my time.

The CHAIRMAN. The gentleman from Virginia, Mr. Goodlatte?

Mr. GOODLATTE. Well, thank you, Mr. Chairman. I appreciate your holding this hearing.

I appreciate, Dr. Clifford, your testimony and your long and hard work on this issue. I very much appreciate that.

I share a number of the concerns raised by the Chairman regarding the lack of progress that has been made at the Department, the amount of money that has been spent, the amount of time that has been taken. I don't attribute that to you, but I do attribute it to schizophrenia that exists down at the Department on this.

As you noted, the previous Secretary of Agriculture, over 3 years ago, called for a voluntary animal identification system. But there are many down at the Department who don't agree with that, and I think that that has been a hindrance to the progress being made.

And I think there are a number of examples of why that has occurred. For example, I was pleased to hear you say that we are going to now get a cost-benefit analysis of animal identification system. But the Department has been working on this for well over 6 years, and you would think that if you were trying to sell producers on the merits of participating in a voluntary system, that this cost-benefit analysis would have been done at the outset and have been available to them for a long period of time.

So, first, let me ask you, is this cost-benefit analysis on a mandatory system or a voluntary system?

Dr. CLIFFORD. It is on both, sir.

Mr. GOODLATTE. And is it a cost-benefit analysis that is targeted at the overall benefits to our country, or is it targeted to the benefits that an individual producer will find if they participate?

Dr. CLIFFORD. I think it looks at all of the cost to both producer and to government. And it looks at the benefit of this with regards to trade, largely, and the movement of product.

Mr. GOODLATTE. Secondly, you have heard the concerns expressed here regarding the security of the information that producers would provide. You have provided assurance that the Department has protected other information that other farmers have had. And yet the Department has, on more than one occasion, recommended to the Congress that the Congress pass legislation to protect this information.

Dr. CLIFFORD. That is correct.

Mr. GOODLATTE. So, in your recommendation to the Secretary, who has the authority to put mandatory animal ID into place, would you recommend that he do so without action being taken by the Congress to provide the protection recommended by the Department? Or would you say, you have to wait until the Congress provides that protection?

Dr. CLIFFORD. I think it is important for the information to be protected. As far as the legal issues around this, I think that would best be answered by the Department's legal staff as well.

Mr. GOODLATTE. And they have recommended that the Congress take action to do that.

Now, you have analogized the protection of this information. All we have, right now anyway, is the equivalent of a phonebook. But, in a phonebook that I am familiar with, there is lots of information that is not in there because people have chosen not to put the information in the phonebook.

Would you recommend that they have that option? Because that is what a voluntary system is. A mandatory system says, you have to be listed in the phonebook, and you have to worry about whether somebody can have access to that phonebook who they don't want to have access to it.

Dr. CLIFFORD. Congressman, I would like to answer that in this way: Previously in all of our disease programs, we had developed ID systems specific to that program, and we always have assigned herd numbers, what we call herd numbers, to those herds at the government level. The fact is that those numbers were not consistent. One premises could have multiple numbers.

It is essential for us to have good-quality data and know where these animals are in a disease outbreak situation for us to be effective. In order to do that, we have to have basic premise identification information within that system.

Mr. GOODLATTE. I understand the need for information.

Dr. CLIFFORD. So my thing is, for it to be effective, it has to be——

Mr. GOODLATTE. Gotcha. In fact, I agree with you on that point. My concern, however, is, what happens to the person who doesn't want to participate? It is not like a phonebook.

Finally—Mr. Chairman, I might run over a few seconds, if that is all right—the third inconsistency I have is in your answers to the gentleman from Texas. You have recommended and you think that the only way to effectively do this is a mandatory system. But you have told him, as a very, very small producer, that it should be voluntary on his part.

And the people we hear from a lot, as you know, are people who have—and they are in the commercial market, in many instances. They may be selling that one fat horse or maybe not, but they are people who have, for example, a small number of poultry that they are raising on their grounds. And if those poultry are taken to the live markets in New York or other places, as you know, that is a very easy way for the diseases that we are all concerned about to spread.

So I guess my last question to you is, is what you are recommending really mandatory? Or is it actually mandatory with a lot of exceptions that would make it, in fact, voluntary for many people? That also seems to be a schizophrenic thing on the part of the Department in terms of what we are really striving for here. So is it mandatory, or is it voluntary?

Dr. CLIFFORD. The answer to that question really lies with the issues of commerce. If you have animals that are routinely going into commerce——

Mr. GOODLATTE. Even if it is a very small operation?

Dr. CLIFFORD. Even a small operation.

Mr. GOODLATTE. If you are only raising 3 or 4 or 5 birds and you take those to a market or something?

Dr. CLIFFORD. If you are continually raising those birds and taking them to a market, our belief is that they should be part of the system.

Mr. GOODLATTE. Okay.

Thank you very much, Mr. Chairman. I appreciate your forbearance.

And thank you, Dr. Clifford. I appreciate your answers.

The CHAIRMAN. Thank you.

The gentlewoman from Colorado, Ms. Markey, do you have a question? You are recognized for 5 minutes.

Ms. MARKEY. Yes. I had to step out, so if this question was already asked and answered, you can let me know.

But with respect to premise registration, beef cattle has shown to be the most difficult to register, while dairy cattle, poultry, swine, sheep, and goats have had a greater participation. So what do you think accounts for this disparity? And particularly with regard to cost, what do you see as the cost differential with beef cattle? And what do we do to address that?

Dr. CLIFFORD. I think the cost-benefit analysis will show this. In a mandatory system, the greatest cost for this program is going to be to the cattle sector. That is because of the cost—a lot of their animals would move as individual animals and not as group lots in commerce, which means that individual identification would have to be applied. So a large part of that cost would lie there with the producers with regards to the identification devices and the labor to put those devices in.

With regards to the lack of participation, I think it has been very difficult to get the beef cattle sector to sign up. That doesn't mean that there are not producers out there leading the charge. One of the reasons we went with cooperative agreements to the private sector to help assist in this effort is we thought members of those associations in the private sector would help stimulate participation. It has not been as effective as we would have liked. So even the private sectors and industry representatives have had difficulty in getting their own members to sign up.

Ms. MARKEY. And just as a follow-up, because the cost is a huge issue—any ways that you are looking at addressing this, to get the participation up with the cattle industry? And, as Chairman Peterson talked a little bit about having the states become more involved because they already have programs set up and some of these producers are already participating in those state programs.

Dr. CLIFFORD. Well, and there are ways to reduce some of this cost. Obviously, for our purposes, we believe that the animal needs to be identified for our purposes when it leaves that premise. So while it is on the premise, if it never leaves that premise, if it was born and raised on the premises, then it really doesn't need to, for our purposes, be identified. It may for the producer's purpose. That is one issue.

The other issue is, over time, as we apply these IDs and if we move to an RFID technology, we know that that cost is going to

come down through competition in the market. And so that will help drive down cost.

For the small producers, you can look at ways of trying to provide—the readers can be very expensive for the electronic technology. They can range from a few hundred dollars to a thousand or more dollars for a reader, which could be very expensive to a person who has 10 cows and would not want to purchase that.

So you could look at different methods where they wouldn't actually need a reader. Maybe they could utilize a reader from a community source or a co-op or something along those lines. Or there may be incentives from the Federal government or state government to help purchase some of those.

Mr. PETERSON. Would the gentlelady yield?

Ms. MARKEY. Yes.

Mr. PETERSON. I just want to make this perfectly clear if I didn't make it clear before.

I had a briefing last week where some folks over at Homeland Security estimate—and I don't know if I believe these numbers or not—say that the potential risk here to the cattle industry is anywhere from $30 billion to $100 billion—$30 billion to $100 billion. That is $300 to $1,000 per animal.

Now, I don't know if that is right or wrong, but say that it is right. What I am saying to people is, fine, you can get all hung up about FOIA and all this other stuff and drag your feet, but what you are doing is putting yourself at risk at some level of $300 to $1,000 an animal. That is what you are doing by continuing to drag this out. All I am saying is, fine, if that is what you want to do, have at it. But don't come back to me and ask for help if that happens to you, okay? You are on your own, and that is the choice you are making. And I will do what I can to make sure that the government doesn't bail you out if this happens to you.

Mr. GOODLATTE. Would the gentleman yield?

Mr. PETERSON. I just want people to understand.

Mr. GOODLATTE. If the gentlewoman will yield?

Mr. PETERSON. I yield.

Mr. GOODLATTE. I appreciate the gentleman's point. I think it is a good one. But wouldn't it also make sense to say that, if you want to participate in a voluntary system, that that would be one of the precautions? That if you are a participant in the system, you would be able to look to the government for help in time of a disaster, and if you didn't, you wouldn't? That is what we try to say to other forms of disaster relief.

Mr. PETERSON. That would be fine. I just think people need to understand the risk they are taking here.

Mr. GOODLATTE. I understand.

Mr. PETERSON. That is what I am concerned about.

Mr. GOODLATTE. And I share that concern.

Mr. PETERSON. And I would be of the same mode. If I was out there raising cattle, I wouldn't want the government knowing what I am doing either. That is my nature. But I think we have to get real about this.

We are going to try to get the Homeland Security Committee and us together to have a briefing that was given to me last week. I think people just need to understand what we are facing here. It

is bigger than just foot-and-mouth. There are other issues out there too that haven't really been talked about.

So, thank you, gentlelady from Colorado.

The CHAIRMAN. Does the lady from Colorado have another point, or are you complete with your questioning?

Ms. MARKEY. No. Thank you, sir. I am finished.

The CHAIRMAN. Mr. Boswell?

Mr. BOSWELL. Thank you, Mr. Chairman. I will be very brief.

There are some strong feelings, Dr. Clifford. You just heard some. I won't try to walk on you. But, you should have an opinion. I am not going to ask you to say any more; you have made your point. But if you are being muzzled or if you can't come up here and tell us what we need to know—I mean, you are an expert. That is why we wanted you to be here. We value your expertise. If you are told you can't come up here and give us straight answers, then we probably need to know that. It is just very frustrating, as we feel the tensions that is—I will wait. Go ahead and get your counsel because——

Dr. CLIFFORD. Congressman——

Mr. BOSWELL. I am not finished. I was pausing while you got your counsel there.

Dr. CLIFFORD. Okay. I am sorry. I apologize.

Mr. BOSWELL. Which is okay. I do the same thing. And we all do. That is why I am not criticizing you for getting counsel. But if you can't come and tell us, we ought to know that.

Mr. Chairman, you can't effectively lead us if we can't have witnesses come and give us their best of their experience. So if he can't speak for the Department, maybe we could rephrase it and say, "Well, what is your opinion?" versus "What are you recommending?" Maybe he can't share what he is recommending.

I guess I get there because, in my many years of military service—and this is a compliment to general officers, people of star rank, flag officers—they will support their commanding officer up the line right up to the Commander in Chief, no question about it. That is the way it works. But every time I have ever had the experience, when I was on the Intelligence Committee or anything else, "But, sir, do you have an opinion?" And then they would say, "Well, this is my opinion, just my opinion," but they would give it. And it was very valuable. It helped. It helped the security of this country.

And I think that is what you are on, Mr. Chairman, is you are concerned about the security of the country and not just our industry of livestock, but it is a big security thing. So anyway, that is just a suggestion.

Thank you. I yield back.

The CHAIRMAN. Do you have your opinion on this?

Dr. CLIFFORD. Yes, sir.

Mr. BOSWELL. Let's have it.

Dr. CLIFFORD. I do have my opinion. The system that we have thus far has not worked. Unless we can provide adequate incentives for them under a voluntary system, it has to be mandatory.

The CHAIRMAN. All right. Thank you very much.

Mr. BOSWELL. And I thank you, too. Thank you very much. I hope you will forgive me for being so crass.

Dr. CLIFFORD. No problem, sir.

The CHAIRMAN. We appreciate you in securing his opinion. It was very helpful. Thank you, Mr. Boswell. Sort of like pulling teeth, isn't it?

I think we have Mr. Costa here. The gentleman from California?

Mr. COSTA. I am not so sure that it all hasn't been said, but maybe not everybody has said it. I was pleased to hear your final comment that, if you are going to have an animal ID program that is successful—I am not trying to put words in your mouth, so I just want to be clear—that it has to be mandatory, it can't be voluntary. Is that correct?

Dr. CLIFFORD. It is either that or it needs to have incentives that would get a high level of participation for producers.

I mean, frankly, sir, the bottom line for me is, as an animal health official for the U.S. government and somebody that cares very much about our animal health, the system has to be effective. This is not effective. And I don't think that this Secretary or even we want to continue to shove dollars at a system that we are not able to get the level of participation that we need to have an effective system.

Mr. COSTA. So for the implementation of a successful program, what would you say are the key elements in the transition that we have to make from where we are today to this mandatory program, realizing the diversity that exists today among the various segments within the industry; both from the cow-calf, the feed lot operations, the dairy operations; I mean the whole—and the packers? Have you given some thought on how you would take this current system that I think everyone agrees is not working——

Dr. CLIFFORD. Absolutely.

Mr. COSTA. And what are the steps?

Dr. CLIFFORD. You can't go from where we are today to a fully 100 percent participation in a matter of a short period of time and have all the tracking components and everything.

So, in the meantime, our recommendation would be to initially move to an immediate bookend approach, as Chairman Peterson mentioned earlier in his statement, which basically gives us the front end of premises being registered, and it collects that data and information at the time the animal is slaughtered or dies. So that we have two ends to connect the dots in between with the animal's movements.

Mr. COSTA. And in those bookends you envision what, a 12- or 24-month period? What timing are you looking at?

Dr. CLIFFORD. We believe we could have that in place—including the rulemaking for that, we would be looking at something around 2 years or less, to have that full—and then followed by another year or two with the traceability component.

Mr. COSTA. So we are talking about 3 years?

Dr. CLIFFORD. Probably 3 to 4 for full, effective implementation.

Mr. COSTA. What would be the second and third step necessary?

Dr. CLIFFORD. I am sorry?

Mr. COSTA. What would be the second and third step necessary to make this transition successful and to get buy-in from all of the various segments within the industry?

Dr. CLIFFORD. Well, to make the transition successful on the bookend approach, we have to have a high degree of premises registered on the front end, with ID being used in commerce.

And then the second component would be that the packers and slaughter facilities would need to be collecting and entering that information in the database at the time of the animal being slaughtered or at the time of death on the farm that that information is provided.

Mr. COSTA. And how do we pay for this?

Dr. CLIFFORD. The payment, depending upon the breakout for government versus private sector, would vary, and depending upon the level, but it is somewhere—the total payment necessary would be something less of—somewhere in the range of $160 million to $190 million for a bookend approach.

Mr. COSTA. And where would the data collection reside? Within each individual operation, i.e., whether it be a packer or whether it be a cow-calf operation or a dairy?

Dr. CLIFFORD. We would have the data with regards to the premise location and the ID itself. And then the ID would be retired once that animal is slaughtered.

Mr. COSTA. My final question—and I will submit some other questions, Mr. Chairman, with your permission, under unanimous consent—is, do you think for the successful implementation of a national ID program that it is necessary—or do you concur with the statement that it is necessary for a transparent implementation of the MCOOL program?

Dr. CLIFFORD. With the COOL program?

Mr. COSTA. Yes.

Dr. CLIFFORD. The COOL program is obviously a separate issue.

Mr. COSTA. Right.

Dr. CLIFFORD. But the 840 number has been basically called safe harbor as a basis for U.S.-born animals. And we have regulated that and allowed the 840 number to be used solely for U.S.-born animals for COOL. So it certainly—if that is utilized in COOL, it could be an assistance and a driver in animal ID.

Mr. COSTA. My time has expired, Mr. Chairman, but just for the Chairman and Members of the Committee, for your own thoughts, in my view you cannot have a successful implementation of a transparent MCOOL program without a national mandatory ID program. I just don't see how you do it. I know that we are talking—I believe the two are linked.

Thank you very much. My time has expired.

The CHAIRMAN. Thank you very much.

And we thank you, Dr. Clifford. This has been a very informative exchange. I am sure that you see from this Committee there are many, many questions, there is a great concern, because there is a great concern within the public about our food safety. Many questions are being raised. And it is my hope that you will be able to share with the Administration and with Mr. Vilsack how important this issue is. And this Subcommittee will be moving very aggressively to protect our food supply. And this National animal ID system is the key to that.

So we thank you.

And we will now have our second panel begin to assemble.

Thank you very much.

Dr. CLIFFORD. Thank you.

The CHAIRMAN. We want to welcome this panel, a very distinguished panel.

We also want to notify everyone that we will have a series of votes coming up at some point. We will pause at that particular point and go take these votes and come back and resume the panel. And we certainly appreciate your understanding and cooperation with us on our schedule for voting.

I want to welcome our distinguished panel, and let me introduce them at this time.

We have Mr. Bill Nutt, who is the President-elect of the Georgia Cattleman's Association, on behalf of National Cattleman's Beef Association, Cattle Health and Well-Being Committee. And he is from Cedartown, Georgia.

Welcome, Mr. Nutt. Glad to have you.

Dr. Max Thornsberry, DVM, who is the President of the Board of R-CALF USA, from Richland, Missouri.

Welcome. Good to have you, Dr. Thornsberry.

And we have Mr. Donald B. Butler, President of the National Pork Producers Council, from Clinton, North Carolina.

Welcome.

Dr. Karen Jordan, DVM, Owner, Large Animal Veterinary Services, co-owner, Brush Creek Swiss Farms, on behalf of the National Milk Producers Federation, Siler City, North Carolina.

And we have Dr. W. Ron DeHaven, D.V.M., M.B.A., Chief Executive Officer of the American Veterinarian Medical Association, Schaumburg, Illinois.

Welcome to all of you. Thank you for coming.

Mr. Nutt, we will begin with you.

STATEMENT OF BILL NUTT, PRESIDENT-ELECT, GEORGIA CATTLEMEN'S ASSOCIATION, ON BEHALF OF THE NATIONAL CATTLEMAN'S BEEF ASSOCIATION CATTLE HEALTH AND WELL-BEING COMMITTEE, CEDARTOWN, GEORGIA

Mr. NUTT. Thank you, Chairman Scott, Representative Neugebauer, Members of the Subcommittee, ladies and gentlemen. It is a pleasure to be here. I look forward to the opportunity to share with you some insights into the way we are operating a herd management system that, incidentally, provides animal traceability in there.

I operate a small cattle business in Georgia. We produce animals in Georgia and in Alabama, have premises in both states. We ship the animals to feed lots in Iowa. When they are ready, they are harvested, and the carcasses are sold on the markets in Omaha. So we are kind of an integrated operation that goes through several things in there.

Our management system is based on managing from cradle to grave for the animals that we raise. Any animal that is born on my place, my premises, gets identified and tagged on the day it is born. We follow it through for the period that it is available in our operation. At the point in time we send it to the feed lot, we transition to another system, a cooperative group that coordinates ship-

ments, moves them to the feed lot in Iowa. They have their own tracking system.

And, by the way, we have animal ID from day one and keep it current, and it gets handed off system to system.

When the animals get in the feed lot, still another system of tracking and record-keeping picks it up and follows it through to harvest. And it ties in with the packers and the harvest houses, data records in there. So there is a complete cradle-to-grave traceability and history of those individual animals by number in there.

You might say, what about animals I purchase? And we do that sometimes. We follow the same system with them, introducing a unique number on the day they enter our herd, and we follow them through in the other system as we go in.

This system is a market-driven, free-choice sort of thing that has operated for some years. It provides data, and the system is certified. All of those pieces allow my products to be sold on the international market, on the Japanese market, which is probably the most difficult export market to provide the data for in there.

Age and source verification, other premium identifiers are carried in the system. And it is basically a management system that allows us to focus on the high end of the market and getting the best deal we can for our products in there. It follows through, and it works very well. And the primary purpose is not animal traceability. The primary purpose is herd management and effective business management. And I would like to just follow this on through.

I would say that this system has worked for a number of years. The system does not—does not—require an electronic ID system. The system does provide for the use of electronic IDs. And I want to talk about that again in just a second, a couple of thoughts on the electronic ID situation in there. We do follow through, and it works very well.

How did this come about? Good business decisions led us to come up with this particular set of software. We could use what we have. There are other sources available that have been developed. They are all in the commercial market. They are market-driven, and they provide value-added data to producers like myself who use this information to try to fine-tune our operations and get things out.

Once again, incidentally, they provide traceability in there. Every time my animal moves from premise to premise, that is entered into the database. When it moves over to the feed lot coordination group, there is a different premise there, and so on, all down the chain, so that there is a track record there and the electronic IDs are there.

I ought to mention electronic IDs. We haven't used them in the past. I do have the readers. I do have them on some of my cattle. These are international standard, ISO-compliant devices. If you have never seen one of those, that is what an EID tag looks like. All it is is a piece of plastic. It has a little bit of electronic circuitry inside. And that by itself, with the proper reader, and when you put it in the tag of an animal and enter that into a database, lets you do some identity.

In practical purposes, it is awful hard when a cow is in a herd to go read that little ID, so we use supplemental things like visual ear tags.

The CHAIRMAN. Mr. Nutt, may I just interrupt just for one second? We want you to kind of wrap up. We have these pressured times. And to all of our witnesses, we are going to try to hold you close to the 5 minutes so that we can get everything in before we go vote, and then we can come back with questions. But your testimonies, your full testimonies are part of the record.

So if you could, Mr. Nutt, just summarize right quick, and we just appreciate you all understanding our time constraints.

Mr. NUTT. Thanks, Chairman Scott. I will do so.

I could summarize our position by saying this: We have a free-market-driven system that pays in the management of our activities. It wasn't contrived to do animal tracking, but it does indeed have that as a by-the-way fallout capability of it.

Would I be satisfied and comfortable with my whole system being swept into a mandatory ID system? Absolutely not. But that part of my system that has to do with an individual animal and where it is would indeed work in there.

Thank you very much for the opportunity to discuss with you, and I will be happy to answer any questions at the appropriate time.

[The prepared statement of Mr. Nutt follows:]

PREPARED STATEMENT OF BILL NUTT, PRESIDENT-ELECT, GEORGIA CATTLEMEN'S ASSOCIATION, ON BEHALF OF NATIONAL CATTLEMAN'S BEEF ASSOCIATION CATTLE HEALTH AND WELL-BEING COMMITTEE, CEDARTOWN, GEORGIA

Chairman Scott, Ranking Member Neugebauer, and Members of the Subcommittee, my name is Bill Nutt and I am a cattle producer from Cedartown, Georgia. I am President-elect of the Georgia Cattlemen's Association and a member of the National Cattlemen's Beef Association's (NCBA) Cattle Health and Well-Being Committee. I appreciate the opportunity to testify today on my use of animal identification.

I will start by stating that NCBA's policy supports a voluntary, market-driven approach to animal ID. The cattle industry recognizes the need for an animal identification plan that is an effective disease surveillance and monitoring tool which serves the needs of America's cattle producers. Enabling state and Federal animal health officials to respond rapidly and effectively to animal health emergencies, such as foreign animal disease outbreaks, is important in protecting our national herd, and NCBA has encouraged cattle producers to register their premises and participate in an animal ID program.

Our industry has serious reservations, though, about a mandatory animal ID program. One of the significant concerns is the confidentiality of producer information that would be held in a USDA database. All data on producers, their land and premises, and their cattle is extremely sensitive, and in many cases proprietary. This is not the type of information that is meant for public disclosure. The release of that information would expose producers to additional liability and risk. The location of their operation could open them up to protests by activist groups at their front gate. The location and number of their cattle could be used against them by competitors or potential buyers.

USDA does not have a good track record when it comes to information confidentiality. As recently as 2007, USDA had problems with FSA leaking producers' social security numbers through their website. If USDA cannot guarantee the security of something as important as social security numbers, how are we to expect them to safeguard our animal ID information? More importantly, it has yet to be shown that USDA can prevent the animal ID database information from being released to a Freedom of Information Act (FOIA) request.

Animal identification, animal movement, and premises registration information should be held in a secure location and protected from disclosure. In addition, the

information should only be accessed by the appropriate state and federal agencies in the event of a Secretary of Agriculture declared animal health emergency.

In the meantime, NCBA supports voluntary adoption of individual animal identification programs that support genetic improvement, source verification, and disease surveillance. In addition, the private sector should have a central role in providing identification solutions that fit the varying needs of America's cattle producers. The private sector should be utilized to provide ISO-compliant identification devices and data collection systems, distribution of system components, and associated hardware and system certification. The private sector should also provide the various software elements required to make the animal ID system work by tracking premise-to-premise animal movements during each animal's lifetime so as to provide a responsive trace-back capability in the event of a declared animal health emergency. The private sector involvement will enable and allow competitive market forces to benefit producers and industry while maintaining the objectives of the National Animal Identification System (NAIS).

I would like to explain to you how I utilize voluntary, market-driven animal identification in my own operation. I am one of many smaller producers in the beef industry. I have found that cooperative efforts with other producers enables my operation to be responsive to the ever-changing beef market demands, that when responded to, can enhance our success in serving these markets profitably.

For many years I have produced high quality beef cattle that I raise in Georgia, ship to Iowa cooperatively with other producers for custom feeding by another small farmer-feeder group, and then, still within the cooperative effort, sell the finished carcasses in Omaha. I have found no better way for producers of quality beef to receive the full value of the cattle we so carefully bred, developed, and raised for the markets we target.

I maintain lifetime data on all my animals starting on the day they are born on my operations, and in the case of purchased animals, when they enter my herd. The record and tracking systems I use provide, among other things, source and age verification capability that qualifies the beef produced to be sold in premium markets that require source/age, genetic, and other certifications that result in my customers paying premiums for these certifications. Age and source verification alone can add $40 to $80 premiums for finished beef.

The data collection and management system used on my operation is simple. Cattle raised on my premises are recorded and tracked beginning on the day they are born. Each animal is processed and tagged in the pasture and pertinent information (eg: tag number, date of birth, sire, dam, birth-weight, etc.) is entered in permanent field record books. The data is then put into a computerized system. Pertinent individual animal data is subsequently added into the record system during the time each animal is in my system. When animals are shipped to Iowa feedlots, the feedlot system picks up tracking and follows each animal through harvest and subsequent carcass sales. I receive periodic status and performance reports during the feeding process, and when each feedlot pen is closed out, comprehensive records of each animal are provided back to me.

This feedback data, combined with the information collected prior to shipment, forms the basis for careful on-going total herd management to meet my business plan objectives. It enables me to monitor the effectiveness of my genetic development efforts and other key management objectives. This system relies on a unique animal identity for tracking but does not require Electronic ID (EID) tags to function. Visual ear tags have worked for many years and continue to function satisfactorily. However, additional use of market-driven, commercially available ISO compliant EIDs correlated to the visual tags is becoming more widely utilized in facilitating individual animal identification in mass processing. Our current systems handle the addition of commercially available visual tag-correlated EIDs with no problems today and will continue to do so in the future, barring unforeseen complications from ill advised regulatory agencies.

While my system has been developed on my operation based on commercially available software which I have tailored to my needs, a number of similar animal identification and tracking systems exist and can be used. Commercial systems are available, and many beef breed associations have tagging systems available to identify, promote, and market cattle based on their particular genetics. Other sources, such as the Southeastern Livestock Network—a regional multi-state cooperative producer group, have available data management systems that collect and process the individual animal data in ways that add value to producers.

These validated systems are all private sector, market driven, and voluntarily applied based on efficient business management principals. Traceability is provided, and since the private systems are not subject to FOIA, data confidentiality is not an issue!

Our systems currently work effectively in response to competitive market driven forces. These systems were developed, and work well, under the concepts of the voluntary NAIS cooperatively developed by industry and involved agencies. I am very concerned, however, about the effects of the latest USDA proposals and initiatives. Moving to mandatory animal ID will change our system from a flexible, market-driven approach to a rigid bureaucratic system that gets in the way of good business management of our operations and adds additional risks and potential liabilities.

According to APHIS, the proposed rule entitled USDA APHIS "Official Animal Identification Numbering Systems" is the next step in developing a nationally integrated, modern animal disease response system and is intended to create greater standardization and uniformity of official numbering systems and ear tags used in both official animal disease programs and the National Animal Identification System (NAIS).

While it would not technically require the use of the animal identification number (AIN), the rule would require that when AINs are used, only those numbers beginning with the 840 prefix will be recognized as official for use. This will be effective for all AIN tags applied to animals 1 year or more after the date of the finalization of this proposed rule. It would also remove the current Premises Identification Number (PIN) format that uses the state postal abbreviation and proposes to create a single national seven-character alphanumeric code format. In addition, the rule would create new requirements for official ear tags and going forward, official ear tags used in animal disease programs could only be issued to registered premises that have PINs. All official ear tags would be required to bear the U.S. shield and the use of the shield will be allowed only on official identification devices approved by APHIS.

A good example of my concerns is the apparent fixation within USDA to control and track movements of official APHIS EID tags and the proposed rule mandating "840" tags as the only acceptable tags. This will further restrict the distribution of these tags, thus making it more and more difficult and expensive for the beef industry to have ready access to the EIDs. Consider the following; for an EID to work within the system, it is mandatory that each EID comply with recognized ISO technical specifications that apply worldwide. The 840 EIDs comply, as do numerous other functionally equivalent EIDs that are widely available and widely used. Incidentally, 840 refers to the first three digits in the standardized multi-digit number sets that provide a unique numeric identifier for each EID in accordance with International standards. Currently, the initial three digit set is used as a country or as an EID manufacturer's code.

In reality, valid ISO compliant EID's in the production and distribution systems, in my supply cabinet, or anywhere else prior to their being attached to an individual animal and the number/animal/premise data entered into a database, have absolutely no practical significance to any animal tracking system! Until these conditions are met, the EIDs are nothing more than tiny, uniquely identified electronic devices encased in plastic.

It is extremely difficult to categorize efforts to track and control production and distribution of the EIDs as a "value added" function. Rather, these bureaucratic efforts simply add additional and unnecessary costs throughout the system by impeding competitive production and distribution, thus resulting in increased costs and aggravation to producers which in turn will discourage producer support and participation. Should this occur, the tracking systems' software must continue (as they do now) to be capable of recognizing that U.S. operations will probably always operate with multiple initial digit sets.

The issue of premises registration is also of some concern. The APHIS proposal seeks to change the current, state-by-state system into a uniform, national system. We ask APHIS to look at the impact on producers, like me, who have already registered premises to determine the economic impact of having to change to a uniform system. This change cannot but additional economic burdens on cattle producers.

In conclusion, I hope you see how a voluntary, market-driven animal identification system can work for producers, and why we are against a mandatory system. The lack of effort to protect producer data or ensure private sector involvement are just many reasons why we cannot support a mandatory system.

The CHAIRMAN. Thank you, Mr. Nutt.

Dr. Thornsberry?

STATEMENT OF R.M. "Max" THORNSBERRY, D.V.M, PRESIDENT OF THE BOARD, R-CALF USA, RICHLAND, MISSOURI

Dr. THORNSBERRY. Yes, thank you very much. Good morning, Chairman Scott and Ranking Member Neugebauer and the Members of the Subcommittee. I do appreciate the opportunity to be here.

I am Dr. Max Thornsberry. I am a 32-year practicing veterinarian, food animal primarily, from southern Missouri. My family has been in that area from the 1830s, and I am the fourth generation to live on the same farm and raise livestock. So we have a long background and history of being part of the livestock system.

I also got out of veterinary school in 1977 and participated in the latter end of the hog cholera eradication. The very first herd that I tested for brucellosis in August of 1977 had 65 bangers, or positive cows, in it. So I have had a very firm and practical education in disease eradication and control.

I need to speak to you today from representing the members of R-CALF USA. We are an independent livestock organization. I am president of the board of directors. There are 10 directors scattered across the United States, representing various states. I represent the six midwestern states where most of the cow-calf operations are in the United States. Missouri is the number-two cow-calf state in the union. Texas is the only other state that has more mother cows than calves produced.

We have heard some information today that I think is incorrect. You have heard that there are 35 percent of the premises signed up for animal ID. That is a misleading number. If you were to count the dairy and the pork and the poultry, that would be very, very appropriate. But when you count beef production in the State of Missouri, our state veterinarian said we have between 7 and 9 percent of the beef operations signed up. That is after millions of dollars being spent nationwide and hundreds of thousands of dollars being spent in Missouri to try to get people enticed to sign up for a free premises ID.

People in my state that have a cow herd average of 33 cows per farmer are not interested in the system. They are interested in the system that Mr. Nutt has defined, a market-driven system. I have a 500-head preconditioning lot. I have been in animal ID since 1998. I have a computer, a printer, two readers in case one goes down, a hookup to the Internet, and a series of tags and taggers that are required for me to participate. That is a cost I have incurred because there is an economic advantage for me to participate. Average producers in our state do not see that economic advantage. They do not want a premises number assigned to their real estate.

This thing is primarily driven by treaties and other agreements we have made with the World Trade Organization. Sitting in the American Association of Bovine Practitioners meeting 2 years ago in Vancouver, Bruce and I told a group of about 600 veterinarians, the question was asked. "Mr. Knight, why are you so hell bent on getting this system on to my clients?" And he replied, "It is very simple. We want to be in compliance with the OIE by 2010." Now, some of you may not know what the OIE is, but it is the Office of International Epizootics. It is a World Trade-represented organiza-

tion that is in Belgium. It is the organization that is demanding that we have animal ID.

Now, if we get animal ID in the United States, that will be Canada and us and possibly Uruguay in the Western Hemisphere that have identified and put in place such a system. That puts us in a very unfair trading position.

I spent, in 2005, a couple of weeks in all of Central America, in Nicaragua, Honduras, Costa Rica. The only Central American country I didn't go to was Belize and Panama. And I can tell you, those countries are not going to participate in electronic mandatory animal ID. They have had cattle there since Columbus landed, and they have a hot-iron branding system that they like. You can even go to the poorest country in the Western Hemisphere in Haiti and they have a hot-iron brand certificate that must accompany the transfer of ownership of livestock.

There are many systems that our organization has in place. We do not oppose animal ID, but we do oppose it being mandatory. Our policy is very simple: If you want to participate, fine; if you don't, fine.

We have had very successful systems in the past that have worked and functioned to control and eradicate diseases. And those systems are being disingenuously negated by indicating that we must have a national animal ID system in place. I do agree that if we are going to have a system, it will be mandatory, and the cost of that mandatory system will be many times more than the $200 million figure that you have been given.

Thank you.

[The prepared statement of Dr. Thornsberry follows:]

PREPARED STATEMENT OF ROBERT MAX THORNSBERRY, D.V.M., M.B.A., PRESIDENT OF THE BOARD, R-CALF USA, RICHLAND, MISSOURI

Good morning Chairman Scott, Ranking Minority Member Neugebauer, and Members of the Subcommittee. I am Max Thornsberry, D.V.M., and I thank you for the opportunity to provide testimony regarding the Subcommittee's review of animal identification systems.

I am here today representing the cattle-producing members of R-CALF USA, the Ranchers-Cattlemen Action Legal Fund, United Stockgrowers of America. R-CALF USA is a membership-based, national, nonprofit trade association that represents exclusively United States farmers and ranchers who raise and sell live cattle. We have thousands of members located in 47 states and our membership consists of seed stock producers (breeders), cow/calf producers, backgrounders, stockers and feeders. The demographics of our membership are reflective of the demographics of the entire U.S. cattle industry, with membership ranging from the largest of cow/calf producers and large feeders to the smallest of cow/calf producers and small feeders. Our organization's mission is to ensure the continued profitability and viability for all independent U.S. cattle producers.

Today I will describe the various animal identification systems employed by the U.S. cattle industry and explain how, together with prudent disease prevention strategies, those systems have successfully prevented, controlled and eradicated animal diseases better than in any other country in the world. Also, I will address why the U.S. Department of Agriculture's (USDA's) proposed National Animal Identification System (NAIS) represents a weakening of our superior disease prevention, control and eradication strategies, and why the NAIS is ill-conceived, unnecessary, unworkable and un-American.

I. Introduction

The United States' success in preventing, controlling, and eradicating diseases and pests in livestock and preventing zoonotic diseases from infecting humans relies on the following three independent, though interrelated, strategies that I will list in descending order of effectiveness:

1. Disease Prevention (preventing the introduction of diseases into the U.S. cattle herd): consisting of good animal husbandry practices, vaccination programs, and border restrictions that disallow disease vectors from entering the United States.

2. Disease Control (halting the spread and dissemination of a disease inadvertently introduced into the U.S. cattle herd): consisting of disease reporting, disease surveillance, geographical containment, quarantines, restrictions on animal movements, identifying and monitoring animals-of-interest, and elimination of disease vectors.

3. Disease Mitigation (minimizing the risk of human exposure to potentially contaminated meat products when contamination is probable): consisting of the removal of high-risk tissues from human food and animal feed and enforcement of sanitary food processing and handling procedures.

As recently as 2003, 13 federal executive Departments and agencies, including USDA, Health and Human Services (HHS), Department of Commerce, and the U.S. Trade Representative formed a Federal Inter-Agency Working Group and reported to Congress on the actions by federal agencies to prevent foot-and-mouth disease (FMD), bovine spongiform encephalopathy (BSE), and related diseases. The group reinforced the need for each of foregoing strategies in order to protect the United States from the introduction and spread of bovine spongiform encephalopathy (BSE).[1]

II. Mandatory Animal Identification Is Not An Effective Disease Prevention Tool

Mandatory animal identification is not an effective tool for preventing the introduction of diseases into the U.S. cattle herd, and there is empirical evidence that the United States has unwittingly relied upon animal identification as a disease prevention measure to the detriment of the health of the U.S. cattle herd, the U.S. economy, and U.S. consumers. For example:

1. In its attempt to prevent the introduction of bovine tuberculosis (TB) and brucellosis into the U.S. cattle herd from Mexican cattle imports, USDA requires all Mexican cattle imported into the U.S. to be individually identified with a permanent brand or a numbered eartag.[2] However, USDA's Office of Inspector General (OIG) reported in 2006 that of the 272 bovine TB cases detected during the previous 5 years by U.S. slaughter surveillance, 75 percent (205) originated in Mexico, and these cases were detected in 12 U.S. states.[3] The OIG explained that because Mexican cattle spend many months on U.S. farms and ranches prior to slaughter, each bovine TB case is potentially spreading the disease in the United States.[4] Thus, not only is the mandatory animal identification of Mexican cattle not helping to control or eradicate TB in the U.S., its misapplication as a disease prevention tool is actually contributing to the spread of the disease, which continues to cause significant economic losses for U.S. farmers and ranchers, as well as increased health and safety risks to the U.S. cattle herd and consumers.

2. In an attempt to ensure compliance with the health and safety provisions contained in USDA's rule that reopened the Canadian border to imports of live Canadian cattle, despite Canada's ongoing BSE outbreak, USDA required, beginning in July 2005, that all Canadian imports be permanently and individually identified with eartags and brands (cattle imported in sealed trucks for immediate slaughter were exempted).[5] However, the OIG reported that USDA did not adequately meet required health and safety provisions designed to prevent the introduction of BSE.[6] In a March 2008 report, the OIG found that over 142,000 identified cattle and swine from Canada were slaughtered in U.S. slaughtering establishments without USDA ensuring that proper import proto-

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[1] See Animal Disease Risk Assessment, Prevention, and Control Act of 2001 (PL 107-9), Final Report, PL 107-9 Federal Inter-Agency Working Group, January 2003 (disease prevention and control strategies are found at 40, 41).

[2] See 9 CFR §§ 93.427(c), (d).

[3] See Audit Report: Animal and Plant Health Inspection Service's Control Over the Bovine Tuberculosis Eradication Program, U.S. Department of Agriculture, Office of Inspector General, Midwest Region, Report No. 50601-0009-Ch, September 2006, at 19, 20.

[4] See id., at iii.

[5] See 70 *Federal Register*, at 549.

[6] See Audit Report: USDA's Controls Over the Importation and Movement of Live Animals, Office of Inspector General, Midwest Region, Report No. 50601-0012-Ch, March 2008, et. seq.

cols were in place,[7] that USDA could not ensure that identified Canadian cattle even arrived at approved slaughtering establishments,[8] and that there were 145 indications of non-compliance with the health and safety standards contained in the agency's rule.[9] In addition, another OIG report revealed that USDA was not properly performing and/or enforcing ante-mortem inspections of cattle at slaughter and that a measure crucial to the protection of human health—the removal of specified risk materials (SRMs)—is not being performed properly, even at plants that slaughter cull cattle that have an inherently higher risk for BSE.[10] Thus, while individual animal identification was touted as a mitigation measure to help prevent the introduction and spread of BSE, as well as to prevent human exposure to the disease, the mandatory individual identification of Canadian cattle functioned as a false panacea that has effectively subjected the U.S. cattle herd and consumers to increased health risks.

R-CALF USA fully supports the mandatory identification of all imported cattle with a permanent hot-iron brand that would conspicuously denote the animals' country-of-origin. However, the importation of foreign cattle subject to such mandatory animal identification should only be allowed following a scientific determination that the country-of-origin of the imported cattle presents no known risk for any serious communicable disease. Because mandatory animal identification can neither prevent the introduction of disease, nor even mitigate potential introduction of disease, the purpose of such mandatory animal identification for imported cattle would be to facilitate the location and monitoring of cattle imported from a country that experiences a communicable disease outbreak subsequent to the scientific determination that the disease was not known to exist in that country.

III. USDA Provides No Evidence That Existing Disease Programs Are Inadequate

The U.S. has been highly successful in controlling and/or eradicating animal diseases following their introduction into the U.S. cattle herd. For example, of diseases that affect cattle, swine, or multiple species reportable to the World Organization for Animal Health (OIE) that have occurred in the U.S., contagious bovine pleuropneumonia has not reoccurred since 1892, foot-and-mouth disease (FMD) has not reoccurred since 1929, bovine babesiosis has not reoccurred on the U.S. mainland since 1943, classical swine fever has not reoccurred since 1976, brucellosis (Brucella melitensis) has not reoccurred since 1999, and porcine cysticercosis has not reoccurred since 2004.[11]

Bovine TB presented a significant risk to people and caused considerable losses in the cattle industry in the early 1900s, but by the 1990s USDA's Animal and Plant Health Inspection Service (APHIS) had reduced bovine TB prevalence to "very low levels."[12] Even despite the continued reintroduction of bovine tuberculosis (TB) in Mexican cattle, as discussed above, at the end of 2007 APHIS reported that "49 U.S. states (including Michigan's Upper Peninsula and part of New Mexico), Puerto Rico, and the U.S. Virgin Islands were considered Accredited TB Free."[13] In 1954, APHIS set out to eradicate brucellosis, and by the end of 2007 APHIS reported that "49 states, Puerto Rico, and the U.S. Virgin Islands were officially declared free of brucellosis."[14] According to APHIS, "The only known remaining reservoir of Brucella abortus infection in the Nation is in wild bison and elk in the Greater Yellowstone Area (GYA),"[15] and cattle in proximity to the GYA from both Montana and Wyoming have recently been infected.

Results such as these completely contradict USDA's claim that a radical, new, and unproven National Animal Identification System (NAIS) is now needed in order to

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[7] See Audit Report: USDA's Controls Over the Importation and Movement of Live Animals, Office of Inspector General, Midwest Region, Report No. 50601-0012-Ch, March 2008, at 29.
[8] See id., at 16.
[9] See id., at 8.
[10] See Audit Report: Evaluation of FSIS Management Controls Over Pre-Slaughter Activities, U.S. Department of Agriculture, Great Plains Region, Report No. 24601-0007-KC, November 2008, et. seq.
[11] See Table A2.3: Status of the Occurrence of OIE-Reportable Diseases in the United States, 2007, 2007 United States Animal Health Report, U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Agriculture Information Bulletin No. 803, issued September 2008, at 133, 134.
[12] 2007 United States Animal Health Report, U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Agriculture Information Bulletin No. 803, issued September 2008, at 29.
[13] Ibid.
[14] Id., at 35.
[15] Id., at 37.

effectively control the spread of animal diseases in the United States. Obviously, USDA did not lack necessary resources to control and eradicate animal disease outbreaks in the U.S. during the past 117 years.

Congress should take particular notice of APHIS' failure to provide any semblance of a scientific risk assessment to support its assertion that NAIS is now necessary to effectively control and eradicate animal diseases. In particular, Congress should demand from USDA a science-based evaluation of the epidemiological necessity and/or value of achieving 48-hour traceback—a stated goal of NAIS—to effectively control the range of diseases likely to affect livestock. This goal is without any scientific support and appears wholly arbitrary, particularly when one considers that many communicable diseases have long incubation periods and are slow spreading, e.g., brucellosis, bovine TB, and BSE. Moreover, communicable diseases that spread swiftly, such as FMD, require immediate geographical containment and quarantine strategies, not the identification of individual animals-of-interest. And, many diseases are spread by vectors other than domestic livestock, such as the spread of Rift Valley Fever by mosquitoes,[16] and therefore require very different containment and control strategies unrelated to livestock identification. R-CALF USA is disturbed by how decision makers have so uncritically subscribed to USDA's assertions regarding the need for NAIS without any substantiating scientific evidence.

IV. The Driving Force Behind NAIS Is A Desire To Conform To International Standards

This leads us to the fact that USDA's radical NAIS concept did not originate on U.S. soil and was not predicated on a need to improve the United States' ability to control the spread of animal diseases. Instead, the impetus for NAIS was the World Trade Organization's (WTO's) goal, formulated in 1995, of facilitating international trade through the liberalization of international trade rules.[17] Because livestock presented a unique challenge to international trade—i.e., a heightened potential for disease spread—the WTO relies upon the OIE to set international standards for managing the human health and animal health risks associated with trading livestock within a more liberalized, global trade environment.[18] As an inducement for the United States and other countries, which historically were averse to assuming the heightened risks associated with imported livestock, particularly livestock produced in developing countries where veterinary infrastructure was lacking, the OIE offered animal identification as a global strategy to mitigate such risks and to facilitate trade. In effect, the OIE sought to convince the United States and other developed countries to abandon their longstanding disease prevention strategies in favor of less effective disease management strategies necessitated by the OIE's trade liberalization goal. To accomplish this goal, the OIE encourages each of its 172 member-countries to "establish a legal framework for the implementation and enforcement of animal identification and animal traceability in the country."[19] Led by USDA, the United States, without conducting its own scientific analysis regarding the need for such a program, was among the first countries to oblige.

From the outset, USDA has aggressively lobbied Congress and the U.S. cattle industry to conform to the OIE's animal identification edict, and it continues to do so today. As recently as March 2008, former USDA Under Secretary for Marketing and Regulatory Programs Bruce Knight argued, in his speech on NAIS delivered at the Houston Livestock Show and Rodeo, that USDA needs to align U.S. rules with international guidelines. In support of NAIS, Knight stated:

> Other countries, which don't yet have their own traceability systems fully in place and therefore can't, under WTO rules, require it of other countries, will still prefer to purchase from sources that can demonstrate traceability . . . But the sooner producers in the U.S. and around the world get on board with animal ID, the more options they will have to market their livestock. In other

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[16] See Rift Valley Fever, Saudi Arabia, Impact Worksheet, USDA APHIS, Veterinary Services, Center for Emerging Issues, September 20, 2000, available at *http://www.aphis.usda.gov/vs/ceah/cei/taf/iw__2000__files/foreign/rvf__saudi0900e.htm.*

[17] See Understanding the WTO, World Trade Organization, Geneva, Switzerland, February 2007, at 1, 11, available at *http://www.wto.org/english/thewto__e/whatis__e/tif__e/utw__chap1__e.pdf.*

[18] See OIE Objectives, World Organization for Animal Health (OIE), Paris, France, available at *http://www.oie.int/eng/OIE/en__objectifs.htm#3.*

[19] Chapter 4.1, General Principals on Identification and Traceability of Live Animals, Terrestrial Animal Health Code, OIE, Article 4.1.1 (7), available at *http://www.oie.int/eng/normes/mcode/en__chapitre__1.4.1.htm#rubrique__tracabilite__d__animaux__vivants.*

words, traceability is the key to international sales and market expansion. Animal ID will open doors for producers everywhere. [20]

This evidence substantiates R-CALF USA's contention that the driving force behind NAIS is not a science-based determination that a 48-hour traceback, or any other component of NAIS, is needed to effectively prevent, control, and eradicate livestock diseases, but rather, it was the previous Administration's desire to lead the rest of the world toward full conformity with international trade standards regarding animal identification. [21] Further substantiating this contention is the universal scope of USDA's proposed NAIS, which originally intended to include bison, beef cattle, dairy cattle, swine, sheep, goats, camelids (alpacas and llamas), horses, cervids (deer and elk), poultry (eight species including game birds), and aquaculture (eleven species), regardless of their intended use as seedstock, commercial, pets or other personal uses. [22] Casting such a broad net that effectively encompasses nearly all animal species potentially subject to international trade, without regard to whether such animals would even be animals-of-interest in any particular epidemiological investigation, strongly suggests that USDA first established a goal to conform to international trade standards and then it subsequently worked backward in order to align its actions with a perceived source of authority. In other words, USDA decided to impose a national animal identification system on U.S. livestock producers and then it invented the need to achieve 48-hour disease traceback capabilities in order to justify and legitimize its pursuit.

IV. APHIS Has Improperly Imposed Nais On U.S. Livestock Producers

R-CALF USA believes that the goal of seeking conformity to international trade standards is a wholly inappropriate consideration for the exercise of APHIS' authority pursuant to the Animal Health Protection Act of 2002—the statute cited by USDA as its source of authority to implement NAIS. [23] In addition, R-CALF USA believes APHIS has far overreached any statutory authority it may have to require any type of animal identification by effectively implementing the foundational components of NAIS, i.e., registering individuals' private property in a federal database and registering individuals' livestock under a federal registry, without first initiating a rulemaking to afford the public any meaningful opportunity for comment. Indeed, contrary to claims made by APHIS that NAIS would remain voluntary, [24] thus assisting APHIS' effort to circumvent its rulemaking responsibilities, APHIS nevertheless mandated NAIS participation for producers participating in federal disease programs pursuant to an official memorandum issued by the agency on Sept. 22, 2008. [25] After objections raised by R-CALF USA and others, APHIS issued a new memorandum on Dec. 22, 2008, that canceled the memorandum issued on Sept. 22, 2008, though the practical effect on APHIS' mandate that producers participating in federal disease programs be registered under NAIS remained unchanged. [26]

VI. NAIS Imposes A Far Stricter And More Burdensome Standard On U.S. Livestock Producers Than USDA Imposes On Foreign Meatpacking Plants And Livestock From Foreign Countries

USDA, APHIS, and the USDA's Food and Safety Inspection Service (FSIS) have long argued that disease mitigation goals and food safety goals are best accomplished using a scientific, risk-based approach. Beginning in 1997, APHIS developed procedures to establish risk-based import requirements for livestock and livestock products imported into the United States, stating it would impose identical import

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[20] Animal ID and International Trade, Bruce I. Knight, Undersecretary for Marketing and Regulatory Programs, Houston Livestock Show and Rodeo, Houston, TX, March 4, 2008.

[21] See id. Former Under Secretary Bruce Knight reiterated USDA's often repeated mantra that "we need to lead by example, stressing the importance of OIE standards, to open markets as we encourage other countries to open theirs."

[22] See United States Animal Identification Plan, National Animal Identification Development Team, Version 4.1, Dec. 23, 2003, at 1.

[23] See Letter from U.S. Agriculture Secretary Tom Vilsack to Dr. R.M. Thornsberry, Feb. 23, 2009.

[24] See A Business Plan to Advance Animal Disease Traceability, USDA-APHIS, Version 1, September 2008, at 52 (APHIS reports that it published a document "to clarify NAIS as a voluntary program at the Federal level.").

[25] See Veterinary Services Memorandum No. 575.19, USDA-APHIS, Veterinary Services, Sept. 22, 2008 (the memorandum states that the premises identification number (PIN) established under NAIS "is to be the sole and standard location identifier for all VS [Veterinary Services] program activities" and that premises "will be registered in the NAIS.").

[26] See Veterinary Services Memorandum No. 575.19, USDA-APHIS, Veterinary Services, Dec. 22, 2008 ("All locations involved in the administration of VS [Veterinary Services] animal disease program activities conducted by VS personnel will be identified with a standardized [NAIS] PIN."

restriction on regions with identical risk situations.[27] In 2003, then Secretary of Agriculture Ann Veneman argued that there should be a more "practical, risk-based approach to trade" with countries such as Canada.[28] In 2005, APHIS publicly issued an official Response to R-CALF Factsheet, wherein the agency took great pains to argue that R-CALF USA was wrong in seeking stricter disease-related import controls because the agency's "scientifically sound, risk-based import and export standards" were the appropriate standards for disease control.[29] The OIG explained in 2008 that FSIS was using a "risk-based approach to select [foreign meatpacking] establishments" for safety inspections of foreign meatpacking plants.[30] The FSIS uses such inputs in selecting foreign establishments as "types and volume of product exported to the United States, past performance of an establishment's food safety controls of public health significance, and delistments of, or recommendations to delist, foreign establishments."[31]

USDA's NAIS, however, is the antithesis of a scientific, risk-based approach to disease mitigation as it treats each animal in the United States as if it were the subject of a disease investigation, registering each livestock owner's private property and tracking not only each animal's origin, but also its movements throughout its entire lifetime. Thus, while USDA, APHIS, and FSIS use a targeted, risk-based approach for determining which foreign animals are eligible for importation and which foreign meatpacking plants are subject to inspection, USDA does not intend to accord U.S. livestock producers or their livestock the same science-based consideration. Instead, USDA applies a double standard to U.S. livestock producers and their livestock by treating each and every one of them as a disease suspect. This inexplicable action by USDA is un-American.

VII. NAIS Is Void Of Practical Considerations For Controlling Animal Disease Outbreaks In The United States

A. APHIS has Misrepresented the Expanded Scope of Its Newly Defined Premises Registration Scheme

Contrary to claims made by APHIS that a foundational component of NAIS—the registration of producers' private property with a "premises identification"—has been part and parcel to the United States' successful brucellosis and bovine tuberculosis programs for decades,[32] there was no requirement for any specific geographical-based premises identification under either the brucellosis or tuberculosis programs.[33] In fact, the bovine TB program specifically authorized "a brand registered with an official brand registry" in lieu of a premises of origin identification.[34]

Firsthand and anecdotal evidence reveals that brucellosis eartags contain a numeric sequence that denotes the state of origin, the local veterinarian that affixed the tags, and a numbering sequence for each individual animal. The location, or premises, under which the paper records are maintained are completed by the local veterinarian licensed under the state animal health official, and he/she may identify the location where the animals were vaccinated and tagged using the name of the nearest town, the nearest highway intersection, or the physical address of the livestock owner. Importantly, the brucellosis and bovine TB programs most certainly did not include the premises identification number that is planned for use under

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[27] See Process for Foreign Animal Disease Evaluations, Regionalization, Risk Analysis, and Rulemaking, USDA-APHIS, Veterinary Services, National Center for Import and Export, 1997; see also 62 *Fed. Reg.*, at 56001.

[28] Transcript of Media Briefing with Agriculture Secretary Ann M. Veneman, Under Secretary for Farm and Foreign Agriculture Services, J.B. Penn, Under Secretary for Marketing and Regulatory Services Bill Hawks and Dr. Elsa Murano, Under Secretary for Food Safety regarding developments of the Canadian BSE Situation on Aug. 8, 2003, at 3.

[29] Response to R-CALF, APHIS Factsheet, USDA-APHIS, Feb. 2, 2005, at 2.

[30] Audit Report, Followup Review of Food and Safety Inspection Service's Controls over Imported Meat and Poultry Products, USDA Office of Inspector General, Northeast Region, Report No. 24601-08-Hy, August 2008, at 6.

[31] Id., at fn. 21.

[32] Veterinary Services Memorandum No. 575.19, USDA-APHIS, Veterinary Services, Dec. 22, 2008, at 2 ("VS [Veterinary Services] animal health programs have used premises identification for many years. For example, premises information was used in the early 1980s to support the eradication of brucellosis and tuberculosis in cattle.").

[33] See 69 Federal Register, at 64646, col. 3 ("The new definition of premises identification number (PIN) differs from the definition it is replacing not only in recognizing the new numbering system but also in recognizing a premises based on a state or federal animal health authority's determination that it is a geographically, rather than epidemiologically, distinct animal production unit.").

[34] See 9 CFR § 77.2 (definition of premises of origin identification in APHIS regulations as of Jan. 1, 2004).

NAIS, and which became effective under APHIS' final rule on July 18, 2007.[35] The premises identification number used prior to this recent rulemaking was defined as:

> [A] State's two-letter postal abbreviation followed by a number assigned by the state animal health official to a livestock production unit that is, in the judgment of the state animal health official or area veterinarian in charge, epidemiologically distinct from other livestock production units.[36]

Thus, the original premises identification number was predicated on the state of origin and assigned by the local veterinarian acting under the state animal health official, without any requirement to register a livestock producer's private property. This is radically different than the new premises identification number planned for use under NAIS. The new NAIS premises identification number usurps the sole judgment of the state animal health official by authorizing the federal government to make the assignment; it no longer expressly requires the state of origin identifier; and, it expressly requires the registration of real property. The newly developed premises identification number under the NAIS scheme is:

> A nationally unique number assigned by a state, Tribal, and/or Federal animal health authority to a premises that is, in the judgment of the state, tribal, and/or Federal animal health authority, a geographically distinct location from other premises. The premises identification number is associated with an address, geospatial coordinates, and/or other location descriptors which provide a verifiably unique location.[37]

Thus, APHIS has radically changed its preexisting disease programs by commandeering what was previously exclusive state and local control over the information required to identify livestock and livestock production units. The effect of this radical change is that livestock producers are now subject to a federal registration of their real property and a federal registration of their personal property (i.e., livestock) under the NAIS.

B. NAIS Unnecessarily Ignores and Supplants Preexisting, Time-Proven Animal Identification Systems

For over a century, USDA has effectively used various means of animal identification to control and eradicate animal diseases. Importantly, USDA, state animal health officials and Tribal animal health officials employed a science-based methodology to identify animals-of-interest in a specific disease program and targeted those animals for identification and subsequent monitoring and surveillance. For slow spreading diseases with long incubation periods, such as brucellosis, government officials targeted those animals in states where brucellosis was likely to exist and that would also be expected to enter the U.S. breeding herd. In other words, those officials targeted those animals that would not be slaughtered before the targeted disease could incubate to infectious levels. The programs involved the vaccination of animals retained for breeding purposes, eartagging the animals with official metal eartags, tattooing the animals, and surveillance for the disease at certain marketing points and at slaughterhouses.

Under the preexisting brucellosis program, if a positive brucellosis case were detected by surveillance, the animal's metal eartag and tattoo provided immediate traceback to the state of origin and to the local veterinarian that vaccinated the animal, and in some incidences the production unit, as determined by the state, where the animal was vaccinated. In the event of a lost eartag or unreadable tattoo on an animal found positive through surveillance, government officials could access information about specific animals through various other sources including:

> 1. Hot-iron or freeze brands, tattoos, and/or ear notches registered under any one of the 15 or more states that maintain state brand programs,[38] several of which recognize brands as an official identification for disease control purposes.[39]
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> 2. Animal identification systems consisting of eartags and tattoos used by breed associations that maintain registries of such animals.

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[35] See 72 *Federal Register*, 39301-39307.
[36] 69 Federal Register, at 64646, cols. 2, 3.
[37] 72 *Federal Register*, at 39306, cols. 1, 3; 39307, col. 1.
[38] See *A Business Plan to Advance Animal Disease Traceability*, USDA-APHIS, Version 1.0, September 2008, at 37 (APHIS states there are 15 states with brand inspection programs with either full or partial state participation).
[39] See *National Animal Identification System*: USDA Needs to Resolve Several Key Implementation Issues to Achieve Rapid and Effective Disease Traceback, U.S. Government Accountability Office, GAO-07-592, July 2007, at 19.

3. Animal identification systems and records used and maintained by private individuals that may consist of eartags, tattoos, ear notches, and dewlap notches.

4. Backtags affixed and recorded at auction yards and other locations.

5. Health certificates used in interstate commerce that either describe or identify the animal(s) transported.

6. Sales receipts and other documents used in commerce.

Local veterinarians and state and tribal animal health officials are the first lines of defense for any disease outbreak and they have used any one or more of these preexisting animal identification systems and devices to successfully conduct animal disease tracebacks in cooperation with APHIS.

C. APHIS Is Disingenuous in Its Attempt to Promote NAIS by Dismissing the Effectiveness of Preexisting Systems

APHIS highlights several case studies in its efforts to promote NAIS. However, the isolated cases it cites are the result of APHIS' dilatory actions to prevent the introduction of foreign animal diseases into the United States and its failure to contain diseases in wildlife. First, APHIS cites the detection of BSE in an imported Canadian cow on Dec. 23, 2003, which resulted in the widespread closure of U.S. beef export markets that have yet to be fully restored.[40] Disturbingly, this imported cow was identified with an official Canadian eartag, and USDA refused to disclose this fact until after U.S. export markets were closed around the world.[41] This is significant because history shows that world markets react very differently when a BSE case is detected only in imported cattle. This different reaction was evidenced when Canada detected its first case of BSE in 1993, in an animal imported from Europe.[42] At that time, APHIS took steps to track, monitor, and test cattle that had also been imported into the U.S. from Europe during the '80s, as well as animals imported from Japan after Japan detected its first case of BSE.[43] However, and despite, the fact that Europe had already instituted a feed ban that prohibited meat-and-bone meal in ruminant feed in 1988 and subsequently upgraded its feed ban in 1990 to prevent the spread of BSE,[44] and despite the fact APHIS knew that Canada likely had rendered dozens of cattle that it had imported from Europe,[45] APHIS took no action: 1) to require Canada to immediately implement a feed ban as a precondition to importing live cattle into the U.S.; 2) to restrict, track, or monitor live cattle imports from Canada; and, 3) took no immediate action to encourage the U.S. Food and Drug Administration (FDA) to implement a feed ban in the U.S. that would mitigate the higher-risk imports from Canada. In fact, the U.S. did not implement a feed ban until late 1997. Thus, the 2003 introduction of BSE into the United States was the result of APHIS' failure to restrict imports from Canada even after Canada was known to harbor a significant risk for BSE. APHIS' NAIS would not, and will not, prevent the introduction of diseases from countries that harbor significant health risks such as BSE, brucellosis, bovine TB, or FMD. The only means of preventing the introduction of such diseases is by restricting imports from countries known to harbor such diseases.

APHIS' second and third case studies involve the 2005 and 2006 detections of BSE in a 12-year-old cow (born in 1993) in Texas and a 10-year-old cow (born in 1995) in Alabama, respectively.[46] NAIS would neither have prevented these cases,

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[40] See A Business Plan to Advance Animal Disease Traceability, USDA-APHIS, Version 1.0, September 2008, at 77.

[41] See BSE (Bovine Spongiform Encephalopathy, or Mad Cow Disease), Department of Health and Human Services, Centers for Disease Control and Prevention, Web site at *http://www.cdc.gov/ncidod/dvrd/bse/* ("Trace-back based on an ear-tag identification number and subsequent genetic testing confirmed that the BSE-infected cow was imported into the United States from Canada in August 2001.").

[42] See 72 *Federal Register*, at 53320, col. 1.

[43] See Animal Disease Risk Assessment, Prevention, and Control Act of 2001 (PL 107-9), Final Report, P.L. 107-9 Federal Inter-Agency Working Group, January 2003, at 49.

[44] See *Evaluation of the Potential for Bovine Spongiform Encephalopathy in the United States*, Joshua T. Cohen, et al., Harvard Center for Risk Analysis, Harvard School of Public Health, at 38.

[45] See U.S. Department of Agriculture's Summary of the Epidemiological Findings of North American Bovine Spongiform Encephalopathy Positive Cattle, USDA, April 2005, at 17 ("Of those [imported European cattle] that were not found alive [in Canada], it was determined that 68 had potentially gone into the rendering stream after being slaughtered (59) or dying on farm (nine).").

[46] See *A Business Plan to Advance Animal Disease Traceability*, USDA-APHIS, Version 1.0, September 2008, at 77.

nor would it have provided any more meaningful traceback information than could have been obtained if the animals were subject to the brucellosis-type identification program. Scientists have determined that neither of these cases was of the "typical BSE strain" found in Canada and the United Kingdom.[47] Instead, the U.S. cases are of the "atypical BSE strain," which is not definitively known to be transmitted through feed and may represent sporadic disease.[48] Both of these cases were born before 1997, the date the U.S. finally implemented a feed ban to arrest the potential spread of BSE.[49] Even assuming that these cases were caused by the consumption of contaminated feed, and given the long incubation period for BSE, the best solutions to protect human health and livestock health is to prevent this non-indigenous disease from being introduced into the U.S. by prohibiting imports from countries known to have infected cattle, enforcing the U.S. feed ban to prevent any potential spread, increasing surveillance, and continuing the removal of high-risk tissues from human food. After testing approximately three quarters of a million cattle from 2004 through 2006, and 40,000 cattle per year thereafter, the U.S. has found no evidence of any spread of BSE in the U.S. cattle herd following the 1997 feed ban.[50]

APHIS also cites TB case studies during the years 2004-2007 in support of NAIS.[51] However, and as discussed previously, APHIS knows that it is continually reintroducing bovine TB via imported Mexican cattle, which are believed to be spreading bovine TB during the months those cattle spend in the U.S. prior to slaughter, and yet, the agency has failed to take any meaningful steps to halt this unacceptable disease reintroduction. Moreover, APHIS' NAIS fails to address how NAIS would better control bovine TB when it is not only continually reintroduced in Mexican cattle, but also, tuberculosis is endemic in U.S. wildlife populations. APHIS, for example, reports that in the state of Michigan, "[c]ontrolling bovine TB in the deer populations is of great importance in the program to eradicate bovine TB in the cattle population. The primary method of disease control involves testing and slaughtering of infected deer."[52] APHIS is disingenuous in its attempts to promote NAIS as being able to control diseases such as bovine TB by achieving the capacity to identify cattle populations "identified to premises of origin within 48 hours,"[53] particularly when primary sources of the disease are foreign countries and wildlife.

APHIS further cites the brucellosis case detected in Montana in 2007, without even mentioning in its case study the fact that the likely source of the disease was wildlife in the Greater Yellowstone Area. Elsewhere, APHIS states that "[t]he presence of brucellosis in the wild, free-ranging bison and elk herds in the Greater Yellowstone Area presents a continual challenge for Brucellosis program eradication efforts in the United States."[54] The source of brucellosis detected in both Montana and Wyoming in 2008, according to APHIS, was infected free-ranging elk.[55] APHIS' resources would be better spent focusing on the known sources of diseases to pre-

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[47] See BSE (Bovine Spongiform Encephalopathy, or Mad Cow Disease), Department of Health and Human Services, Centers for Disease Control and Prevention, Web site at *http://www.cdc.gov/ncidod/dvrd/bse/*.

[48] See BSE (Bovine Spongiform Encephalopathy, or Mad Cow Disease), Department of Health and Human Services, Centers for Disease Control and Prevention, Web site at *http://www.cdc.gov/ncidod/dvrd/bse/*.

[49] See *Mad Cow Disease: Improvement in the Animal Feed Ban and Other Regulatory Areas Would Strengthen U.S. Prevention Efforts*, U.S. Government Accountability Office (formally Government Accounting Office), GAO-02-183, January 2002, at 9.

[50] See Bovine Spongiform Encephalopathy (BSE) Enhanced Surveillance Program, U.S. Animal Health and Productivity Surveillance History, USDA-APHIS Veterinary Services, available at *http://nsu.aphis.usda.gov/inventory/activity.faces?INVENTORY__NUMBER=44*; see also Bovine Spongiform Encephalopathy (BSE) Ongoing Surveillance Program, U.S. Animal Health and Productivity Surveillance History, USDA-APHIS Veterinary Services, available at 77, 79.

[51] See A Business Plan to Advance Animal Disease Traceability, USDA-APHIS, Version 1.0, September 2008, at 77, 79.

[52] Michigan Bovine Tuberculosis Eradication Project, U.S. Animal Health and Productivity Surveillance History, USDA-APHIS Veterinary Services, available at *http://nsu.aphis.usda.gov/inventory/activity.faces?INVENTORY__NUMBER=337*.

[53] A Business Plan to Advance Animal Disease Traceability, USDA-APHIS, Version 1.0, September 2008, at 59.

[54] Bovine Brucellosis Eradication Program, U.S. Animal Health and Productivity Surveillance History, USDA-APHIS Veterinary Services, available at *http://nsu.aphis.usda.gov/inventory/activity.faces?INVENTORY__NUMBER=117*.

[55] See Status Report__Fiscal Year 2008, Cooperative State-Federal Brucellosis Eradication Program, Debbi A. Donch and Arnold A. Gertonson, USDA-APHIS Veterinary Services, available at *http://www.aphis.usda.gov/animal__health/animal__diseases/brucellosis/downloads/yearly__rpt.pdf*.

vent their introduction into the U.S. cattle herd rather than to subject the entire U.S. livestock industry to the invasive scheme contemplated in the NAIS.

As evidenced by APHIS' Status of Current Eradication Programs found at Appendix 1, the agency has been highly successful at eradicating cattle diseases using existing resources. Given the lack of any scientific analysis regarding the expected change the NAIS would have on APHIS' current rate of successful disease eradication, Congress should avoid the agency's efforts to supplant its time-proven programs with an unproven system that is likely to consume more resources in its administration (i.e., in its reporting, tracking, and monitoring animal movements and managing colossal databases) than the agency now spends in preventing, controlling and eradicating disease.

VIII. The Costs Of Compliance With Nais Will Accelerate The Exodus Of U.S. Farmers And Ranchers

A. The Cattle Industry Suffers From a Long-Run Lack of Profitability that Would Worsen if Producers are Subjected to Additional Costs of Production

For decades, Congress and USDA have ignored the effects on U.S. livestock producers of the tremendous buying power exercised by oligopolistic meatpackers. As a result, anticompetitive practices abound, and the once competitive marketplace is now heavily tilted in favor of corporate agribusiness. This has created a long-run lack of profitability for independent family farmers and ranchers who are marketing into a system that persistently produces prices too low to cover their cost of production. The results are alarming, as independent farmers and ranchers in each of the major livestock sectors are exiting their respective industries at phenomenal rates.

For example: 90 percent of U.S. hog operations exited the industry since 1980, their numbers falling from 667,000 in 1980 to only 67,000 in 2005; over 40 percent of U.S. sheep operations exited the industry during this period, their numbers falling from 120,000 to only 68,000 in 2005. About 40 percent of cattle operations exited the industry during this period as well, falling from 1.6 million to 983,000 in 2005.1A[56] These data show that U.S. livestock industries are unhealthy and contracting rapidly. The NAIS will significantly accelerate the exodus of U.S. farmers and ranchers.

According to USDA's Economic Research Service (ERS), the average return to U.S. cow/calf producers in 2007 was an operating loss of $46.25 per bred cow.[57] When total production costs are included, such as hired labor and taxes and insurance, the actual loss per bred cow in 2007 was $608.08.[58]

Since 1996, the year the U.S. cattle industry began its unprecedented herd liquidation, the average return to U.S. cow/calf producers was an operating loss of $6.42 per bred cow per year.1A[59] Again, when total production costs are included, such as hired labor and taxes and insurance, the actual loss per bred cow per year from 1996 through 2007 was $493.87.1A[60]

During this period, 1996-2007, when U.S. cattle producers experienced this average actual loss of $493.87 per bred cow per year, 228,880 U.S. cattle operations exited the industry, their numbers falling from 1.2 million to 965,510, and the number of operations fell further in 2008 to 956,500.[61] Thus, during the past dozen years, U.S. cattle operations have exited the industry at a rate of over 19,000 operations per year, the equivalent of losing more cattle operations each year than are in the entire states of California, Colorado, or Idaho.[62]

Mr. Chairman and Members of the Subcommittee, this is not a natural attrition rate—this is a crisis, and until Congress takes action to correct the long-run lack

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[56] See 72 *Federal Register*, at 44681, col. 2.

[57] See Cow/Calf Production Costs and Returns Per Bred Cow, 1996-2007, Data Sets: Cow-calf, USDA Economic Research Service, available at *http://www.ers.usda.gov/data/CostsandReturns/testpick.htm.*

[58] See id.

[59] See id.

[60] See id.

[61] See Cattle, USDA National Agricultural Statistics Service, Mt An 2-1 (1-97), available at *http://usda.mannlib.cornell.edu/usda/nass/Catt//1990s/1997/Catt-01-31-1997.pdf*; See also Farms, Land in Farms, and Livestock Operations: 2008 Summary, USDA National Agricultural Statistics Service, Sp Sy 4(09), February 2009, at 14, available at *http://usda.mannlib.cornell.edu/usda/current/FarmLandIn/FarmLandIn-02-12-2009.pdf*. See Farms, Land in Farms, and Livestock Operations: 2008 Summary, USDA National Agricultural Statistics Service, Sp Sy 4(09), February 2009, at 18, available at

[62] See Farms, Land in Farms, and Livestock Operations: 2008 Summary, USDA National Agricultural Statistics Service, Sp Sy 4(09), February 2009, at 18, available at *http://usda.mannlib.cornell.edu/usda/current/FarmLandIn/FarmLandIn-02-12-2009.pdf*.at 18 (In 2007, California had 16,000 operations, Colorado had 14,700 operations, and Idaho had 10,600 operations).

of profitability in the U.S. cattle industry, we will continue hollowing out rural communities all across America.

The NAIS would significantly worsen the crisis caused by a lack of profitability because it would add additional production costs to an industry already unable to recover its cost of production from the marketplace.

B. The Projected Costs of NAIS are Significant and Untenable for An Industry Unable to Recover Its Costs of Production From the Marketplace

APHIS has not provided the public with a cost/benefit analysis for NAIS despite having aggressively promoted the program and having expended millions of taxpayer dollars to promote the program over the past several years. However, in 2003 USDA published estimates of the cost of verifying the origins of cattle during its early rulemaking for mandatory country-of-origin labeling. The estimates published by USDA included those submitted by Sparks Company Inc. and Cattle Buyers Weekly (Sparks/CBW), and E.E. Davis, both of which estimated the cost of animal identification for U.S. cattle producers.[63] Sparks/CBW estimated that the cost to cattle producers for verifying the origins of cattle using animal identification would range from $8.63 to $10.63 per head, and E.E. Davis estimated costs for cattle producers of up to $15.30 per head.[64]

More recently, Kansas State University (KSU) developed a spreadsheet "to assist livestock producers and others in the industry with estimating the costs associated with an individual animal identification system," though it asserts that not all the costs included in its spreadsheet would be required under NAIS.[65] Though it is unclear to R-CALF USA whether the costs included by KSU are understated or overstated, the spreadsheet estimates are very similar to the earlier estimates published by USDA. For example, KSU estimates the cost per head for a producer with 100 head of brood cows at $15.90 per head.[66] Importantly, the KSU spreadsheet reveals that larger cattle operations would pay significantly less per animal than would smaller operations, e.g., the estimated cost for a producer with 400 brood cows is $6.14 per head.[67] Thus, it would appear from the KSU data that the average-sized cattle operation in the United States, which consists of approximately 44 cows per herd, would be expected to incur costs that are considerably more per head than the $15.90 estimate for a herd size of 100 head.

This substantial inverse cost scaling, i.e., costs become substantially lower as operation size becomes larger, will significantly disadvantage small- to medium-sized cattle operations in the marketplace, thus encouraging the further corporatization of the U.S. cattle industry. And, as previously stated, adding additional costs on U.S. cattle producers who are already suffering from a long-run lack of profitability will accelerate the ongoing exodus of family farmers and ranchers from the U.S. cattle industry.

C. Evidence Shows that the Scope of the NAIS is Beyond Contemplation, and Similar, Though Much Smaller, Programs Attempted Elsewhere are Fraught with Problems

In a 2006 news conference, former Agriculture Secretary Mike Johanns said in regard to the NAIS:

> First thing I would say is that to describe this as a massive project is to underdescribe how big this is and how significant it is and how much is involved. I'll just take one industry, the cattle industry. At any given time you have 90 to 100 million head of cattle in the United States. There has never been a system put in place that would deal with that kind of magnitude. And we are talking about a system that literally says from the time of their birth on through the entire chain, we will trace that animal until we can ascertain where the animal finally was processed. So just a huge undertaking.[68]

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[63] See 68 *Federal Register*, at 61962, cols. 2, 3.

[64] See id., at 61964, cols. 1, 2.

[65] See RFID Cost.xls—A Spreadsheet to Estimate the Economic Cost of a Radio Frequency Identification (RFID) System, Version 7.6.06, available at *www.agmanager.info/livestock/budgets/production/beef/RFID%20costs.xls.*

[66] See id.

[67] Average herd size calculated by dividing the number of U.S. cows and heifers that have calved in 2008 (41,692,000) by the number of U.S. operations with cattle and calves in 2008 (956,500).

[68] Transcript of Tele-News Conference with Agriculture Secretary Mike Johanns And Dr. John Clifford, USDA's Chief Veterinarian Regarding the National Animal Identification System Washington, D.C.—April 6, 2006.

More recently, in 2008, former USDA Under Secretary Bruce Knight said in regard to conducting a cost/benefit analysis for NAIS:

> I want to share a couple of other efforts that we're involved in regarding animal ID. One is a benefit-cost analysis of NAIS that researchers at Kansas State University are conducting for us. To the best of our knowledge, no other country has studied this. It is a massive undertaking, but necessary to advance the U.S. ID system. We believe this study will provide empirical evidence that animal ID is worth the effort we're putting into it-and that producers put into it also.[69]

These statements demonstrate that the NAIS is a colossal program, certain to have impacts that reach far beyond what anyone has presently contemplated. R-CALF USA is convinced NAIS will be a colossal failure—necessitating a whole new bureaucracy just for its administration and resulting in a new era of unwarranted government intrusion on the personal lives and private property of U.S. livestock producers.

The former president of the Australia Beef Association and a fifth-generation cattleman from Australia, John Carter, whose family, incidentally, registered the first-ever cattle brand in Australia in 1853, produced a short but compelling video on how Australia's attempts to administer its National Livestock Identification System have been a disaster for Australian producers. I have provided a copy of Mr. Carter's video in DVD format for the Subcommittee, and you will find that he also references a report from the United Kingdom, which he says reveals significant problems with the animal identification program underway in Europe, as well.

IX. Solutions To The Legitimate Challenge Of Expanding Disease Traceback Capabilities And Improving Information Sharing Among And Between Federal, State, And Tribal Officials

A. NAIS is an Unreasonable and Unnecessary Response to the Legitimate Need for Improving U.S. Disease Prevention, Control, and Mitigation

APHIS has raised perhaps only two legitimate disease traceback concerns regarding the nation's continued ability to effectively control and eradicate diseases during the agency's entire, multi-year campaign to promote NAIS:

First, APHIS has acknowledged that as a direct result of the successful eradication of diseases under APHIS' preexisting disease programs, there are now fewer producers (and likely fewer livestock) participating in federal disease programs.[70]

Second, APHIS acknowledges difficulties in sharing information between and among Federal and state animal health officials.[71]

R-CALF USA views both these concerns as legitimate challenges to the United States' continued ability to successfully control cattle disease outbreaks and eradicate diseases. R-CALF USA believes that both of these challenges can be effectively addressed using statistical, science-based solutions that do not, as NAIS does, infringe upon the private property rights and rights and expectations of privacy of U.S. livestock producers, impose significant compliance costs on U.S. livestock producers, impose burdensome reporting requirements on U.S. producers, favor corporate agribusiness over U.S. family farmers and ranchers, result in the storage of U.S. producer information in a foreign country's database,[72] require a whole new federal bureaucracy, or subject U.S. producer and livestock information to a heightened risk of mischievous access by livestock buyers or anti-livestock groups.

B. A More Practical Solution to Prevent, Control, and Mitigate Diseases in the U.S.

R-CALF USA urges Congress and USDA to immediately cease all efforts to implement the NAIS. Instead, R-CALF USA recommends that Congress and USDA focus on targeted solutions to the legitimate livestock disease-related challenges faced by

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[69] Animal ID and International Trade, Bruce I. Knight, Undersecretary for Marketing and Regulatory Programs, Houston Livestock Show and Rodeo, Houston, TX, March 4, 2008.

[70] See Animal ID and International Trade, Bruce I. Knight, Undersecretary for Marketing and Regulatory Programs, Houston Livestock Show and Rodeo, Houston, TX, March 4, 2008, at 3 ("Further, these days fewer beef producers are participating in disease programs as eradication efforts have been successful.").

[71] See Veterinary Services Memorandum No. 575.19, USDA-APHIS, Veterinary Services, Dec. 22, 2008 ("Differences in the information systems have historically existed among the Federal and State animal health information systems . . . [and] were not compatible or capable of begin integrated across systems.").

[72] See Record Retention Authorization (RDA) No. 00292000, Wisconsin Department of Agriculture Trade and Consumer Protection (WDATCP), Division of Animal Health—Livestock Premises Registration, January 2008 (showing that Wisconsin's livestock premises database records are maintained in an electronic oracle database in Canada and current records are required by USDA to be retained for 5 years in accordance with the USAIP (U.S. Animal Identification Plan).

U.S. livestock producers, and take steps to meaningfully address legitimate food safety challenges, as evidenced by recent, and massive, recalls of meat produced in U.S. slaughtering plants.

Specifically, R-CALF USA recommends the following alternative course:

1. Prevent the importation of serious cattle diseases and pests from foreign sources:
   a. Prohibit the importation of livestock from any country that experiences outbreaks of serious zoonotic diseases, including pests, until scientific evidence demonstrates the diseases and/or pests have been eradicated or fully controlled and there is no known risk of further spread. This recommendation includes a request for an immediate ban on live cattle imports from Canada, which harbor a heightened risk for BSE.
   b. Require all imported livestock to be permanently and conspicuously branded with a mark of origin so identification can be made if a zoonotic disease or serious pest outbreak occurs in the exporting country subsequent to importation.
   c. Require all livestock imported into the United States to meet health and safety standards identical to those established for the United States, including adherence to U.S. prohibitions against certain feed ingredients, pesticide use on feedstuffs, and certain livestock pharmaceuticals.
   d. Require TB testing of all imported Mexican cattle and further require that all Mexican cattle remain quarantined in designated feedlots until slaughtered.
   e. Reverse USDA's efforts to carve out regions within disease-affected foreign countries in order to facilitate imports from the affected country before the disease of concern is fully controlled or eradicated.
   f. Increase testing of all imported meat and bone meal to prohibit contaminated feed from entering the United States.
2. Adopt the surveillance and identification components of the preexisting brucellosis program, including the metal eartag and tattoo that identifies the state-of-origin and the local veterinarian that applied the identification devices, and require breeding stock not otherwise identified through breed registries to be identified at the first point of ownership transfer.
3. State and tribal animal health officials should be solely responsible for maintaining a statewide database for all metal tags applied within their respective jurisdictions and should continue to use the mailing address and/or the production unit identifier determined appropriate by the attending veterinarian to achieve traceback to the herd of origin should a disease event occur. Under no circumstances should the Federal government maintain a national registry of U.S. livestock or require the national registration of producers' real property.
4. The Federal government should enter into agreements with state and tribal animal health officials to pay for the state's and tribal government's cost of identifying breeding stock, maintaining the state and tribal databases, and bolstering disease surveillance at livestock collection points such as livestock auction yards and slaughtering plants, including increased surveillance for BSE.
5. The Federal government should coordinate with the states and tribes to establish electronic interface standards and establish improved communication protocols so it can more effectively coordinate with the states and tribes in the event of a disease outbreak.
6. The Federal government should coordinate with the states and tribes to establish improved protocols for the retention and searchability of state and tribal health certificates, brand inspection documents, and other documents used to facilitate interstate movement of livestock.
7. Establish specific disease programs and focus increased resources toward the eradication of diseased wildlife in states where wildlife populations are known to harbor communicable diseases.

To address the challenge of increased incidences of tainted meat products, Congress and USDA should implement a requirement that meat sold at retail and at food service establishments be traceable back to the slaughterhouse that produced the meat from live animals, not just back to the processor that may have further processed tainted meat. This simple improvement would enable investigators to determine and address the actual source of meat contamination—primarily the unsanitary conditions that allow enteric-origin pathogens to contaminate otherwise healthful meat.

X. Conclusion

R-CALF USA greatly appreciates the Subcommittee's investigation of the NAIS and we trust that you will not allow USDA to carry through with this unacceptable

proposal. R-CALF USA stands ready to assist Congress and USDA in the development and implementation of a more reasonable, workable, and effective program to continue protecting U.S. livestock and consumers from diseases that affect livestock.

Sincerely,



R.M. "MAX" THORNSBERRY, D.V.M.,
R-CALF USA President of the Board,
Attachments: DVD of Cattle Identification in Australia

APPENDIX I

Status of Current Eradication Programs

Current VS disease eradication programs include cooperative State-Federal efforts directed at cattle and swine brucellosis; bovine and cervid tuberculosis; and pseudorabies in swine. The following table shows the status of States in these programs.

State	Cattle Brucellosis*	Swine Brucellosis**	Bovine TB***	Cervid TB***	Pseudorabies****	Scrapie*****
	Last Update Jan. 1, 2009	Last Update Jan. 1, 2009	Last Update Jan. 1, 2009	Last Update Jan. 1, 2009	Last Update Jan. 1, 2009	Last Update Jan. 1, 2009
AL	Free	Free	Free	MA	Stage 5	Consistent
AK	Free	Free	Free	MA	Stage 5	Consistent
AR	Free	Free	Free	MA	Stage 5	Consistent
AZ	Free	Free	Free	MA	Stage 5	Consistent
CA	Free	Free	MAA	MA	Stage 5	Consistent
CO	Free	Free	Free	MA	Stage 5	Consistent
CT	Free	Free	Free	MA	Stage 5	Consistent
DE	Free	Free	Free	MA	Stage 5	Consistent
FL	Free	Free	Free	MA	Stage 5	Consistent
GA	Free	Free	Free	MA	Stage 5	Consistent
HI	Free	Free	Free	MA	Stage 5	Consistent
IA	Free	Free	Free	MA	Stage 5	Consistent
ID	Free	Free	Free	MA	Stage 5	Consistent
IL	Free	Free	Free	MA	Stage 5	Consistent
IN	Free	Free	Free	MA	Stage 5	Consistent
KS	Free	Free	Free	MA	Stage 5	Consistent
KY	Free	Free	Free	MA	Stage 5	Consistent
LA	Free	Free	Free	MA	Stage 5	Consistent
MA	Free	Free	Free	MA	Stage 5	Consistent
MD	Free	Free	Free	MA	Stage 5	Consistent
ME	Free	Free	Free	MA	Stage 5	Consistent
MI	Free	Free	MA/MAA/Free	MA	Stage 5	Consistent
MN	Free	Free	MA/MAA	MA	Stage 5	Consistent
MO	Free	Free	Free	MA	Stage 5	Consistent
MS	Free	Free	Free	MA	Stage 5	Consistent
MT	Class A	Free	Free	MA	Stage 5	Consistent
NC	Free	Free	Free	MA	Stage 5	Consistent
ND	Free	Free	Free	MA	Stage 5	Consistent
NE	Free	Free	Free	MA	Stage 5	Consistent
NH	Free	Free	Free	MA	Stage 5	Consistent
NJ	Free	Free	Free	MA	Stage 5	Consistent
NM	Free	Free	MAA	MA	Stage 5	Consistent
NV	Free	Free	Free	MA	Stage 5	Consistent

NY	Free	Free	Free	MA	Stage 5	Consistent
OH	Free	Free	Free	MA	Stage 5	Consistent
OK	Free	Free	Free	MA	Stage 5	Consistent
OR	Free	Free	Free	MA	Stage 5	Consistent
PA	Free	Free	Free	MA	Stage 5	Consistent
RI	Free	Free	Free	MA	Stage 5	Consistent
PR	Free	Free	Free	MA	Stage 5	Consistent
SC	Free	Free	Free	MA	Stage 5	Consistent
SD	Free	Free	Free	MA	Stage 5	Consistent
TN	Free	Free	Free	MA	Stage 5	Consistent
TX	Free	Stage 2	Free	MA	Stage 5	Consistent
UT	Free	Free	Free	MA	Stage 5	Consistent
VA	Free	Free	Free	MA	Stage 5	Consistent
VI	Free	Free	Free	MA	Stage 5	Consistent
VT	Free	Free	Free	MA	Stage 5	Consistent
WA	Free	Free	Free	MA	Stage 5	Consistent
WI	Free	Free	Free	MA	Stage 5	Consistent
WV	Free	Free	Free	MA	Stage 5	Consistent
WY	Free	Free	Free	MA	Stage 5	Consistent

* Class A (less than .25 percent herd infection rate) or Class Free
** Stage 1, 2 or Free
*** Modified Accredited (MA), Accredited Free (Free) or Modified Accredited Advance (MAA)
**** Stage 1, 2, 3, 4 or Free
***** A State that APHIS has determined, conducts an active State scrapie control program consistent with Federal requirements.

Disease control and eradication measures include quarantines to stop the movement of possibly infected or exposed animals; testing and examination to detect infection; destruction of infected (sometimes exposed) animals to prevent further disease spread; treatment to eliminate parasites; vaccination in some cases; and cleaning and disinfection of contaminated premises.

APHIS animal health programs are carried out by a field force of about 250 veterinarians and 360 lay inspectors working out of area offices (usually located in State capital cities). Laboratory support for these programs is supplied by APHIS' National Veterinary Services Laboratories (NVSL) at Ames, Iowa, and Plum Island, N.Y., which are centers of excellence in the diagnostic sciences and an integral part of APHIS' animal health programs.

Under the Virus-Serum-Toxin Act of 1913, APHIS enforces regulations to assure that animal vaccines and other veterinary biologics are safe, pure, potent, and effective. Veterinary biologics are products designed to diagnose, prevent, or treat animal diseases. They are used to protect or diagnose disease in a variety of domestic animals, including farm animals, household pets, poultry, fish, and fur bearers.

In contrast to animal medicines, drugs, or chemicals--all of which are regulated by the U.S. Food and Drug Administration--veterinary biologics are derivatives of living organisms. Unlike some pharmaceutical products, most biologics leave no chemical residues in animals. Furthermore, most disease organisms do not develop resistance to the immune response produced by a veterinary biologic.

Veterinarians and other professionals in the APHIS VS Center for Veterinary Biologics regulate and license all veterinary biologics as well as the facilities where they are produced. They also inspect and monitor the production

The CHAIRMAN. Thank you very much.
Mr. Butler?

STATEMENT OF DONALD P. BUTLER, PRESIDENT, NATIONAL PORK PRODUCERS COUNCIL, CLINTON, NC

Mr. BUTLER. Good morning, Chairman Scott, Ranking Member Neugebauer, and Members of the Committee. My name is John Butler. I am President of the National Pork Producers Council. NPPC is an association of 43 state pork producer organizations and

serves as the voice in Washington for America's 67,000 pork producers.

To maintain the viability of the U.S. pork industry and all of animal agriculture, we strongly support a mandatory animal identification system across all livestock, dairy, and poultry species, with each industry developing an effective and affordable ID system for their species.

A mandatory animal ID system plays three vital roles for America's pork producers and consumers: One, it strengthens the security of the Nation's livestock industry, especially in the event of an international intentional introduction of a pathogen or toxin that could affect animal health. Two, it provides U.S. pork producers and Federal and state animal health officials with improved tools to manage swine herd health through disease surveillance, control, and eradication. Three, it enables U.S. pork producers to maintain and promote access to international markets, which are critical to the continued viability of our industry.

The advantage of a mandatory ID system is that it places in a searchable database in each state all premises holding livestock. In the event of a foreign or domestic animal disease outbreak, animal health professionals can efficiently review the premises that have been exposed, rather than trying to physically locate them by driving around in the countryside.

The goal of an ID system is trace-back of an animal to its farm of origin within 48 hours of the discovery of disease. This would allow a disease to be brought under control and eradicated more quickly, thereby saving taxpayer dollars and animals and keeping foreign markets open for our exports.

The U.S. livestock industry, dairy, and poultry increasingly are vulnerable to foreign animal diseases because of increased international trade and travel. There is also a threat of deliberate introduction of foreign animal disease by terrorist organizations.

A disease infecting just one U.S. pig could cause massive economic disorder in the U.S. pork industry and, for that matter, for the entire U.S. livestock industry. It is estimated in a 2005 study that an outbreak of foot-and-mouth disease could cost U.S. pork producers between $40 billion and $60 billion.

The U.S. pork industry has a functional mandatory swine ID system which has been in place since 1988. The system which helped eradicate pseudorabies from the commercial herd requires that all swine in interstate commerce be identified and the movement records be reported to Federal and state animal health officials.

When the U.S. Department of Agriculture announced in 2004 the creation of the NAIS system, the U.S. pork industry eagerly supported its implementation. The NAIS system establishes standards for each species of livestock, poultry, and fish to bring national uniformity to animal identification. The U.S. pork industry adapted its existing swine ID system to fit the requirements of the NAIS program.

Premises registration is the foundation of swine identification standards. Group ID is the preferred method for identifying market swine. Animals not eligible for group designation must be identified with official ID methods or devices, such as tags bearing an animal ID number or premises ID number.

The NAIS standards for swine require movement data to be captured and maintained as production records by individual owners and producers. The records must be readily available to USDA upon request, and records must be maintained for 3 years after the animal leaves the premises. The U.S. pork industry does not support reporting movement data to centralized databases unless the Federal Government is willing to help pay for such a system.

For the past 4 years, NPPC and the National Pork Board has worked with USDA to register swine premises, and we are proud to say that we now have 80 percent of all the swine premises in the U.S. registered. Additionally, U.S. pork producer delegates at the 2007 annual meeting voted to ask packers to require premises registration as a condition of sale and for breed registries to require it as a condition of registration.

The lack of coherent implementation strategy at USDA has allowed critics of the national program to distort many of the facts about its requirements, including the privacy of data collected. Such data is simply a contact or producer name, things that you would find in a telephone directory. This information already is publicly available and has been provided by producers to Government agencies through various permitting arrangements.

While the U.S. pork industry has been successful in implementing a national ID system compliant with the national program, it must be recognized that some diseases, such as foot-and-mouth disease, affect multiple species.

I am finishing up, sir.

Given the contribution of animal agriculture to the U.S. economy, the pork industry believes it is imperative that the U.S. Government establish a mandatory system. And we ask that Congress and the Obama Administration provide the resources available to make that happen.

Mr. Chairman, thank you for the opportunity to speak to you, and I will take questions at the appropriate time.

[The prepared statement of Mr. Butler follows:]

PREPARED STATEMENT OF DONALD P. BUTLER, PRESIDENT, NATIONAL PORK PRODUCERS COUNCIL, CLINTON, NC

Introduction

The National Pork Producers Council (NPPC) is an association of 43 state pork producer organizations and serves as the voice in Washington, D.C., of America's 67,000 pork producers.

The U.S. pork industry represents a significant value-added activity in the agriculture economy and the overall U.S. economy. In 2008, it marketed more than 110 million hogs, and those animals provided total gross receipts of $15 billion. Overall, an estimated $21 billion of personal income from sales of more than $97 billion and $34.5 billion of gross national product are supported by the U.S. hog industry. Iowa State University economists Dan Otto and John Lawrence estimate that the U.S. pork industry is directly responsible for the creation of nearly 35,000 full-time equivalent jobs and helps generate an additional 515,000 indirect, mostly rural, jobs.

The U.S. pork industry today provides about 20 billion pounds of safe, wholesome and nutritious meat protein to consumers worldwide.

Like many other segments of the U.S. economy, the pork industry has suffered through some tough economic times over the past 18 months. Last year, U.S. pork producers lost an average of $22 on each hog marketed, and it has been estimated that the industry, as a whole, has lost 35 percent of its equity since September 2007.

The industry's one bright spot has been exports, which have helped temper U.S. pork producers' losses. In 2008, the United States exported 2.05 million metric tons,

or 4.4 billion pounds, of pork valued at nearly $5 billion. Last year was the 17th consecutive year of record pork exports.

It is critical to the continued viability of the U.S. pork industry—and to the livestock, dairy and poultry industries—that the United States establish a mandatory system that allows animal health officials to better identify, control and eradicate diseases that could infect the country's livestock herds and affect domestic and international markets.

Pork Producers Have Been Committed To Mandatory Animal ID For 20 Years

The U.S. pork industry has had a functional, mandatory swine identification system in place since 1988. This system requires that all swine in interstate commerce be identified and that movement records be reported to Federal and state animal health officials (53 FR 40378, October 14, 1988). This rule has been codified as 9 CFR 71.19. In 2000, the rule was amended to include group/lot identification for feeder pig movements across state lines within a production system. Today, for interstate commerce, the U.S. pork industry has:

- Individual identification for all replacement breeding swine.
- Individual identification for all breeding swine at commingling and/or slaughter.
- Identification of feeder pigs.
- Identification of market pigs back to their owner from federally inspected plants.
- Feeder pig movements across state lines within a production system based on written health plans and production records.

The U. S. pork industry's commitment to mandatory identification was lead by the Pseudorabies Eradication Program, which created a system for identifying premises with infected animals and ultimately led to the successful eradication of the disease from the commercial swine herd.

NPPC passed its first resolution on animal identification in 1995. In 1998, U.S. pork producers agreed to the concept of a national premises identification system. In 1999 and 2000, U.S. pork producers agreed that improved sow and boar identification were needed, and the NPPC Board of Directors approved the concept of a national premises identification system.

When the United States Department of Agriculture (USDA) announced in 2004 the creation of the National Animal Identification System (NAIS), the U.S. pork industry eagerly supported its implementation. The NAIS established standards for each species of livestock, poultry and fish to bring national uniformity to animal identification. Seeing the value of uniformity for animal health purposes, the U.S. pork industry quickly began adapting its exiting swine identification system to fit the new requirements of the NAIS. The Pork Industry Identification Working Group completed the program standards for the NAIS for swine in April 2006. Once program standards were established, a Swine Identification Implementation Task Force, with representation from each segment of the pork industry, was set up to oversee implementation of the NAIS for swine. While USDA has not adopted these standards, U.S. pork producers are implementing them today. While the focus has been on premises registration and implementation of the program standards in the U.S., the pork industry has been proactive in communicating its efforts with Canada and Mexico to ensure comprehension and to start the process of harmonization of swine identification standards in North America.

Premises identification—knowing where U.S. pigs are raised—is the foundation of the U.S. swine identification standards. Group identification is the preferred method of identification in market swine. Animals not eligible for group designation must be identified with official identification methods or devices (tags) bearing the official Animal Identification Number (AIN) or Premises Identification Number (PIN). If a tag is required, it will comply with AIN tag requirements.

According to the program standards for the NAIS for swine, movement data will be captured and maintained as production records by the individual owners, production systems and markets. These records must be made readily available to USDA upon request and must conform to applicable regulations. Records must be maintained for 3 years after the pigs leave the premises.

All interstate movements of swine and semen must be reported either on a certificate of veterinary inspection (health certificate) for individually identified animals or an interstate movement report for group identified animals. The premises identification numbers of the shipping and receiving premises must be recorded on the certificates of veterinary inspection and the interstate movement report.

At the 2005 annual meeting of the U.S. pork industry, U.S. pork producers voted for a policy supporting a U.S. mandatory national ID system. U.S. pork producers also voted at the 2007 annual meeting to ask pork packers to require premises registration as a condition of sale and to ask breed registries to require it as a condition of registration. Through these combined actions and the success of the Swine Identification Implementation Task Force, today more than 80 percent of U.S. swine premises have been registered.

The U.S. pork industry and USDA have worked cooperatively to register swine premises. The National Pork Board entered into a cooperative agreement with USDA to assist with producer education on the benefits of animal identification. Educational materials were developed, and staff was contracted to work one-on-one with producers at state meetings, farm shows, fairs and with state identification coordinators to promote premises registration. The effort was so successful that the agreement was renewed for fiscal 2009. With funds provided through these agreements, the swine industry has been able to achieve the highest percentage of premises registered in the livestock, dairy and poultry industries.

Mandatory Animal ID Is Needed To Protect U.S. Livestock Herds

The best way to protect the health of U.S. animal agriculture is through a mandatory animal identification system across all livestock, dairy and poultry species where each industry develops an effective and affordable ID system for their respective species. Having such a mandatory system in place would enhance U.S. animal health officials' ability to trace diseased or exposed animals to their farm of origin and identify other potentially exposed premises within 48 hours after the discovery of a disease. The U.S. pork industry strongly supports a mandatory animal identification system as a way to maintain the health of U.S. livestock, dairy and poultry.

The real advantage of a mandatory animal ID system is that it places in a searchable database in each state all premises holding livestock. In the event of an animal disease outbreak, be it a foreign animal disease or a domestic animal disease, animal health professionals can efficiently review the premises that have been exposed to a disease rather than trying to physically—by driving—locate them. This will allow an animal disease to be brought under control and eradicated more quickly, thereby saving taxpayer dollars and animals.

Animal ID Is The Cornerstone Of All Animal Health Programs

As USDA has developed animal disease eradication programs over the years, premises registration and animal identification have been the cornerstone of the programs. By simply knowing where livestock are raised, U.S. animal health officials are better able to respond and eradicate diseases. When the U.S. pork industry was eradicating Pseudorabies from the domestic herds, for example, regulatory animal health officials maintained the names and addresses of pork producers. They did this so they could respond quickly when a positive Pseudorabies test came back from the laboratory.

Breeding animals were identified with backtags at market for this same reason. Samples were taken from these animals and tested for Pseudorabies. If an animal tested positive, the regulatory animal health officials went back to the owner of the animal. The U.S. pork industry and USDA have worked together over the years to eradicate diseases, such as Pseudorabies and Classical Swine Fever, from the U.S. swine herd.

Animal ID Is Needed For Foreign Animal Disease Response

The U.S. livestock, dairy and poultry industries are increasingly vulnerable to foreign animal disease because of potential spread through increased international travel and trade. Even more frightening is the threat of deliberate introduction of an animal disease by terrorists.

Less than 75 miles from the U.S. shores, for example, lurks a disease that could cost the U.S. pork industry billions of dollars. Classical Swine Fever is widespread throughout the Caribbean islands and is only a boat ride away from the U.S. mainland. And there is any number of foreign animal diseases ready to infect just one U.S. pig and cause massive economic disorder in the U.S. pork industry and in the entire U.S. livestock industry. It was estimated in 2005 that a food and mouth disease (FMD) outbreak would cost the U.S. pork industry, alone, between $40 billion and $60 billion, an estimate that would be even higher today.

Based on figures from 2008, when the U.S. pork industry exported nearly $5 billion of pork, producers would lose $48 per head if just export markets were closed because of an animal disease outbreak in the United States. (Further loses undoubtedly would be incurred because domestic consumers would not purchase pork, either.)

The U.S. pork industry urges USDA to implement a mandatory animal ID system to address the growing dangers to the U.S. livestock industry.

Problems Implementing A Mandatory Animal ID System

The U.S. pork industry applauds USDA for its efforts to set up a national animal ID system. But the agency has struggled since 2004 to implement a viable NAIS that serves the needs of all animal agriculture.

The lack of a coherent implementation strategy by USDA has allowed critics of the NAIS to distort many of the facts about its requirements. Some opponents have used the "red herring" of the government's ability, or lack thereof, to maintain the privacy of data collected. But the data required to register a premises is simply a contact or producer name, a street address, telephone number and the types of livestock and/or poultry maintained on the premises. This information already is publicly available in telephone books and county records or already has been provided by producers to government agencies through various permitting processes. No information that isn't currently available from public sources, such as state-issued environmental permits, is being collected for premises registration.

Critics of the NAIS have raised other concerns that give the impression that the animal agriculture industry has something to hide or has information that it is unwilling to have included in the NAIS. The U.S. pork industry believes in full disclosure and does not share that point of view.

Another issue that provoked serious opposition to the NAIS was an "ill-defined" USDA proposal to require all animal movements to be reported to a central database. The enormous workload and expense to build and maintain that caused many in the U.S. livestock, dairy and poultry industries to question the benefits of such a broad requirement. USDA scaled back the reporting to only birth and final disposition of animals. But serious damage was done to the initial support for NAIS.

Further implementation of the NAIS now is hampered by a lack of funding. Continued shortfalls are devastating the program and causing it to limp along. Large sums of money previously have been appropriated for NAIS, with much of it spent on research and demonstration projects to evaluate the feasibility of portions of the system and to test new technologies. By not fully appropriating dollars to fund the NAIS, Congress has sent the message that it is not happy with the way USDA was using the money. But this sends the wrong message to our trading partners and the U.S livestock, dairy and poultry industries. Congress must fully support a mandatory national animal ID system with dollars needed to achieve the goal of a 48-hour trace-back in the event of an animal disease. Resurrecting the ID system at a later time would be nearly impossible. It is not hyperbole to suggest that progress on implementing the NAIS will come to a standstill due to the funding shortfall.

Summary

While the U.S. pork industry has been successful in implementing a national swine ID system compliant with the NAIS, it must be recognized that some diseases, such as FMD, affect multiple species. Even if the U.S. pork industry registers 100 percent of the country's pork premises, it would remain vulnerable to the unregistered premises down the road that may have other susceptible animals that become exposed to an animal disease. That is why the U.S. pork industry strongly supports a mandatory national animal identification system. Until the animal identification is made mandatory and all premises are registered, it will never have the intended effects of providing surveillance and, indeed, improving the animal health infrastructure, aiding in the control and eradication of highly contagious foreign and domestic animal diseases and, ultimately, protecting the U.S. livestock industry, its producers, processors and hundreds of related businesses and more than a half million mostly rural jobs for Americans.

Given the contribution animal agriculture makes to the U.S. economy, the U.S. pork industry believes that it is imperative that the United States adopt a mandatory national animal identification system for all relevant livestock species. It urges Congress and the Obama Administration to lend its support for a national mandatory animal identification system and to provide adequate funding for its implementation and maintenance.

In summary, the U.S. pork industry supports an identification system that is species specific and accommodates the production practices of each species, that allows animals to be identified and moved by groups or lots and that requires individual identification only for animals moved outside a closed production system. It also believes the identification system should be required by federal regulation and include a central database created and operated with federal funding. The U.S. pork industry does not support reporting of every animal movement.

The CHAIRMAN. Thank you, Dr. Butler.

Dr. Jordan?

STATEMENT OF KAREN JORDAN, D.V.M., OWNER/OPERATOR, BRUSH CREEK SWISS FARMS; CHAIRPERSON, ANIMAL HEALTH & WELFARE COMMITTEE, NATIONAL MILK PRODUCERS FEDERATION, SILER CITY, NC

Dr. JORDAN. Thank you for inviting the National Milk Producers Federation to testify before you today.

My name is Karen Jordan. My husband and I also own and operate Brush Creek Swiss Farms of Siler City, North Carolina, where we milk 75 registered Brown Swiss and have about 70 replacement heifers. I am also a practicing dairy cattle veterinarian. I also serve as Chair of the National Milk Producers' Animal Health and Welfare Committee and also serve as Chair of the Cattle Committee of National Institute for Animal Agriculture.

My testimony today focuses on the need for mandatory animal ID for the livestock industries. And I will also review the efforts the dairy industry has taken to move comprehensive animal ID to a reality.

Animal ID is most important in maintaining animal health in every dairy herd. While identifying animals and premises cannot prevent disease any more than licensing an automobile can prevent accidents or theft, identification is essential to speeding a timely response and minimizing the spread of potentially devastating consequences. It would be difficult to track and control the spread of a contagious disease without realtime knowledge about where animals are located and where they have been.

First, I want to provide you with a quick overview of the dairy industry to place in perspective our need for mandatory animal ID. In 2008, the 57,000 commercially licensed dairy farms produced nearly 190 billion pounds of milk from 9.3 million dairy cows, generating nearly $38 billion in dairy-related income. Additionally, our dairy producers alone have more than $110 billion invested in our land, machinery, our dairy cows, and our equipment. Mandatory animal ID is a collective insurance policy for the dairy industry to protect our markets and our assets.

Our dairy industry has taken a strong proactive stance in advocating for mandatory animal ID. National Milk Producer Federation has a standing policy that supports three major areas: The first is the establishment of a mandatory national animal ID system at the earliest possible date for reporting livestock movements. The second is the adoption of ISO-compliant RFID ear tags for cattle. The third is having one centrally managed national database which facilitates ready access to essential tracking data by all state and federal animal health authorities on a realtime basis while safeguarding producer confidentiality.

In 2005, a coalition of six dairy organizations that serve our many thousands of dairy farmers—those organizations being the American Jersey Cattle Association, Holstein Association, National Association for Animal Breeders, National Dairy Herd Improvement, National Milk Producers, and the Dairy Calf and Heifer Growers Association—these six formed a group called IDairy because we collectively believe that our industry will be best served

when all dairy operations and ultimately all dairy cows are identified in a national central database.

IDairy believes that a national animal ID system can both protect farmers' privacy and also allow for immediate access of relevant information in the event of a food safety crisis that could endanger the entire dairy chain. IDairy has adopted RFID tag technology standards to allow tracking of animals at the speed of commerce.

Additionally, IDairy has selected the National Fair Database as the preferred private database for dairy animals to keep the confidentiality of data, with Government access only occurring in the event of an animal disease outbreak where tracking information is required.

In 2007, National Milk and USDA, on behalf of IDairy, entered into a cooperative agreement to promote premise registration within the dairy industry as part of the national animal ID system. By working collectively with USDA, the states, and industry, IDairy estimates that nearly 75 percent of our dairy producers have registered their premises. However, until an animal ID becomes mandatory, obtaining that last 25 percent is going to be difficult.

Animal ID is extremely important in reducing the effects of a foreign animal disease outbreak in the U.S. For example, in 1999, a University of California at Davis study estimated that a foot-and-mouth disease outbreak limited to solely to just the dairy region of California would result in the destruction of 20 to 100 percent of that region's dairy herds. The resulting losses in milk production, plus the containment and depopulation costs, are conservatively estimated between $325 million to almost $2 billion, adjusted for 2007 prices.

Finally, even a quickly contained foot-and-mouth disease outbreak could wipe out our export sales. And last year our exports were worth $4 billion.

As you can see, our Nation's dairy farmers have been very proactive in support of animal ID because of the importance of animal ID as a collective insurance policy for the dairy industry. We respectfully request that mandatory animal ID become a priority for USDA.

If this is to truly be a new era of responsibility, we need to be mindful that preparing for a quick and effective response to emergencies lies at the heart of a responsible animal health system.

And I thank you today for providing me with the opportunity to testify on behalf of National Milk Producers.

[The prepared statement of Dr. Jordan follows:]

PREPARED STATEMENT OF KAREN JORDAN, D.V.M., OWNER/OPERATOR, BRUSH CREEK SWISS FARMS; CHAIRPERSON, ANIMAL HEALTH & WELFARE COMMITTEE, NATIONAL MILK PRODUCERS FEDERATION, SILER CITY, NC

Thank you for inviting the National Milk Producers Federation (NMPF) to testify before you today. My name is Karen Jordan. My husband and I also own and operate Brush Creek Swiss Farms with 75 registered Brown Swiss cows and 70 replacement heifers. I am also a practicing veterinarian in Siler City, North Carolina where I own a large animal veterinary service. I currently serve as the chairperson for the NMPF Animal Health & Welfare Committee, and previously I served as vice chair from 1993 to 2006. For the past 5 years I have also served as the chair of the Cattle Health Committee for the National Institute for Animal Agriculture.

My testimony today focuses on the need for mandatory animal identification for the livestock industries, and I will also review the efforts the dairy industry has taken to move comprehensive animal identification to a reality. Animal ID is paramount in maintaining animal health in every dairy herd. While identifying animals and premises cannot prevent disease, any more than licensing automobiles can prevent accidents or theft, identification is essential to speeding a timely response, and minimizing the spread of potentially devastating consequences. It will be difficult to track and control the spread of a contagious disease without real-time knowledge about where animals are located and where they have been.

First, I want to provide you with a quick overview of the dairy industry to place in perspective our need for mandatory animal ID. In 2008, the 57,127 commercially licensed dairy farms produced nearly 190 billion pounds of milk from 9.33 million dairy cows, generating nearly $38 billion in dairy-related income. Additionally, dairy producers alone have more than $110 billion dollars invested in their farms, including dairy cows, herd replacements, buildings, machinery, and land. Mandatory animal ID is a collective insurance policy for the dairy industry to protect our markets and our assets.

The dairy industry has taken a strong proactive stance in advocating for mandatory animal ID. NMPF standing policy supports:

- "the establishment of a mandatory national animal identification system (NAIS) at the earliest possible date for reporting livestock movements in the U.S.;
- adoption of International Organization for Standardization (ISO)-compliant radio frequency identification device ear tags for the cattle industry; and
- one centrally-managed national database, which facilitates ready access to essential tracking data by all state and federal animal health authorities on a real-time basis, while safeguarding producer confidentiality."

In 2005, a coalition of six dairy organizations that serve many thousands of dairy farmers—the American Jersey Cattle Association, Holstein Association USA, Inc., National Association for Animal Breeders, National Dairy Herd Improvement Association, National Milk Producers Federation and Dairy Calf and Heifer Association—formed a group called IDairy because we collectively believe that our industry will be best served when all dairy operations, and ultimately, all dairy cows, are identified in a national central database. IDairy believes that a national animal identification system can both protect farmers' privacy, and also allow for immediate access of relevant information in the event of a food safety crisis that could endanger the entire dairy chain.

IDairy has worked vigorously to implement animal identification in the dairy industry. IDairy has adopted RFID tag technology standards to allow tracking of animals at the speed of commerce. Additionally, IDairy has selected the National FAIR database as the preferred private database for dairy animals to keep the confidentiality of data with government access only occurring in the event of an animal disease outbreak where tracking information is required. National FAIR has been administered by Holstein Association USA, Inc. for a decade and is used by the State of Michigan for their animal tracking database.

In 2007, NMPF (on behalf of IDairy) and USDA entered into a cooperative agreement to promote premises registration within the dairy industry as part of the National Animal Identification System. By working collectively with USDA, states, and industry, IDairy estimates that nearly 75 percent of dairy producers have registered their premises as part of the National Animal Identification System. Many states, including Michigan, Wisconsin, Idaho, New York, Pennsylvania, Indiana, Utah, Nevada, and South Carolina, have more than 90 percent of their dairy producers participating in premises registration. However, until animal ID becomes mandatory, obtaining the last 25 percent participation will be difficult.

Animal identification is extremely important in reducing the effects of a foreign disease outbreak in the U.S. cattle population. For example, the cost to the dairy industry of an outbreak of Foot and Mouth Disease in the U.S., based on recent epidemiological studies, would likely be quite serious. A 1999 University of California at Davis study estimated that a foot-and-mouth disease outbreak limited solely to California's South Valley would result in the destruction of 20% to 100% of the region's dairy herds. Resulting losses of milk production plus the containment and depopulation costs are conservatively estimated at $325 million to $1.75 billion, adjusted for 2007 prices.

A 2007 study published in the Journal of the American Veterinary Medical Association demonstrated that an outbreak spread through a sale barn or state fair could be multiplied by 10- or 20-fold, as would the dairy industry's cost, to as much as $30 billion or more. Finally, even a quickly contained foot-and-mouth disease out-

break could close overseas markets to U.S. dairy export sales. These were worth nearly $4 billion in 2008, and the loss of these sales would have an additional, disastrous impact on U.S. milk prices.

As you can see U.S. dairy farmers have been very proactive in support of mandatory animal ID. Because of the importance of animal ID as a collective insurance policy for the dairy industry, we respectfully request that mandatory animal ID become a priority for USDA. If this is to truly be a New Era of Responsibility, we need to be mindful that preparing for a quick and effective response to emergencies lies at the heart of responsible animal health system.

Thank you for providing me with the opportunity to testify on behalf of the National Milk Producers Federation.

The CHAIRMAN. Thank you, Dr. Jordan.

Dr. DeHaven?

STATEMENT OF RON DEHAVEN, D.V.M., M.B.A., CHIEF EXECUTIVE OFFICER, AMERICAN VETERINARY MEDICAL ASSOCIATION, SCHAUMBURG, IL

Dr. DEHAVEN. Thank you, Mr. Chairman and Members of the Subcommittee. I am Dr. Ron DeHaven, Chief Executive Officer of the American Veterinary Medical Association. I truly appreciate the opportunity to testify before you today on the National Animal Identification System and the important role it plays to protect our Nation's food supply and food animal populations.

From farm to fork, veterinarians protect the health and welfare of our Nation's animals. We are on the front lines when it comes to surveillance and response to foreign animal diseases that could severely impact public health, animal health, our food supply, and our trade.

The AVMA believes that a system to identify animal locations and track their movement is essential to quickly minimizing the impact of a potentially catastrophic animal disease. The U.S. simply cannot afford to wait for an animal health crisis to make this system mandatory and animal identification a reality.

The National Animal Identification System could dramatically reduce the time required to control animal disease outbreaks. A potential response time of 48 hours would be a vast improvement over the current outdated system, which often relies on an outdated paper trail system. For example, it took an average of 199 days to trace TB-infected animals back to their farm of origin during the time period of October of 2005 to August of 2007.

For a highly contagious disease, such as foot-and-mouth disease, a rapid response, possible with the NAIS, could save millions of animal lives and billions of dollars. For a cow with BSE, or mad cow disease, the NAIS would allow authorities to rapidly identify and locate her offspring and other cows that would have been exposed to the same feed and then potentially keep them out of our food system.

Animal identification systems are becoming prerequisites to international trade, and numerous studies describe how the U.S. lags behind other major livestock-producing countries in our animal tracing capability. The BSE events in the U.S. since 2003 have demonstrated the importance of animal traceability to maintain and re-establish export markets.

But beyond financial repercussions, disease outbreaks have the potential to decimate livestock populations and cause untold animal suffering. The NAIS would allow animal health officials to re-

spond far more quickly and effectively to locate, quarantine, and eliminate the disease and thereby dramatically reduce the animals that might suffer as a result of an outbreak.

Some producers have expressed concerns about invasion of their privacy and personal property rights from a national animal ID system. But in reality, premises registration information can be found in a phonebook and many other publicly available information sources.

The unique animal identification requirements of NAIS are very similar to other forms of identification that are currently being used by almost all livestock producers for herd records, as well as for disease programs, such as tuberculosis and TB. And while the cost to implement a national electronic animal ID system will be high, let's not forget that this cost pales in comparison to the cost of a major disease outbreak.

The AVMA has worked closely with APHIS to help implement and publicize NAIS to our AVMA members. We have urged all large-animal veterinarians to register their hospitals and their own premises, as well as to encourage their clients to register their premises. But despite the combined efforts of many for the past several years, only about a third of the Nation's farms, ranches, and food animal facilities are registered. The AVMA believes that the NAIS would not live up to its expectations and potential benefit unless the majority of all food animal facilities are registered.

We simply cannot afford to wait for the next disease outbreak to create and fully implement a National Animal Identification System. As a body that represents highly trained professionals who work on the front lines protecting public and animal health as well as our Nation's food supply, the AVMA strongly believes that participation in the NAIS should be mandatory. Only with full producer participation will we be able to quickly contain and eradicate diseases and, as a result, minimize the impact on public health, on animal suffering, interruption of our food supply, and the financial health of our livestock and related industries.

Mr. Chairman, thank you, and thank you, Members of the Subcommittee, for giving the American Veterinary Medical Association the opportunity to speak in support of the National Animal Identification System. America's veterinarians look forward to continue to working with you for the full implementation of this important system.

[The prepared statement of Dr. DeHaven follows:]

PREPARED STATEMENT OF DR. RON DEHAVEN, D.M.V., M.B.A., CHIEF EXECUTIVE OFFICER, AMERICAN VETERINARY MEDICAL ASSOCIATION, SCHAUMBURG, IL

Thank you, Mr. Chairman, and Members of the Subcommittee. I am Dr. Ron DeHaven, chief executive officer of the American Veterinary Medical Association (AVMA), which represents more than 78,000 veterinarians across the United States.

I appreciate the opportunity to testify before you today on the National Animal Identification System (NAIS) and its important role in helping protect our nation's food supply and contain disease outbreaks in the food animal population. I would also like to acknowledge the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) for working so diligently to advance the NAIS, which the AVMA considers crucial to controlling potentially disastrous livestock disease outbreaks. The AVMA strongly believes that a mandatory system that allows us to identify animal locations and track their movements is key to quickly

minimizing the impact of a potentially catastrophic animal disease on America's public health, animal health and food supply.

The AVMA strongly supports the implementation of the NAIS, and I would like to emphasize several important points:

- The AVMA believes the U.S. cannot afford to wait for a devastating animal disease outbreak to make the NAIS a reality—the NAIS needs to be a mandatory program to ensure timely implementation.
- The information needed for identifying livestock production premises to make the NAIS fully functional is not much more than what is already in publicly accessible sources, such as phone books, and individual animals' identification systems are used daily by livestock producers for other purposes. In short, the privacy concerns raised by the opponents of NAIS are unwarranted.
- Compared to the costs associated with a widespread outbreak of a potentially devastating disease that is not contained due to lack of an identification system, the cost of implementing the NAIS is minimal.
- An effective NAIS would help the U.S. livestock industry and state and federal government agencies track and more quickly contain/eradicate a disease outbreak, minimizing the number of animals affected and thereby reduce the amount of animal pain, suffering and destruction.
- International standards that directly affect animal trade are moving toward the direction of traceability "from farm to fork"—if the United States is to remain competitive or grow export markets, an effective NAIS will be required.
- An effective NAIS will significantly enhance the ability to rapidly track, control and eradicate endemic livestock diseases, thereby increasing overall productivity for livestock owners and associated industries.

Livestock production in the United States is an asset that feeds not only our country, but a great deal of the world, every day. It is an asset that must be protected from accidental or malicious outbreaks of potentially catastrophic animal diseases. The NAIS is a critical tool to protect animal health.

Veterinarians' Roles in Protecting Public Health and America's Food Supply

The AVMA's membership reflects more than 84 percent of America's veterinarians. Among other things, our members protect the health and welfare of our nation's animals; protect animal and human health through prevention and control of zoonotic diseases; and help protect our nation's food supply—from farm to fork. Our members protect the health of the animals on farms through preventive care and by examining, diagnosing and treating them when they are ill. Veterinarians also provide farmers and producers with guidance on nutrition, disease prevention, management and other health-related issues. Veterinarians examine animals before slaughter and examine the carcasses during processing to ensure that diseased animals do not enter the food supply. We also inspect and certify that animals, and animal products, transported in interstate and international commerce are not infected or diseased.

But it doesn't end there. Veterinarians are on the front lines when it comes to surveillance and response to foreign animal diseases, such as foot and mouth disease, highly pathogenic avian influenza, bovine spongiform encephalopathy and many more diseases that could, and have previously, severely impacted animal health, the nation's food supply and U.S. trade. Veterinarians are experts in zoonotic diseases—animal diseases that can be spread to people. Veterinary epidemiologists develop strategies for understanding optimal responses to diseases—how they develop, how they are spread, how they can be eradicated, and how they can be prevented.

Our members are not only in private practice, research, academia and industry, they are also employed in key positions within state and federal governments. Food supply veterinarians working in government have a variety of roles, including ensuring that meat, eggs and dairy products are safe for consumption. They oversee the health of the animals that produce these items that are such an integral part of our nation's diet and economy. On both the state and federal levels, food animal veterinarians are in critical food safety and defense roles at agencies such as the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), Food Safety Inspection Service (FSIS) and Agricultural Research Service. They also fill vital positions at the U.S. Food and Drug Administration, the Department of Homeland Security and in the U.S. Army. Every state has veterinarians in its government to help support those efforts on the state level. The veterinary profession, therefore, plays an integral role in the infrastructure and daily operations

of systems that ensure the high quality of U.S. livestock production and animal products that we all enjoy today. An effective NAIS will further enhance these efforts.

The Impact of an Effective National Animal Identification System

As many are aware, the impact of an accidental livestock disease outbreak can be devastating to animal production, food production and trade. In addition, intentionally introduced foreign animal diseases are a national security issue. NAIS would dramatically reduce the time required to control a disease outbreak and minimize the economic and public health impact such an outbreak would create. A potential response time of 48 hours is a vast improvement over the current, outdated system of tracking outbreaks of animal disease to their sources. Investigators spent an average of 199 days tracing the sources of animals infected with bovine tuberculosis between October 2005 and August 2007. Some could not be traced back to the herd of origin. For a disease such as foot and mouth disease (FMD), which spreads very quickly, a rapid response time is critical to preventing a potential national outbreak that could cost millions of animals' lives and billions of dollars. Another example: if a cow is showing any signs that it may have "mad cow disease" (BSE, or bovine spongiform encephalopathy), NAIS would allow authorities to rapidly identify and locate the offspring of that cow and other cows that may have been exposed to the same feed that was eaten by the affected cow and prevent them from entering our food system. NAIS would enable the savings of significant time, minimize trade impact and, more importantly, significantly reduce the potential for the disease spreading to other parts of the country.

Most of us are familiar with the impact of the FMD outbreak in the United Kingdom and Europe a few years ago. Because the disease is endemic in perhaps 60 percent of the world, the United States is fortunate to have last experienced an outbreak in 1929. If FMD does enter the United States, the impact of an effectively functioning NAIS that has efficient animal traceability and disease surveillance components would be dramatic. A conservative estimate of the total consumer and producer losses from an FMD outbreak in the United States [1] with the animal traceability and surveillance of a mandatory NAIS is significantly less than without it: $50.3 billion with NAIS and $266.3 billion without it; depopulation of latent infected herds would drop from 60 percent without a NAIS to 30 percent with NAIS; the loss of market share to the beef industry alone would drop from $18.25 per head sold to $9.26.

Because of delays caused by the inability to rapidly trace and perform surveillance, the small number of actual cases of bovine spongiform encephalopathy, or "mad cow" disease, that have occurred in the United States under the existing system had a real financial impact similar to what is projected by a potential FMD outbreak. Much of this came from loss of trade and decreased global competitiveness. Following the BSE events in the United States in December 2003, the vast majority of the beef export market was completely closed. Five years later, U.S. beef producers have regained only about 75 percent of the beef export market volume they had prior to the BSE event. A 2008 [2] study that reviewed animal identification systems in North America argues that animal identification systems are becoming "prerequisites to international trade."

Indeed, in many countries the demand for traceability has compelled government action. Case studies [3] of poultry, beef, pork, lamb and fish firms located in France, Holland, Germany, Norway and Scotland that employ traceability indicate that the company officials adopted traceability because they believed that consumers wanted to know the origin of their food and the processing methods used in preparing it.

A number of studies describe how the United States lags behind a number of major livestock producing countries in animal traceability. According to these studies, the pork industries in the United Kingdom, Denmark, Japan, New Zealand, Australia and the European Union (EU) all lead the U.S. pork industry in animal traceability. In addition, Australia and the EU have advanced mandatory sheep traceability systems beyond the voluntary system present in the United States. Australia, the EU, Japan, Brazil, Argentina and Canada also lead the United States in beef traceability systems. It is important to note that Meat and Livestock Aus-

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[1] Zhao, Z., T.I. Wahl, and T.L. Marsh. (2006). "Invasive Species Management: Foot-and-Mouth Disease in the U.S. Beef Industry." Agricultural and Resource Economics Review, 35: 98-115.)

[2] Murphy, R.G.L, D.L. Pendell, D.L. Morris, J.A. Scanga, K.E. Belk, and G.C. Smith. 2008. "Review: Animal Identification Systems in North America." Professional Animal Scientist 24:277-286.

[3] Buhr, B.L. (2003). "Traceability and Information Technology in the Meat Supply Chain: Implications for Firm Organization and Market Structure." Journal of Food Distribution Research 34(3):13-26.

tralia, a company that provides a variety of services to Australia's red meat industry, considers cattle identification in their country to be an insurance policy in the event of a trade disruption. Since 2004, the EU has been implementing a revised system known as TRACES (Trade Control and Expert System). This system is specifically designed to identify animals and animal products and track their movements from outside the EU and within and between all EU countries. It consolidates and simplifies existing systems and creates better tools for managing animal disease outbreaks. As David Byrne, the EU Commissioner for Health and Consumer Protection announced in 2004 [4], "The new TRACES database will facilitate tracking the 50,000 animals transported in the EU each day. This is a major innovation and will help in case of an outbreak of an animal disease like foot and mouth disease. The new database will reduce red tape for both economic operators and competent authorities."

Beyond financial repercussions, disease outbreaks have the potential to quickly infect and decimate livestock populations. Because NAIS is a modern, streamlined information system, producers and animal health officials would be able to respond quickly and effectively to animal disease outbreaks. NAIS' components allow for tracing animal movements to locate, quarantine and eliminate suspicious and confirmed diseased animals in the event of an outbreak.

To those unfamiliar with the history and epidemiological dynamics of livestock disease and the consequences of disease outbreaks, it may seem unnecessary to have an animal identification system that enables the government to effectively monitor the location of farm animals. Indeed, some producers have expressed concerns that the system will violate their privacy and personal property rights. But in reality, the information that will uniquely identify livestock premises is the same that is found in any phone book; the unique animal identification required by the NAIS is very similar to the brands, ear tags, tattoos and other forms of identification currently used by almost all livestock producers. A key difference is that premise and animal identification within NAIS will now be standardized throughout the country. A standardized system will ensure the United States can rapidly track, contain and eradicate animal diseases.

Many of the premises and disease monitoring systems used in national disease eradication and control programs in the United States have been in place for decades and are no longer sufficient to meet the traceability expectations of veterinarians, farmers, livestock industries or U.S. trading partners. Examples of these livestock disease control and eradication programs, some of which have been operational for more than 50 years, deal with: brucellosis and tuberculosis in all livestock species; spongiform encephalopathies in sheep (scrapie), cattle ("mad cow" disease) or farmed elk and deer (chronic wasting disease); pseudorabies in swine; Johne's disease in most ruminants; avian influenza in poultry; and even viral diseases in fish. These outdated premise and disease monitoring systems must be upgraded if we are to effectively deal with animal disease outbreaks.

As a body that represents highly trained veterinarians who work in the front lines of protecting public and animal health and our nation's food supply, the AVMA strongly believes that participation in the NAIS should be mandatory for all livestock premises and food animals in our country. By making the NAIS mandatory, America will not only protect a critical resource from potentially devastating diseases, but an effective NAIS will act as a safeguard for guaranteeing the availability of our animal food supply. With full producer participation in the NAIS, we will be able to quickly contain and eradicate diseases that would otherwise have profound immediate and long-term impacts on both our food supply and the U.S. agricultural industry.

AVMA Policy on and Support for NAIS

It is for these reasons—protection of public health, animal health and the food supply—that the AVMA approved an updated policy supporting NAIS in 2006.

The AVMA policy states:

"The American Veterinary Medical Association (AVMA) supports an effective National Animal Identification System (NAIS) that contains the following key elements:

1. USDA implementation of all species working group reports that were submitted to the NAIS Subcommittee of the Secretary's Advisory Committee on Foreign Animal and Poultry Diseases.

[4] Europa Press Room (2004) TRACES: Commission adopts new system to manage animal movements and prevent the spread of animal disease. European Union Press Release, Reference IP/04/487, April 15, 2004.

2. USDA development of minimum standards for a NAIS.

3. Rapid implementation of a mandatory NAIS.

4. Implementation benchmarks and timelines established in federal regulation to achieve the NAIS goals identified in the strategic plan.

5. Implementation that continues to engage all stakeholders in providing input through the NAIS Subcommittee of the Secretary's Advisory Committee on Foreign Animal and Poultry Diseases and other designated forums.

6. Database(s) that are accessible 24 hours a day and 7 days a week by animal health officials.

7. System cost does not detract from effective implementation.

8. A system that is workable for producers of all sizes.

9. Exception from freedom of information disclosure laws for data collected in support of the NAIS."

Since approving this policy, the AVMA has worked closely with APHIS on the implementation of NAIS. Last year, APHIS began offering A Veterinarian's Toolkit, a free informational toolkit developed by veterinarians for veterinarians. The toolkit will be continually updated by APHIS and includes fact sheets, conversation-starter tips and live links to provide veterinarians with the information they need to effectively participate in and advocate for NAIS.

The AVMA publicized the toolkit to our members to help veterinarians better understand the program and explain the livestock identification system. We urged all veterinarians to become involved in the NAIS program and to not only register their hospitals and their own premises, but also to encourage their clients to register their premises. As research time and again confirms, no one carries more credibility with animal owners than veterinarians.

But despite our best efforts—as well as the efforts of the USDA and its industry partners—only about one-third of the nation's food animal production facilities are registered with NAIS. Currently, only 505,000 (35 percent) of America's food animal production facilities were registered. Since it is impossible to predict which corner of our nation or sector of animal agriculture will be impacted by a disease outbreak, the AVMA believes that the system will not live up to its potential benefit unless all food animal production facilities are registered. It is for this reason that we believe voluntary NAIS registration is not effective and thus support mandatory participation in the system.

Conclusion

The NAIS is an essential tool in any livestock disease outbreak to track down all animals impacted by the outbreak and put a stop to the spread of the disease. We cannot afford to wait until the next disease outbreak to institute and implement a national animal identification program. A fully functioning NAIS will help control any potential disease outbreak, limit the spread of disease to more animals and, as a result, limit the diseases' impact on public health, animal suffering, interruption of food supply, and the financial health of livestock and related industries.

NAIS enables our nation's food supply to benefit from technological developments that will reduce what once took months to a matter of hours. The cost of participation and maintenance of this system pales in comparison to the cost of an outbreak and is essential for the benefit of animal health, food safety, food security and the nation's economy.

Thank you, Mr. Chairman and Members of the Subcommittee, for giving the American Veterinary Medical Association the opportunity to speak in support of mandatory participation in the National Animal Identification System. America's veterinarians look forward to continuing to work with you on the implementation of this system and determining the most effective ways to protect and improve public and animal health.

The CHAIRMAN. Thank you very much.

And I want to just let each of you know how much we appreciate your consideration of the time constraints. We just want to get as many questions in and answers in as we can. I am going to start off very quickly with just one.

Mr. Nutt and Mr. Thornsberry, you were very eloquent in your statements about what you do, your own voluntary system that you have in place, which you are to be commended for. But the issue is not what you are doing but what others in your industry aren't

doing. You may be doing well with yours, but your neighbor isn't. Maybe your sales barn that you use isn't, that you are a part of.

I want to ask you, how do you feel—I mean, this is a "no man is an island" situation. This industry is connected. As long as it is voluntary and you may do it but your neighbor down the road doesn't do it or where you intermingle your cows don't do it, it is going to eventually hurt you and make it difficult even for your own business to survive.

And the other point is that you both have mentioned the economic costs, you have mentioned privacy courses, you have mentioned liability and legal costs, but I have not heard you mention one time the other costs, the human costs, the loss of lives, the other factors that are so very important that are pressing very hard on the minds of those of us up here who have to represent this issue.

Could you comment on that aspect of it and the fact that, while you are doing well with it, others are not, and how that pertains to your business?

Dr. THORNSBERRY. I will answer that from the standpoint of food safety. Being a veterinarian, I deal with food safety on a daily basis, but I also owned a food plant, a meat processing plant for 5 years. So I have been on the cutting edge of APHIS's food safety technology.

And I, for the life of me, cannot come up with any idea or method or way that national ID is going to have anything to do with food safety. It would identify the animal and possibly allow a little quicker trace-back. But every animal that goes through the livestock auction I work at gets a back tag that identifies it to the owner with his name and address and phone number, where it came from before it goes to slaughter.

So I cannot come up with any concept whereby this system would improve food safety. The food safety issues we have in the livestock industry occur at the slaughter plants. Until the Hassett plan is corrected, whereby you can trace the meat back to its point of slaughter, you are not going to have food safety where it needs to be in the United States.

I was—a processing plant, they traced it back to me and closed me down, and yet E.coli 0157:H7 comes from a slaughter facility from meat that I would purchase, and yet they would not trace it back to that point.

So there is a lot of hype about food safety as it relates to animal ID, but I have been involved in it for 8 or 10 years now, and I can't come up with any relevance to it, period.

Mr. NUTT. I would agree with that general approach in there.

There are two separate issues. Both are vital. We can't lose sight of the food safety issue. It is a major concern in the beef industry because our continued marketability has to be dependent on the consumer feeling the meat is safe. So we fully support that.

But, again, it is difficult, from a producer point of view, to see the connection between an animal ID mandatory system and food safety, per se. The gentleman has very well laid out the perspective from a handling point of view, and I generally agree with him.

The CHAIRMAN. Well, Mr. Nutt, one quick question, and then I want to get to Mr. Conaway before we have to go vote.

You mention in your testimony that you can't trust the Department of Agriculture for the information required by NAIS on the information security question. That is a very, very telling statement.

But let me ask you this: Would you support a mandatory ID system that utilized private industry to collect the data rather than the Department of Agriculture?

Mr. NUTT. Yes, indeed. That is a viable option in there.

I think the real issue, though, is, what is the data that is collected? Certainly, I have no problem and I doubt if few producers would ever question providing information on an animal unique ID and the premises where that animal has been and perhaps a little bit more.

It is the uncertainty that we find. And when we look at the APHIS proposals, we see extensions that go far beyond the limits that we are talking about that make us very, very concerned about the other data that keeps being mentioned in there. If we knew more what it was, we could probably be a little bit more comfortable with it. But, absent that, the practice in the past has not led us to be particularly comfortable.

The CHAIRMAN. All right. Thank you very much.

Mr. Conaway?

Mr. CONAWAY. Thank you, Mr. Chairman.

Mr. Butler, you mentioned that your organizations have asked packers and breed registries to require premise registration. Now, what was the response of those guys, the packers and breed registries? What was their response to this request?

Mr. BUTLER. Most of the major packers in our industry have been willing to do that, sir.

Mr. CONAWAY. So they now require it in order to accept pigs from everyone? So you have 100 percent registration?

Mr. BUTLER. No, sir. I said "most." We don't have a hundred percent, but most of the major packers and processors have agreed to do that.

Mr. CONAWAY. And the breed registries?

Mr. BUTLER. I am told that the breed registries are close. I don't have a figure.

Mr. CONAWAY. Six out of eight? I am not sure how many breeds there are.

Mr. BUTLER. I don't have a number, sir.

Mr. CONAWAY. Okay. Would you mind getting that information for us? It might be helpful.

Mr. BUTLER. We can get it.

Mr. CONAWAY. Dr. Jordan, you mentioned that 25 percent of your premises aren't registered, and yet dairymen receive direct assistance, Federal assistance on milk and those kinds of things. It would seem to me that there would be a requirement there that they register.

What is it about the benefits that are touted by those who want this system that these 25 percent in your breed don't believe?

Dr. JORDAN. So you are asking what is the holdup to get that last 25?

Mr. CONAWAY. Yes, why do they not believe the benefits? Because the advocates, you walk through your positions, and you go,

"Well, yeah, gee, why wouldn't I do that?" So the folks who don't like it or who have chosen not to register, what is their pushback?

Dr. JORDAN. I think you get back to some of that producer confidentiality and just having that confidence in the whole system.

Mr. CONAWAY. Okay. What I heard you say was your mandatory system would have a national database with all movement captured. Dr. DeHaven and others who want a mandatory system, does your mandatory system include that piece also?

Dr. DEHAVEN. Congressman Conaway, certainly ultimately that would be the goal. You heard talk earlier about having the bookends and having a premises registered and having an ID that would be obtained at slaughter upon death of the animal.

Mr. CONAWAY. Okay, but what I heard you say was that the current mandatory program that you are putting forward would simply be a premise registration. But you are broader than that. I don't want you bait and switching folks with this information, saying it is going to be like a phonebook with this information in it. But your ultimate goal is a broader, nationalized database where all of this information would reside, separate and apart from states and everybody else?

Dr. DEHAVEN. We are supporting the entire system, to include the traceability aspect. If we are dealing with a highly contagious disease, such as foot-and-mouth disease, you need to know what animals were where at what point in time.

Mr. CONAWAY. What starts the 48-hour clock? What triggers the 48-hour clock? Everybody is talking about this 48-hour position. What is the trigger on that? How do we know if we are actually complying on that?

Dr. DEHAVEN. My assumption is that that would be upon the confirmed diagnosis of an exotic or foreign animal disease.

Mr. CONAWAY. Okay. So some child in Philadelphia gets sick eating a hamburger; when does the 48-hour clock start running on tracing back to the animal that caused that?

Dr. DEHAVEN. I would just clarify, Congressman, that the purpose is not for tracing residues or bacteria in processed meat products, but rather we are talking about diseases of livestock, of——

Mr. CONAWAY. So it is not safety of folks eating stuff. It is just safety or trying to determine issues within herd?

Dr. DEHAVEN. Food safety begins with the health of the animal. So this system is designed, initially at least, to be focused on live animals and tracing animals that may have a disease.

Mr. CONAWAY. Okay. On that, you mentioned a particular event, that there was 199 days it took to do this trace-back. What happened in that 199 days and whatever that would have not happened had we had the 48-hour deal and it worked?

Dr. DEHAVEN. My assumption, Congressman, is that APHIS employees would have contacted and had to contact a number of individuals who may have been involved in owning, transporting, or otherwise marketing those animals. You contact an individual, ask them if they can tell you where a particular animal came from, where they were at a certain point in time, and that individual tells you, "I will get back to you in a few days after I can look at my records."

Mr. CONAWAY. All right. So what bad happened that would not have happened had the Federal Government had direct access to all of this data?

Dr. DeHaven. It is difficult to determine. And I certainly don't have——

Mr. CONAWAY. Well, but you come up here and you say there is trillions of dollars' worth of risks to the system for one sick pig contaminating an entire population. But——

Dr. DEHAVEN. Let me clarify, Congressman. Are we talking about the TB situation, or are we talking about an outbreak of foot-and-mouth disease? Two totally different situations. In either case, with 199 days to find animals, there could be infection being spread even with tuberculosis. With foot-and-mouth disease, 199 days, we have lost the battle; that outbreak is out of control at that point.

Mr. CONAWAY. Okay. Well, you wouldn't let it go that long.

Dr. DEHAVEN. The assumption in a foot-and-mouth disease outbreak is that, instead of, as Dr. Clifford testified, tracing 199 animals and taking 199 days, with a foot-and-mouth disease outbreak we would be tracing tens of thousands of animals and wouldn't have the luxury of 199 days to find out where they are now. We would need to know very quickly before that 199 animals quickly becomes 10,000 or 20,000.

Mr. CONAWAY. All right.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much.

We do have votes. Here is what we are going to do: We are going to recess until 12:35. It will give us time to go—we have three votes. The first vote has been on about 5 minutes now. So 12:35 we will come back and we will begin the process again. Until then—12:45, 12:45 we will come back.

[Recess.]

The CHAIRMAN. Thank you for your patience. We are going to resume. Members will come as they can. And, again, we appreciate your understanding of our hectic schedule going forward.

Let me ask Mr. Thornsberry. The Department of Agriculture said in a briefing last week that it takes up to 199 days to track animals with TB and herdmates, which is a huge problem in many states, not just on the southern border.

How do you explain that the lack of an animal ID program will benefit the producer in that regard?

Dr. THORNSBERRY. Personally, sir, I would have to see those figures.

If the USDA can't track down a cow that has come in from Mexico with an indelible brand on it that has TB in 199 days, then we have a real problem. And I don't believe that to be the case. It may have taken 199 days for them to identify all of the cohorts and every place it had been and all the other cattle that it had been with.

I have participated in the disease trace-back system personally. And I had a cow here 4 years ago that came from Colorado, and I had all the information I needed on her in two hours with two telephone calls. So I don't know where that figure comes from. I would like to examine that data to see if that is true.

But I can't imagine that in our modern day of technology that we have that you couldn't identify a cow in the United States. Every state has a system of ID. You can't move a cow across a state line without having a health certificate with the identification number on it. You can't run an animal through any livestock auction without having a back tag on it and identification on it, back tag number.

I would have to see those numbers. But if they took 199 days to trace down one cow, then we have a real problem in this country, and animal ID is not going to help it.

The CHAIRMAN. All right.

Mr. Butler, why is it important for all livestock, as you have said, all livestock and poultry premises to be registered? Why not just have the swine premises registered and let the other groups worry about themselves?

Mr. BUTLER. Well, Mr. Chairman, I would tell you simply that there are a number of diseases that affect swine and other species. If there is an outbreak within the swine herd in a community, it would be important for people to know where the other susceptible species are so that those producers could be notified. Conversely, if there were to be an outbreak in a species on a farm and there was no system for identifying where that animal is or notifying me, as a neighbor, that my herd is in peril, that is a problem.

The CHAIRMAN. Okay.

Dr. Jordan, let me ask you this from the dairy point of view. Understanding the fact that production systems are completely different for beef and dairy and the fact that dairy cattle are handled every day, what do we do about the fact that both beef and dairy are susceptible to the same diseases?

Dr. JORDAN. Well, that is the worst thing about disease, it doesn't respect what that cow does for a living. And that is part of the reason I don't see how we can have a system that only supports one side of the cattle industry. We are going to have to have an ID that is supportive to dairy and beef.

Our diseases just don't make a distinction between our cattle. And we have to be able to rapidly trace whether it comes from—a disease that first started out in the beef industry, it is going to easily transfer over to the dairy industry and vice versa, just the way our cattle populations move.

The CHAIRMAN. And why does the dairy industry favor RFID tags? And how does the dairy industry feel about the United States Department of Agriculture's neutral technology stance on 840 tags?

Dr. JORDAN. Well, the RFID tag, to me, is an easy way. It is an easy tag, it is a small tag, inexpensive, really, in the scheme of things. I know Dr. Clifford told you, like, a price of about $3 or $3.50. Literally, the tag is about a $2 tag, $2.25. I think his figures were more that added manpower.

We are going to tag our cattle in some way, just for our daily production purposes. The main thing, the RFID tag technology, it lets us collect data at the speed of commerce. And I think, any time you are going to have to track down cattle, that speed of commerce is what becomes critical in minimizing any kind of effects of a disease outbreak.

The CHAIRMAN. Okay.

Dr. DeHaven, let me ask you, 48 hours, we have a catastrophic event from, say, hoof-and-mouth disease. How real is a potentially catastrophic disease outbreak in this day and age? And do you believe we would be adequately prepared to handle and eradicate such an outbreak with the voluntary NAIS system in place?

Dr. DEHAVEN. Mr. Chairman, we have been—and I say "we" in that I was formerly with the Animal and Plant Health Inspection Service, both in the position that Dr. Clifford is currently in as well as the administrator of that agency. So I can tell you that we have been working on trying to get this system in place for a number of years. And so I would share Dr. Clifford's disappointment that we only have about a third of the premises registered.

I think that Dr. Jordan made a really good point, in terms of being able to trace animals at the speed of commerce, because that is how animals move. There has been a lot of computer modeling done where, if there were infection introduced into a livestock market today, within 24 hours animals from that livestock market could be in 15, 17 different states. And if we can't trace those animals to their current location at the speed of commerce, then we quickly have infection established in those 15, 17, or 20 different states. They then move from there, and it exponentially increases.

So, again, the ability to contain and eradicate a disease effectively depends on how quickly you find it and how quickly you can contain it. And this animal ID system would be the link between that, once you find it, to quickly contain it.

The CHAIRMAN. We are not prepared now. We are not prepared for an outbreak now.

Dr. JORDAN. If we were to have introduction of a highly infectious disease, such as foot-and-mouth disease, and we didn't find it literally immediately, in fact we would not be prepared to contain what potentially could be a widespread outbreak.

The CHAIRMAN. Do we know—any of you may answer this—but do we know the size of the damage that could be done now?

I mean, I was a part of this Homeland Security presentation last week with the Chairman, and I was worried before the presentation, but afterwards I was even more worried, that we aren't prepared in the food supply chain and particularly in this aspect. Because airborne means animal to human, is that not correct?

Dr. DEHAVEN. Airborne means that it can go from farm to farm via transmission in the air. And a lot of diseases are thought to be spread that way.

Some of the modeling that has been done would estimate that if we were to have a foot-and-mouth disease outbreak that is quickly contained, within 72 hours or less, the cost would be at least $5 billion. And then, if we were not able to contain it immediately, then the cost goes up exponentially, and I believe that Chairman Peterson used a figure in the hundreds of billions of dollars.

Recognize that, as we would do if—or we do when a country is found to have foot-and-mouth disease and we cut off all exports or imports into the U.S. from that country, if we were to diagnose foot-and-mouth disease in this country, the same thing would happen in reverse. Virtually the rest of the world that is not affected by foot-and-mouth disease would cut off our exports until such time as we could assure them that we had contained and eradicated it.

If that took weeks, months, or years, that is when the cost can take on that magnitude of $100 billion, $200 billion.

The CHAIRMAN. All right. Thank you very much.

Mr. Smith?

Mr. SMITH. Thank you, Mr. Chairman.

Mr. Butler, earlier I think you are the one who stated—you talked about an antiquated system currently in place, paper-driven, old-fashioned. Is that correct?

Mr. BUTLER. Congressman Smith, I don't believe I was the person who made that comment.

Mr. SMITH. Okay. Someone did. I apologize.

Dr. DeHaven?

Dr. DEHAVEN. Congressman Smith, I believe that I made the comment about a paper-driven system.

Mr. SMITH. Okay. Right. So are you saying then that a system is in place now but antiquated?

Dr. DEHAVEN. We have had systems in place, particularly with tuberculosis and brucellosis eradication, when we had widespread disease outbreak and every state had extensive program for those diseases. Part of the disease program included metal ear tags and then paper records for those.

As we have been successful in eradicating or almost eradicating those diseases, we don't have nearly the number of animals that are tested, and so we don't have nearly the number of animals identified even with those paper and metal tag-type systems.

Mr. SMITH. Okay. Thank you. I appreciate that.

Dr. Jordan, I am not a dairy expert, but I know that cows are the primary focus of a dairy operation. Logistically can you explain the process and then the costs associated with cows versus bulls and the timing, and as much information as you can share.

Dr. JORDAN. Are you talking about just actually getting the job done of putting a tag in an animal?

Mr. SMITH. Right. What would be the cost difference for a cow as compared to a bull?

Dr. JORDAN. Well, I can answer you from how it would work on our farm.

Our baby bull calves are, essentially for our operation, are the ones that are going to leave our farm. And for us, all we would have to do is just purchase that little $2 tag and put it in his ear. And whether someone chooses—like, a small herd may not choose to actually identify every one of those animals for daily work with an electronic $2 tag. But as soon as that cow is sold in commerce and enters marketing channels, the day she is loaded on that trailer, you can put that tag in. It is that simple.

Versus some of our bigger dairies, they are already seeing the value of having that electronic tag, using that tag as their primary ID system to get their jobs done every day. In other words, rows of cattle, and they just take that wand and they pass it down, and then that wand beeps when it hits that ID tag that they have previously identified they want to do something to that animal today.

Mr. SMITH. So you would be comfortable, though, with the way it would be handled with the bull calves and otherwise?

Dr. JORDAN. Yes.

Mr. SMITH. Okay.

I think that is all I have, Mr. Chairman.

The CHAIRMAN. Thank you very much.

I want to thank the panelists.

I want to just say this, as we move toward our next panelists, that this has been very, very illuminating to us. This is, as I said at the outset, a very complex, complicated issue, but it is also an urgent issue.

There are people out there that do not like us, and we are vulnerable in our food supply area. And we have to look at animal ID from the perspective of the human cost with the same degree of energy or even more energy as we look at the economic costs, as we look at the lack-of-privacy costs. Those are fixable things, we can fix those, but we can't fix a human life that is lost because we failed to act in time to protect our food chain.

And I think therein lies the apex of our issue, and that is that we must do everything in our power to protect the food chain. The one thing that has come out clear in this is there is a huge economic cost. There is the front-end economic cost that Mr. Nutt and Mr. Thornsberry talked about. But there is also an economic cost to this industry if we fail to do something, especially when it is relatable to exports and to what the world reaction is to our own markets.

Voluntary animal ID leaves perilous holes in the bottom of the bucket, and these holes have to be filled. The issue is, can we do it voluntarily or must it be done in a mandatory way? It seems to me that, with the questions that have been raised and the points that have been made, those concerns of economic, those concerns of the privacy issue and trust with the Department of Agriculture from the standpoint of our Mr. Nutt, whose points were very well-taken—but at the bottom of the day, the issue becomes what is the most secure way to protect our food chain and protect the American people and that seems to be mandatory.

The discussion is still open. We are moving forward. You all have helped us tremendously, and we thank you for your time and participation with us today. Thank you.

And now we will assemble the third panel.

Thank you all very much. We are just pleased to have you.

We have with us on the third panel Dr. Rob Williams, Counsellor of Agriculture with the Embassy of Australia.

So, thanks. Good to have you.

We also have, accompanying him, Mr. Dean Merrilees, Minister counsellor of agriculture, Embassy of Australia; and Mr. Kerry St. Cyr, Executive Director of the Canadian Cattle Identification Agency of Calgary, Alberta, Canada.

Thank you for coming. Glad to have you.

We will start with Dr. Williams.

STATEMENT OF DR. ROB WILLIAMS, COUNSELLOR OF AGRICULTURE, EMBASSY OF AUSTRALIA, WASHINGTON, D.C.; ACCOMPANIED BY DEAN MERRILEES, MINISTER COUNSELLOR OF AGRICULTURE, EMBASSY OF AUSTRALIA, WASHINGTON, D.C.

Dr. WILLIAMS. Thank you, Chairman.

The Australian Government would like to thank the Subcommittee for the opportunity to share information on our experiences with implementing and improving Australia's National Livestock Identification System, or NLIS. I refer you to my written testimony for a more comprehensive account.

As background, a number of factors have influenced the successful development of Australia's animal identification system, including heavy reliance on export markets, strong industry and government partnerships, and maintaining customer or consumer confidence.

A mandatory cattle identification system based on visual tail tags was developed in Australia in 1967, which provided the ability to trace all cattle back to their last property of residence. The initial impetus for an improved national traceability system in Australia came from industry, on the basis that such a system could serve interests for disease management and commercial market requirements. In Australia's experience, this type of system best works on a mandatory basis.

With NLIS, the Federal Government has an overall policy coordination role and supplies funding to underpin the national system. The state governments, including territories, have the legal jurisdiction over livestock and implement the legislation that underpins the program. The industry, through the producer-owned Meat and Livestock Australia, or MLA, currently administer the database for NLIS.

NLIS, which commenced in 1998, was implemented by Government and industry first agreeing to a national performance standard and business rules. The development of national performance standards was critical to a uniform rollout of NLIS. Standards included a requirement to be able to trace back within 48 hours an animal to its place of birth, the adoption of a 99 percent retention and read rate, and devices that could be read at a maximum distance of four feet. At the time, only one technology met those standards under Australia's variable and harsh field conditions, and that was the machine-readable half duplex RFID, which was adopted as the technology for NLIS.

The rules regarding access to the NLIS database are outlined through business rules in the terms of use for the NLIS database. Government has access to the database for relevant fields of information necessary to manage a suspected or actual disease outbreak or a chemical residue incident. The data collected through NLIS is protected from freedom of information requests by other interested parties, primarily because the information is held by a private company in MLA. Today, there have been no known FOI requests for this information.

Currently, NLIS in cattle is a permanent whole-of-life system that allows individual animals to be identified electronically and tracked from property of birth to slaughter for food safety, product integrity, and market access purposes. NLIS is endorsed by Federal and state governments and by major producer, food lot, agent, sow yard, and processor industry bodies.

NLIS became mandatory in July of 2005 for cattle. Tracing systems are now operational or under development for sheep and goats, pigs, and alpacas.

The development and implementation of livestock traceability systems has significant costs, but the benefits of being able to accurately and quickly trace animals in the event of a disease or chemical residue issue outweigh these in the Australian context. Costs for NLIS are shared by both government and industry. It cost approximately $56 million to tag the national cattle herd, and the annual tagging costs thereafter are approximately $20 million. To put these costs into perspective, Australian beef exports are valued at approximately $17 million a week.

NLIS database stores more than 194,000 properties and almost 17 million devices. Over 55,000 transactions or movements are recorded daily. And over 97 percent of the transactions are processed in the database within 30 minutes, making this realtime data. When integrated with post-slaughter tracking systems, the database facilitates rapid tracing of cattle and carcasses.

Australia's experience has demonstrated that a system based on visual tags or brands, complemented by paper-based records, does not provide a robust basis for tracing livestock. Electronic systems have been demonstrated to be more reliable, less prone to human error, less resource-intensive, and easier to use.

In conclusion, NLIS was developed to enable the rapid and accurate trace-back and trace-forward across Australia. This has benefits in terms of disease control and market access. NLIS is performing well and meeting the needs of all key stakeholders and has proven to be very useful for herd management.

The Australian Government thanks the Subcommittee for this opportunity to share with you the results of our experience to date in implementing an animal identification system. And it is certainly an honor to be able to provide this information to the Subcommittee.

[The prepared statement of Dr. Williams follows:]

PREPARED STATEMENT OF DR. ROB WILLIAMS, COUNSELLOR (AGRICULTURE), EMBASSY OF AUSTRALIA, WASHINGTON, D.C.

Introduction

The Australian Government would like to thank the Subcommittee for the opportunity to share information on our experiences with implementing and improving Australia's National Livestock Identification System (NLIS). It is an honour to be able to provide information to the Subcommittee on our system which may assist in your deliberations. The system represents a joint commitment and working partnership between the Australian Government at federal and ftate levels and Australian industry.

Background

A number of important factors have influenced the successful development of Australia's national livestock identification system:

- Australia's reliance on export markets (two thirds of all agricultural products are exported, including 70 per cent of beef);
- The emergence of a realization within industry and shared by government that an animal identification (ID) system would be useful in sustaining customer satisfaction with the integrity of our product;
- A strong industry and government partnership, particularly evident in the cattle and beef sectors;
- A mandatory property identification system for cattle since 1967 that has been used to support and maintain Australia's favourable animal health status; and
- Agreement among all parties that the system be as simple, cost efficient and practical as possible.

The system originated from the early 1960s when Australia undertook an ambitious US$600 million program to eradicate Bovine Tuberculosis and Brucellosis (official eradication program began in 1970, and Australia declared freedom from the diseases in 1997 and 1993 respectively). In response to interest from trading partners, a mandatory cattle identification system based on using tail tags was developed in 1967 that provided the ability to trace all cattle back to their last property of residence. A premise ID numbering system was used to identify herds in relation to a parcel of land—these were referred to as Property Identification Codes (PIC) and provided the ability to trace all cattle back to their last property of residence.

The initial impetus for a national traceability system in Australia came from industry rather than government on the basis that such a system could serve industry interests for disease management and commercial market requirements. In Australia's experience, this type of system best works on a mandatory basis, especially given its large reliance on exports. Like the United States of America (US), Australia has a federal system of government and this has required it to build a consensus on the division of responsibility and oversight of NLIS. The Federal government has an overall policy coordination role and supplies funding to underpin the national system. The state governments have the legal jurisdiction over the movement and health of livestock and develop and implement legislation that underpins the program through government/industry management Committees. This Committee in each state coordinates extension and producer education programs such as demonstration sites, an assistance hotline and industry seminars that assist producers with on-farm use of technology. The state governments have established a registry of PICs, are responsible for ordering of identification devices and have assisted with establishing the reading infrastructure and more recently auditing device performance and monitoring compliance with legislative requirements. The industry, in Meat and Livestock Australia (MLA), currently administer the database for NLIS.

In the mid-1990s, after the successful eradication of brucellosis and tuberculosis, livestock industries, state and federal governments agreed that there was a need to convert the established visual-read-only PIC system to an electronic whole-of-life individual cattle identification system on the grounds that it was only a matter of time before such a system would be needed to ensure biosecurity, food safety and market access. This system became known as NLIS. In 1998, once again in response to a trading partner, individual identification was made compulsory for producers supplying the European Union (EU) market to provide meat from Hormone Growth Promotant-free cattle. The NLIS has been vital in Australia maintaining access to the high value EU market and has contributed to maintaining a high level of consumer confidence for Australian beef in its other major markets such as Japan and Korea.

Implementation of NLIS

NLIS was implemented by government and industry first agreeing to a set of National Performance Standards and Business Rules. The development of national performance standards was critical to a uniform and national roll out of the NLIS. Standards included a requirement to be able to trace back within 48 hours an animal to its place of birth, the adoption of a 99 per cent retention and read rate, and devices that can be read at a maximum distance of 1.2 metres. The technology selected had to meet these specific performance standards. At the time, only one technology met those standards under Australia's variable and in many cases, harsh field conditions—the machine-readable half duplex Radio Frequency Identification Devices (RFID), which was adopted as the technology for implementing the NLIS.

Business rules were developed to operate at the farm, saleyard and slaughterhouse levels. For example, all animals must be tagged prior to leaving the property of birth, and all stock movements must be read at points of transfer including saleyards and slaughterhouses.

The NLIS database is currently administered by MLA on behalf of SAFEMEAT . The rules regarding access to data are outlined through business rules in the "Terms of Use for the National Livestock Identification System Database". Federal and state governments have access to the database for relevant fields of information necessary to manage a suspected or actual disease outbreak or residue incident. These fields include date of sale or slaughter, PIC number, RFID number, and National Vendor Declaration (NVD) serial number. Private access to specific fields of information is only available to registered users such as producers, sale yard operators and slaughterhouse owners and includes data of a commercial nature such as carcase weights and fat scores.

The data collected through the NLIS is protected from Freedom of Information (FOI) requests by other interested parties primarily because the information is held

by a private company in MLA. The privacy and "commercial-in-confidence" provisions of the Australia FOI Act offer additional protection because the legislation provides exemptions for this type of data. To date, there have been no known FOI requests for this information.

Current Status

NLIS is Australia's system for identification and traceability of livestock. It is a permanent whole-of-life system that allows individual animals to be identified electronically and tracked from property of birth to slaughter-for food safety, product integrity and market access purposes. NLIS is endorsed by Federal and state governments and by major producer, feedlot, agent, saleyard and processor industry bodies and is underpinned by legislation.

NLIS became mandatory in July 2005 for cattle. Tracing systems are now operational or under development for sheep and goats, pigs and alpacas. The development and implementation of livestock traceability systems has significant costs, but the benefits of being able to accurately and quickly trace animals in the event of a disease or chemical residue issue outweigh these in the Australian context.

NLIS operates in conjunction with other relevant legislation with regard to product liability. In Australia, a National Vendor Declaration (NVD) exists in all cattle, sheep and goat transactions. This declaration is a signed statement from the vendor declaring the animal and public health status of the livestock consignment over the previous 60 days.

There are significant costs that are shared by both industry and government in adopting NLIS. It cost approximately US$56 million to tag the national cattle herd and the annual tagging costs thereafter are approximately US$20 million. To date, the Federal and state governments have committed approximately half the establishment costs in the last decade, and the industry the other half through both check-off funds and capital investment. To put these costs into perspective, Australian beef exports are valued at approximately US$70 million per week.

The cost of the cattle tags is met by farmers, and averages between US$1.35—US$2.65 per tag. The cost of sheep tags is up to approximately US$1. In addition to the tags, farmer costs include the tag applicator, which ranges from US$15 to US$125. In addition, other optional costs may be incurred by a farmer to purchase equipment such as tag readers, software and IT equipment to utilise NLIS as a herd management tool.

NLIS (Cattle)

NLIS (Cattle) uses machine-readable RFID devices (either an ear tag, or a rumen bolus/ear tag combination) to identify cattle. Each device contains a microchip encoded with a unique number linked to the PIC of the property of origin. All locations where cattle are kept (e.g. farms, saleyards, abattoirs etc) are required to have a PIC. When animals move along the supply chain, the RFID devices are scanned with an electronic reader and the movement details (e.g. the PIC an animal moves to) are recorded on the NLIS database, so that animals can be tracked. A life record of an animal's residency, and which animals it came into contact with, is established.

The NLIS database stores more than 194,000 PICs and almost 70 million devices. The database is accessed through the internet via a User ID and password. Cattle producers are able to directly access the database to report the movements of their cattle. When integrated with post-slaughter tracking systems, the database facilitates rapid tracing of cattle or carcases should there be a suspected or actual disease outbreak or chemical residue incident.

The system is mandatory and is now fully in place across Australia—with over 55,000 transactions/movements recorded daily. Over 97% of transactions are processed in the database within 30 minutes, making the data 'real time' and of enormous value for tracing purposes.

In addition to the location history of the animal, devices may have 'statuses' recorded against them, for example, risk statuses from chemical residues, animal health statuses, market eligibility information as well as lost or stolen cattle, completeness of traceability history etc.

NLIS in cattle is progressing well and has been demonstrated to be highly effective. During the national traceability exercise conducted in May 2007, CowCatcher II, 98.7% of animals were traced back to their property of birth within 24 hours and all in-contact animals were traced within 48 hours.

(Sheep and Goats)

NLIS for sheep and goats is a mob -based, paper-based system for tracing sheep and farmed goats. It uses visually readable ear tags which have the PIC printed

on them and is complemented by the use of a movement document. A database for sheep and goats has been developed.

NLIS (Sheep & Goats) was introduced on 1 January 2006 with the requirement to apply a visual tag with a PIC to sheep and farmed goats, complemented by movement documentation, before leaving the property of birth. From 1 January 2009 under the national rules for NLIS (Sheep & Goats) all sheep and farmed goats must be tagged with an NLIS accredited device before leaving their property of birth.

The national traceability exercise in August 2007, SheepCatcher I identified enhancements required with NLIS in sheep and goats to ensure prompt and accurate traceability of these animals for market access and disease control purposes. These enhancements have been, or will shortly be implemented.

NLIS (Pigs)

NLIS in pigs is in the early stages of development. It is a mob-based system based on tattoos and brands along a with movement document. At present only the animal identification part of the system is mandatory. Movements of animals through saleyards are required to be recorded.

NLIS (Alpaca)

NLIS in alpaca is in the early stages of development. The alpaca industry is advocating the use of RFID tags that incorporate both radio frequency and visual readability in the one tag for animal identification. The peak industry body is of the view that it will be easier and less expensive to set up the RFID system now while the industry is in its infancy.

Future Steps

NLIS is performing well and meeting the needs of key Australian stakeholders and international trading partners and customers. NLIS has proven to be very useful for herd management. The NLIS database enables 'statuses' to be ascribed to individual animals (for example, risk statuses from chemical residues, animal health statuses, market eligibility information, lost or stolen cattle). This functionality is potentially a very powerful tool for disease preparedness and response capacity, or for market management.

Some tools are being developed to enable interrogation and tracing through the NLIS database to be more efficient and effective. For example the Victorian Department of Primary Industries has developed a tracing tool called LiveTRACE TM. LiveTRACE integrates property data, animal ID data, property animal health data and transaction data in order to perform two major types of analysis: link analysis and timeline analysis. Links between various entities, such as a property and a saleyard, and their relationships over time can then be viewed.

The current priority species for NLIS is sheep and goats. The following strategies are currently under development or are in the process of being implemented to enhance NLIS (Sheep and Goats):

- mandatory mob based movements recording for all saleyard transactions will be implemented nationally from 1 July 2009; and
- mandatory transaction tagging will be implemented from 1 July 2009.

State and Territory jurisdictions are also working towards national uniformity for the purposes of NLIS (Sheep and Goats), particularly in the areas of PICs, movement documentation and saleyard transaction data. For example:

- All States are to require the use of approved movement documentation for all stock movements between different PICs.
- For saleyard transactions, agents are required to provide the purchaser with the following information: date of sale, from PIC, other PICs on tags recorded on documentation, number of head on movement documentation, movement document serial number, to PIC, number of head transferred to each buyer PIC, saleyard NLIS ID. This information may be provided in paper or electronic form, including the use of the central database. Where stock are purchased by a processor, the information must be provided prior to slaughter. For other purchases, the information is to be provided within seven days.
- Documentation to be retained for 7 years by a producer, and for 2 years by other parties (processors and agents).Tags and documentation to be required for movement of a live animal to a knackery. If an animal dies on farm and is moved to a knackery, a record of the movement to be retained by the consignor.

NLIS is under development for pigs and alpaca's.

Conclusions

NLIS was developed to enable the rapid and accurate traceback and traceforward of livestock across Australia. This has benefits in terms of disease control and market access. Australia's experience has demonstrated that a system based on visual tags or brands complemented by paper-based records does not provide a robust basis for tracing livestock. Australia has found that interrogating such a system is slow and resource intensive and the data are unreliable due to human error in recording transactions. Electronic systems have been demonstrated to be more reliable, less resource intensive and easier to use.

The NLIS has been implemented as a practical, government and industry partnership that has delivered business management benefits to the cattle and beef industry along the whole chain from 'gate to plate'. Integrating NLIS with herd management systems assists producers in supporting their quality assurance and food safety claims.

The Australian Government thanks the Subcommittee for this opportunity to share with you the results of our experience to date implementing a National Animal Identification System.

Additional information is available at *www.nlis.com.au and www.animalhealthaustralia.com.au*

For any queries, please contact the Australian Embassy:

- Dean Merrilees, Minister Counsellor (Agriculture) on [REDACTED]
- Dr Rob Williams, Agriculture (Veterinary) Counsellor on [REDACTED]

The CHAIRMAN. Thank you very much.

Mr. St. Cyr?

STATEMENT OF KERRY ST. CYR, EXECUTIVE DIRECTOR, CANADIAN CATTLE IDENTIFICATION AGENCY (CCIA), CALGARY, ALBERTA, CANADA

Mr. ST. CYR. Good afternoon, Mr. Chairman, Members of the Subcommittee. Thank you on behalf of the board and staff of the Canadian Cattle Identification for the opportunity to testify today.

The CCIA is a federally incorporated, not-for-profit organization that was initiated by the Canadian cattle industry to establish a national individual animal trace-back system for animal health and food safety in Canada. Through the leadership and foresight of producers and industry leaders and willing partners in the Federal Government, the CCIA was incorporated in 1998.

Conceptually, the original cattle identification system was designed to increase domestic and international consumer confidence through the assurance of efficient animal trace-back to assure the containment and eradication of animal health issues and assist in the management of food safety concerns. It was also to maintain and increase market access by avoiding trade barriers imposed due to animal health issues and support industry by opening up new markets.

And what it also does for us is it allows us to remain competitive not only with other species—and I am speaking from a cattle perspective—but other countries that were focusing on developing animal ID and trace-back programs.

As a result of this proactive approach by our industry leaders in government, Canada was prepared to react effectively and efficiently to the emergence of BSE as an animal health issue in 2003.

As I noted earlier, the agency is a federally incorporated, not-for-profit entity led BY a board of directors that is made up of representatives from several sectors of the livestock industry. Though not a voting member of the board, the Canadian Food Inspection Agency has been an exofficio representative on our board since its

inception and has been an integral partner in the development and implementation of the program. Other government partners have been Agri-food and Agriculture Canada and some provincial governments.

From a historical perspective, the CCIA completed its initial voluntary implementation in 2001 and for less than $4 million. The mandatory enforcement by CFIA for animal ID was phased in starting on July 1st, 2002.

The CCIA's repository houses the national ID and trace-back systems for a variety of industry and species groups, including dairy, beef, bison, sheep, and pork. The CLTS, or our repository, is the core of cattle marketing programs in Canada, as it is the source of information needed to provide international markets with credible data on the cattle they are importing. For the pork industry, the CCIA had previously developed the Western Slaughter Database for swine and is now working with this industry on a development and implementation of their own national traceability system.

Due to the emergence of avian influenza, the CCIA has worked with provincial groups in the poultry sector for the creation of premises identifiers to be used in their emergency planning system. Recently there was an outbreak of avian influenza in British Columbia, and, with their robust emergency planning system, supported by premise ID, the scope of the problem was effectively managed and the resulting cull was only 60,000 birds, not the tens of millions seen previously.

I guess the basis for our success has been an effective partnership between Government and industry, where industry has played a leading role in setting the timeline and the path forward, and had willing participation from the Federal Government in the delivery of this.

In the material that was forwarded to me in advance, one of the issues that was identified were what were the positives and the negatives. Well, we have heard a lot about technology being the key for speed of commerce. It can also be the Achilles heel if the system doesn't fit the industry that it needs to work in.

Part of that is the use of the RFID tag. I agree completely with my compatriots from Australia that it is the key to making it work. The reality is that in Canada, much as in parts of the United States, there are severe climatic conditions that affect the retention of the tags. We are focusing on an ongoing program of improvement to deal with that.

In conclusion, what I would like to emphasize is that we believe we have a successful system based on the strength of the collaboration between industry and government, where industry plays a leading role and that government is a willing partner with industry.

Thank you for inviting me to speak here today.

[The prepared statement of Mr. St. Cyr follows:]

PREPARED STATEMENT OF KERRY ST.CYR, EXECUTIVE DIRECTOR, CANADIAN CATTLE IDENTIFICATION AGENCY (CCIA), CALGARY, ALBERTA, CANADA

Mr. Chairman and Members of the Committee, thank you on behalf of the Board and staff of the Canadian Cattle Identification Agency (CCIA) for the opportunity to testify today.

The CCIA is a federally incorporated, not for profit organization that was initiated by the Canadian cattle industry to establish a national individual animal traceback system for animal health and food safety in Canada.

The origins of the CCIA can be found in the animal disease outbreaks of the 1980's and early 1990's; international events such as the outbreaks of Foot and Mouth Disease and BSE in other jurisdictions, and the management and eradication of Bovine Brucellosis and Tuberculosis domestically. Given our dependency on export markets, this emphasized the need to more effectively identify the cattle herd in Canada.

Through the leadership and foresight of producers and industry leaders and willing partners in the federal government the CCIA was incorporated in 1998.Conceptually the original cattle identifications system was designed to:

- Increase domestic and international consumer confidence through the assurance of efficient animal trace back to ensure the containment and eradication of animal health issues and assist in the management of food safety concerns;
- Maintain and increase market access by avoiding trade barriers imposed due to animal health issues and support industry by opening up new markets; and
- Remain competitive with not only other species but other countries that were focusing on developing animal ID and traceback programs.

As a result of this pro-active approach by our industry leaders and government, Canada was prepared to react effectively and efficiently to the emergence of BSE as an animal health issue in 2003.

As noted earlier, the Agency is a federally incorporated not-for-profit entity led by a Board of Directors made up of representatives from several sectors of the livestock industry. Though not a voting member of the Board, the Canadian Food Inspection Agency (CFIA) has been an ex-officio representative on our Board of Directors since inception and has been an integral partner in the development and implementation of the program. Other government partners have been Agri-Food and Agriculture Canada (AAFC) and some provincial governments.

CCIA, as the national traceability administrator for the Canadian cattle and bison industry, manages, administers and develops policy for the national animal ID, tracking and traceback program.

Included in these duties are the allocation of unique individual tag numbers from the national database, these unique tag numbers (animal ID) are required before an animal can move from the herd of origin and must be maintained to the point of export or carcass inspection.

The CFIA is responsible for regulatory enforcement as defined within the Health of Animals Act. The CFIA also ensures that the National program meets the ever evolving animal health and food safety traceback requirements from both domestic and international perspectives.

AAFC also works closely with the CCIA to ensure the funding requirements for important development and enhancement initiatives are met.

From a historical perspective the CCIA completed its initial voluntary implementation in 2001 and for less than $4 million. The mandatory enforcement by CFIA was phased in starting on July 1, 2002.

The effectiveness of the planned and phased in implementation has been very good. Based on international reviews of the traceback process following animal health issues, CCIA has been recognized as a world leader in animal identification and traceback.

With a nation wide compliance rate of between 99-100%, the CCIA has implemented a sustainable identification program while maintaining and surpassing national standards.

The CCIA's repository (the Canadian Livestock Traceability System [CLTS]) houses the national ID and traceback systems for a variety of industry and species groups, including dairy, beef, bison, sheep, pork and poultry.

The CLTS is the core of cattle marketing programs in Canada as it is the source of information needed to provide international markets of credible data on the cattle they are importing.

For the Pork industry, the CCIA had previously developed the Western Slaughter Database for swine and is now working with this industry on the development and implementation of their own national traceability system.

Due to the emerging issue of avian influenza, the CCIA has worked with provincial groups in the poultry sector for the creation of Premises Identifiers to be used in their emergency planning system. Recently there was an outbreak of avian influenza in British Columbia and with their robust emergency planning system, sup-

ported by Premises ID, the scope of the problem was effectively managed and the resulting cull was only 60,000 birds, not the tens of millions seen previously.

CCIA has been an active participant in the formation and maintenance of the Canadian animal identification system by creating national standards to provide direction and leadership on individual identification, technology, tag distribution, data reporting and auditing. As well as working directly with both industry and government partners, the CCIA has implemented a system that is practical and fully supported by the Canadian cattle industry and other sectors.

On an ongoing basis the CCIA assists the CFIA in any animal health or food safety related investigations in Canada, which have been an integral part in all BSE investigations. The system provides invaluable and timely tag inventory, tag history, retirement data from the packing plants and exports, and the activity of all herds involved. In the follow-up reviews to the 2003 BSE investigations, the international review Committee was very complimentary of the effectiveness of the Canadian traceback system.

During negotiations with Japan for the re-opening of their market to Canadian beef exports, a key factor was the existence and credibility of the Canadian animal identification system. Supported by the system Canadian access to an increasing number of international markets is occurring, with recent market agreements in the Middle East an example of this.

From the perspective of being a "partner" in external traceability systems, CCIA has also had an effective and collaborative relationship in coordinating efforts with the Wisconsin Livestock ID Consortium for system development to meet their state's needs.

With a proven successful industry/government partnership that has endured and grown, the CCIA is poised to leverage on its past and current success with animal identification and grow the potential for full Canadian livestock and poultry traceability.

A key concern that everyone in our societies has is the issue of security of their personal information—it is a concern that is raised constantly and from the perspective of CCIA, it is a requirement imposed by privacy legislation. All personal information associated with each tag number is securely maintained within the national database and is only accessed by authorized personnel in the event of an animal health issue.

Releases of information needed for the handling of such matters as stray animal searches and for the enabling of value-added information sharing is performed with the appropriate consents.

From a structural and procedural basis, the CCIA assists producers and other industry participants meet their regulatory reporting requirements to governments, federal and provincial, through controlled access based on defined protocols.

With the emergence of commercially driven, value-added programs, the development of industry consent-based information-sharing protocols has also been implemented, that is to say that if a producer and someone else in the value-chain wish to share defined information they can have that information flow facilitated by the system. However, I would emphasize that all the participants must agree to this and define the terms of what they are willing to share.

As with all technology-based systems, the CCIA has continued to enhance the functionality of the animal identification program through ongoing system enhancements, including a complete upgrade in 2006 to facilitate the migration from bar code tags to Radio Frequency Identification (RFID) technology tags. It has also implemented components to support:

- Various value added and post-BSE initiatives such as Age Verification; and
- The implementation of Premises Identification Numbers to support emergency planning and enable movement reporting.

The use of Age Verification, the ability to associate an animal birth date with a unique animal identification number, has been a key evolution. To address the ever increasing demands from our international trading partners for livestock products with specific requirements accurate age determination for Canadian cattle is a necessity.

In order to ensure the industry could maintain its market access, the CCIA implemented changes to the CLTS that provide an effective and internationally recognized validation and age verification process. This functionality enables producers to submit information to meet regulatory requirements (Alberta and Quebec) or commercial interests in a recognized national database and have it readily available when it is required by either domestic or export markets.

The transition from the original bar code tags to Radio Frequency Identification (RFID) technology officially began on January 1, 2005. The bar coded tags were no

longer eligible for sale in Canada as of July 1, 2005, and as of September 1, 2006 producers were no longer allowed to tag anything but mature breeding stock with the bar code tags. The transition will be complete as of December 31, 2009, with all cattle leaving their farm of origin being mandated as requiring a CCIA approved RFID tag.

From a commercial perspective, the evolution from bar codes to RFID has been moving faster than this timeline, with many feedlots and other commercial entities (e.g. dairies and feedlots) using the unique animal RFID tag number as a critical component in their business systems to monitor feed, health, production, and other factors.

The implementation of RFID technology has provided many benefits including:

- Providing accurate and efficient trace back information more efficiently;
- Allowing for the electronic reading of numbers without the line of sight and legible bar code required for an optically based system;
- Ensuring Canada has an accurate and comprehensive age verification system; and
- Providing the necessary basis for full animal movement tracking at the speed of commerce.

In conjunction with national standards, the CCIA's standards for RFID tags ensure visual, mechanical, physical, electrical and environmental quality, additionally they are also tested to make sure they cause no undue welfare concerns to an animal. The CCIA also verifies associated technology such as readers to ensure that they meet all standards for readability.

As the CCIA continues to enhance the current system it provides an increasingly efficient platform to collect essential animal identification related data and other attribute information that has both regulatory and commercial utility. The use of the data supports a variety of applications, which includes the:

- Transition to RFID tags;
- Previously referenced implementation of age verification;
- Premise Identification registration facilitates tracebacks and movement tracking, whether it is a Group or Lot approach (pork and sheep), individual animal sighting; or unique animal movement (cattle and pork breeding animals), animal health zone controls, and disaster planning / recovery; and
- Value-Added commercial programs, either for mass-marketed approaches or local niche markets.

In preparing for this hearing it was identified that there was interest in learning what had worked and what has not been as successful. I will attempt to share some of my learnings and that of my organization.

Given that technology is described as the key to the success of the system, it is fair to say that it can also be its Achilles heel. By this I mean that the system can be incredibly efficient when all sectors have a high level of technological infrastructure, but when that infrastructure is not as robust (e.g. dial-up or not Internet vs. high-speed / broadband) a single solution or approach is not always attainable or viable.

This is a key factor for developing the tools and techniques for data collection, distribution, and also the structure for the education and training required to support producers and other industry participants. Failure to address the capture methods issue and education aspects can have significant impact on overall credibility of the system.

Another key area is the base level technology, that of the RFID tag and the factors affecting its retention and readability. This component is one that is subject to an incredible range of environmental and climatic factors in Canada and testing and product improvement and producer education are vital to addressing concerns.

With respect to addressing key technology factors or other system-related issues, CCIA is moving to continuous improvement practices to address the technological and engineering factors, while using these practices to identify key educational issues for the industry and how to best deliver the training.

Underlying this is the reality that there is no "one size fits all" approach to a national traceability system in a country as large and diverse as Canada and we will use a collaborative and open approach to working with industry, the business sector, and government to address the issues and deploy the right tools for the getting the job done.

In June 2006, recognizing industry's leadership and foresight in building the foundation for livestock traceability, Federal/Provincial/Territorial (FPT) Ministers committed to phasing in a National Agriculture and Food Traceability System (NAFTS),

beginning with livestock and poultry. Four sectors have been prioritized: cattle, sheep, hogs and poultry.

In August 2006, an Industry-Government Advisory Committee was established to lead the development and implementation of the national traceability system for the livestock and poultry components of NAFTS. IGAC is the current forum for industry and governments to collaborate on traceability.

The need for this approach will become even more evident as we advance down the path to a full multi-species traceability system. Having a flexible and collaborative organization and system will be the only way that we will achieve a vision that embraces the full continuum of traceability from the farm gate to the consumer's plate.

The integration of multiple complex data systems, while protecting the personal privacy of individuals will necessitate innovative solutions and extensive collaboration between a large number of parties.

As you can imagine, communications is a crucial factor in the success or failure of a national identification system. No one party can make it a success or result in its failure—it is dependent on the resources and participation of all industry sectors, organizations and government to ensure industry and all stakeholders are informed and able to support and use the program and understand its future potential.

Multi-year campaigns utilizing standard themes in various communications tools, such as brochures, advertisements, educational forums, presentations, websites, posters and media kits, are needed to ensure that the CCIA effectively communicates key messages about the program.

The path to the future that the CCIA has committed to is one that continues to:

- Meet and strives to set performance levels that exceed domestic and international requirements for animal identification, tracking and traceability;
- Improve Canada's overall animal health emergency response capabilities;
- Enhance all aspects of data integrity and quality control;
- Define and implement all necessary technological and database enhancements;
- Ensure a cost-effective, efficient and long term sustainable program for sectors of the livestock and poultry industries;
- Support to our industry partners in their efforts to engage and educate the consumer as well to assure them of food safety and the quality of Canadian meat; and
- Work with our trading partners in an effort to achieve international standardization and increase the efficiency and cost-effectiveness of all livestock identification and traceability programs.

The animal identification program was initially mandated as a joint venture between industry and the Federal Government to meet the basic animal health and food safety traceback requirements. This partnership continues to be very strong and productive and one that is expanding to include provincial governments and an ever-expanding range of industry sectors.

The evolution of the relationships and the collaborative development of the necessary tools are seen as the most effective way forward and pave the way for the effective and efficient use of the system for all stakeholders.

Thank you for your invitation to meet with you and the time to speak to you today.

The CHAIRMAN. Thank you both very much. We are very, very grateful.

Let me start the questioning with you, Mr. St. Cyr. Can you comment on whether mandatory ID has helped your export markets?

Mr. ST. CYR. Well, I can't speak from the perspective of having taken part in the negotiations. However, the subjective evidence that I have received from our Canadian Cattlemen's Association is that the existence of our animal ID system was crucial in opening the Japanese market to Canadian beef.

The CHAIRMAN. Now, did any of your businesses go out of business directly related to their participation in mandatory animal ID?

Mr. ST. CYR. Not to my knowledge.

The CHAIRMAN. What was the start-up cost for your programs? And what are the annual costs to each of your governments, Aus-

tralia and Canada? Please state if your answers are in U.S. dollars or your own currency.

Mr. ST. CYR. As I noted in my presentation, the start-up cost for the CCIA was approximately $4 million Canadian and our annual operating cost is about $3 million Canadian.

Dr. WILLIAMS. Certainly, from our cattle industry perspective, the start-up costs were about $56 million U.S., in terms of tagging the national herd and some of the infrastructure costs that needed to be put in place. Then it is approximately $20 million U.S. a year to maintain the annual tagging. That cost so far has been shared 50-50 between government and industry.

The CHAIRMAN. And just in Australia, is Australia TB-free? If the answer is yes, would you credit the mandatory ID system for that success?

Dr. WILLIAMS. Yes, we are TB-free. We have been TB-free since 1997. And the basis of having a mandatory animal identification system was due to our tuberculosis and brucellosis eradication program. So definitely yes.

The CHAIRMAN. So have either of you ever had to use or execute your system for a disease problem? And if so, how long did it take you to track all of the animals that you were looking for?

Dr. WILLIAMS. We certainly have used it on some minor residue issues. So, going back to the questions that were asked of the previous panel on food safety, it still is a useful food safety tool. Certainly anecdotally, from the minor issues we have had to deal with, it has been a very effective tool for traceability.

But we have also tested it, as a government, through exercises. We have had two exercises for the cattle industry called Cow Catcher I and Cow Catcher II—very ingenious names, of course. Basically, Cow Catcher I was conducted before the mandatory system came into place, and we found the overall result for traceability was about 75 percent. Our national performance standard is related to tracing an animal within 24 hours and also contact animals within 48 hours. When we ran the exercise Cow Catcher II, which was conducted in 2007, the traceability success rate rose to 99 percent, or nearly 99 percent of cattle were traced within 24 hours.

The CHAIRMAN. Now, to the both of you, do you believe that your animal ID system would be as an effective if it were voluntary?

Mr. ST. CYR. I will start out on this one.

The program in Canada did start out on a voluntary basis, and it had a reasonable uptake. However, to reach the point where you have the critical mass, it had to be converted to a mandatory animal ID system.

The CHAIRMAN. Okay.

And you?

Dr. WILLIAMS. I don't have anything to add to the other comment, other than to say, yes, in the Australia experience it started off as voluntary, but, again, our experience has shown that it must be a mandatory system.

The CHAIRMAN. Thank you very much.

Mr. Neugebauer?

Mr. NEUGEBAUER. Thank you, Chairman.

Dr. Williams, in your testimony—and I want to make sure I understand this clearly—what portion of that cattle ID system in your country is borne by the producer and what portion is borne by somebody else?

Dr. WILLIAMS. Are you talking about the costs of the system?

Mr. NEUGEBAUER. Yes.

Dr. WILLIAMS. In terms of costs, it has been approximately 50-50 in terms of the actual split. It does vary between states. Different states and different territories were able to implement the system under their own—well, they were required to put the legislation in place and under their own steam, if you like. But in terms of actual costs, it has worked out to be approximately 50-50.

Mr. NEUGEBAUER. Fifty percent the producer and 50 percent the government then?

Dr. WILLIAMS. Exactly, yeah.

Mr. NEUGEBAUER. In the Australian system, what are some of the primary things that your government did to protect what would be considered proprietary data that the producers would not want to share in a public domain? What have you all done to protect that?

Dr. WILLIAMS. Yes, that is a good question. The data collected through NLIS is protected from freedom of information acts in Australia. And the major reason why that is done is because the database is actually held by a private company, in Meat and Livestock Australia.

And there have been no known requests for data for freedom-of-information purposes to date, but even so, the data is protected.

Mr. NEUGEBAUER. Now, is some of that data held by private companies and then accessed by the government? Or is it all in a government database?

Dr. WILLIAMS. No, it is in a private database run by a producer-owned group called Meat and Livestock Australia. The government has access in specific circumstances, for suspected or actual disease outbreaks or chemical residue incidents. So, most of the time, the government is not accessing the database.

Mr. NEUGEBAUER. So when you ran Cow Catcher I and Cow Catcher II, did you physically go into the database, or did you call the private company and say, we need trace-back or information on these? How did that work?

Dr. WILLIAMS. No, we physically used the database at the government level, both mainly the state and territory levels but also Federal Government. It is an ID user, password-protected system, Web-based, Web-enabled. Government offices have their own user ID and password protection, so you know who accesses the database, and you also have different levels of protection as to what you can access in the database.

Mr. NEUGEBAUER. So, in other words, can you physically go in there and download data, or do you have to review it online?

Dr. WILLIAMS. I am a government veterinarian and not IT expert, but I have actually interrogated the database myself. Most of the time, a government officer would—they only have access to certain fields in the database, and most of the time what you have isn't easily seen on the screen, so you then might make a few notes

about what you might need to do, say, make a phone call or go to a sow yard.

So you could—I am not sure whether you can actually download it, but you can certainly—you have access to the database that you need to.

Mr. NEUGEBAUER. Do you have mandatory animal ID for all food animals in Australia?

Dr. WILLIAMS. We are moving towards that system. So mandatory tagging of sheep and farmed goats was brought in in January 2006, and we are moving to a mandatory recording system.

And I think it was explained by previous panelists, you sort of go through this in a step-wise process. You register premises, then you start to identify the animals, and then you actually have the traceability systems put in place.

So we are working towards the traceability system. July 2009 in sheep and farm goats, we will have mandatory requirements for recording through sow yard transactions.

Mr. NEUGEBAUER. Where the private sector is maintaining the database and the government is accessing it, and so therefore if somebody does an open records request, the government doesn't have any data in its hands, other than maybe the premises numbers or something like that? So, that is the way you have protected the proprietary information?

Dr. WILLIAMS. Basically any information from that database, as I said, it is exempt from the Freedom of Information Act in Australia.

Mr. NEUGEBAUER. By statute?

Dr. WILLIAMS. Yes, that is correct.

Mr. NEUGEBAUER. I want to go to my Canadian friend. By the way, we came to Canada on a field hearing a couple of years ago.

And where are you in the process? Do you have mandatory animal ID for every food animal in Canada?

Mr. ST. CYR. Not all food animals, at this point. We are moving on that path. The goal of industry and government is to have that in the next few years.

Right now, we have cattle, bison. Pork will have a national traceability system this year. Sheep has moved that way. Goats are probably the last of the commercial type of livestock species that don't have it.

Mr. NEUGEBAUER. What mechanisms has the Canadian Government put in place to help to protect this proprietary information so that producers don't feel like their operations are an open book?

Mr. ST. CYR. Well, because we are essentially a private company that manages it on behalf of industry and government, we have a different regulatory environment instead of the Federal Government. The Federal Government and provincial governments have right of use and access to information through the regulatory regime that they operate under, but that is the only information that they have right of use and access for.

Proprietary information is managed under a separate regulatory regime, where it is consent-based by the producer. So you want to have a value-chain sharing approach, so that you are carrying that attribute information along. All of the members of the value chain

who want to share information must consent and provide us with that consent so that that can be enabled for them.

Mr. NEUGEBAUER. So that is to make certain representations about the origin of that product, where it has been and so forth——

Mr. ST. CYR. Exactly.

Mr. NEUGEBAUER.—for countries or companies that are sensitive to food safety?

Mr. ST. CYR. Yes.

Mr. NEUGEBAUER. Thank you, Chairman.

The CHAIRMAN. Thank you.

Just as a note, we are going to have the second panel come back very briefly. So those, the second panel here, please stay put. We are going to have you come back momentarily. We appreciate your attendance here.

To continue the questioning, Mr. Costa?

Mr. COSTA. Thank you very much, Mr. Chairman. For clarity here—I just have one question for these witnesses—are we then going to move to the second panel?

The CHAIRMAN. Yes.

Mr. COSTA. Okay.

I also have some constituents here who are very involved in the issues that we are talking about here today. So I am pleased that they are here to get their own take on what is going on.

Quickly, with both Australia and with Canada, do you have an equivalent of the animal identification—I mean like the MCOOL program? I don't know how familiar you are with it here in the United States, but it requires labeling for products that are sold in our markets. Do you have an equivalent of that in Australia or Canada?

Mr. ST. CYR. Recently, the Federal Government implemented Product of Canada labeling requirements. But because that is outside of my area of expertise, I would be very reluctant to comment on that.

Mr. COSTA. Okay.

For Australia?

Dr. WILLIAMS. We do have Mandatory COOL for some products but not for red meat. So it has no basis for beef.

Mr. COSTA. So suffice it to say, both of your countries are in transitioning as far as consumer demands and other markets dictate, as it relates to both labeling as well as animal identification.

But you see animal identification, to the heart of the questions that you were asked today, as being a health issue and not a marketing issue, is that correct?

Mr. ST. CYR. For us, from the government perspective—and I can only speak subjectively, because I just work with them——

Mr. COSTA. Yes. I mean, there are three reasons. It is either health, marketing, or trade.

Mr. ST. CYR. For the way the current system is structured, it is an animal-health-based approach. From the commercial side, the industry side, it is a facilitator to allow them to market both domestically and internationally.

Mr. COSTA. Is it the same in Australia?

Dr. WILLIAMS. No. It is actually covering all three. Certainly for animal health from a government perspective, the legislators' per-

spective. But from an industry perspective, it is definitely market access. In fact, because we so heavily rely on exports in Australia, that was one of the key drivers for NLIS—or mandatory NLIS.

Mr. COSTA. And trade.

Dr. WILLIAMS. Yes, exactly. That is correct.

Mr. Costa. I would like to go to the next panel, if that is possible, Mr. Chairman.

The CHAIRMAN. Thank you very much. I want to thank this panel for your participation. You have been very helpful to us, and your full testimony will be a part of the record. We want to thank you very much.

And if the second panel could reconvene for a moment, we have a couple of quick questions Mr. Costa would like to ask.

Mr. COSTA. I thank the Chairman and Ranking Member for your indulgence. I tried to get back here as quickly as I could from the floor and got waylaid.

As you are sitting down, quickly, Mr. Nutt and Dr. Thornsberry and—I guess Mr. Butler is not here—Dr. Jordan and Dr. DeHaven, question: Mr. Nutt, do you oppose mandatory—I heard your testimony earlier—ID? Animal identification?

Mr. NUTT. I will start off by saying this: As we know it today, with the degree of definition that there is, we very much opposed a mandatory system.

Mr. COSTA. All right. I just wanted to clarify that.

Dr. Thornsberry, you are opposed as well?

Dr. THORNSBERRY. 100 percent.

Mr. COSTA. Okay. I thought I understood in the testimony—I was here at the time—that the pork industry supported it, if I am correct for the record, as did the dairy industry. Is that correct?

Dr. JORDAN. That is correct.

Mr. COSTA. We have about, what, about 9.3 million milk cows in the country?

Dr. JORDAN. That is right, mature animals, yes.

Mr. COSTA. And about 4 million heifers, replacement heifers, something like that? But you have worked with the mandatory program, in essence, for a while.

Dr. JORDAN. Yes. Well——

Mr. COSTA. I mean de facto. I mean the way you register your animals for breeding dates and everything, they are all registered, they are identified from dairy to dairy, right?

Dr. JORDAN. Well, I am not going to lead you astray in thinking that all of our cattle are registered with breed associations.

Mr. COSTA. No, I understand that.

Dr. JORDAN. Okay.

Mr. COSTA. I am a third-generation dairy person, so I know a little bit about the business.

Mr. DeHaven, your position on mandatory ID?

Dr. DEHAVEN. We support mandatory ID.

Mr. COSTA. Okay.

Mr. Thornsberry and Mr. Nutt, the question I asked the previous panel, I think there are three reasons why we—and I know, Mr. Thornsberry, you strongly supported labelling, or I believe R-CALF strongly supported it. And I am confused. I think there are three reasons, as I said, for animal ID: health, marketing, and trade.

And you told me how you felt about the trade issues in your testimony, so obviously that doesn't sway you. But I am trying to understand why, if you support labelling under MCOOL, doesn't it seem inconsistent for you as a veterinarian not to support it for health reasons?

I mean, we have BSC issues that we have to deal with, we have brucellosis, we have TB. I have had two dairies in my district that have tested positive, and it has been a horrific, difficult challenge to deal with. I mean, it just seems to me, if we had mandatory ID, we could deal with a lot of these issues.

Mr. Thornsberry, do you find your position inconsistent?

Dr. THORNSBERRY. No, I certainly do not. There is no relationship to ID and COOL. COOL identifies the country of origin, not the farm of origin. And all meat and all cattle coming into this country from another country have to be marked with a mark of origin. All we have to do is maintain that origin. Anything born in the United States doesn't need an identification, because all foreign products are identified.

You know, we hear this——

Mr. COSTA. Let me ask you a question. Would you not agree that, if we had a national animal ID program in place, that the length of time associated with the costs of testing for TB, for example, could be dramatically reduced, that we could save money?

Dr. THORNSBERRY. No, I do not. I don't know of a dairy yet that doesn't have their animals identified in some fashion or another. Seventy-two percent of all dairies are part of DHIA, and all those have an individual identification on them.

I don't believe that animal ID is going to be any miraculous system that will automatically prohibit us from ever having a problem in this country.

Mr. COSTA. But you have concern about animals being imported from Mexico or Canada, right?

Dr. THORNSBERRY. Most certainly I am.

Mr. COSTA. Of all the animals that I understand that have been traced out and tested from Mexico, I understand 377,000 tests, not one has tested positive?

Dr. THORNSBERRY. For TB?

Mr. COSTA. Yes.

Dr. THORNSBERRY. Seventy-five percent of the TB identified in the United States by DNA typing comes from Mexican cattle.

Mr. COSTA. Not one of the Mexican cattle that I understand was implicated in the tests.

Dr. THORNSBERRY. No, sir, that is incorrect. The OIG has made a report here recently. Part of the problem we have TB in this country, we have wildlife reservoirs. That is going to continue to be a problem forever.

Mr. COSTA. Well, of course, whether you have MCOOL or whether you have a mandatory ID.

Dr. THORNSBERRY. But 75 percent, 75 percent of the——

Mr. COSTA. But would you not argue that mandatory ID'ing would provide an added safety issue?

Dr. THORNSBERRY. No, I would not.

Mr. COSTA. Well, I would disagree with you. I mean, I understand why you don't like it.

Dr. THORNSBERRY. Yes, I don't think you have weighed the consequences of this program. You have had Australia talk to you that has 25 million head of cattle. Talking about us, we have 100,000 head of cattle in this country.

Mr. COSTA. 100 million cattle.

Dr. THORNSBERRY. I mean 100 million.

Mr. COSTA. Right, last time I checked.

Dr. THORNSBERRY. We have four times as many cattle, four times the cost, if not more. They are getting tags much less expensively than we are because most of our tags come from that country. Mine are costing me $3.

Mr. COSTA. I don't think you can do MCOOL successfully, as I said to the earlier witness—and I don't expect I am going to change your mind, but you are not going to change your mind—unless you have mandatory ID. I think the two go hand in hand.

Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you very much.

Before we adjourn, I want to recognize the Ranking Member, if you have anything you would like to say.

Mr. NEUGEBAUER. Well, I think this has been very helpful. And I think one of the things that this begins to articulate is there are a lot of different ways to approach this issue. But I think one of the most important things, as we move in this direction of trying to make a decision on what to do with animal identification, is we need to get it right. And we hear that even if we started now, it would take 4 years to implement it. Gosh, if it would take 4 years to implement it and then we didn't get it right, how long would it take to fix it?

So I appreciate the Chairman. I hope this is an issue that we will thoughtfully proceed with. We may have to have additional hearings and possibly look at some different ways to approach this issue.

The CHAIRMAN. Well, thank you, Mr. Ranking Member.

And I want to thank all of you, all of you that came, took time out of your busy schedule to come and share with us your expertise. We deeply appreciate it. It has been very helpful to us and very informative.

As I said before, this Committee is moving aggressively on this issue. I think our time clock is ticking. As I mentioned, this issue is a homeland security issue now, and our next hearing will be a joint hearing between this Committee and the Homeland Security Committee.

This is taken very seriously. We feel the Administration is taking it very seriously. We are going to move forthrightly. We are going to figure out a way to deal with those concerns.

I think you have real concerns, Mr. Thornsberry and Mr. Nutt, in terms of the confidentiality of information, make sure it is protected. I think we did have some examples, although from Australia and Canada. They are smaller economies of size than ours; we recognize that. But I think we have the nucleus for coming up with a conclusion.

And, like I said, at the end of the day, the bottom line is protecting the food chain of the American people, thereby protecting

the human costs that we have but also protecting our economy as well. It only takes one little slippage.

Now I would just like to say, under the rules of the Committee, the record of today's hearing will remain open for 10 calendar days to receive additional material and supplementary written responses from the witnesses to any question posed by a Member.

This hearing of the Subcommittee on Livestock, Dairy, and Poultry is thereby adjourned.

[Whereupon, at 12:43 p.m., the Subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

SUBMITTED STATEMENT OF JUDITH MCGEARY, EXECUTIVE DIRECTOR, FARM AND RANCH FREEDOM ALLIANCE

The Farm and Ranch Freedom Alliance (FARFA) is a non-profit organization headquartered in Austin, Texas. Founded in April 2006, FARFA has over 600 members and over 2,000 subscribers to its mailing list from across the country. FARFA is dedicated to protecting the interests of independent farmers, ranchers, homesteaders, and other livestock owners.

USDA has described NAIS as "one of the largest systematic changes ever faced by the livestock industry."[1] Despite the scope of the proposed program, the government has not conducted any scientific studies to analyze the design or effectiveness of the NAIS. Nor has the government ever completed a cost-benefit analysis. Rather, the USDA has relied on unsupported, generalized statements that NAIS is necessary to protect the United States against an outbreak of animal disease and that it will help the export market. The discussion below is an overview of the most egregious issues that have been ignored by the proponents of the program.

Background

In the 1980s and 1990s, industry trade groups developed plans for a national electronic animal identification system.[2] In 2002, the National Institute for Animal Agriculture (NIAA) established a task force to create a National Animal Identification System.[3] The NIAA is a trade organization composed primarily of large agri-business, technology companies, and government bureaucracies.[4] The NIAA included USDA in its task force to develop a national electronic identification system.[5]

In April 2005, the USDA published the Draft Strategic Plan and the Program Standards for the NAIS. These documents set out a three-stage program: premises registration, animal identification, and animal tracking, discussed in more detail below. The Plan stated that the NAIS would be mandatory after an initial voluntary period.[6]

After a public outcry, USDA announced in November 2006 that NAIS would be voluntary at the federal level.[7] The same day USDA made this announcement, it also announced the availability of $14 million to fund state programs under cooperative agreements. The cooperative agreements with the states include provisions requiring the states to reach specified goals for participation.[8] The federal funds thus encourage states to adopt mandatory programs, as Wisconsin and Indiana have done,[9] or to use coercive measures to increase registrations. For example, Michigan now requires all cattle to be tagged with NAIS-compliant RFID tags (and the properties registered), Tennessee has refused disaster relief to farmers whose properties were not NAIS-registered, and Colorado has expelled children from the State Fair livestock show because their parents' properties were not registered.[10]

Further, despite referring to "critical mass" as an intermediate goal for participation, the USDA has repeatedly stated that its ultimate goal is to have 100% or "full" participation. It is not plausible that 100% of animal owners, including thousands of people who have livestock as pets, will choose to sign up for this program of their own free will, in time to meet USDA goals. The reality is that states continue to

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[1] USDA Press Release No. 0120.06 (Apr. 6, 2006).

[2] *See, e.g,* Proceedings of the 1994 Livestock Identification Consortium, online at *http://animalagriculture.org/Proceedings/1994IDProceedings.asp*

[3] Draft Strategic Plan, United States Department of Agriculture, Animal and Plant Health Inspection Service (published Apr. 25, 2005) (hereinafter "Draft Plan") at 4.

[4] The list of NIAA members is available at *http://animalagriculture.org/aboutNIAA/members/memberdirectory.asp.*

[5] Draft Plan at 4.

[6] Draft Plan at 8-9.

[7] USDA, National Animal Identification System (NAIS): A User Guide and Additional Information Resources (Version 2.0, December 2007) (hereinafter "User Guide").

[8] *See, e.g.,* USDA, Announcement of Cooperative Agreements for Implementation of the National Animal Identification System (NAIS) (Nov. 22, 2006) (hereinafter "Cooperative Agreement Announcement") at 1 ("Applications must present well-defined measurable outcomes and total allocation of funding will be dependent upon achieving projected results with a mid-year assessment.").

[9] Wisconsin and Indiana have implemented mandatory premises registration. *See* Wis. ATCP Rule 17.02; 345 IAC 1–2.5. State agencies in Texas, Vermont, and Pennsylvania have proposed mandatory regulations under NAIS and only withdrawn them after intense public outcry.

[10] USDA has expressly approved of coercive tactics, such as requiring participation in NAIS to be tied to existing programs. *See* User Guide at 7. USDA's 2007 call for applications for cooperative agreements also allows for data mining. *See* Cooperative Agreement Announcement at 12. Numerous anecdotal reports have also surfaced of individuals being told that the state program was mandatory (even when nor regulations had been adopted), told that they had to register in order to attend a show or sell their animals at public auction, or other threats.

face pressure from USDA to implement mandatory or coercive measures to meet the USDA's goals and to receive federal funds to meet those goals. We urge Congress to halt or restrict the USDA's implementation of NAIS.

I. NAIS will impose significant costs on livestock and poultry owners, including small farmers and pet owners.

The USDA provided a grant to Kansas State University in 2007 to conduct a cost-benefit analysis. Although USDA has the results, it has refused to release the study to date. Instead, the USDA and state agencies continue to spend money on NAIS and expect animal owners to pay costs, while our economy faces a severe recession.

Even just the first step of the NAIS, premises registration, involves significant costs: computer hardware and software to create the database of all animal owners, and the personnel for data entry, management, and maintenance. These costs must be paid either through a fee on the landowner (as proposed in Texas) or with taxpayer dollars.

Animal identification is a separate, costly step. Although the external RFID tags cost $3, the implantable microchips cost approximately $20. The cost of actually tagging the animals must also take into account the costs of a veterinarian's assistance (for implantable micrcohips) or the equipment and labor necessary to precisely place the tags in the correct portion of the ear so that they can be read electronically.[11] There is also the potential for human or animal injury in the process, as well as the shrinkage associated with greater handling of the animals.[12] Most farmers and ranchers have very narrow profit margins and will not be able to absorb these costs. Some animals, such as sheep and goats, may be worth as little as $50 to begin with, making such costs clearly excessive. If leg bands are used to identify poultry at birth, they will require multiple tag changes while they grow to maturity, which could easily mean spending more money on tags than the bird would sell for.

The third step, reporting, will require animal owners to either have electronic readers and computers, or to pay someone else to scan the tags and report. The cost for reporting every movement of every animal will differ, depending on whether the owner has to hire additional labor to help with the paperwork requirements. The list of reportable events is long: the tagging of every animal; regional shows and exhibitions; every sale, whether by private agreement or market; missing animals; predator losses; euthanasia; rendering; and slaughter. The resulting databases will be massive, requiring extensive equipment and personnel. These costs may be directly imposed on the animal owner, or they may be partially hidden by using taxpayer dollars, levies on sales barns, or other methods. But they must be paid somehow.

The Australian Beef Association has estimated that the costs for the Australian program (which covers cattle only) could be as high as $40 for each animal.[13] The Association noted that a British parliamentary Committee found that Britain's tracking program cost as much as $69 per animal sold. When multiplied by the approximately 100 million cattle in this country, 9 million horses, 9 million goat and sheep, and millions more included livestock and poultry animals, these costs are staggering.

II. NAIS will not increase food safety.

For many people, the issue of animal health is closely linked to food safety. Yet the NAIS will do nothing to improve the safety of our food supply. Most food-borne illnesses are from bacteria such as salmonella, e. coli, and campylobacter, or the Norwalk viruses.[14] These organisms contaminate food due to poor practices at

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[11] For example, paying a vet in the Central Texas area to implant a microchip in a horse costs between $60 and $80, based on a phone survey. For the external tags, an applicator is needed and the tag is supposed to be placed in a precise ¼ area of the ear.. *See* Michigan University Extension, Bulletin E–2967 (July 2006).

[12] A presentation by Kansas State University researchers conducting a cost-benefit analysis of NAIS under a grant from USDA, included the following "cost categories" for implementation of NAIS for cattle: RFID tags, RFID technology, labor (associated with each category), shrink, animal injury, human injury, depreciation, and opportunity costs.

[13] Australian Beef Association, Submission to the Queensland Government Relating to the National Livestock Identification System Regulatory Impact Study (2005).

[14] *See* Centers for Disease Control and Prevention, *http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm 1Bmostcommon (website last checked May 8, 2006). Campylobacter, salmonella, and e. coli are all found in the intestines of animals, so that contamination occurs during the slaughter process. The Norwalk viruses are believed to spread primarily from one infected person to another, through handling of food by infected kitchen workers or fishermen.*

slaughterhouses or in food handling.[15] The NAIS will not prevent these problems from occurring. Moreover, because the tracking will end at the time of slaughter, the NAIS will not improve the government's ability to trace contaminated meats once they leave the slaughterhouse and enter the food chain.

In fact, the NAIS will actually reduce food safety. Economies of scale and the provisions for group identification under NAIS will translate to advantages for factory confinement farms. The use of antibiotics in these farms has raised significant health concerns, while significant environmental issues have been linked to the confinement operations' animal management practices. Meanwhile, small farmers who sell their products locally, creating a diversified and totally traceable food supply, will be driven out of agriculture by the costs of NAIS.

Although it is not a widespread problem, the issue of BSE or Mad Cow Disease is of great concern to many Americans. The most effective protection against the human health threat from BSE would be a system of testing every slaughtered cow that enters the food supply, as is currently done in Japan. [16] England and the European Union also test significantly more cattle than does the USDA, which tests only about 1/10 of 1% of our slaughtered cattle.[17] The USDA has justified this low testing rate on the grounds that it estimates that there are only 4 to 7 cows in the entire country that have BSE. Yet the USDA apparently sees no contradiction in pushing for the electronic tagging and tracking of 100 million cows, a process that will not actually detect those few sick ones or prevent them from entering the food supply.

NAIS will do nothing to increase the safety of the American food supply, although it will almost certainly raise the cost of food.

III. NAIS will not improve animal health.

It is critical to recognize that animal diseases, in both wild and domesticated animals, have been part of human existence for thousands of years. The excuse of disease cannot justify every intrusion into citizens' privacy and burdens on their property rights. **But we are not even faced with a true choice between safety and freedom, because the NAIS will not provide any true protection against disease.**

The sole goal of the NAIS is to provide 48-hour traceback of all animal movements. According to the proponents, every animal must be part of the system. Yet the government has not provided any studies or models showing why 48 hours is a magic number nor why 100% of animals must be included. The Farm and Ranch Freedom Alliance submitted requests under the Freedom of Information Act (FOIA) in November 2006 and December 2007, asking for the studies, risk analysis, and other scientific documents used to develop NAIS. USDA has acknowledged receipt of both requests and has provided no objection under FOIA, yet it still has not produced a single study.

Basic scientific principles and practical experience both establish that the susceptibility of animals to disease and the likelihood of transmission differ greatly de-

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[15] *See* Centers for Disease Control and Prevention, *http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm 1Bmostcommon (website last checked May 8, 2006). "Meat and poultry carcasses can become contaminated during slaughter by contact with small amounts of intestinal contents. Similarly, fresh fruits and vegetables can be contaminated if they are washed or irrigated with water that is contaminated with animal manure or human sewage. . . . Later in food processing, other foodborne microbes can be introduced from infected humans who handle the food, or by cross contamination from some other raw agricultural product."*

[16] *See* Congressional Record—House at H4270 (June 8, 2005) (comments of Congressman Kucinich); *See also* Final Report, Japan-United States Working Group, Section 1(1)(iii) (Japan's BSE Measures) (July 22, 2004) ("Based on Article 14 of the Abbatoirs Law, only animals that pass ante-mortem and post-mortem inspections are approved for slaughter and dressing for use as edible meat. . . . cattle of 0 months or older (all ages) are subjected to BSE testing during this post-mortem inspection.").

[17] The U.S. tested a little over 176,000 cows for BSE in 2004 and tested fewer than 700,000 cows *total* between June 2004 and March 2006, a period of almost two years. *See* News Release, Statement by USDA Chief Veterinary Officer John Clifford (DVM) Regarding Positive BSE Test Results (Mar. 13, 2006). Between 32 and 35 million cattle are slaughtered each year in the U.S., so the USDA has been testing approximately 1% for BSE. *See* USDA, Livestock Slaughter 2003 Summary (35.5 million cattle); Livestock Slaughter 2004 Summary (32.7 million cattle); 2005 Summary (32.4 million cattle). In contrast, the European Union countries tested more than 8 ½ **million** cows just in 2003, and tested over 6 million in just the first 9 months of 2004. *See* U.K. Food Standards Agency, Results of BSE testing in the EU, *http://www.food.gov.uk/bse/facts/cattletest*; Results of BSE testing in EU in 2004, *http://www.food.gov.uk/bse/facts/cattletest2004.* In 2006, the USDA announced that it was reducing testing by 90%.

pending on the species of animal, the exact disease, and the conditions under which the animals are kept. [18]

Non-commercial operations are not immune from disease, but they do not pose the same risks as the commercial facilities. Using poultry as an example, in the 2004 outbreak of avian flu in Texas, the disease was found in a 6,600 bird flock in commercial poultry operation; but despite testing more than 350 nearby non-commercial flocks, no infected birds were found in non-commercial flocks. [19] In the 2002 outbreak of avian influenza in Virginia, "farm equipment, vehicles and personnel" that moved among commercial facilities caused transmission of the virus. [20] An NGO report indicates that the spread of avian flu, including the greatly-feared H5N1 virus, is due to the conditions in confinement poultry operations. [21] As noted in that report, a USDA report found that, out of 45 outbreaks of avian flu in the country of Laos, 42 of the outbreaks occurred in commercial operations. [22]

Despite the clear, scientifically documented differences between production systems and non-industrialized holding of livestock, NAIS treats all owners alike. Under NAIS, a small-scale livestock owner with 10 chickens free-ranging is considered as much of a threat to animal health as a commercial operation with 10,000 chickens living in a crowded building. The farmer raising sheep or cattle on healthy pastures is treated the same as the feedlot with hundreds of animals crowded into small pens. Indeed, the small-scale producers face even heavier burdens than the large commercial operations because of economies of scale and the way the USDA has defined group lot numbers. **This program is precisely the opposite of what is needed to prevent and control disease.**

NAIS may also increase the spread of livestock diseases by creating a new black market. If the NAIS is implemented on a mandatory basis, or creates restrictions on people's right to buy, sell, or use their animals, it is inevitable that some people will decide not to comply. Since they will be acting illegally, they will be far less likely to seek a veterinarian's help should a disease problem arise. To understand the potential problem, one has only to look at the outbreak of Exotic Newcastle Disease that occurred in Los Angeles in 2002, a situation that pro-NAIS supporters have repeatedly referenced. [23] The Exotic Newcastle Disease outbreak was started and spread by cockfighting flocks. [24] Cockfighting is illegal in California and the roosters were smuggled in from Mexico. [25] Thus, the NAIS will actually create conditions that increase the probability of disease outbreaks by undermining the first line of defense: the actions of private individuals and their veterinarians in quickly diagnosing and containing diseases.

There are far more effective ways to address animal diseases than an electronic identification and tracking system. The USDA and the equivalent state agencies have extensive programs in place to monitor, track, and contain disease. These existing programs were analyzed in the Government Accountability Office's (GAO's)

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[18] The health problems caused by confinement or industrial management systems have been well documented in the scientific literature. *See, e.g.,* Cravener, T.L., W.B. Roush, and M.M Mashaly, *Broiler Production Under Varying Population Densities,* POULT. SCI. 71(3):427–33 (1992); M.R. Baxter, *The Welfare Problems of Laying Hens in Battery Cages,* VET. REC. 134(24):614–19 (1994); D. Herenda and O. Jakel, *Poultry Abbatoir Survey of Carcass Condemnation for Standard, Vegetarian, and Free Range Chickens,* CAN. VET. J. 35(5):293–6 (1994); T.G. Nagaraja and M.M. Chengappa, *Liver Abscesses in Feedlot Cattle: A Review,* J. ANIM. SCI. 76(1):287–98 (1998); T.G. Nagaraja, M.L. Galyean, and N.A. Cole, *Nutrition and Disease,* VET. CLIN. N. AM. FOOD ANIM. PRAC. 14(2):257–77 (1998); D.H. Tokarnia, J. Dobereiner, P.V. Peixoto, and S.S. Moraes, *Outbreak of Copper Poisoning in Cattle Fed Poultry Litter,* VET. HUM. TOXICOL. 42(2):92–5 (2000)

[19] News Release, Texas Animal Health Commission (Apr. 1, 2004).

[20] E–Digest Volume 2, Number 11, *Issues Faced in the 2002 VA AI Outbreak;* paper presented by Dr. Bill Pierson, at the 2002 Poultry Health Conference sponsored by the Ontario Poultry Industry Council.

[21] Genetic Resources Action International ("GRAIN"), Fowl Play: The Poultry Industry's Central Role in the Bird Flu Crisis (Feb. 2006) (hereinafter "GRAIN Report").

[22] GRAIN Report (quoting USDA, *Laos: Poultry and Products__Avian Influenza,* GAIN Report, U.S. Department of Agriculture (Mar. 16, 2005)).

[23] *See, e.g.,* News Release, Texas Animal Health Commission (Feb. 28, 2006).

[24] R. Scott Nolen, *Exotic Newcastle Disease Strikes Game Birds in California,* JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION NEWS (Nov. 15, 2002)

[25] *See* News Release, Texas Animal Health Commission (Jan. 1, 2003) ("END likely was initially introduced into Southern California through illegal importation of infected birds."); Congressman Elton Gallegly, Smuggling Cockfighting Roosters a Conduit to Bird Flu, SANTA BARBARA NEWS–PRESS (Dec. 11, 2005).

report on the efforts to protect agriculture from a terrorist attack.[26] As acknowledged in that report, the government's ability to respond to an intentional introduction of livestock disease reflects its ability to respond to natural outbreaks.[27]

The GAO identified multiple deficiencies in the government programs: many veterinarians lack the training needed to recognize the signs of foreign animal diseases; USDA does not use rapid diagnostic tools to test animals at the site of an outbreak; vaccines cannot be deployed within 24 hours of an outbreak; and current USDA policy requires a complex process for deciding if and when to use vaccines, a process that could be too lengthy during an outbreak.[28] The report listed additional "management problems": a decline in agricultural inspections at ports of entry, which are the first line of defense against the entry of foreign diseases; weaknesses in the flow of critical information among stakeholders; insufficient technical assistance to states for developing emergency response plans; shortcomings in coordinating working groups and research efforts; and lack of integration of agencies' databases.[29] **Notably, the GAO did *not* identify any deficiencies in current mechanisms for tracking animals, or recommend that resources be allocated to create a program such as NAIS.**

Instead of addressing prevention, diagnosis, and treatment of disease, the USDA has spent over $130 million of taxpayer dollars to develop an electronic tracking system[30] and seeks to impose this unnecessary and ineffective system on every person who owns livestock.

IV. NAIS will not protect against bioterrorism.

The USDA's claim that the NAIS will protect against bioterrorism is equally flawed. In 2005, the Government Accountability Office (GAO) reported on the efforts to protect agriculture from a terrorist attack.[31] The GAO identified multiple deficiencies in the government programs: many veterinarians lack the training needed to recognize the signs of foreign animal diseases; USDA does not use rapid diagnostic tools to test animals at the site of an outbreak; vaccines cannot be deployed within 24 hours of an outbreak; and current USDA policy requires a complex process for deciding if and when to use vaccines instead of slaughtering animals, a process that could be too lengthy during an outbreak; and the number of inspections of agricultural imports has actually decreased since 2001.[32] Notably, the GAO did ***not*** identify any deficiencies in current mechanisms for tracking animals, or recommend that resources be allocated to create a program such as the NAIS.

While the GAO report did not identify NAIS as important in controlling animal disease, the report highlighted what may happen after the government traces animals back. Current USDA policy calls for "depopulation." Stripping away the euphemisms, this means that the government will kill all susceptible animals, domestic and wild, within a 10 kilometer radius of wherever the infected animal has been. 1A[33] Healthy animals will be killed, whether or not the disease is fatal to animals or transmissible to humans. If the disease spreads beyond the initial quarantine zone, the government will continue to expand the kill zones.[34] This policy is wasteful, will drive many small farmers out of business, and increases the risk of terrorism by creating an unnecessarily high–profile target.

All of these issues make the U.S. vulnerable to bio-terrorism, and none will be addressed by the NAIS. In fact, as noted by the GAO report, **the concentration of our food supply makes it vulnerable to attack** "because diseases could spread rapidly and be very difficult to contain. For example, between 80 and 90 percent of grain-fed beef cattle production is concentrated in less than 5 percent of the

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[26] United States Government Accountability Office, GAO–05–214, Homeland Security: Much is being done to protect agriculture from a terrorist attack, but important challenges remain (Mar. 2005) (hereinafter "GAO Report on Agriculture").

[27] The GAO Report on Agriculture repeatedly refers to the government's response to outbreaks, "whether natural or intentional." *See, e.g.,* GAO Report at p.26. The Report's conclusion explicitly states: "By overcoming these challenges, the United States will be in a better position to protect against and respond to a disease outbreak, whether natural or intentional." *Id.* at p.56.

[28] GAO Report on Agriculture at p.6–7.

[29] GAO Report on Agriculture at p.7–9.

[30] Steve Stecklow, U.S. Falls Behind In Tracking Cattle To Control Disease, Wall Street Journal (June 21, 2006).

[31] United States Government Accountability Office, GAO–05–214, Homeland Security: Much is being done to protect agriculture from a terrorist attack, but important challenges remain (Mar. 2005) (hereinafter "GAO Report on Agriculture").

[32] GAO Report on Agriculture at p.6–7.

[33] GAO Report on Agriculture at p.13 n.12 & p. 31.

[34] GAO Report on Agriculture at p.31.

nation's feedlots."[35] The NAIS was developed by and for large producers, and will only lead to increased corporate control and consolidation of our nation's food, as small producers are driven out. This in turn increases our vulnerability.

V. NAIS is not justifiable as a market program.

The USDA has also stated that the animal identification program is necessary to help the export market.[36] This rationale obviously applies only to food animals, not most American horses, nor our parakeets, parrots, llamas or alpacas, all of which are included in various states' NAIS plans.

With respect to food animals, the issue of the export market could easily be addressed by a voluntary program, supported by the affected meat exporters. Such a program would allow the market to determine how valuable it is to track animals from birth to death. Any farmer that wishes to export animals or food to other countries could enroll in the program. In turn, exporters could refuse to buy from anyone who was not also enrolled in the tracking program. Interestingly, the U.S. imports significantly more beef than it exports,[37] raising a question as to the true value of the export market to the economy as a whole.

From the perspective of the domestic market, this program could simultaneously be used to create a label that might then demand a premium from concerned consumers, similar to the organic certification program.

Although the USDA has claimed that the program is currently "voluntary" and "market driven," the facts do not support this. USDA has spent over $130 million to develop this program, and requested another $33 million this year. It has provided over $45 million in grants to the states and tribes between 2004 and 2008 and over $5 million to industry organizations in 2007–08.[38] Several states, at USDA's urging, have either adopted or proposed mandatory portions of the program. This is not a market-driven program.

Neither the export market nor the domestic market requires a mandatory program that includes every single livestock animal in the country. The free market should be allowed to function.

VI. NAIS has significant technological problems.

Although the USDA has claimed that NAIS is "technology neutral," the USDA's documents specify that RFID tags will be the means for identifying cattle and the Equine Species Working Group has similarly specified that microchips will be the default means for identifying horses.[39] RFID technology, like any electronic device, is subject to problems that do not exist with traditional identification methods such as branding or tattoos. Depending on the security of the technology used, one can clone microchips, infect them with viruses, or reprogram them.[40] The specific type of microchip recommended by the Cattle and Equine Species Working Groups, the ISO 11784/11785 chip, is particularly vulnerable to reprogramming because it is based on a "recipe" that any manufacturer can follow.[41] That recipe produces chips that can be programmed in the field before they are applied to the animals, or even reprogrammed after they are in the animal.[42] It is impossible to reliably trace an animal if someone can change its identity at any time.

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[35] GAO Report on Agriculture at p.1.

[36] *See* Transcript of Secretary Mike Johnns Remarks to the National Cattlemen's Beef Association Annual Meeting__Denver, Colorado (Feb. 3, 2006), *http://www.usda.gov/wps/portal* (Home/Newsroom/Transcripts and Speeches) Release No. 0060.06.

[37] *http://www.ers.usda.gov/data/meattrade/BeefVealYearly.htm*

[38] *http://www.usaspending.gov/*

[39] Draft Program Standards at p.20; Equine Species Working Group Recommendations to USDA, Recommendation ±13 (May 24, 2005). *See also http://www.horsecouncil.org/equine%20id%20website/AHC%20ESWG%20Microchip%20Paper%209.23.05.htm*

[40] *See* Annalee Newitz, *The RFID hacking underground,* Wired, *www.wired.com/wired/archive/14.05/rfid__pr.html*; John Markoff, *Study says chips in ID Tags are vulnerable to viruses,* New York Times (Mar. 15, 2006); In a university study in the Netherlads, a group of scientists showed that it was possible to create a self-replicating RFID virus. Rieback, M.R., B. Crispo and A. Tanenbaum, Is your cat infected with a computer virus?, Vrije Universiteit Amsterdam, Computer Systems Group.

[41] *See* Draft Program Standards at p.20; Equine Species Working Groups Recommendation, Recommendation ±13 (May 24, 2005))

[42] For example, an ad in a Swedish newspaper stated: "We offer a new chip service. We will change the ID number of the 'Kennel club' type chip according to your wishes. Inexpensive. Easy. Fast. Total discretion. Also sale of ISO programming units." Sveriges Storsta Morgontidning (Feb. 18, 1998). In 1998, ISO received a formal petition calling for revisions or suspension of the standards, and identifying multiple flaws in the ISO 11784/85 standard, including the lack of unique ID codes. *See* letter from Gosstandrat of Russia, Committee of Russian Federation for Standardization, Metrology and Certification, to Rudolf Zens, Secrteary, SC

Continued

Significantly, the ISO 11784/85 chip is *not* the type of microchip that has been generally used in horses, dogs, or cats in the United States for private purposes, and it emits on a different frequency, 134.2 kHz, rather than standard 125 KHz. Thus, most of the scanners and microchip readers in the U.S. today will not read or even detect these ISO chips. Every animal handling facility will have to buy expensive new scanners in order to comply with the USDA- and ESWG-recommended technology.

The problems with the microchips and readers are only the beginning. The USDA has set out its vision of multiple public and private databases, capturing all of the reportable "events" for every animal in the system, with the USDA creating a metadata portal to use for its purposes.[43] The technological aspects of setting up such huge databases are daunting. Along with the technological requirements, there will be literally hundreds of millions of opportunities for human error in this system. Moreover, integrating databases is far from a simple task. Indeed, despite the emphasis on inter-agency cooperation since 9/11, the GAO's 2005 report on agriculture and terrorism noted that the federal government still had not integrated its own databases.[44]

The technology companies that make microchips, software, and manage databases could make billions of dollars under NAIS. Yet, there is no evidence that they could deliver reliable 48-hour traceback of unique animal identification.

VII. NAIS will impact the entire economy, for the benefit of a handful of corporations.

The ultimate cost of the NAIS goes beyond the billions in direct costs discussed above. Some people who currently own animals will choose to sell or slaughter their animals rather than submit to such an intrusive government program or to violate their religious beliefs. Many other animal owners will be forced to sell because of the expensive and time-consuming requirements. The USDA estimates that there are approximately 1.4 million premises with livestock in the US. While this number is daunting enough, it significantly underestimates the true numbers of people who will be affected. USDA's estimate is based on who responded to the 2002 Agriculture Census, which excludes millions of horse owners, homesteaders, and those who keep livestock as pets. In fact, Massachusetts reports that it has already registered twice as many properties as had been reported under the census! And even the USDA census reflects the fact that the majority of animal owners are small farms and ranches, not large commercial operations that can pass on the costs of the program.

If a significant portion of livestock owners dispose of their animals, or simply let their flocks and herds dwindle because of cost and labor under NAIS, there will be wide-reaching effects throughout the economy. Businesses that sell feed and supplies to small producers may go out of business. Local feed mills may also close. Real estate prices could be depressed even more as large numbers of rural land parcels are put up for sale.

While many people will suffer severe economic burdens under the NAIS, the large agri-business and technology companies will profit from the increased export of food products and massive demand for microchips, software, and databases. These companies played a key role in developing the NAIS. For example, executives for large technology companies such as Global Vet Link sit on the board of directors of the NIAA, the trade group that established the working groups in 2002. Other entities who are proponents of NAIS will benefit from managing the databases, such as the associations (i.e. NCBA and American Farm Bureau) that have joined together to form the United States Animal Identification Organization (USAIO) to manage the "industry-led animal movement database."[45]

VIII. NAIS will burden citizens' property rights and civil liberties.

If the state implements the program on a mandatory basis or using coercive methods, the NAIS imposes heavy burdens on people's freedoms and rights, raising multiple Constitutional issues.

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19 (Mar. 2, 1998) at *http://www.rfidnews.com/images/3–2–98.gif*. See also The Controversial ISO 11784/85 Standard, ISO 11784/85: A Short Discussion, at *www.rfidnews.com/iso__11784short.html*. ISO 11784/85 "Standard" with Blemish: A discussion of the ISO standard for RFID: its provenance, feasibility and limitations at *www.rfidnews.com/iso__11784.html* (website last checked July 1, 2006).

[43] USDA, Integration of Private and State Animal Tracking Databases with the NAIS (released Apr. 6, 2006).

[44] GAO Report on Agriculture at p.7–9.

[45] Animal Identification, Government Affairs Center, National Cattlemen's Beef Ass'n (Apr. 3, 2006) at *http://hill.beef.org/newview.asp?DocumentID=15053*.

The NAIS will establish a huge, permanent database of citizens' real property (the homes and farms where animals are kept) and personal property (the animals themselves), and potentially make it criminal to own those animals without registration of farms and animals. Individuals will be required to report each animal's movements, every sale, and every slaughter. **Since animals do not move themselves, this means reporting the individuals' own movements.** Ownership of livestock is a traditional activity that has been practiced throughout history without government surveillance. There is no more justification for imposing reporting requirements on animal owners than on the owners of any other common property, such as tools. Moreover, this plan will heavily burden individuals' ability to raise food for themselves and their families. The NAIS will therefore burden people's Fifth and Fourteenth Amendment rights.

Further, having collected information on people's private homes and property, the NAIS fails to protect this information. If the information is held by the government, individuals face massive intrusion into their lives and, potentially, the use of the information for taxing and other purposes. If the information is held by private companies, individuals will be vulnerable to competitive misuse of their information or sale of their information, a serious problem that has already occurred in many other areas.

The NAIS also poses First Amendment problems. Some groups, such as the Amish or Mennonites, have well-known religious objections to registrations and technological devices. Other groups also believe that they are prohibited from participating in this program due to scriptural prohibitions.

The proposed system may also violate the Fourth Amendment's protections against unreasonable searches and seizures, the equal protection clause, and constitutional restrictions on the taking of property.

Conclusion

Most of the people who will be impacted by NAIS are still unaware of it. When voters who own livestock, horses, and poultry find out the burdensome nature of the program, they will wonder why Congress created it, or allowed the USDA to implement it without clear statutory authority. We urge you to support your voters' interests by halting the NAIS.

NAIS is an intrusive, burdensome program that will not provide any real protection against animal disease or bioterrorism. The program is not justifiable on either philosophical grounds or a cost-benefit analysis. To the extent that tracking is a benefit to the market, it should be a voluntary, market-driven program paid for by the participants.

Sincerely,

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SUBMITTED LETTER FROM FARM AND RANCH FREEDOM ALLIANCE, TEXAS LANDOWNERS COUNCIL, AND THE NATIONAL FAMILY FARM COALITION

ATTACHMENT

March 9, 2009

Dear Senators:

The undersigned organizations request that you remove funding for the National Animal Identification System (NAIS) from the 2009 Omnibus Appropriations bill. Contrary to its stated purposes, NAIS will not address animal disease or food safety problems. Instead, NAIS imposes high costs and paperwork burdens on family farmers and creates incentives for CAFOs and vertically integrated systems. This burdensome, ill-conceived, and badly implemented program should not receive the $14.5 million of funding that has been included in the Omnibus Appropriations bill.

Background:

The USDA's plans for NAIS describe a far-reaching three-step program that calls for every person who owns even one livestock or poultry animal to register their property, tag each animal when it leaves the property it was born on, and report a long list of movements to a database within 24 hours. The listed species include chickens, horses, cows, sheep, goats, pigs, llamas, alpacas, elk, deer, bison, turkeys, and more. The provisions would apply to every person with even one of these animals, whether or not it is used for commercial purposes, and would directly impact millions of people who own these animals. Group or lot identification would only be allowed where animals are managed as a group from birth to death and never commingled with animals outside of their production system. In practice, group identification would apply mainly, if not entirely, to confined animal feeding operations (CAFOs) and vertically integrated operations.

The USDA issued the first guidance documents for NAIS in 2005, and included plans to make the program mandatory by 2009. After a public outcry, the agency stated that NAIS was "voluntary at the federal level," but it continued to fund mandatory state-level implementation of NAIS. The agency also supported the states' use of coercive measures, such as requiring NAIS premises registration for participation in 4-H events or disaster relief.

The latest step taken by USDA is the issuance of a proposed rule that would mandate NAIS premises registration as the sole form of property ID for disease control programs. The proposed rule also lays the groundwork, through definitions, for the next step of mandating animal identification.

There is widespread opposition to NAIS across the country. Four states have passed laws that prohibit their state agencies from implementing a mandatory program: Arizona, Kentucky, Missouri, and Nebraska. Over a dozen bills have been introduced in other states since 2007 to either bar NAIS completely or to limit it to a voluntary, non-coercive program. States that have considered or are currently considering such bills include: Arkansas, Colorado, Illinois, Indiana, Louisiana, Massachusetts, Oklahoma, South Dakota, Tennessee, Texas, Virginia, Washington, And Wyoming. USDA has ignored the serious concerns states have over the costs and effectiveness of NAIS and continued to push forward with the NAIS program.

Our Concerns:

The NAIS is fundamentally flawed for multiple reasons:

1) No analysis or quantification of the alleged benefits. The USDA has made unsupported assertions that our country needs 48-hour traceback of all animal movements for disease control. Yet the USDA has failed to provide any scientific basis, including such things as risk analysis or a scientific review of existing programs, to support this claim. The USDA has also asserted that NAIS would provide 48-hour

traceback, but has failed to address the many technological and practical barriers. The experience in Australia, which has implemented electronic tracking of cattle and which has seen an exploding bureaucracy and millions of unaccounted animals, shows that the program will not accomplish what is claimed. The existing disease control programs, combined with measures such as brand registries and normal private record-keeping, have provided cost-effective traceback. A new and costly program such as NAIS is unnecessary and potentially counterproductive.

2) No analysis or quantification of the costs. In 2007, USDA provided a grant to Kansas State University to conduct a cost-benefit analysis. Yet, as of March 2009, the agency has yet to produce any cost-benefit analysis. The NAIS program would involve extensive costs, including:

    a. Premises registration database & updates;
    b. Tags, mostly electronic, and related equipment, such as readers, computers, and software;
    c. 24-hour reporting requirements, imposing extensive paperwork burdens;
    d. Out of pocket expenses, labor, stress on animals;
    e. Qualitative costs – religious freedoms, privacy, loss of trust in government.

    As shown in some earlier work done by Kansas State University, the costs are significantly higher for people with smaller herds. With approximately 96 million cattle, 9 million horses, 9 million sheep and goats, and millions more poultry, pigs, llamas, alpacas, and other animals that will be individually tagged and tracked, NAIS will cost animal owners and taxpayers billions of dollars.

3) Unfair burdens placed on family farms and sustainable livestock operations: In addition to the costs, the NAIS would impose significant reporting and paperwork burdens on small farms. In addition, sustainable livestock operations, which manage animals on pasture, would face higher rates of tag losses than confinement operations due to animals getting their tags caught on brush or fences. NAIS essentially creates incentives for CAFOs, with the accompanying social and environmental concerns.

4) NAIS rewards vertical integration and consolidation: The USDA's guidance documents provide that "animals that typically move through the production chain as a group of animals of the same species can be identified by Group/Lot Identification Numbers (GINs), rather than individual numbers. This practice is most common in the poultry and pork industries. However, group/lot identification may be an option for other species when they move through the production chain as a group." In practice, this means that companies who maintain ownership of the animals throughout their lives – as is done in vertically integrated confinement operations – will be relieved of most of the costs and paperwork burdens of NAIS.

5) Loss of trust in the government. The proposed rule is the latest in a series of ambiguous and confusing documents. Under the proposed rule, it appears that tattoos and brands will still be allowed, but the language is confusing and unclear. This will increase the costs, both quantifiable (such as the costs to agencies of education and enforcement under the proposed rule) and qualitative (such as the loss of trust in agencies by animal owners). For more than two years, USDA has misled farmers by claiming that NAIS is a "voluntary" program while funding cooperative agreements with states to implement NAIS using coercive and deceptive tactics (e.g.,. data mining and denying disaster relief to those not enrolled in NAIS).

6) A disincentive for individuals to be involved in farming or animal husbandry of any kind. The costs and government intrusions that would result from NAIS will cause many to leave farming or to choose not to enter the profession. With an acknowledged crisis of an aging farming population, the long-term costs imposed by creating disincentives for people to enter or remain in farming could be extremely damaging to our ability to raise food in this country and to rural economies.

7) No food safety benefits. NAIS will not prevent foodborne illnesses, such as E. coli or salmonella contamination, because the tracking ends at the time of slaughter. Food safety is better served by focusing on programs such as increased testing for bovine spongiform encephalopathy (BSE or Mad Cow), improved oversight of slaughterhouses and food processing facilities, and increased inspections of imported foods. Programs such as NAIS that burden small, sustainable farmers will hurt efforts to develop safer, decentralized local food systems

8) Ethical concerns: The USDA's working groups were initially drawn from the working groups established by the National Institute for Animal Agriculture (NIAA). The NIAA is an industry trade organization, and the members of the working groups included many companies who stood to profit directly from the implementation of NAIS, such as tag manufacturers and database management companies. These conflicts of interest have never been addressed. Additionally, the plan calls for privatized databases, leaving farmers and ranchers vulnerable to the misuse of their confidential information. Moreover, the USDA has allowed for little-to-no involvement of average animal owners who will be directly impacted by NAIS.

9) USDA has spent too much time and money already, with no results. USDA established working groups in 2002, and has spent over $130 million since 2004. Yet the agency still failed to produce a workable plan. In these tough economic times, we cannot afford to spend good money after bad.

10) Alternatives: Using the USDA's resources on alternative approaches would provide significantly greater benefits for both animal health and food safety. Measures such as increased inspections of imports and more rigorous enforcement of regulations on slaughterhouses are clear areas for improvement. Domestically, focusing on high-risk areas such as CAFOs would be consistent with both good science and good economics.

For these reasons, we strongly urge you to remove funding for NAIS from the 2009 Omnibus Appropriations bill. We thank you for your consideration.

Sincerely,

Adopt a Farm Family
American Grassfed Association
American Raw Milk Producers Pricing Association
Arkansas Animal Producers Association
Ashtabula Lake Geauga Counties Farmers Union (OH)
California Farmers Union
Carriage Operators of North America
Cattlemen's Texas Longhorn Registry
Colorado Independent Cattlegrowers Association
Community Farm Alliance
The Cornucopia Institute
Dakota Rural Action
Davis Mountain Trans Pecos Heritage Association (TX)
Downsize DC
Empire State Family Farm Alliance (NY)
Fair Food Matters (MI)
Family Farm Defenders
Farm and Ranch Freedom Alliance
Farm-to-Consumer Legal Defense Fund
Food for Maine's Future

Freedom 21
Innovative Farmers of Ohio
International Texas Longhorn Association
Local Harvest
Maine Organic Farmers and Gardeners Association
Massachusetts Smallholders Alliance
Mesa County Cattlemen's Association (CO)
Michigan Farmers Union
Michigan Land Trustees
Missouri Citizens for Private Property Rights
Missouri Farmers Union
Missouri Rural Crisis Center
Montana Cattlemen's Association
Montana Farmers Union
National Association of Farm Animal Welfare
National Family Farm Coalition
Northeast Organic Farming Association - Massachusetts
Northern Illinois Draft Horse and Mule Association
Northern New Mexico Stockman's Association
Northern Plains Resource Council
Ohio Farmers Union
Organic Consumers Association
Ozarks Property Rights Congress (MO)
PFUSA Grange #835 (CA)
Powder River Basin Resource Council (WY)
Progressive Agriculture Organization
Property Rights Congress
R-CALF USA
Regional Farm and Food Project (NY)
Rural Vermont
South Dakota Stockgrowers Association
Sovereignty International
Sustainable Food Center (TX)
Texas Eagle Forum
Texas Landowners Council
Tuscaloosa Property Rights Alliance (AL)
US Boer Goat Association
Virginia Land Rights Coalition
Western Organization of Resource Councils
Weston A Price Foundation

[REDACTED]

SUBMITTED STATEMENT OF THE NATIONAL FAMILY FARM COALITION

We welcome the opportunity to submit this statement to the Subcommittee as you review the National Animal Identification System (NAIS). The National Family Farm Coalition represents family farmer and rural advocacy organizations in 30 states. We strongly urge USDA to reconsider the NAIS program in light of the significant failures to date in implementing NAIS and its large cost burdens to farmers and ranchers already struggling with the current economic crisis.

USDA first issued a "Draft Strategic Plan" on NAIS in 2005 that called for mandatory animal identification and reporting of animal transport by 2009. An outcry from farmers and ranchers across the country over the far-reaching impacts of this program has delayed implementation, with USDA claiming the program was "voluntary" while funding State Cooperative Agreements and using other coercive tactics, such as directing veterinarians to enroll customers in NAIS. The latest action by USDA is a proposed rule issued in January 2009 that mandates the NAIS Premises Identification Number (PIN) as the only means of identifying properties for USDA animal health programs. The proposed rule also mandates the use of NAIS for ear tags using official animal identification numbers (AIN). The proposed rule affects cattle, bison, sheep, goats and swine directly. The National Family Farm Coalition objects to USDA's continued attempts to force this program on producers and

believes a mandatory NAIS system will not address animal disease but will further burden farmers and ranchers financially, posing a severe threat to farmers' livelihoods..

Current Animal Disease Programs Effective

NFFC believes current disease programs for tuberculosis, brucellosis, Johne 's disease and scrapie have proven effective and financially practicable for farmers. Such programs currently allow for low-cost metal tags and/or tattoos not tied to the NAIS Animal Identification Number (AIN). Existing animal disease programs have done an excellent job in almost eliminating brucellosis and drastically reducing incidents of TB. Traceback capability in the event of disease outbreaks is available through current branding, ear tag and tattooing programs. NFFC fails to understand why an expensive, untested, complicated new bureaucracy is necessary to address animal disease outbreaks. Free trade agreements have also allowed livestock in from countries that do face animal disease problems, such as TB in Mexico and BSE from Canada, which NAIS does not address. U.S. efforts to control animal disease should focus on disease *prevention* instead of investing valuable resources in disease *management*.

Costs to Family Farmers

Most disturbing to family farmers is USDA's refusal to release cost-benefit analyses of the NAIS program, in marked contrast to the numbers developed by USDA during the debate over country-of-origin labeling. By requiring all AIN ear tags to conform to the 840 prefix, USDA is inevitably allowing for the requirement of expensive RFID tags as the only ear tag technology permitted in animal disease programs. This places high financial costs on farmers who must pay for the tags, technology readers and software necessary to comply with the NAIS program. A Kansas State University analysis presented an average cost of $15.90 per cow for producers with fewer than 100 head of cattle. Producers with more than 400 cows would face a cost of $6.14 per head. The United States has lost thousands of farmers and ranchers since 1960 due to low prices and industry consolidation. NAIS will only fuel this unfortunate trend and make it virtually impossible for small and mid-size farms to compete and survive. Furthermore, producers raising grass-fed beef or sustainably raised hogs and other livestock will find the costs of NAIS prohibitive. NAIS is an unfair tax on America's producers. USDA has failed to provide any evidence that the program will be cost-effective and has instead spent over $130 million on the program with very little to show for it, other than intense producer opposition.

Additionally, the recent proposed rule by USDA explicitly overrides state and local laws. Four states have passed anti-NAIS legislation: Missouri, Kentucky, Arizona and Nebraska. More than a dozen other states are considering such legislation. Missouri state law explicitly prohibits the mandatory enrollment of producers into NAIS without approval by the state legislature. Such widespread opposition from diverse states shows why USDA needs to reconsider whether NAIS is truly the most effective way to address animal disease concerns. Nonetheless, USDA has continually ignored the views of states and pushed onward with implementation.

Unfair Advantages to Industrial Operations

A further advantage under NAIS is granted to confined animal feeding operations (CAFOs): they may use "Group Lot" numbers for thousands of animals since they do not co-mingle with other species. This gives an unprecedented advantage to CAFOs over diversified farmers and those who do not raise animals in confinement. Many studies indicate that diseases are far more prevalent among animals raised in CAFOs and that E. coli contamination can be traced mainly to industrial livestock operations. It makes no economic sense to assign large livestock operations group/lot identification numbers (GINs) while separate AINs are required for diversified, smaller producers.

NFFC Summary of NAIS Program

USDA has not provided adequate evidence to show how "standardization" and "uniformity" are needed to improve current systems that have worked to date. NAIS is an unprecedented bureaucratic undertaking that has proved unsuccessful in several countries, including Australia; tag loss rates and inaccurate producer database accounts have severely impacted their livestock industry. America's family farmers deserve a more honest appraisal of the NAIS program and the expensive threat it poses to farmers struggling in the current economic climate.

We appreciate the opportunity to submit testimony and urge USDA to allow for more producer input into the best means to address animal disease and the flawed premises of NAIS. Attached is a letter signed by 60 diverse organizations opposing

the continued appropriations for USDA's NAIS program that was included in the recent Omnibus Appropriations bill.

SUBMITTED MATERIAL SUBMITTED BY KEVIN KIRK, SPECIAL ASSISTANT TO THE DIVISION DIRECTOR, MICHIGAN DEPARTMENT OF AGRICULTURE, ANIMAL INDUSTRY DIVISION

MICHIGAN DEPARTMENT OF AGRICULTURE
ANIMAL INDUSTRY DIVISION
MICHIGAN'S ELECTRONIC IDENTIFICATION PROGRAM FOR CATTLE

Animal identification has been an integral part of Michigan's animal disease eradication programs for decades. In August 2001, the Michigan Department of Agriculture (MDA) initiated an electronic cattle identification tracking system as part of its bovine Tuberculosis (TB) Eradication Program. Electronic identification was initially used to individually identify and track the movement of cattle in a TB high-risk area/infected zone (Modified Accredited Zone [MAZ]), which was comprised of 11 counties and two partial counties in northeast Michigan. This project was funded in part by United States Department of Agriculture (USDA) grants to assist Michigan's Tuberculosis Eradication Program.

The merit of the electronic based ID system was immediately realized: the TB whole-herd testing time was reduced by as much as 50% once cattle were tagged with radio frequency identification (RFID) tags. Additionally, tracking cattle with an electronic identification (EID) system provides assurance that all mechanisms of control, monitoring, and surveillance are employed to their fullest capabilities.

Since the initiation of the EID system, one TB positive cow was diagnosed and traced back to the herd of origin. This particular cow had met the TB movement requirements and had been moved legally out of the infected zone. The herd of origin's TB testing history, and all cattle movements after the index cattle departed, **were traced in less than fifteen minutes.** Without the use of EID and the electronic database, this process could have taken weeks.

The EID system has also enabled MDA to develop a web-based movement permit system for cattle. The web-based system allows MDA to issue a movement permit online if all testing requirements have been met. Producers can then print the permit or receive it by fax or mail.

On April 19, 2004, USDA established two separate zones with different TB risk classifications in Michigan—the Modified Accredited Zone (MAZ) and the Modified Accredited Advanced Zone (MAAZ). Beginning on June 1, 2004, all cattle of all ages were required to have electronic identification and a movement permit before leaving a premises within the MAZ and all cattle were tagged with EID during TB testing.

As part of its effort to obtain TB Free Status for the Upper Peninsula, MDA expanded its EID program to include the Upper Peninsula. MDA offered a 50/50 cost-share program in August 2004 to cattle producers in the Upper Peninsula who wished to obtain EID tags to identify cattle leaving the farm in support of the free status application. Over 600 producers ordered over 65,000 tags during the cost share program. The Upper Peninsula was granted TB Free Status in September 2005.

On January 9, 2006, the Michigan Commission of Agriculture adopted a policy mandating RFID for cattle in Michigan effective March 1, 2007. MDA, in partnership with industry and stakeholder groups, was charged with developing an implementation plan. Cattle are the only species of farm animals required to be identified electronically in Michigan.

A communication strategy was developed and implemented which targeted key audiences to develop their understanding of the role RFID plays in the Bovine Tuberculosis Program. The communication strategy addressed the concerns of the farming community as MDA moved from a free identification ear tag to a producer purchased RFID tag. The communication strategy focused on how RFID tags can improve animal health, human health, and food safety.

The communication strategy recognized the importance of sharing information with all producer groups and other interested persons. All livestock producers were sent a letter explaining the RFID requirements and a *Question and Answer* document. Livestock markets assisted with outreach to inform their clientele about the identification program. MDA produced a brochure and fact sheet which were distributed at county fairs.

Nearly 60 educational workshops and industry meetings were held across the state. Outreach, both at the grass roots level and through statewide marketing, was vital to the success of the EID project. Well over 3,000 cattle producers attended the meetings which allowed MDA to disseminate a positive message about the program to producers from key leaders.

MDA sponsored cattle handling and ID tagging demonstrations at the July 2006 and July 2007 Ag Expo. Six informational seminars/tagging demonstrations were presented during the 3-day events. Nearly 1,000 people participated in the presentations.

By March 2007, 90-98% of cattle coming into Michigan livestock auction markets were tagged with RFID tags. MDA's program allows for cattle producers who are unable, or object to RFID tags, to bring cattle to the markets untagged. Untagged cattle are tagged at the markets and the producer is charged a fee. This procedure allows MDA to maintain the integrity of its animal identification program while respecting the views of some producers who object to the program on religious or other grounds.

By October 5, 2007, Michigan cattle producers had purchased over one million RFID ear tags. Over 11,000 Michigan premises supported this milestone. In addition, there are over 19,400 premises in Michigan registered in the Standard Premises Registration System (SPRS).

Between April 2006 and December 31, 2008, 15,661 cattle producers have ordered 1,718,593 RFID tags. All Michigan livestock markets and eight slaughter facilities are equipped with stationary panel readers or wand readers capable of reading any RFID ear tag. As of December 31, 2008, livestock markets had scanned 480,776 tags and slaughter facilities had scanned 332,888 tags.

The success of Michigan's mandatory cattle identification program can be attributed to the partnership established between producers, agricultural businesses, and state and federal government agencies. The EID program focuses on three core areas: animal health, human health, and food safety. Michigan's accomplishments have built a foundation on which other states can build in developing their cattle traceability programs. Michigan would highly encourage other states and the federal government to use Michigan's model for cattle traceability. By doing so, citizens can benefit from increased public health and food safety. The EID program has created efficiencies on the farm and in the Department and allows staff to focus on public safety.

Submitted by: Dated: March 6, 2009

Kevin Kirk
Special Assistant to the Division Director
Michigan Department of Agriculture
Animal Industry Division
[REDACTED]

SUBMITTED MATERIAL SUBMITTED BY SHANE KOLB, DRA LIVESTOCK TEAM CHAIR, DAKOTA RURAL ACTION



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WRITTEN TESTIMONY OF DAKOTA RURAL ACTION
Presented to the
UNITED STATES HOUSE OF REPRESENTATIVES -HOUSE COMMITTEE ON AGRICULTURE
SUBCOMMITTEE ON LIVESTOCK, DAIRY, AND POULTRY "TO REVIEW ANIMAL IDENTIFICATION SYSTEMS"
MARCH 11, 2009

Thank you Representative Scott and members of the subcommittee on Livestock, Dairy, and Poultry for holding this hearing to review "Animal Identification Systems."

Dakota Rural Action is a grassroots family agriculture and conservation group that organizes South Dakotans to protect our family farmers and ranchers, natural resources, and unique way of life. DRA has over five-hundred members across the state, representing farmers and ranchers, consumers and other working people of our region, all of whom will be impacted by the National Animal Identification System (NAIS) as proposed by USDA and APHIS.

It is time for Government waste to end

On March 4, 2009 President Obama is quoted as saying "It's time for government waste to end. It's time to only invest in what works."

The National Animal Identification System (NAIS) is a prime example of investment that is not working and government waste that should end immediately. USDA has been working for over five years and spent over $130 million to implement the NAIS program. After all this time and money wasted, the program is still incomplete and written in a way that is impossible to implement. Furthermore, the system as proposed has only been able to accomplish participation from 35% of the nations producers.

While I think it's good to focus on the money wasted on this program we need to also make sure it's clear that this money was wasted on a program with no clear purpose and unwanted by independent producers. Just focusing on the government was doesn't really get the message across because we are glad their efforts haven't been successful and have worked against them. In affect helping to cause the waste.

The best course for USDA to take is to abolish the program and live up to the promises made by President Obama to end government waste.

NAIS overrides existing animal trace-back and disease prevention programs

USDA states that NAIS is designed to identify and track individual livestock and poultry animals and has pitched it as a disease tracking program. However, they have designed a program that actually hijacks existing, well-functioning

disease response and brand inspection programs run by individual states and have put more burdens, through cost and liability on the shoulders of livestock producers and farmers.

According the USDA's own documents, NAIS is not designed or intended to be a food safety program. NAIS does not address the most immediate needs in the wake of BSE, Brucellosis Bovine Tuberculosis and other animal disease to protect the U.S. food supply and does nothing to inform consumers or ensure that food born illnesses are prevented. Consumer confidence will remain high, if the US herd remains healthy, and current disease tracking programs are working.

NAIS does not address animal disease prevention. It is not sensitive to any specific disease transmission and instead only provides for tracking once a disease outbreak has been discovered. Furthermore, the program completely ignores the risks of foreign animal disease introduction.

The program develops a new, large, bureaucratic program that is unproven and replaces proven, less expensive health programs already functioning. One longstanding, effective program identifies cattle vaccinated for brucellosis and allows trace-back through a tattoo and tagging system. The system is overseen by USDA's Animal and Plant Health Inspection Service (APHIS), and run by state animal health or livestock boards. In another system, state officials "back-tag" all animals going to slaughter, resulting in a record of the state in which the animal was tagged and identification number leading back to the seller. Similar programs also exist for sheep and goats through the scrapie program and hogs for cholera. In addition, many states have a hot iron brand program that provides a permanent identification of the animal throughout its life. These proven programs would be eliminated if NAIS is implemented fully.

There is clear proof that NAIS intends to supersede these existing and effective programs with the result of actually adding harm to animal health. In two consecutive memos, one in September 2009 and a second in December 2009, APHIS attempted to coerce producers into participation in NAIS by tying it directly to animal health program participation and encouraging State Veterinarians to assign NAIS premise numbers to producers who did not voluntarily register. As a result of opposition to these memos, USDA finally issued a proposed rule in the Federal Register on January 13, 2009.

Under the rules proposed by USDA, any producer who participates in a federal animal health program would be required to have an official USDA animal identification tag. To get that tag, producers must register with the NAIS program. If they don't, USDA can and/or will register that producer and assign them an official NAIS number without their consent.

This poses many concerns for producers. First, all documentation issued by USDA on NAIS thus far has said that this is a voluntary program. Under this proposed rule, NAIS is mandated for any producer who chooses to protect the health of his or her herd and the herds of his or her neighbors. Secondly, ranchers are concerned that this proposal discourages basic animal husbandry. Because of costs, government intrusion and fear of the unknown ramifications of NAIS, some producers will choose NOT to vaccinate their livestock and participate in animal health programs. This poses a risk for all livestock and actually undermines the safety of livestock in our country.

Proprietary Information:
NAIS would collect proprietary information that could be misused. After five years NAIS has still not made a final decision on how the information gathered from the program will be stored. There have been proposals about the federal government hold the information in a single data base, allowing livestock owners to contract with a private data base company that complies with federal standards, and allowing each state to hold the information.

In any of these cases, collection of private ownership information creates potential privacy risks for financial information of farmers and ranchers. NAIS would have information on the number of livestock owned and that matched with other documentation meat packers have could be used to discriminate among producers, price fix, or even dictate production practices to livestock producers.

The manipulation of livestock prices in the livestock market and the increase control of the cattle and hog industry by large, corporate interests will be perpetuated by the implementation of NAIS. Currently three major packers slaughter over 80% of fed cattle. They already use methods like packer ownership and captive supplies through formula pricing to drive down prices to producers. With the added information of the number of livestock available on the ranch and the potential for data on those animals, these packers would have an even stronger stranglehold on producers.

President Obama has said he will "...fight to ensure family and independent farmers have fair access to markets, control over their production decisions, and transparency in prices, and change federal agriculture policy to strengthen producer protection from fraud, abuse and market manipulation; and make sure that farm programs are helping family farmers, as opposed to large vertically integrated corporate agribusiness..."

NAIS is an example of a program that does not fit into President Obama's platform for agriculture.

Unwarranted Liability

Unless carefully developed, animal identification information could be used to shift liability for food contamination incidents from the packers and processors back to farmers and ranchers. Many food borne illnesses are a result of problems during processing not during the raising of the animals. To this point there has been not safeguards written into any of the NAIS proposals that would protect producers from unwarranted liability.

Producers cost and burden

There is no doubt that NAIS will be a burden to producers in time and money. Through the program, ranchers would be required to document any movement from premise to premise. For many ranchers, especially in the West, this would be a logistical nightmare. The documentation of animal movement from one pasture to another would result in paperwork that takes away from their job of ranching. For an example, one Western rancher might have private range, range recently purchased from another rancher, government grazing leases rented school and public lands and rented private property—all requiring different premise numbers. In order to be sustainable, cattle on this ranch need to be moved regularly, sometimes weekly, depending on the rain and other weather conditions. This would require documentation to the NAIS data base each time the movement is made, requiring hours of paperwork. Furthermore, assuming that these ranchers have internet access or ways to expediently submit the information is a myth.

Moreover, there has been no study done to determine the cost of implementing NAIS for either USDA or the individual state that will be required to carry the cost if NAIS becomes mandatory. There is also no indication of the actual cost of participation in NAIS. As late as the January 13 proposed rule, USDA admitted in their proposed rule: "We do not currently have all the data necessary for a comprehensive analysis of the effects of this proposed rule on small entities." However, USDA and APHIS are actively recruiting participation from those "small entities." After more than five years and as they are moving people into the program, ranchers expect that USDA and APHIS would have already provided information about the actual cost of the program.

The cost of implementing NAIS will fall more heavily on small producers than large ones due to the allowance by USDA for large groups, especially confinement animals, to be identified as a group rather than by individually applied identification devices. This cost could be devastating to smaller, family farm and ranch operations.

There has been no study done to determine the cost of implementing NAIS for either the USDA or the individual states that will be required to carry the cost if NAIS becomes mandatory.

One size does not fit all

The United States is a country of many unique landscapes and individual producers. Even within each rural community, there are a wide range of types of livestock grown and methods of animal husbandry. The needs of programs from dairy producers to ranchers to backyard poultry growers differ significantly, thus the need and method of trace-back. Moving to one uniform, standardized, technology-neutral system for the identification of livestock does not take into effect the individual nature of livestock producers' operation, marketing decisions and technological access and will prove to be inefficient for both producers and the government.

Summary

After more than five years and over $100 million, USDA still does not have a national animal identification system in place that is effective or can be properly implemented. Most importantly, it is still not acceptable to the majority of livestock producers, which can be witnessed by USDA's reports showing that only 35% of producers nationwide are volunteering to participate. Therefore, it falls under the category of wasteful government spending.

NAIS as applied overrides existing animal health programs that are proven to work and replaces it with a program that is neither proven nor cost effective.

No safeguards have been put in place to protect the proprietary nature of the information required through NAIS and Premise registration, adding to the problems of market concentration and manipulation by corporate agri-business.

The program, as written, will result in unwarranted liability and costly burdens to livestock producers.

While a standardized program for animal trace-back is a lofty goal, the ability to implement such a program in a country as diverse as the United States is foolhardy.

Please ensure that all components of NAIS remain strictly voluntary and end any move to make NAIS a mandatory program by outlawing the use of any NAIS program as a requirement to access livestock marketing opportunities or youth livestock programs. Disconnect NAIS and Premise ID from any existing state or private disease tracking or branding program and ensure that any state or federal program does not use NAIS or Premise registration to participate in those programs.

Respectfully Submitted,

Shane Kolb

Shane Kolb,
DRA Livestock Team Chair,
Bison, SD

Attachment:HOUSE CONCURRENT RESOLUTION NO. 1015 - A concurrent resolution, stating South Dakota's policy on animal identification programs

HOUSE CONCURRENT RESOLUTION NO. 1015

A CONCURRENT RESOLUTION, Stating South Dakota's policy on animal identification programs.

WHEREAS, the ability to efficiently track food-producing animals from birth to slaughter is vital to safeguarding animal health, protecting the safety of the food supply, and promoting the economic vitality of South Dakota's animal agriculture industry; and

WHEREAS, the United States Department of Agriculture's National Animal Identification System (NAIS) is a voluntary partnership among producers and government that seeks to provide a uniform animal identification system and ensure a forty-eight-hour trace-back of livestock in the event of a disease outbreak; and

WHEREAS, implementing NAIS focuses on animal identification for animal health and disease control purposes; and

WHEREAS, Section 1619 of the 2008 federal farm bill focuses on producer confidentiality and safeguarding producer information; and

WHEREAS, the United States Department of Agriculture has approved a standardized animal identification system that is technology neutral; South Dakota livestock producers acknowledge the importance of partnering with local, state, and federal regulators to create and maintain effective animal disease programs that utilize animal identification; and South Dakota's producers maintain that state control of animal identification and database systems is preferable to federal control:

NOW, THEREFORE, BE IT RESOLVED, by the House of Representatives of the Eighty-fourth Legislature of the State of South Dakota, the Senate concurring therein, that the policy of the State of South Dakota is to continue to work with the United States Department of Agriculture and Congress, seeking to ensure that all components of NAIS remain a voluntary animal identification system that adequately protects producer information, and that producer involvement in NAIS shall remain voluntary in South Dakota unless otherwise required by federal law; and

BE IT FURTHER RESOLVED, that the policy of South Dakota is that the South Dakota Animal Industry Board shall maintain control of animal identification systems implemented in South Dakota for animal health purposes, and no state agency may attempt to mandate NAIS for nonvoluntary marketing programs.

Adopted by the House of Representatives, March 4, 2009
Concurred in by the Senate, March 6, 2009

Timothy A. Rave
Speaker of the House

Karen Gerdes
Chief Clerk of the House

Dennis Daugaard
President of the Senate

Trudy Evenstad
Secretary of the Senate

SUBMITTED MATERIAL SUBMITTED BY RUSSELL LIBBY, EXECUTIVE DIRECTOR, MAINE ORGANIC FARMERS AND GARDENERS ASSOCIATION (MOFGA)

(adopted August 10, 2006)

The Maine Organic Farmers and Gardeners Association (MOFGA) strongly opposes the National Animal Identification System (NAIS) proposed by the U.S. Department of Agriculture (USDA).

The program proposes that livestock farmers register their premises, identify all newborn animals and flocks, and track movements of new animals from one owner to another. It is intended to cover every place where farmers keep livestock—from huge feedlots and confinement dairies with 20,000 animals or more, to small backyards where families keep three chickens to produce fresh eggs for themselves.

MOFGA opposes this program because:

1. It will force people who are not part of the national and international food distribution system to participate in a registration and tracking program that, ultimately, will discourage more people from producing food for themselves and their communities. The registration, tagging, and tracking systems will require everyone with animals to file paperwork regularly with state and/or Federal agricultural authorities. The proposed system will treat everyone who has any livestock the same—as if everyone ships his or her animals into anonymous, national markets, even if the animals never leave the farm.

2. The proposed tracking systems will force farmers to bear most of the costs of participation, for limited public value. Farmers will pay for tags and identification systems, and will be responsible for the costs of recordkeeping and submitting information on animal movements. Ultimately, this will raise food costs.

3. The approach focuses on tracking diseases after the fact, rather than disease prevention and animal health. There is no disease prevention aspect in the system as proposed. The goal of the program is to be able to trace back diseases to their origins—not an altogether bad goal. The problem is that it appears to be the only goal. Too many public veterinary resources already are directed to these identification systems, rather than disease prevention.

4. It is unworkable at the comprehensive scale envisioned. Maine's Department of Agriculture, Food and Rural Resources (Department) lacks the human, technical and data resources to manage this program effectively. For example, Maine, as most other states operates a voluntary scrapies certification program. Scrapies is a degenerative disease of sheep, similar to mad cow disease (however there is no scientific evidence that Scrapies poses any risk to human health). Participating farmers tag all their animals, and the Department checks each flock regularly for signs of the disease. Farmers track sales to and from the participating farms, and maintain records of sheep from flocks that appear to be scrapies-free. The USDA estimates that there are 600 farms in Maine with at least one sheep, but only 140 farms participate in the Maine Sheep Breeders' Association, and even fewer are enrolled in the first phase of the Scrapies program. If Maine lacks the resources to find, identify, and work with all of the sheep farmers in Maine, how will the state do that for all of the animals and species targeted by the NAIS?

MOFGA's Approach to Animal Health

Society must rethink the way it tackles animal health problems, and it must empower farmers to help find solutions. The Department must support these efforts directly. Any animal wellness program implemented to help prevent the spread of an animal disease epidemic should be voluntary, confidential, provide appropriate exemptions for farms not participating in interstate commerce, and emphasize a continued investment in livestock health. This will require the active participation of a wide range of farmers, as well as more technical veterinary support from the state.

Appropriate Actions

1. The Department should hire at least one additional veterinarian with the primary responsibility of helping all livestock producers recognize the benefits of closely and continually monitoring the health of their animals.

2. In the event of a disease outbreak (e.g., avian influenza), MOFGA would notify its members, via both e-mail and letter, of the issues and how to help prevent further spread of the disease. MOFGA would encourage livestock farmers to contact the state veterinarian's office for advice.

3. Working with the Department and Cooperative Extension Offices, MOFGA will provide its members with excellent record-keeping systems for identifying

animals and using that information to improve the general health and productivity of animals on the farm.

4. MOFGA will provide examples of record-keeping systems that allow farmers to track both the source and disposition of animals brought onto their farms and sold from their farms.

5. MOFGA's Livestock Specialists will encourage all farmers to follow the principles of organic livestock health, and work with farmers to identify breeds and lines that succeed and thrive in this bioregion under organic production systems.

6. Fundamentals of animal health also require that animals be treated humanely. MOFGA staff members will integrate these principles into their work with all livestock producers, regardless of the scale of production.

7. MOFGA encourages farmers to work closely with all livestock health resources and to monitor closely the health of all the animals on their farms.

SUBMITTED MATERIAL SUBMITTED BY TODD MORTENSON, PRESIDENT, SOUTH DAKOTA CATTLEMEN'S ASSOCIATION

South Dakota Cattlemen's Association

www.sdcattlemen.org

March 13, 2009

United States House of Representatives
Committee on Agriculture - Subcommittee on Livestock, Dairy, and Poultry
Chairman Scott and Ranking Member Neugebauer
1301 Longworth House Office Building
Washington, DC 20515

Dear Chairman Scott and Ranking Member Neugebauer:

On behalf of the South Dakota Cattlemen's Association (SDCA), thank you for the opportunity to comment on the National Animal Identification System (NAIS). NAIS is an issue of paramount importance to our 1,000 cattle producer members.

As outlined in SDCA's member-adopted policy, a voluntary ID program is preferable to a mandatory system. However, SDCA policy also supports mandatory identification for breeding stock to address animal diseases. We also recognize the industry must encourage voluntary participation sufficient to achieve reasonable herd health monitoring on a national scale.

NAIS must provide a simple yet complete set of features and functions to address various requirements of the USDA, state animal health authorities and the various species within the livestock industry. The NAIS must maintain the privacy of producers' data, and be flexible to accommodate differences in production methods. It must all be based on a strong technical foundation that allows for flexibility and scalability to grow and adapt over time. Above all, NAIS must be capable of providing prompt trace-back in livestock disease investigations and surveillance, such as bovine spongiform encephalopathy (BSE), foot and mouth disease (FMD), or other animal diseases, particularly those that are highly contagious.

Specifically, SDCA's priorities for the National Animal Identification System include:

- SDCA supports mandatory identification for breeding stock as the first step in a comprehensive NAIS system. We believe this will be a big step in ensuring efficiency in disease trace-back efforts. For other segments of livestock production, our policy supports a voluntary animal identification program, driven by the marketplace. We believe increasing demand for source and age-verified products will ultimately provide sufficient participation to achieve reasonable herd health monitoring on a national scale.
- NAIS must maintain the privacy of producers' data, and be flexible to accommodate differences in production methods. Data should only be shared for the purposes of herd health surveillance and only with animal health officials involved in disease management programs.

- NAIS must be flexible and scalable to grow and adapt with production practices over time, without placing a significant economic burden on livestock producers.
- Voluntary participation in source and age-verification programs which require individual animal identification should be preserved and recognized as adequate for disease tracking purposes. In addition, producers who voluntarily participate in such programs should not be further penalized in the event of an economically devastating disease outbreak – they should be eligible for federal disaster assistance if/when it's deemed necessary.
- SDCA also urges Congress and USDA to continue to work closely with livestock producer groups in the planning and development of this system, including after the system is fully operational. Seeking producer input throughout the entire process and operation will allow industry a more thorough understanding of the program and provide for continuous improvement.

The U.S. is the only developed country in the world without a comprehensive animal identification and tracking system, and SDCA is concerned this may inhibit our global competitiveness long term as our trading partners demand increased traceability and accountability in this post-BSE era. SDCA also recognizes that other U.S. programs, such as Country of Origin Labeling (COOL) and brand inspection programs in western states, are not adequate to replace individual animal identification as a tool for accurate and efficient animal disease traceback.

SDCA supports ongoing efforts to streamline animal disease programs through a National Animal Identification System while urging the administration to work closely with producer groups and regulatory officials to meet the various needs of producers, animal health officials and consumers. On behalf of our 1,000 beef producer members, thanks for your consideration of our input.

Regards,

Todd Mortenson, President
Hayes, South Dakota

Cc: Representative Stephanie Herseth Sandlin
Senator John Thune
Senator Tim Johnson

SUPPLEMENTAL MATERIAL SUBMITTED BY MARGARET NACHTIGALL, EXECUTIVE DIRECTOR, SOUTH DAKOTA STOCKGROWERS ASSOCIATION (SDSGA)

SOUTH DAKOTA STOCKGROWERS ASSOCIATION
426 St Joseph St., Rapid City, SD 57701

March 10, 2009

To: U.S. House Subcommittee on Livestock, Poultry, and Dairy
Hearing Clerk, Jamie Mitchell

Re: March 11 Hearing – Animal Identification Programs.

To Whom it May Concern;

South Dakota Stockgrowers Association (SDSGA) is a membership powered organization of approximately 1500 South Dakota farmers and ranchers. Our mission is the preservation and protection of the viability and profitability of our rural economy in South Dakota, and nationally through our National Congressional Delegates and as an affiliate to national organizations. We are mostly involved with, but not limited to, cattle, (cow-calf producers, seed stock producers, and some feeders) sheep and horses.

SDSGA appreciates the opportunity to share written testimony regarding the National Animal Identification System (NAIS).

We are deeply concerned with several objectives named within the NAIS Business Plan and User's Guide.

A. While USDA states that the program is currently voluntary at the federal level it has been providing funds to individual states to implement the program. The amount of money received by the states is directly dependent upon the number of premises registered in the state.
   Youth groups have been prohibited from exhibiting their animals at certain fairs without a premises registration.
   Many individuals have had their premises registered without their knowledge.
   We believe these actions are not only wrong and unethical in a system that is supposed to be "voluntary", but leads to a strong lack of trust in USDA.
B. Immediate reports of commingling are impossible in a rural state such as South Dakota, where pastures range from a few hundred acres to several thousand acres. Animals are moved from pasture to pasture – in some areas every 3 to 7 days. Pastures are not always contiguous and animals are not always moved in a group. In sparse areas cattle may commingle without immediate knowledge of the owners, thus placing producers in danger of non-compliance and heavy fines.
C. The livestock industry already has plans in place that have sufficed extremely well over the past 100 years in eradicating disease within our country and preventing foreign animal disease from crossing our borders.

D. Nothing in NAIS prevents the primary owner of an animal from the liability of a disease that was contracted following change of ownership as this animal progresses through the 'pasture to plate' chain of events.
E. NAIS, as it is structured at this time, would actually usurp the power of our state animal industry board and place it with the federal government.
F. The plan to use RFID and/or Hi-Frequency tags that can be read by anyone is an invasion of private property.
G. A disease becomes endemic, not because it wasn't traced, but because it was not prevented. Diseases that threaten our national herd and the health of our people such as Tuberculosis, Foot and Mouth Disease, Brucellosis, need to be stopped at the borders of our country; they need to be eradicated in the wildlife. Why are we more worried about *tracing* them than we are about *stopping* them before they reach our herd?
H. Our urban consumers have been led to believe NAIS is a protection of their food supply – this is not true – NAIS only traces disease after it's in our herd, it does not prevent disease, nor does it treat disease.
I. It is unconscionable that USDA would even suggest that we register our real property with the federal government in a program that has no rules or regulations; no cost analysis, nor cost-benefit analysis; stipulations that we cannot conceivably comply with; has cost the taxpayers approximately $140,000,000, 5 years work and has only 33% participation.

SDSGA sincerely appreciates the Subcommittee of the Livestock, Poultry and Dairy investigating and accepting testimony regarding the National Animal Identification System. We strongly and respectfully urge you to hear the producers (the first link in this food chain) who ask that you deny the proposed NAIS program and work toward securing our food borders and eradicating the diseases of our wildlife that are a threat to our domestic livestock.

Additional Information:

Please be advised, South Dakota Stockgrowers Association agrees with and fully supports testimony presented by R-CALF USA President Max Thornsberry

Respectfully Submitted

Margaret Nachtigall
Executive Director
South Dakota Stockgrowers Association

SUPPLEMENTAL MATERIAL SUBMITTED BY R.M. "MAX" THORNSBERRY, D.V.M., PRESIDENT OF THE BOARD, R-CALF USA



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March 20, 2009

The Honorable David Scott
Chairman, House Committee on Agriculture
Subcommittee on Livestock, Dairy, and Poultry
1301 Longworth House Office Building
Washington, D.C. 20515-6001

Re: R-CALF USA Post-Hearing Testimony Regarding *Review of Animal Identification Systems*

Dear Chairman Scott and Subcommittee Members:

The Ranchers-Cattlemen Action Legal Fund – United Stockgrowers of America (R-CALF USA) appreciates this opportunity to submit additional views regarding the U.S. House of Representatives, Committee on Agriculture, Subcommittee on Livestock, Dairy, and Poultry's (Subcommittee's) Review of Animal Identification Systems. R-CALF USA is a national, non-profit organization that represents thousands of U.S. cattle producers on domestic and international trade and marketing issues and is dedicated to ensuring the continued profitability and viability of the U.S. cattle industry.

As discussed in R-CALF USA's pre-hearing testimony in this matter and in testimony provided before the Subcommittee, R-CALF USA believes it is both possible and important to improve disease traceability in our U.S. livestock herds, but the National Animal Identification System (NAIS) proposed by the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) is *not* an appropriate nor workable solution to accomplish this important objective.

It is important for the Subcommittee to know that USDA began designing, developing, and promoting NAIS more than six years ago and, yet, the Subcommittee's March 2009 hearing was the *first* meaningful opportunity for the actual producers of livestock to provide information to Congress regarding this radical, sweeping proposal certain to impose significant costs on the U.S. livestock industry each year. R-CALF USA is, therefore, grateful for this *first* opportunity to address the tremendous amount of misinformation surrounding NAIS. This misinformation, as evidenced by statements made and questions asked by Subcommittee members during the hearing, is now deeply entrenched in both Congress and industry circles due to USDA's unrestrained, aggressive, multiple-year and multi-million dollar NAIS promotional campaign, which included not only direct payments to States and Tribes, but also, direct payments to the National Cattlemen's Beef Association's National Cattlemen's Foundation, National Milk Producers Federation, and the National Pork Board.[1] In addition, the American Veterinary

[1] *See* About NAIS: Industry Partnerships, USDA APHIS, available at http://animalid.aphis.usda.gov/nais/about/industry_partnerships.shtml; *see also* USDA Announces Plans to Expand

Medical Association (AVMA) represents veterinarians "employed in key positions within state and federal governments . . . such as the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) Food Safety Inspection Service (FSIS) and Agricultural Research Service."[2] Clearly, the witnesses called by the Subcommittee that represent the interests of these USDA/NAIS-obligated federal agencies and nonprofit organizations are mere extensions of USDA itself and cannot and should not be relied upon to provide any meaningful, critical analysis of USDA's NAIS.

Below, R-CALF USA will address the issues raised at the hearing that have contributed to widespread misapprehension regarding the application, scope, purpose, and probable effects of USDA's NAIS.

I. THE UNITED STATES' CURRENT PREPAREDNESS TO ADDRESS LIVESTOCK DISEASE OUTBREAKS

A. The United State's Success or Failure in Controlling *Actual* Livestock Diseases

NAIS proponents claim that because NAIS is not implemented, the U.S. is ill-prepared to control disease outbreaks in U.S. livestock. However, R-CALF USA provided the Subcommittee with documented evidence showing that preexisting U.S. livestock disease programs have functioned in a highly successful and highly effective manner to control and eradicate livestock diseases in the United States. R-CALF USA documented that with the preexisting system, the U.S. successfully controlled and/or eradicated such diseases as contagious bovine pleuropneumonia, foot-and-mouth disease (FMD), bovine babesiosis, classical swine fever, Brucella melitensis, porcine cysticercosis, bovine tuberculosis (bovine TB), brucellosis, and bovine spongiform encephalopathy (BSE or mad cow disease).[3] This successful record of disease control and eradication is exemplary under world standards. For example, USDA states that FMD is widespread around the world and has been "identified in Africa, South America, Asia, and some parts of Europe," and despite the occurrence of nine separate outbreaks, the U.S. eradicated FMD in 1929.[4] The World Organization for Animal Health (OIE) provides data showing that both brucellosis and bovine TB also are widespread around the world,[5] though the U.S. believes it has eradicated the former disease in the U.S. in all

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National Animal Identification System Cooperative Agreements to Nonprofit Organizations, USDA APHIS, news release, February 2, 2007, available at http://www.aphis.usda.gov/newsroom/content/2007/02/NAISRFP.shtml ("USDA will make up to $6 million available for the cooperative agreements [with nonprofit organizations]").

[2] The National Animal Identification System, Testimony of W. Ron DeHaven, DVM, MBA, CEO, American Veterinary Medical Association, Before the House of Representatives Committee on Agriculture, Subcommittee on Livestock, Dairy, and Poultry (hereafter "AVMA Testimony"), March 11, 2009, at 4.

[3] *See* R-CALF USA Hearing Testimony, Review of Animal Identification Systems, March 11, 2009 (hereafter "R-CALF USA Hearing Testimony"), at 4, 5 (for all diseases other than BSE); at 12 (for BSE, but also, the Subcommittee should take note that USDA is so confident that it has eliminated the risk of BSE that it has both *reduced* government surveillance for BSE and it has *prohibited* private meatpackers from conducting voluntary BSE testing of cattle at slaughter (*see Creekstone Farms v. USDA*, No. 06-CV-0544-JR, Order (March 29, 2007)).

[4] APHIS Factsheet: Foot-and-Mouth Disease, USDA APHIS Veterinary Services, February 2007, available at http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_foot_mouth_disease07.pdf.

[5] *See* World Animal Health Information Database (WAHID) Interface, Disease Information, Disease Distribution Maps, World Organization for Animal Health (OIE), Paris, France, available at http://www.oie.int/wahis/public.php?page=home.

but the wildlife population in the Greater Yellowstone Area and the U.S. was able to designate 49 states as "TB Free" in 2007, with wildlife populations and Mexican cattle imports continuing to served as reservoirs for the disease.[6] Regarding BSE or mad cow disease, the USDA was so confident that it had eliminated the risk from BSE that within months of detecting the second, "atypical strain" of BSE, this time in a 10-year-old cow in Alabama, USDA significantly curtailed its national surveillance for BSE,[7] aggressively fought and ultimately won a court battle to prevent any private meatpacker from conducting their own surveillance for BSE,[8] and promulgated a rule (which went into effect on Nov. 19, 2008) to allow cattle with a heightened BSE risk to enter the United States from Canada, *even when USDA's base-case risk assessment predicted that the U.S. would import 19 BSE infected cattle over the next 20 years under the rule*.[9]

In fact, NAIS proponents fully acknowledge that *preexisting* U.S. livestock disease programs have been highly effective. USDA stated "Now, with successful eradication of many diseases, the need for and level of vaccination and testing is low – as is the percentage of uniquely identified animals and premises in the United States."[10] Emphasis added. In his testimony before the Subcommittee, USDA's Chief Veterinary Officer, Dr. John Clifford, stated, "While certainly not the modern, standardized system we envision with NAIS, those [preexisting animal identification] systems did provide us with a solid base for traceback."[11] Emphasis added.

USDA and other NAIS proponents offer not a shred of evidence to support the position that the structural and operational components of preexisting USDA disease programs were not highly effective in controlling and eradicating livestock disease, including preexisting disease identification systems, recording systems, surveillance and monitoring systems, and disease program methodologies. Only the AVMA has attempted to denigrate preexisting diseases systems by characterizing them as "outdated premises and disease monitoring systems," but it failed to provide even a scintilla of evidence in support of its unfounded assertion.[12]

The evidence reveals the obvious – that the structural components and functionality of preexisting disease programs are time-proven and highly effective at controlling and eradicating livestock diseases in the United States. The success and effectiveness of preexisting systems do

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[6] *See* R-CALF USA Hearing Testimony, at 5.
[7] *See* APHIS Factsheet: USDA's BSE Surveillance Efforts, USDA APHIS, July 2006, available at http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_BSE_ongoing_vs.pdf ("USDA will begin transitioning its enhanced BSE surveillance program to a level that is more commensurate with the extremely low level of risk in the United States.").
[8] *See Creekstone Farms v. USDA*, No. 06-CV-0544-JR, Order (March 29, 2007).
[9] *See* 72 Federal Register, 1109 ("Using a base-case assumption . . . over the next 20 years, our quantitative model predicts the importation of a total of approximately 19 infected bovines over that period under the provisions of this proposes rule.").
[10] National Animal Identification System (NAIS) – A User Guide and Additional Information Resource, USDA APHIS, Version 2, December 2007, at 7, available at http://animalid.aphis.usda.gov/nais/naislibrary/documents/guidelines/NAIS-UserGuide.pdf.
[11] Review Animal Identification Systems, Testimony of Dr. John Clifford, Deputy Administrator for Veterinary Services, USDA APHIS, before the House Committee on Agriculture's Subcommittee on Livestock, Dairy, and Poultry (hereafter "USDA Testimony"), March 11, 2009, at 2.
[12] AVMA Testimony, at 9.

not justify a radical new program as envisioned in the NAIS. Congress must flatly reject the NAIS' premise that preexisting U.S. livestock disease programs are broken.

B. The Weaknesses In Ongoing Disease Control Programs Would Not Be Resolved By NAIS

NAIS proponents assert that as a result of the successful control and eradication of livestock diseases under preexisting systems, fewer livestock producers and fewer livestock are participating in the animal identification systems incumbent to preexisting livestock disease programs.[13] However, and importantly, the testimony of NAIS proponents reveals that this assertion *is not true for all livestock species*. USDA' Chief Veterinarian testified that:

> The poultry industry . . . continues to have a high level of traceability – estimated at more than 95 percent today. . . The commercial swine industry utilizes group/lot identification exclusively, thus premises information alone provides a high level of traceability. . . [and] [a]n estimated 95 percent of sheep flocks are listed in the scrapie database.[14]

This testimony reveals that participation in animal identification systems incumbent to preexisting disease programs by the poultry and sheep industries already exceeds the 70 percent "critical mass level of participation" benchmark that USDA has established for NAIS,[15] and participation by the hog industry *may* already exceed that benchmark as well. Thus, the argument that there is insufficient participation by poultry and sheep producers, and perhaps by hog producers, to ensure disease traceability in the event of a disease outbreak is meritless.

The concern that there are fewer producers and fewer livestock participating in animal identification systems incumbent to preexisting disease programs is applicable perhaps only to the U.S. cattle industry. But, it is both false and disingenuous to assert that a significant number of U.S. cattle are not already participating in official animal identification programs. In fact, USDA affirms that that, "For the past several years, approximately 25-30% of the cattle population has been officially identified," most of which are identified through preexisting disease programs.[16] Based on the size of the U.S. cattle herd – estimated by USDA to be 104 million head on July 1, 2007[17] – approximately 26-31 million cattle in the U.S. herd are "officially identified."

Based on information and belief, R-CALF USA asserts the percentage of identifiable cattle is *significantly* higher than USDA's estimate. As stated in R-CALF USA's pre-hearing testimony, there are 15 states that operate state brand programs, which require the permanent identification of individual cattle,[18] some states require identification of breeding age cattle when

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[13] *See* R-CALF USA Testimony, at 17, fn 70.
[14] USDA Testimony, at 7.
[15] A Business Plan to Advance Animal Disease Traceability, USDA APHIS, Version 1.0, September 2008, at 2.
[16] *Id.*, at 67.
[17] *Id.*, at 16.
[18] *See* R-CALF USA Testimony, at 10, fn 38.

ownership is transferred,[19] and many cattle producers voluntarily participate in export-eligibility programs that incorporate traceable animal identification devices on individual cattle.[20]

NAIS proponents disingenuously allege that because of what they call an "outdated system of tracking outbreaks of animal diseases to their sources;"[21] and a "lack of any official identification" with which to determine the "specific origin of the subject animal . . .[and] without movement data,"[22] disease traceback investigations have taken too long to conduct. Both the AVMA and USDA cited the same statistics to support their allegations: AVMA stated, "Investigators spent an average of 199 days tracing the sources of animals infected with bovine tuberculosis between October 2005 and August 2007."[23] USDA stated, "The average time spent conducting a traceback involving 27 recent bovine tuberculosis investigations was 199 days."[24]

Congress has trusted, independent resources available to ascertain particular problems encountered by Federal agencies when carrying out their respective Federal missions. The Government Accountability Office (GAO) and the USDA's Office of Inspector General (OIG) are such resources. The OIG conducted an audit of USDA's control over its bovine TB eradication program in September 2006. According to the audit, the OIG found that a lack of identification on individual animals was not the sole source of USDA's problem in conducting its bovine TB investigations. In fact, the OIG found that over half of the investigations that were closed with an outcome of "untraceable" were animals that *were* identified with eartags, but the eartags either were not collected at the time of slaughter, had been removed by the feedlot prior to slaughter, or were unable to be traced because there was no requirement to maintain records.[25] Equally important, the OIG found that USDA's disease eradication efforts were hampered because the agency was not using its oversight tools in a timely manner, i.e., not timely reviewing and responding to the annual and monthly summaries of program results submitted by States nor was it properly reviewing States for program compliance.[26] The OIG also found that USDA was not following Federal regulations for declaring affected bovine TB herds, which weakened the agency's ability to contain and eradicate the disease and resulted in no additional controls being put in place for the majority of bovine TB cases detected in the past 5 years.[27] The agency was also cited for not timely downgrading the TB status of States after the agency knew that the disease was not isolated in one herd;[28] not having adequate controls to restrict the introduction of bovine TB in Mexican cattle;[29] not requiring slaughtering facilities to conduct surveillance at the recommended rate;[30] not monitoring high-risk herds and the corresponding

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[19] *See*, e.g., South Dakota Legislature, Administrative Rules, Chapter 12:68:05:02.
[20] For more information on export-eligibility programs, view USDA's Bovine Export Verification procedures available at USDA's Website.
[21] AVMA Testimony, at 5.
[22] USDA Testimony, at 3.
[23] AVMA Testimony, at 5.
[24] USDA Testimony, at 4.
[25] *See* Exhibit F – Reasons for Closing FY 2004 Investigations as "Untraceable," Audit Report: Animal and Plant Health Inspection Service's Control Over the Bovine Tuberculosis Eradication Program, September 2006, at 38.
[26] *See* Audit Report: Animal and Plant Health Inspection Service's Control Over the Bovine Tuberculosis Eradication Program, Report No. 50601-0009-Ch, September 2006, at 5-9.
[27] *See id.*, at 11-14.
[28] *See id.*, at 16-17.
[29] *See id.*, at 19-21.
[30] *See id.*, at 22-24.

on-farm testing that is required;[31] and not providing sufficient training to investigators so investigations could be completed in a timely manner.[32]

This evidence demonstrates that NAIS proponents are disingenuous in charactering NAIS as an end-all solution to weaknesses affecting the United State's ability to continue effective disease control and eradication. The systemic problems described above are internal management problems that impede disease control and eradication as well as disease investigations and would *not* be solved by implementing the NAIS.

C. The United States' Capacity to Address Future Disease Outbreaks

The OIG audit report referenced above is one of several OIG reports that reveal USDA is already experiencing significant difficulty in properly executing its preexisting disease control responsibilities, for reasons related more to management problems than to a lack of animal identification. R-CALF USA referenced another, a 2008 OIG report, in its prehearing testimony that describes USDA's failures to meet required health and safety regulations designed to prevent the introduction of BSE.[33] The Subcommittee should review these official evaluations as well as the investigative reports completed over the past several years by the GAO. For example, the GAO found in 2003 that USDA did not provide border inspectors guidance on FMD prevention activities in response to the 2001 European outbreak.[34] And, in 2007, the GAO found that management problems in USDA may leave U.S. agriculture vulnerable to foreign pests and diseases.[35] These official government reports do not provide assurance that USDA has the capacity to properly administer and effectively operate such a colossal program as envisioned by NAIS, and given the centralization of disease-related responsibilities inherent in the NAIS, failure to do so would significantly increase the risk of disease introduction and spread in the United States.

No analysis or evaluation has been conducted to determine if USDA has the capacity to implement the far-reaching NAIS, nor whether the NAIS is even likely to accomplish what proponents claim. Nevertheless, NAIS proponents offer no cogent explanation as to why an entirely new system of livestock disease control and eradication is needed rather than the more conservative and reasoned approach of continuing to build on the time-proven successes of preexisting systems, e.g., by taking steps to increase the use of preexisting animal identification devices within each of the 50 States to increase the numbers of identifiable livestock. Instead, NAIS proponents have employed tactics that both understate our nation's current disease preparedness and overstate what, at best, can only be responsibly described as an unknown effectiveness of the NAIS.

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[31] *See* Audit Report: Animal and Plant Health Inspection Service's Control Over the Bovine Tuberculosis Eradication Program, Report No. 50601-0009-Ch, September 2006, at 28-29.
[32] *See id.*, at 22, 25, 28.
[33] *See* R-CALF USA Testimony, at 3, fn 6.
[34] *See* Bioterrorism: A Threat to Agriculture and the Food Supply, U.S. Government Accountability Office (formally U.S. Government Accounting Office), GAO-04-259T, November 19, 2003.
[35] *See* Agricultural Quarantine Inspection Program: Management Problems May Increase Vulnerability of U.S. Agriculture to Foreign Pests and Diseases, U.S. Government Accountability Office, GAO-08-96T.

As previously stated in R-CALF USA prehearing testimony, USDA must refocus its efforts to prevent the introduction of foreign animal diseases by reinstating recently relaxed preventive measures. It is a contradiction for USDA and other NAIS proponents to claim that U.S. cattle producers must shoulder the burden of an entirely new disease program to protect the U.S. cattle industry from diseases while they simultaneously support the dismantling of U.S. disease prevention measures, as is evidenced by the USDA's over-30-month rule that allows animals of high-risk for BSE to enter the United States, the USDA's refusal to restrict the importation and movement of Mexican cattle that continue to reintroduce bovine TB into the United States, and the USDA's proposal to relax important FMD restrictions for Argentina.[36]

By working to improve the management-related deficiencies identified by both the OIG and GAO, and by following the recommendations R-CALF USA made in its prehearing testimony to improve the United States' ability to continue its historical successes in preventing, controlling, and eradicating livestock diseases, the U.S. will be well-prepared to effectively address future disease risks.

D. Misapprehensions Abound Regarding the Need for Improving U.S. Livestock Disease Prevention, Control, and Mitigation Strategies

During the Subcommittee's hearing, only a few livestock diseases and their respective epidemiologies were discussed. Members of the Subcommittee raised specific concerns, however, for diseases that would spread from livestock to humans, known as zoonotic diseases. FMD was discussed in the context of being perhaps the flagship zoonotic disease that would most justify NAIS. This is unfortunate as the underlying premise is false. According to USDA, "FMD is *not* recognized as a zoonotic disease."[37] Emphasis added.

Also during the hearing, allegations were made that the United States is behind other countries in implementing a NAIS. The AVMA claimed that Australia, the EU, Brazil, Argentina and Canada all lead the United States in beef traceability systems, implying that a lack of NAIS alone would disadvantage the U.S. vis-à-vis international trade.[38] This proposition is absurd. In 2008, for example, the USDA Foreign Agriculture Service (FAS) reported that Brazil had only 6,780 cattle farms registered in Brazil's new traceability system as eligible for exports to the EU.[39] However, the EU did not have confidence in Brazil's oversight of its registered farms and temporarily banned Brazilian beef imports.[40] Moreover, with the single exception of Australia, each of the listed countries has had chronic, widespread outbreaks of infectious diseases including FMD and BSE, indicating that the veterinary infrastructure, disease mitigation programs, and livestock husbandry practices in those countries were inadequate. Improved traceability in those countries, therefore, was deemed necessary as a substitute to their preexisting disease strategies, which failed to protect against disease epidemics. The U.S., on the

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[36] *See* R-CALF USA Testimony, at 18.
[37] APHIS Factsheet: Foot-and-Mouth Disease, USDA APHIS Veterinary Services, February 2007, available at http://www.aphis.usda.gov/publications/animal_health/content/printable_version/fs_foot_mouth_disease07.pdf.
[38] *See* AVMA Testimony, at 7.
[39] *See* EU Suspends Brazil Beef Imports; At Least Temporarily, GAIN Report, EU-27, Livestock and Products, 2008, USDA Foreign Agriculture Service, GAIN Report No. E48016, February 1, 2008, available at http://www.fas.usda.gov/gainfiles/200802/146293595.pdf.
[40] *See Ibid.*

other hand, has a well-developed veterinary infrastructure, highly effective and time-proven disease mitigation programs, and it continues to practice sound livestock husbandry practices.

It is also important to note that among the listed countries, only the U.S. and EU are not wholly dependent on exports to maintain the economic viability of their domestic cattle industries. Countries such as Australia, Brazil, Argentina and Canada each produce far more beef than is consumed within their respective countries.[41] The U.S. continues to under-produce beef for the domestic market and in 2008 it under-produced by 294,000 metric tones, the equivalent of about 648 million pounds of beef.[42] This explains why, in 2004, when U.S. beef exports fell to a 19-year low, prices paid to U.S. cattle producers for their cattle increased to the highest levels in history (not adjusted for inflation). As the chart in Appendix 1 clearly shows, beef exports have not historically driven prices paid to U.S. livestock producers. Congress must consider this important fact when, as here, USDA and other NAIS proponents erroneously claim that NAIS is essential to ensuring the economic viability of the U.S. cattle industry because it helps to maintain export markets. Though export markets are indeed important, R-CALF USA understands that the export market is a secondary market to the U.S. cattle industry and can and should be maintained through continued *voluntary* producer participation in beef export programs. NAIS is *neither* necessary *nor* appropriate for this purpose.

II. NAIS IS A RADICAL DEPARTURE FROM PREEXISTING U.S. DISEASE PROGRAMS

A. Preexisting Disease Programs Did Not Require Participation in NAIS' New Premises Registration Scheme

Contrary to assertions made by NAIS proponents, the NAIS envisions a radical new location identifier for determining the locations where livestock originate and a radical new registration process. The assertion made by the AVMA, for example, that "the information that will uniquely identify livestock premises is the same that is found in any phone book," is false.[43] The new USDA NAIS-driven regulations, made final in 2007, changed the preexisting definition of premises from one that identified an epidemiologically distinct livestock production unit, as determined by the State animal health official or local veterinarian, to one that is a geographically distinct location associated with an address, geospatial coordinates, and/or other location descriptors. This new location is no longer determinable by the local veterinarian, but rather, by the State, Tribal, and/or Federal animal health authority.[44] USDA states that at a minimum the following pieces of information would be maintained by States/Tribes:

1. Premises identification number (PIN);
2. Name of entity;
3. Contact person for premises;

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[41] *See* Beef and Veal Summary Selected Countries, USDA Foreign Agricultural Service, available at http://www.fas.usda.gov/psdonline/psdReport.aspx?hidReportRetrievalName=Beef+and+Veal+Summary+Selected+Countries&hidReportRetrievalID=49&hidReportRetrievalTemplateID=7.

[42] *See Ibid.*

[43] AVMA Testimony, at 8, 9.

[44] *See* R-CALF USA Testimony, at 9, 10.

4. Street address, city, state, and zip or postal code (or latitude/longitude coordinates) of the premises;
5. Contact phone number;
6. Operation type;
7. Date activated, date retired, and the reason retired (to determine whether animals still exist at the location); and,
8. Alternative phone numbers.[45]

Pursuant to new NAIS dictates, some States are now requiring the legal description of a producer's property be provided on the premises registration application form.[46] Obviously, this information is far more extensive than what would be found "in any phone book." R-CALF USA is additionally concerned that the authority of local veterinarians, who work closest with individual livestock producers to successfully prevent and control diseases, have been effectively stripped of their historical authority to determine appropriate location identifiers under NAIS.

B. Preexisting Disease Programs Did Not Infringe Upon the Rights and Privileges of U.S. Livestock Producers

What is perhaps the most successful of all preexisting disease programs – the program that eradicated brucellosis from all but a remaining wildlife reservoir – did not require livestock producers to participate in any form of national premises registration that required the assignment of a nationally unique number to their real property. Instead, the program focused on identifying individual animals with a unique number that visibly identified the State from where the animal originated as well as the local veterinarian that vaccinated and/or identified the animal. Records maintained at the State level enabled tracback to the owner of the animals and the particular production unit where the animal had been vaccinated and/or identified.

R-CALF USA believes the NAIS scheme that envisions mandatory premises registration, mandatory registration of each animal, and subsequent reporting requirements for animal movements is an unnecessary, over-the-top and highly intrusive Federal scheme that violates the rights and privileges of U.S. livestock owners. Not only does the NAIS scheme violate the expectation of privacy that every citizen enjoys, but also, R-CALF USA believes it constitutes the very type of government excess that is prohibited by the U.S. Constitution.

C. The Primary Identification System Envisioned Under NAIS Would Significantly Weaken U.S. Disease Traceability

The NAIS proposes to completely phase-out preexisting official numbering systems, including the highly successful numbering system used to eradicate brucellosis in all but a known wildlife reservoir, and supplant them with only the NAIS "840" numbering system.[47]

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[45] National Animal Identification System (NAIS) – A User Guide and Additional Information Resource, USDA APHIS, Version 2, December 2007, at 77, available at http://animalid.aphis.usda.gov/nais/naislibrary/documents/guidelines/NAIS-UserGuide.pdf.

[46] *See, e.g.*, State of Nebraska Premises Identification Registration Form, available at http://ne.locatein48.com/pdfs/Ag_RegForm.pdf

[47] *See* A Business Plan to Advance Animal Disease Traceability, USDA APHIS, Version 1.0, September 2008, at 18.

This would be a colossal mistake as the "840" numbering system, unlike the preexisting brucellosis numbering system, would preclude the initiation of a domestic disease traceback investigation until and unless animal health authorities could first access the NAIS database. This is because the only visible location identifier contained on the "840" eartag is the 840 number that denotes a U.S. country-of-origin. This visual information is useless for domestic disease traceability and only if animal health officials can gain access to the NAIS database would they be able to ascertain even the State from which the animal originated. Under the preexisting brucellosis numbering system, each State is uniquely and visually identified on the animal's eartag. In the event of a disease outbreak, an animal health official could immediately and visually identify the State from which a suspect animal originated and could contact the appropriate State animal health authority to immediately initiate quarantine procedures or other disease control strategies – even in the event of a natural disaster that could delay access to the NAIS database.

The NAIS, therefore, constitutes a centralization scheme that effectively puts all the eggs in one basket and relegates complete dependency on an unproven electronic database, which is inherently susceptible to errors and outages, for initiating disease traceback investigations. The use of the "840" numbering system eliminates the prudent redundancy incumbent to preexisting numbering systems that allows for the visual segregation of animals-of-interest in a disease outbreak – based on which of the 50 States the animal originated. The use of a numbering system that does not provide a visual means of narrowing a disease traceback within the continental U.S., in the event that access to the NAIS database is even temporarily untenable, is a fundamental and fatal flaw inherent to the NAIS that could likely lead to a failure to control an otherwise controllable disease outbreak.

III. THE RELATIONSHIP BETWEEN ANIMAL HEALTH AND FOOD SAFETY

U.S. livestock producers have long understood that safe and healthful meat originates with healthy livestock. This is why U.S. family farmers and ranchers have long supported and practiced sound animal husbandry practices and participated in livestock disease control and eradication programs, such as the brucellosis and bovine TB programs. And, this is why USDA's actions of knowingly increasing the risk of introduction of zoonotic diseases such as BSE and bovine TB are found so incongruous by livestock producers and consumers alike. The examples provided by R-CALF USA describing these incongruent actions – allowing high-risk Canadian cattle to comingle with the U.S. herd despite USDA's own base-case risk assessment that predicts the U.S. will import 19 BSE infected cattle from Canada over the next 20 years, and not restricting Mexican cattle from entering the U.S. although they are a known source of bovine TB – remain an unexplained phenomenon that directly undermines the efforts of family farmers and ranchers who endeavor to raise and produce healthy livestock. The NAIS would not rectify these high-risk policies and R-CALF USA seeks Congress' help to reverse them.

As R-CALF USA stated in its prehearing testimony, the legitimate food safety concerns evidenced by increased recalls of massive volumes of meat would likewise not be remedied by NAIS. These recalls are the result of the contamination of meat by pathogens during the slaughtering process, and the source of this contamination is the slaughtering facilities where

livestock are slaughtered, not livestock producers. R-CALF USA strongly encourages Congress to require food traceability for meat products so meat consumed by consumers can be traced back to the actual source of contamination.

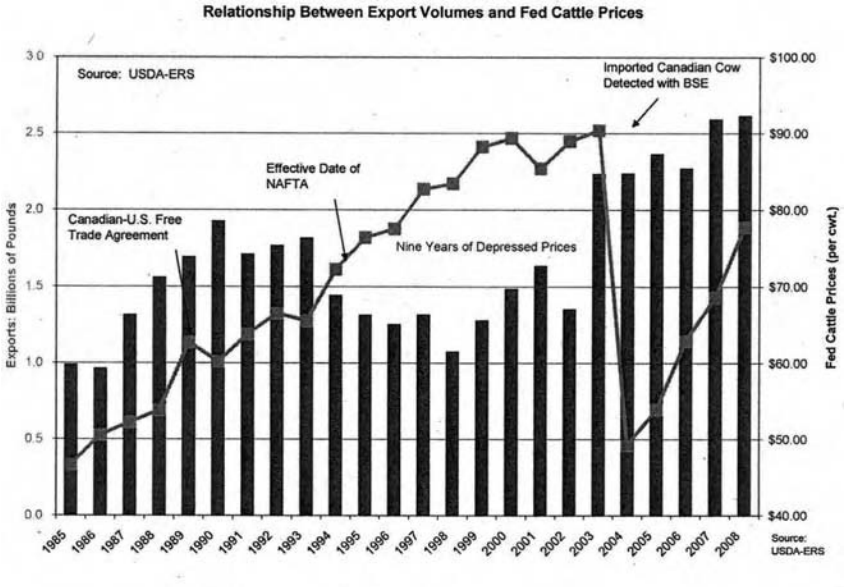
IV. CONCLUSION

R-CALF USA greatly appreciates this opportunity to include its post-hearing testimony in the official record of the March 11, 2009, Subcommittee hearing on "Review of Animal Identification Systems." Further, R-CALF USA respectfully encourages the Subcommittee to adopt the recommendations R-CALF USA made in its pre-hearing testimony to improve disease prevention, control, and mitigation practices in the United States.

Sincerely,

R. M. Thornsberry DVM

R.M. (Max) Thornsberry, D.V.M.
R-CALF USA President of the Board



Key: The bar graphs represent fed cattle prices
The line represents export volumes

SUBMITTED MATERIAL SUBMITTED BY DEBORAH STOCKTON, EXECUTIVE DIRECTOR, NATIONAL INDEPENDENT CONSUMERS AND FARMERS ASSOCIATION (NICFA)

March 4, 2009

Introduction:

The United States Department of Agriculture (USDA) has spent considerable taxpayer money and physical resources on the "National Animal Identification System" (NAIS), acting without Congressional mandate and creating widespread opposition from farmers, ranchers, livestock owners, homesteaders, consumers and agriculture supply businesses–a massive grassroots response that NAIS is a bad idea, unwanted, and not grounded in the reality of farm life, animal husbandry or healthy food.

What is the purpose of Animal ID?

A system of animal identification for disease traceback, sales, health, and breeding recordation has been in continuous use in the United States for well over a century. Refined during its extensive use, the current system, without NAIS components, has and does work well. Why create NAIS?

What is the purpose of NAIS?

The USDA's NAIS would require "premises registration" of any property where a single farm animal is kept; Radio Frequency ID tagging or microchipping of every animal; and reporting of every animal's movements presumably within 24 hours to a federal database under penalty of severe fine, confiscation of animals or both. NAIS proposes

- a national disease response network built to protect your animals, your neighbors, and your economic livelihood against the devastation of a foreign animal disease outbreak.

FACT: The USDA already has in place the network they claim NAIS will supplant.

The USDA's claim that "modern" technology will enable 48-hour traceback during disease outbreak is untenable. In reality, NAIS will not prevent disease because it does not address the *cause* of disease. Traceback can help track the movement of disease, but if a cataclysmic foreign animal disease outbreak occurred, NAIS will not improve on the current system for containment and quarantine.

Costs of NAIS

The monetary and time costs to implement NAIS are prohibitive for any but the largest industrial livestock producers. Small farms, that make up the vast majority of agricultural holdings, could not comply and sustain their operations. Farming in America would reduce to large industrial operations. Food costs would increase as monopolies increase. Food borne illness, statistically a product of industrial production and processing, would increase. Rural economies would suffer.

During this economic downturn, when small farms are the fastest growing agriculture sector, these expanding sources of employment and local food production would fail. At the same time, taxpayer burden would increase to pay for government agencies to oversee and enforce NAIS.

Cost of NAIS to small farmers and livestock owners

Partial estimated costs for NAIS according to the spreadsheet for an RFID system for cattle developed by Dhuyvetter and Blasi of Kansas State University in 2003 (wand reader price updated for 2009).

- 400 head or more of cattle: **$6.69** per head
- 100 head of cattle: **$18.07** per head per year.
- 25 head cattle: *$63.61* per head

NOTE: Cost for small producers is almost *10 times* that for large producers.

- Net Returns on Cow—Calf operations projected for 2009–2010 per cow: $-24.25, -47.92[1]. Combined with NAIS costs: projected net loss of $87.86— 111.53 per cow/calf. This does not include the **time** cost of implementing NAIS.

Results of 2007 US Census of Agriculture for percentage of small producers, who would be most impacted by NAIS.

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[1] FAPRI 2007 U.S. and World Agricultural Outlook January 2007 FAPRI Staff Report 07–FSR 1 ISSN 1534–4533 Food and Agricultural Policy Research Institute Iowa State University University of Missouri-Columbia Ames, Iowa U.S.A., p. *121 www.fapri.missouri.edu/outreach/publications/2007/OutlookPub2007.pdf*

- 90% of beef producers own fewer than 100 cattle each
- 70% of pork producers own fewer than 100 hogs
- 91% of sheep producers own fewer than 100 sheep
- 93% of egg producers own fewer than 100 poultry.

These figures correlate with the conclusions of Buhr and Resende-Filho in their presentation at the 2006 International Association of Agricultural Economists Conference. Their total projected cost of NAIS per quarter for just the beef and pork sector was $27.5 million, that far outweighed the projected increase in revenue of $10.42 million. They concluded with this statement: "If the defense of the NAIS is based on its effect on the demand side of the market for meats it is expected that the US Federal government will need to pay for a great part of the costs with the NAIS; otherwise the NAIS is likely to be economically unfeasible in the US." This statement is more relevant in 2009 with the economic challenges that ALL small producers face.

Case: A small producer/homesteader (actual example)

Sabo Family in Southern Illinois. Livestock: 9 milk goats, 10 goat kids, 2 goat bucks, guardian donkey, 2 feeder steers. Provides food for 3 adults, 4 children, along with ¼ acre garden, 80% of family food.

- Operating cost FY 2008: grain, supplements, hay, veterinarian expenses: $3,007
- Return on investment: 275 lbs livestock protein, 380 gal. goat milk, 100 lbs soft cheese (I.e. Cream Cheese), 130 lbs hard cheese (Cheddar, etc), organic matter to maintain garden production.
- Current market cost of items produced for personal use: $16,569.95.

Breakdown:

- Protein @ $5.22 per pound ($1435.50): Goat Milk @$3.86 per quart ($5,867.20); Soft Cheese @ $21.92 per pound[2] ($2,192), Hard Cheese @ $54.43 per pound[3] ($7,075.25)
- Projected additional cost of NAIS enrollment: $4,024 initial investment[4] with annual cost fluctuating $2,871—$3,981 Dependant upon livestock "events," database management costs increases, and as yet unknown producer participation cost requirements for the "Free" National Animal Identification System (renewal, reporting, redress).

Conclusion: Operating costs first year would increase 133.82%. Combined with economic downturn in the United States economy, increased feed costs due to redirection of feed grain to Biofuel development and increased farm costs to produce hay, mandatory enrollment would be counter-productive to the individuals involved due mainly to cost constraints. Basically, it would be impossible.

This producer would be required to purchase of an additional $16,569.95 of foodstuffs on an annual basis. Point of interest: The annual Mortgage payment of this individual is $13,584. The amount spent for food on an annual basis would exceed the Mortgage cost. This does not include the loss of supplemental organic matter to maintain garden plot for production of vegetable and fruit products. Author was unsure of where to source compost.

Cost to Rural and Local Economies

- As small farms disappear, counties and states will experience loss of taxes
- Stores selling local farm products will have to "outsource" to non-local
- Farm support businesses will lose their primary customer base

Cost to Consumers

Case: Diederichs. Family of six in the suburbs of Chicago who sources much of their family food from local farms, farmer's markets and neighbors. "I know that every particle of my family's hamburger came from the same healthy, local steer. It is impossible to put monetary value to peace of mind"—Sue Diederich, mother

- 2008, 1 year's supply of beef for family of six: $1115.41 (a half steer)
- NAIS impact on farmer expected to increase that amount to $2000.00[5]

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[2] Current 3/1/9 market source Whole Foods, St. Louis, MO data used @ $21.92 per pound

[3] Sourcing price–shipping required as no local sourcing for this product: *http://www.amazon.com/Sterling-Goat-Milk-Cheddar-Cheese/dp/B0000DG6XY*

[4] *http://www.freetofarm/extras.html: Appendix A–2.*

[5] USDA figures—profit per calf: *http://www.ext.nodak.edu/extnews/newsrelease/2003/061903/02beefta.htm.* Note: Mean off 20% lowest and 20% highest for inputs: $417.50 inputs cow/calf, same for sale of 500 pound calves: $405.00 so already at a loss of $ -12.50 for calf growers in '08. Add the cost of id to this and realize 30% of our beef comes from herds with less

Continued

NOTE: The same increase applies to chicken, lamb, turkey, pork, eggs, milk and other dairy products fish and shellfish [6]

IMPACT ON GARDEN AND PRODUCE:

- Quality produce depends on natural inputs, especially manure of nearby livestock farms. Costs for manure will also increase, if it can be sourced locally at all. Small produce farms will lose their sources or leave the business.

IMPACT ON NON-FOOD CONSUMER GOODS:

- All clothing and other items made from animal hides or fibers will increase in price.
- Some 1500 different consumer products manufactured with milk casein as an ingredient__adhesives to paint and pharmaceuticals (Venus Casein Products [7]) will increase in price.
- Vaccinations for childhood diseases, flu. pneumonia, and more contain ingredients (legally necessary in some cases)from cattle and/or chickens (Vaccine Excipient [8]) that will increase in price

CONSUMERS WITH EXTRAORDINARY BURDEN FROM NAIS:

- Senior citizens, many on fixed incomes will become more dependent upon all levels of government for assistance. Single parents, also already economically disadvantaged, will do the same.

Conclusion: With U.S. population increasing daily, demand will increase as supply decreases, putting extraordinary pressure on the remaining farmers, affecting all consumers, and government agencies at all levels, and forcing a remedy for a situation that should never have happened. Given the economic situation, many American families will be imperiled by this program.

Problems with similar systems in other countries

IN AUSTRALIA

- Costs to Sale Barns: In excess of $30,000 even with subsidizing [9]
- Excessive Fines:
- Stephen Blair, cattle producer, fined $17,300 for incorrectly tagging 177 head of cattle: Mr Blair was fined $1800 under the Stock Diseases Act and ordered to pay court costs of $15,500. [10]
- $500 fine for eight cattle lacking proper identification [11]

IN THE UK

- Healthy Herd of 567 Head Destroyed for Clerical Reasons

In March, 2007 Cheshire, UK dairy farmer David Dobbin's prize-winning registered dairy herd was destroyed by DEFRA for undefined "irregularities" in "some" paperwork regarding the identification of his cattle under the EC system. DEFRA confiscated the cattle passports which are to bear the eartag number of the individual animal on the RFID document, then confiscated his cattle telling Dobbin he had 48 hours to positively identify the animals, no longer in his possession, via DNA or they would be destroyed. As per EC regulation 494/98, no indemnity was paid. The herd was valued in excess of 500,000 pounds and was destroyed in March of 2007. [12]

Premises Registration and RFID Tagging:

- Enrollment in NAIS requires a landowner to register his property as a "premises," by signing a contract of unspecified duration and unclear legal meaning. Most farm owners object to this and refuse to enroll.
- The "840" registration prefix for RFID tagging is a U.S. designation. NAIS is an *international* system.

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than 50 head and you can see the problem immediately. Also *http://www.fapri.missouri.edu/outreach/publications/2007/OutlookPub2007.pdf* Note: page 137 shows a loss of -$24.25 for 2009 and a profit of $9.20 for 2008

[6] NAIS Draft Business Plan: *http://animalid.aphis.usda.gov/nais/naislibrary/documents/plans__reports/TraceabilityBusinessPlan%20Ver%201.0%20Sept%202008.pdf.* Also NAIS User Guide: *http://animalid.aphis.usda.gov/nais/naislibrary/documents/guidelines/NAIS–UserGuide.PDF*

[7] Venus Casein Products, Inc: *http://www.venuscasein.com/*

[8] Vaccine Excipient & Media Summary, Part 2—Excipients Included in U.S. Vaccines, by Vaccine; *http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/B/excipient-table-2.pdf*

[9] *http://www.abc.net.au/news/stories/2006/07/14/1686569.htm*

[10] *http://theland.farmonline.com.au/news/nationalrural/livestock/Cattle/cattle-producer-ordered-to-pay-17300-for-nlis-tag-breach/798558.aspx*

[11] *http://www.abc.net.au/news/stories/2006/10/16/1765737.htm*

[12] *http://www.telegraph.co.uk/news/uknews/1545862/Christopher-Bookers-notebook.html*

- The database for premises registration for the state of Wisconsin, and possibly for the entire country, is being held in Canada. [13]

Insofar as the database exists outside the jurisdictional authority of the United States, how can producers ascertain the sanctity of this information when the 1974 Privacy Act does not extend beyond U.S. borders? Who has access to this information? We would never be able to determine that information.

NAIS Enrollment:

- USDA alleges 33/% enrollment of U.S. livestock holding properties
- Actual number closer to 9.7%

As of March 2009 the USDA alleges over 33% of livestock holding properties are registered as "premises" in NAIS. Many of these are multiple unit enrollments, livestock auction facilities that own no cattle, custom feed lots, rodeo arenas, USDA employees, state DOA extension agents, livestock owners who are unaware they are enrolled and producers who are in the process of "Opting Out." Some youth have been forced to "enroll their property" before a single goat or lamb could qualify for government controlled state fair competition. Western Horseman Magazine has the largest circulation of any livestock publication in the world. In their online poll, June of 2008, based on thousands of votes, revealed over 93% of animal owners, if given a choice, would refuse to comply with any component of NAIS.

- USDA press releases and staff state a number of 1.4 million livestock raising operations exist in the US.
- The 2007 US Ag census, plus data from the American Horse Council, plus farms with below $1000 in annual sales bring the correct number to at least 3,910,022. The category with the greatest growth recorded in the 2007 census was cattle owners of one to nine head and the under $1000 income group. Small farms are growing in numbers faster than all others.

Calculating the actual number of all real farms, total NAIS alleged enrollments minus the multiple enrollments and adding the under $1000 income farms, the percentage of enrolled farm owners in the US is not 33% but, in fact, less than 9.7%.

Conclusion

The USDA has spent over $138,000,000 for state cooperative agreements and NAIS sign up incentive programs. Its 28 USDA branches, including the Farm Service Agency, County Extension offices and USDA licensed professionals, have dedicated untold hours to coerce new enrollments in NAIS. The cost to USDA per NAIS enrolled farm owner is well over $360 each to date.

NAIS is the result of looking for trouble, not finding it anywhere, diagnosing it incorrectly, and applying costly, bogus remedies. Never has such a USDA grandiose plot been attempted with less user approval, less convincing value, and such distorted numbers used to spin the program.

Solution

Industrial agriculture created NAIS to benefit industrial agriculture. We support private industry creating and maintaining a system like NAIS for its own use and benefit. If the system is cost effective, it will pay for itself. If it is not cost effective, forcing small farmers and taxpayers to pay for it makes no sense.

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[13] Obtained by a producer in Wisconsin under Open Records law, pursuant to WI open records statute. Available by request. E—mail *info@nicfa.org*.

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BENEFIT-COST ANALYSIS OF THE NATIONAL ANIMAL IDENTIFICATION SYSTEM

NAIS BENEFIT-COST RESEARCH TEAM

JANUARY 14, 2009

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Executive Summary

Purpose

The purpose of this study was to conduct a benefit-cost analysis of the United States National Animal Identification System (NAIS). The NAIS is a voluntary federal animal identification system operated by the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA). NAIS is designed primarily to protect the health of the nation's livestock and poultry to enhance animal health and maintain market access. The three components of NAIS are: 1) premises registration, 2) animal identification, and 3) animal movement tracking. Objectives of this study included estimating benefits and costs of adopting NAIS by the livestock and poultry industries as well as determining how net benefits are likely to be allocated among industry sectors, consumers, and government. The benefit-cost analysis focuses on impacts of NAIS adoption in the bovine, porcine, ovine, poultry, and equine industries.

Procedure

The approach included:

1. Assimilating a comprehensive set of published literature associated with aspects of animal ID and tracing.
2. Synthesizing a broad set of information on expected benefits, costs, challenges, recommendations, and concerns associated with NAIS adoption from personal meetings and phone conversations of our research team with industry and government stakeholders. The research team completed in excess of 50 interviews with more than 100 industry and government stakeholders.
3. Developing direct cost estimates of adoption of NAIS practices by firms operating in the bovine, porcine, ovine, poultry, and equine industries.
4. Using the direct cost estimates to determine short-run and long-run societal benefits and costs and who realizes the associated benefits and costs of adoption of NAIS practices by the bovine, porcine, ovine, and poultry industries under a variety of scenarios.

Summary Results: Bovine, Porcine, Ovine, and Poultry

Estimated costs of adopting bookend or full tracing NAIS practices by species for an average operation in selected industry segments are summarized in table 1. A bookend system refers to simply identifying the animal individually or in group/lot fashion at its birth premises and then terminating the record at the packing plant when the animal is processed, with no intermittent tracing or recording of animal movement. A full tracing system refers to the bookend plus also tracing and recording movements of animals (individually or by group depending on species) through their lifetime as they change ownership.

For a typical dairy cow operation, total cost of a bookend system would be $2.47 per cow and full tracing $3.43 per cow annually. A large portion of the costs for dairy cow operations are costs of individual electronic tags for calves for a bookend system plus scanning costs for a full tracing system. The typical beef cow operation would incur higher cost than the typical dairy producer with a $3.92 per cow bookend adoption cost and a $4.22 per cow full tracing cost. Other segments of the beef industry (i.e., backgrounders, feedlots, auction markets, and packers) incur much smaller costs than the cow sector because their main costs are replacing lost tags for a bookend and incurring scanning costs for full tracing.

Porcine adoption costs of bookend and full tracing are much smaller than bovine costs because porcine utilize primarily group identification by pen or lot rather than individual animal identification (with the exception of cull breeding animals that use individual identification). For a typical farrow-to-wean operation, annual costs of a bookend system are $0.01 per animal sold and a fully tracing system costs $0.025 per animal sold.

Ovine operations would use group identification for lambs but individual identification for breeding animals. Annual costs to adopt a bookend system would be $0.71 per animal sold and to adopt a full tracing system would be $1.07 per animal sold.

Poultry operations would utilize exclusively lot identification systems and have relatively low adoption costs of about $0.02 per animal sold annually for layers and $0.001 per animal sold for broilers.

Table 1. Average Annualized Adoption Costs of NAIS per Animal

Species/Segment	Units	Bookend	Full Tracing
Bovine			
Dairy Cow	($/cow)	$2.468	$3.433
Beef Cow	($/cow)	$3.919	$4.220
Backgrounding	($/hd sold)	$0.233	$0.710
Feedlot	($/hd sold)	$0.204	$0.509
Auction Markets	($/hd sold)	$0.000	$0.230
Beef Packers	($/hd sold)	$0.099	$0.099
Porcine			
Farrow-to-Wean	($/hd sold)	$0.010	$0.025
Farrow-to-Feeder	($/hd sold)	$0.010	$0.028
Farrow-to-Finish	($/hd sold)	$0.031	$0.126
Wean-to-Feeder	($/hd sold)	$0.000	$0.007
Feeder-to-Finish	($/hd sold)	$0.002	$0.012
Packers	($/hd sold)	$0.001	$0.001
Ovine			
All operations	($/hd sold)	$0.709	$1.065
Poultry			
Layers	($/hd sold)	$0.019	$0.019
Broilers	($/hd sold)	$0.001	$0.001
Turkeys	($/hd sold)	$0.002	$0.002

As industry adopts a new information technology and incurs direct adoption costs, adjustments occur in market supply and demand and associated prices and quantities at every level of the vertical market chain from producers through consumers including the export market. In particular, adoption of NAIS shifts supply curves to reflect added costs and shifts demand curves to reflect changes in market access associated with industry adoption of NAIS practices. These shifts in market supply and demand determine who ultimately absorbs benefits and costs of NAIS adoption. To determine net benefits and costs of NAIS adoption, we evaluated numerous scenarios of market responses to varying industry adoption rates.

The first set of scenarios compare doing nothing (status quo) to adopting full animal tracing for just the bovine sector. The bovine sector is the focus here because it is it the sector among bovine, porcine, ovine, and poultry that would incur the largest adoption cost of NAIS practices. Under the status quo scenarios, we further explore what the impacts are if by doing nothing we also lose export market access. We are likely to lose export market access over time if we do not adopt NAIS practices, even without any major market or major animal disease event, because the international marketplace is making animal identification and tracing systems the norm and any country that does not conform will have less market access.

Table 2 summarizes the total loss per head to producers in the beef sector, after all markets adjust as a result of not adopting NAIS practices (i.e., status quo) under 0%, 10%, 25%, and 50% permanent export market losses for beef. If we do nothing to adopt NAIS, and nothing happens to export markets, the result is no cost, no market loss. If we do nothing and we lose market access, which we believe is likely, the beef industry will suffer losses. The losses would amount to $18.25 per head if we do not adopt NAIS and we lose 25% of export market share. To put this into perspective, this would be about like losing access to the South Korean export market at 2003 export market shares.

Table 2. Net Annual Loss in Beef Producer Surplus from Status Quo with Varying Export Market Losses

Export Market Loss Incurred			
0%	10%	25%	50%
($/head sold)			
$0.00	-$7.31	-$18.25	-$36.47

The second set of scenarios address what happens if the industry adopts full animal tracing in the bovine sector, and as a result, is able to avoid losing beef export market access. Table 3 summarizes this set of scenarios under varying full bovine tracing adoption rates. The diagonal values of the table are underlined to highlight that as adoption rate increases, more of the export market share is likely to be retained. If 30%

adoption of full tracing occurred and the export market loss that was saved is 0%, the producer losses would be $3.72 per head reflecting adoption costs. If adoption rate was 70% and this resulted in saving 25% of the export market, the benefit (net of costs) of full tracing adoption to beef producers would be $9.26 per head.

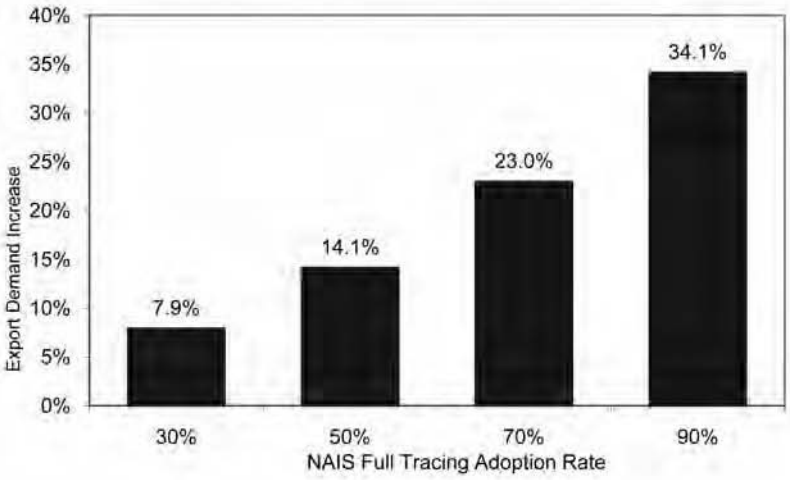
Table 3. Net Annual Gain in Beef Producer Surplus Under Varying Adoption of Full ID and Tracing Rates

Full Tracing Adoption Rate	Export Market Loss Avoided			
	0%	10%	25%	50%
	($/head sold)			
30%	**-$3.72**	$3.59	$14.53	$32.74
50%	-$5.62	**$1.70**	$12.63	$30.85
70%	-$8.99	-$1.68	**$9.26**	$27.47
90%	-$15.02	-$7.71	$3.23	**$21.45**

Additional scenarios included estimating the size of beef export demand and domestic beef demand gains that would each individually just completely pay for NAIS adoption by producers in the beef industry.

The magnitude of beef export market demand increase that would encourage beef producers (cow/calf, backgrounders, feeders, dairy, auction markets, and packers) to adopt full animal ID and tracing is shown in figure 1. Full animal ID and tracing with 30, 50, 70, and 90% industry adoption rates could be completely paid for with increases in beef export demand. A 23% increase in beef export demand would completely pay for 70% adoption of full animal ID and tracing in the US beef herd over a 10-year period. No other benefits beyond these would be necessary to make the investment in NAIS economically viable.

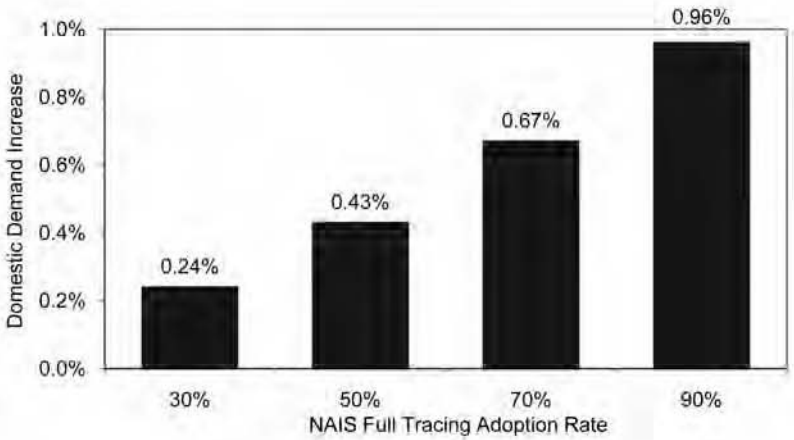
FIGURE 1. CHANGE IN BEEF EXPORT DEMAND NEEDED SO THAT WHOLESALE BEEF, SLAUGHTER CATTLE, AND FEEDER CATTLE SECTORS DO NOT LOSE ANY CUMULATIVE PRESENT VALUE 10-YEAR SURPLUS OF FULL TRACING BY ADOPTION RATES



Research indicates that domestic beef demand is likely to be greater for products having animal ID and traceability. Small increases in domestic beef demand, with all else constant, would also completely pay for full animal ID and tracing in the beef industry. Figure 2 shows the increase in domestic beef demand needed to just pay for cattle and beef producer investment in full animal ID and tracing with 30, 50, 70 and 90% adoption rates. A one-time 0.67% increase in domestic beef demand would be enough to fully pay for 70% adoption of cattle ID and tracing, with no other benefits, over a ten-year period. This is a modest increase in beef demand needed to pay for animal ID and tracing relative to the results found in previous studies of more than 5% higher demand for fully traceable meat products. With 70% NAIS adoption of full animal tracing and a 0.67% increase in domestic beef demand, all producer and consumer sectors of beef, pork, and poultry gain economic surplus and lamb producers and consumers lose a small amount of economic surplus. The overall societal gain under this scenario (producer plus consumer surplus) is a 10-year cumulative net present value of $7.2 billion. In other words, NAIS adoption would result in large positive net returns to

producers and consumers with a very small increase in domestic beef demand resulting from NAIS adoption.

FIGURE 2. CHANGE IN DOMESTIC BEEF DEMAND NEEDED SO THAT WHOLESALE BEEF, SLAUGHTER CATTLE, AND FEEDER CATTLE SECTORS DO NOT LOSE ANY CUMULATIVE PRESENT VALUE 10-YEAR SURPLUS OF FULL TRACING BY ADOPTION RATES



Whether the presumed market gains would be realized with the various NAIS adoption rates for full animal ID and movement tracing is uncertain. However, the assumed demand enhancements are within the realm of probable outcomes suggesting NAIS adoption in bovine, porcine, ovine, and poultry industries, as a whole, offers substantial net economic benefits to producers over a 10-year period. Though economic impacts of NAIS adoption are not positive for all sectors of all four species or all market participants as reported in detail in Section 9, overall total net benefits are positive.

SUMMARY RESULTS: EQUINE

Conducting a benefit-cost analysis of NAIS adoption in the equine industry was a significant challenge. Even published data on horse population in the United States have a wide range of estimates including from around five million to more than nine million horses. Collecting accurate equine data is a challenge because a considerable number of horse owners are not included in USDA surveys as many are not farm operations. As a result, we rely heavily on surveys and private industry data sources for information on equine population, animal movement and comingling activities, and industry characteristics in our analysis. Because of substantial data limitations in the equine industry analysis, unlike our analysis for livestock and poultry species, we did not estimate separate costs for varying NAIS adoption rates. Our estimates are for 100% of equine owners to adopt each NAIS practice. Rough estimates of varying adoption rates could be made by taking an adoption percentage times the 100% adoption cost.

Direct net present value of cost of 100% adoption of premises registration by equine owners is estimated at $2.7 million annually; adoption of individual horse micro-chipping is $34.5 million; and animal tracing is $38.7 million. The total annual estimated net present value of direct cost of 100% adoption of all three NAIS activities is $75.9 million per year.

Benefits of NAIS adoption in the equine industry are potentially numerous. However, the largest benefits appear to be from animal health surveillance, potential endemic disease eradication, and export market access in the event of a major equine disease outbreak. Annual costs of Equine Infectious Anemia (EIA) testing alone are $57.5 million (75% of total NAIS adoption costs). The equine export market represents some $460 million annually. Any major equine disease outbreak would adversely affect the equine export market. Though our analysis is unable to definitively conclude whether the benefits of full NAIS adoption in the equine industry exceed adoption costs, if adoption were able to eradicate diseases such as EIA and prevent major export market losses, benefits would quickly exceed adoption costs.

Dealing with Uncertainty in Estimates

Generally throughout our study, as assumptions were made especially where ranges of probable costs of NAIS adoption were available, we tended to use either the median or upper range of cost estimates. As such, our cost estimates are likely higher than what industry would experience especially as adjustments are made over time after adopting new technology. As benefits of NAIS adoption were estimated, we focused on benefits associated with animal disease management and likely market access (domestic and export demand impacts) affects of NAIS. Because many more benefits associated with NAIS are likely to accrue, we know that we underestimate potential benefits of adoption. Combined, this means net benefits (benefits minus costs) of adopting NAIS practices likely exceed those presented in our study.

1. BACKGROUND

ANIMAL IDENTIFICATION HAS EXISTED in a variety of forms in the United States for a long time. For example, brands and brand registry, used primarily for animal ownership verification, have been in place in the United States since the late 1800s. Animal breed registries typically use some form of animal identification for maintaining individual animal records. Several federal and state disease surveillance and eradication programs such as the sheep scrapie, swine pseudorabies and brucellosis, cattle tuberculosis and brucellosis, and equine infectious anemia have required forms of animal identification and/or passports for many years. Most vertebrate animals imported into, or exported out of, the United States must have official identification. Permits are required in addition to Certificates of Veterinary Inspection (CVI) for interstate livestock movement. The vast array of animal identification systems and methods vary by state, by species, and by animal disease surveillance or eradication program. The variation in systems and ID protocols results in inconsistencies, duplication, and inadequate rapid animal tracing relative to a more unified and coordinated system.

Concerns about the overall inability of US animal health officials to rapidly trace animals in the event of an animal health issue motivated industry and government to design more standardized, effective, and efficient animal identification systems. In 2002, the National Identification Development team made up of some 100 animal and livestock industry professionals, brought together by USDA, presented an animal identification plan that became known as the US Animal Identification Plan (USAIP). Through work of numerous animal and livestock industry stakeholders, a plan was developed to establish the USAIP in 2003. The BSE discoveries in Canada and the United States in 2003 heightened interest in a national animal identification system. Since that time, the animal identification plan has been further developed and renamed the National Animal Identification System (NAIS).

NAIS is a voluntary federal program administered by the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA). NAIS involves three dimensions of identification: 1) premises registration, 2) animal identification, and 3) animal movement tracking. The main purpose of NAIS is to enhance animal tracing to protect the health of US livestock and poultry. Additional goals of NAIS include monitoring vaccination programs, documenting affected and unaffected regions in a disease outbreak to maintain trade, providing timely animal movement information when needed, and establishing animal health inspection and certification programs. NAIS covers a broad array of animal species with the December 2007 APHIS *Business Plan to Advance Animal Disease Traceability*[1] designating bovine as highest priority for NAIS development; medium priority for porcine, equine, poultry, cervids, and caprine; and low priority for ovine and aquatics. With much of the NAIS designed, the next critically important step in implementation is an assessment of likely economic benefits and costs associated with adoption of the system. Before widespread industry adoption is likely, a better understanding of the types and magnitudes of benefits and costs and who will bear each as NAIS is adopted by industry is essential to understand the direct and indirect economic impacts of such an effort. The purpose of this study is to estimate the benefits and costs of NAIS.

[1] As of the publication date of this report, the most recent version of the *Business Plan to Advance Animal Disease Traceability* was published in September 2008 and is available at: http://animalid.aphis.usda.gov/nais/naislibrary/documents/plans_reports/TraceabilityBusinessPlan%20Ver%201.0%20Sept%202008.pdf.

2. OBJECTIVES

THE GENERAL PURPOSE OF THIS PROJECT was to conduct an assessment of the economic benefits and costs of a National Animal Identification System in the United States including premises registration; animal identification systems; and animal movement reporting for major species of cattle, hogs, sheep, poultry and horses and to a limited extent, minor species of bison, goats, cervids, and camelids. In particular, specific objectives were:

1. To determine similar and different attributes and methods of NAIS across species so benefit and cost estimates unique to accepted methods of adopting NAIS techniques could be completed (e.g., individual animal vs. group/lot identification methods).

2. To determine direct benefits and costs for livestock producers who adopt NAIS practices and standards. Different industry sub-sectors for each species are analyzed separately because benefits and costs can differ for different production phases (e.g., cow/calf, backgrounding, and feedlot producers in beef production). Furthermore, benefits and costs are estimated separately for different operation size categories for each major production phase because benefits and costs may not be scale neutral.

3. To determine direct benefits and costs for livestock marketing institutions (e.g., local auction and video markets) as applicable of adopting NAIS practices and standards. Benefits and costs are estimated by operation size category to evaluate differences across alternative operation sizes.

4. To determine direct benefits and costs to livestock slaughtering operations associated with adoption of NAIS practices and standards. Benefits and costs are estimated by operation size to assess scale neutrality.

5. To determine overall short- and long-run net benefits to society from NAIS adoption. We specifically estimate how benefits and costs would accrue to livestock producers, processors, consumers, and state and federal government agencies.

3. PROCEDURE

TO ACCOMPLISH THE OBJECTIVES OF THIS PROJECT, several phases of research were completed. These phases included collecting considerable amounts of information, data, and past research. A detailed assessment of costs of adoption and administration of NAIS technology was undertaken, and a sizeable modeling effort was employed to determine short- and long-run benefits and costs. The research process included:

3.1 LITERATURE REVIEW

We conducted a substantial literature review related to benefits and costs of animal ID and traceability systems. Past literature has been used to identify potential benefits and costs, develop estimates of benefits and costs, and parameterize models to analyze the distribution of net benefits across industry segments and society. Discussion of past literature is interspersed as relevant throughout this report and a reference section at the end of the report (section 15) provides a complete reference list. We compiled the body of literature and provided it to APHIS in electronic format to provide ease of investigating in further detail specific information and studies cited in our report and to help provide a foundation for future work.

3.2 INDUSTRY STAKEHOLDER MEETINGS

Our research team conducted more than 50 meetings with more than 100 stakeholders representing a broad range of industry sectors, species, and professional leaders. A complete list of organizations represented in our meetings is provided in Appendix 3. The purpose of these meetings varied depending upon the specific organization or person visited. In general, we gathered information about anticipated costs, potential benefits, challenges, and opportunities associated with NAIS adoption from the perspectives of the stakeholders represented by each organization. Information gleaned from these meetings is integrated in a variety of places throughout this report. Additionally, in Section 13 we

summarize related information gleaned from these meetings that is not necessarily incorporated directly into our benefit-cost estimation discussion and analyses.

3.3 Direct Industry Cost Estimation

Estimation of direct costs for premises registration, animal identification, and animal tracing was undertaken to develop a foundation of costs of NAIS adoption in each major directly affected sector by species. Care was taken to complete as accurate an industry-wide representation of these adoption costs as could be completed subject to available data. Detailed methods, assumptions, and estimates of NAIS adoption costs are presented in Sections 4 through 7.

3.4 Government Costs and Benefits

Costs to federal and state government of developing and operating NAIS as well as potential benefits government health organizations would gain from NAIS adoption were estimated to assess governmental impact. Results from these analyses are presented in Section 8.

3.5 Market and Societal Benefit and Cost Allocations

To determine how benefits and costs of premises registration, animal identification, and animal tracing would be reflected in short- and long-run industry sectors and consumers, we developed an economic model (equilibrium displacement model). The model and associated results are documented in Section 9. The equilibrium displacement model is used for estimation and allocation of benefits and costs specifically in the cattle, swine, poultry, and sheep industries.

3.6 Equine Industry Benefits and Costs

Equine represents a substantial economic industry, but one that is quite distinct from meat animal industries from a market supply and demand framework. As such, a separate independent analysis was conducted to

estimate benefits and costs of NAIS in the equine industry. The approach used and resulting benefit and cost analysis of NAIS adoption in equine is presented in Section 10.

3.7 Minor Species Benefits and Costs

NAIS includes species that represent a much smaller direct economic impact than the major species addressed in other sections of our report. In particular, deer, elk, goats, bison, and aquatics are included within the NAIS program. Development of comprehensive benefit and cost analyses for these more minor species was not a focus of our study. We provide brief summaries of the extent of animal ID in selected minor species in Section 11.

PREFACE TO DIRECT COST ESTIMATION

BEFORE PRODUCERS ARE LIKELY TO ADOPT an animal identification (AID) system, they need to know and understand the direct costs to compare with expected benefits. Likewise, if the government were to mandate an NAIS, it is important to understand direct costs that producers would incur. Direct costs are those costs that are incurred to adopt NAIS technology. Estimation of direct costs is the focus of the next four sections of this report. Who actually bears these costs and the associated benefits once market supply and demand adjust is evaluated and reported in a later section of this report (Section 9). This information is also important for policy decisions regarding cost-share, subsidies, etc. that might be put in place to help offset costs for producers.

To estimate direct costs associated with an AID system for bovine, porcine, ovine, and poultry, assumptions as to the type of identification system used were required. In the cattle (bovine) industry, it was assumed the technology used for animal identification would be electronic identification (eID) using Radio Frequency Identification (RFID) ear tags and identification would be on an individual animal basis. For the swine (porcine) industry it was assumed market hogs would be identified with a group/lot ID and cull breeding stock would be identified with a unique visual premises ear tag. Sheep (ovine) industry cost estimates were based on a scrapie program tag for breeding animals and group/lot ID for lambs. For the poultry industry it was assumed group/lot ID would be used for all poultry. These individual animal or group/lot identification methods by species were all based upon the general guidelines developed by the NAIS working groups for each species.

Costs were estimated at the producer level for all four species (beef and dairy cattle, swine, sheep, and poultry) and at the packer level for beef, dairy, swine, and sheep. Because of the integrated nature of the poultry industry, separate costs were not estimated at the packer level. With group/lot ID, additional costs incurred at the packer level are minimal as systems capable of group/lot ID are already in place allowing tracking and traceability of individual groups. Because a high percentage of cattle are sold through auction markets, costs also were estimated for auction

markets for beef and dairy cattle. Total costs to the respective industries were estimated under three scenarios: 1) premises registration only; 2) bookend AID system, where animals are identified at birth and at termination (slaughter) without intermittent movement recording; and 3) animal ID with tracing of animal movements. Industry costs of each of these scenarios were estimated at adoption levels ranging from 10 to 100 percent in 10 percent increments. To aid the process of reporting direct costs in the preceding three scenarios, specific costs are categorized as (a) tags and tagging costs; (b) reading costs; and (c) premises registration costs. The next four sections discuss methods and assumptions for estimating NAIS implementation cost for the cattle, swine, sheep, and poultry industries, and include summaries of the cost analysis.

4. Direct Cost Estimates: Bovine

Costs were estimated by segmenting the cattle industry into six main groups (referred to as operation types): 1) Beef Cow/Calf, 2) Dairy, 3) Backgrounder (also referred to as Stocker), 4) Feedlot, 5) Auction Yard, and 6) Packing Plant. Estimating costs separately for these different operations makes it possible to see how different segments of the cattle industry would be impacted by adopting NAIS practices.

The Beef Cow/Calf group was defined as all producers who breed cattle for the express purpose of raising and selling a calf crop. The Dairy group was defined as all producers who raise and breed cattle for the express purpose of raising and milking lactating cattle. The Backgrounding group refers to operations that feed weaned animals for a period of time prior to selling them to a feedlot where they are finished. In this analysis, only background operations that buy weaned cattle are included in the cost estimation. Operations that background their own weaned animals would not have the added costs associated with NAIS adoption that a backgrounder who buys market cattle would incur. Feedlot operations are defined as any operation that feeds a weaned animal a concentrated diet for the purpose of selling that animal to a packing plant. Auction yards were defined as any bonded company that sells cattle as a

marketing service. Packing plants were defined as any operation that slaughters live animals under government inspection to produce meat products for sale to the public.

The Beef Cow/Calf and the Dairy groups were split into two subcategories: operations that currently identify calves individually and those that do not. Operations that currently identify calves individually use various methods of identification (e.g., plastic ear tags, metal tags, branding, tattoos, etc.). Of the various methods, plastic ear tags is the most common with 80.7% of operations identifying calves individually using this form of ID (USDA 2008q). For this report, all operations that currently identify calves individually are referred to as "tagging operations" and incremental costs associated with RFID are based on a "second tag" used. The breakdown of tagging operations for Cow/Calf producers was based on information reported in the National Animal Health Monitoring System (NAHMS) publication titled *Part 1: Reference of Beef Cow-Calf Management Practices in the United States, 2007-08* (USDA, 2008q). Similarly, the breakdown of tagging operations for Dairy producers was based on information found in the NAHMS report *Dairy 2007 Part I: Reference of Dairy Cattle Health and Management Practices in the United States* (USDA, 2007a). The methods of estimating costs hereafter discussed will apply to both subcategories unless stated otherwise.

The following discussion of cattle industry costs is partitioned according to the six operation types. The Beef Cow/Calf group is followed by the Dairy, Backgrounders, Feedlot, Auction and finally the Packing Plant groups. Each section describes the methods and assumptions used to estimate the cost for that sector. These six group subtotals were summed to find the total final cost for the cattle (bovine) industry. Because some methods and assumptions were employed for two or more groups, the Cow/Calf group will be explained fully; thereafter, if another industry sector uses the same approach as the Cow/Calf groups, the reader is referred to the appropriate subsection in the Cow/Calf section. Also, the following discussion pertains to costs associated with all cattle being identified and movements tracked (i.e., Scenario 3 listed above). Costs of just premises registration (Scenario 1) and just bookend systems (Scenario 2) are summarized separately later in this section.

4.1 Beef Cow/Calf

4.1.1 Tags and Tagging Costs

Operation Distributions

One of the objectives of this study was to determine if the implementation cost of an animal identification system varied by operation size. To determine if economies of size exist, costs of adopting animal identification were estimated for various operation sizes. The USDA National Agriculture Statistics Service (NASS) report most cattle data (e.g., number of operations, inventories, calf crop) by size groups. Thus, NASS size categories were used as breakpoints for this study. Cattle inventories (*Cows that Calved – Beef*) for January 2007 and July 2007, the 2007 percent of cattle by size of operation, and the number of operations per size group operating in 2007 were collected (USDA, 2008e). The total head of beef cows per operation for each size category was found by averaging the January and July inventories and multiplying this number by the respective percentage of cattle by size of operations. Dividing this cow inventory number by the total number of beef cow/calf producers in that size group revealed the average number of cows per operation for each size category. To estimate the number of breeding bulls per premises, the 1997 NAHMS Beef Report (USDA 1997a) estimate of one bull for every 25.3 cows was used. With these two pieces of information, the total breeding herd inventory was calculated for the seven different operation size categories.

RFID Tags Placed

To determine the number of tags purchased, the total number of animals tagged in a year needed to be calculated. The operation size subcategories were each assigned an adjusted calving rate of 94.6% and a cull rate of 11.0%. This adjusted calving rate does not represent the number of pregnant cows, but rather, the number of calves born alive per 100 cows after accounting for twinning. This value was calculated by taking the 2007 calf crop (USDA, 2008e) and subtracting the number of dairy calves, which was calculated by taking the 2007 dairy inventory (USDA, 2008e) and multiplying it by the percentage of dairy cows giving

birth to weaned calves (USDA, 2007a). Adding parturition related deaths for beef calves (USDA, 2006d) to total beef calves weaned gave the total number of beef calves born alive. Dividing this by the total number of beef cows gave the calving rate, which was then adjusted to account for twinning. According to the 1997 NAHMS Beef Report (USDA, 1997a), the average pregnancy rate was approximately 92.6% and the cull rate was 11.9%. This indicates that the pregnancy and cull rates used in this analysis are reasonable, where the difference was small and likely due to differing years between the NAHMS report and the data used in this analysis.

To figure the number of replacements retained and kept in the breeding herd, the percentage of culls was added to the percentage of cow deaths and this percentage was multiplied by the average herd size. Table A4.1.1 in Appendix A4 reports the number of beef cow/calf operations and various production and inventory level values by size of operation.

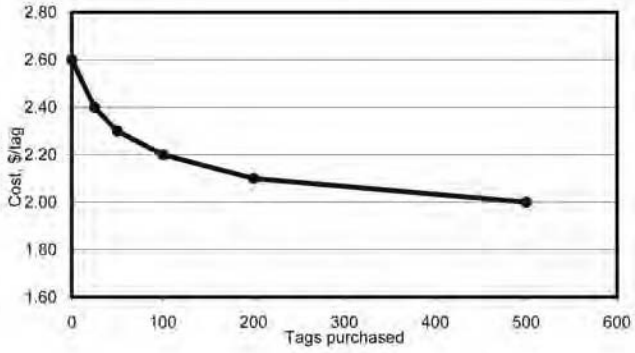
To calculate the number of RFID tags placed, different assumptions were used for the subcategories of operations currently tagging versus operations not tagging. For operations that currently tag, it was assumed that parturition-related deaths were not tagged and all calves that died after parturition were tagged. Death loss percentages from *Cattle Death Losses* (USDA, 2006d) were applied to the 2007 calf crop numbers. It was also assumed that these operations would incur a tag loss rate requiring some animals (calves and cull cows and bulls) to be retagged before shipping to buyers. For operations that do not currently tag, it was assumed that nothing was tagged until the animals were shipped to the auction yard where they were tagged by an auction yard crew for a fee.

The tag loss rate applied was 2.5%. This loss rate is higher than the 1% manufacturers' guidelines from the USDA (Walker, 2006). Research has revealed RFID tag loss rates vary from less than 1% to as much as 5% (Williams, 2006; Watson, 2002; Evans, Davy and Ward, 2005). The median value of 2.5% from the various research studies was used for this analysis.

RFID Tags and Applicator Cost

To find the cost of RFID tags, an internet search was conducted resulting in 12 companies located that offered RFID cattle tags. These businesses were located in the lower 48 states of the United States. The prices ranged from a high of $3.00 to a low of $2.00, with the average cost being $2.25. Based on discussion with industry participants, it was assumed that economies of size exist when RFID purchases are made resulting in lower tag cost with higher volumes. The high price of $3.00 per tag was considered to be an outlier and was excluded from the analysis. A non-linear relationship between volume (tags purchased) and cost was used where the high price was $2.60 per tag and the low price was $2.00 per tag. Figure 4.1 shows the tag prices used in the analysis as they relate to tags purchased (i.e., operation size).

Figure 4.1. Assumed RFID Tag Purchase Price as Volume Varies

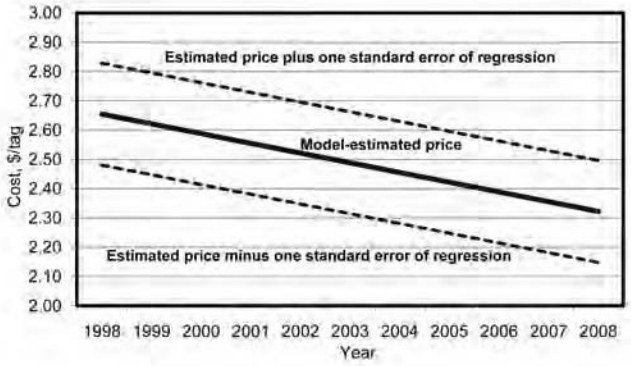


As technology improves over time and the use of electronic ID tags increases, the cost of this technology is expected to decline. Thus, the costs of tags and readers will likely fall over time, which implies tag costs used in this analysis likely represent an upper estimate. An attempt was made to quantify how the nominal (not inflation-adjusted) cost of individual electronic animal ID button tags has changed over time. To

assess the change over time, a spectrum of electronic ID button ear tag prices were collected from several vendors over 1998-2008. Collecting consistent prices from a large number of the same vendors each year was not possible. Many tag supply companies entered and exited the market during this time frame. Also, tag price data were frequently unavailable because firms considered it confidential and because of the relative newness of this technology. Because price trends from the same consistent set of vendors were unavailable for a continuous 10-year period, prices were collected from as many vendors as possible for as many years as was available from each. The result was a total of 63 prices of button electronic ID tags (excluding visual tags), spread across the 11-year period, representing a total of 22 different vendors/sources. As much as possible, tag prices reflected an order of 100 or fewer tags, to not further complicate the analysis with volume-order discounts that can be sizeable. Ordinary least squares regression was used to estimate a model with dummy variables for vendors and a time trend for year using the 63 observed prices. A regression model with the time trend squared was also estimated to test whether the price over time was changing nonlinearly with time. The quadratic time trend term was not statistically significant and thus was not retained.

Results of the regression analysis indicated that, on average, the nominal cost of electronic ID button tags, after adjusting for vendor differences, has declined about $0.033 cents per year or $0.33 cents per tag over the past 10 years (this estimate was statistically different from zero with 95% confidence). The regression analysis also demonstrated statistically and economically important variation in tag prices across different vendors within a year. The regression-predicted electronic ID button tag price by year is illustrated in figure 4.2. Included in this figure are dashed lines illustrating the standard error of the regression-predicted price (these lines represent an approximate 68% confidence interval on expected tag price at the means of the data). The dashed lines demonstrate the magnitude of unexplained variation in tag price in the regression modeling exercise. We attempted to collect similar data on hand-held wand readers. However, we were not able to obtain sufficient numbers of observations and consistent technology over time to complete a reliable trend analysis in costs of readers.

FIGURE 4.2. REGRESSION-PREDICTED ELECTRONIC ID BUTTON TAG PRICE OVER TIME



While conventional, two-piece applicators might work with RFID tags, it is possible that the RFID button will be damaged during application with conventional tag applicators. Thus, it was assumed the incremental cost of implementing an RFID program included the full cost of RFID-specific applicators. That is, producers were assumed to have to purchase an RFID applicator in addition to whatever they currently use for identifying calves individually. To find the RFID applicator costs, an internet search was conducted to obtain estimates of applicator costs. The average cost of RFID applicators was $44.83, which compares to an average cost of $18.62 for conventional two-button applicators. Average life span of an applicator was assumed to be four years and the number of applicators required increased as the operation size increased. Tables A4.1.2 and A.4.1.3 in Appendix A4 report the number of tags and tag applicators required by size of operation for beef cow/calf operations that currently tag and those not currently tagging, respectively.

Labor and Chute Costs for Tagging Cattle

Producers who adopt RFID technology will have an additional time outlay in placing the RFID tag into a calf's ear. To account for this, it was assumed that it would take 30 seconds to insert a second tag for those operations currently tagging. Because producers that currently tag already incur the initial setup time and tagging costs associated with a conventional tag (or some other method of individual identification), only the extra time to tag an animal was considered as this reflects the incremental cost. The labor rate used was $9.80 per hour (US Department of Labor, 2007). Operations that do not currently tag will not incur this cost in their operations as they do not tag their animals, but they will incur a cost associated with tagging when their cattle are sold.

To account for the marginal labor and chute costs when tagging weaned and culled animals, setup time, tag time, number of employees, and chute charges were considered. For operations that tagged at birth, only the animals that lost their tags were considered (i.e., animals needing to be retagged). An article published at North Dakota State University indicated that it took 66 seconds to work an animal in a squeeze chute (Ringwall, 2005b). Using this value and an assumed setup time of 15 minutes along with the total number of cattle needing to be tagged, the total number of hours to tag/retag animals was estimated. This number was then multiplied by the number of employees and the labor rate to come to a total labor cost. The number of employees ranged from one to six and was assigned to the different size categories based on producer opinion.

The last component was the chute cost associated with tagging animals. For producers who already tag, a rate of $1.00 per head was used. This reflects the feedlot industry chute charge that ranges from $0.75-1.50 (Boyles, Frobose, and Roe, 2002; Ringwall, 2005b).

For producers who do not currently identify calves individually, i.e., non-tagging operations, it was assumed that the auction yard would charge these producers for a tagging service. Based on survey results on tagging costs from auction yards (Bolte, 2007) and Livestock Marketing Association (LMA) data regarding the distribution of auction market sizes in the US, it was estimated that the average chute and labor cost would

be $2.54 per head. This did not include the cost of an RFID tag, but it did include added liability insurance premiums and human injury costs to the extent that auction markets incorporate these costs into their charges.

Injury Costs Associated with Tagging Cattle

Tagging cattle involves the risk of injury to both the people doing the tagging and to the cattle. Thus, human and animal injury cost was estimated on a per animal head basis. To estimate the cost of human injury associated with tagging cattle the total labor cost associated with tagging cattle was multiplied by 10% as an estimate of workman's compensation, which is used as a proxy for human injury costs.

To estimate the animal injury cost associated with tagging an animal, the total number of cattle (Beef Cow/Calf and Dairy) workings per year was estimated. Because many dairy cattle workings are routine in nature (e.g., milking each day), they are less likely to cause an injury and thus they were assigned a weight of 10% compared to beef cattle workings at 100%. In other words, from an injury standpoint, milking a cow 10 times was assumed to be equivalent to tagging a beef animal once. The USDA estimate of the total value of lameness and injury to cattle of $104,427,000 (USDA, 2006d) was divided by the estimate of total annual cattle workings. This provided an estimate of the animal injury cost per working, which was then used to estimate the marginal animal injury cost of working cattle associated with animal identification. While it is a strong assumption to assume all lame animals were caused by working them, it was the only estimate that could be found. This number, now on a per head basis, was then applied to the number of animals being sold that needed tags.

Cattle Shrink Associated with Tagging Cattle

When cattle are processed through a chute for tagging, they may incur weight loss or a short time of not gaining at the rate they were without processing. Many publications have shown the affects of shrink related to time off feed (Barnes, Smith and Lalman, undated; Gill et al. undated; Ishmael, 2002; Krieg, 2007; Richardson, 2005; Self and Gay, 1972). However, the complexity of the cow/calf industry and the published information available was such that it was impossible to determine a reliable average incremental shrink associated with tagging calves. Additionally, management style, working weights, and other factors that contribute to shrink costs vary considerably from operation to operation.

In order to calculate a shrink cost for those operations that tag, a two-pound loss was assumed for every weaned animal that needed to be retagged before they were shipped. While most of the literature suggests that total shrink is more than this, the literature points out that most of this shrink is feed and water. For those operations retagging their animals, the feed and water loss can be replaced as soon as the animals are turned back into their pen or pasture. However, what cannot be replaced is the loss of animal weight gain for that day (at least not by the seller). While operation dependant, most will have an average daily gain between one and three pounds for weaned animals. This study used the median point of two pounds as the shrink and used 25% of the average market price for calves ($121/cwt) to arrive at a cost per head. The reason only 25% of the lost weight was included was because of the compensatory gain that the buyer of the cattle would realize.[2] The cost associated with shrink for cull animals was figured in the same manner only a lost weight of 2.5 pounds and an average price of cull cows ($48/cwt) were used.

The shrink costs for operations currently not tagging was estimated in a similar fashion. However, the total pounds of shrink was assumed to be slightly higher than calves that are tagged at the ranch because calves tagged at the livestock auction market would not have the same

[2] While the seller might actually incur a higher cost than this, the buyer would receive a benefit associated with compensatory gain and thus the 25% reflects a net loss to the industry due to tagging. The 25% is generally consistent with the consensus of an informal survey of animal scientists, veterinarians and producers.

opportunity to eat or drink prior to being sold. For these operations the assumed shrink was 2.62 pounds, based on a shrink rate of 0.5% observed with 30 minutes of sorting animals (Richardson, 2005). Cull breeding animals needing to be tagged at the time of sale were assumed to shrink at a rate of 2.75 pounds. The total amount of shrink for both weaned and cull animals were multiplied by the group's respective average selling price to find the cost of shrink per head and ultimately per operation. Shrink costs varied slightly between operations that currently tag cattle versus those that do not, but they did not vary by operation size (i.e., operations of all sizes incurred the same per head shrink costs associated with tagging cattle). Tables A4.1.4 and A4.1.5 in Appendix 4 report the various tagging-related, i.e., cattle working, costs for beef cow/calf operations that currently tag and those currently not tagging, respectively.

4.1.2 Reading Costs

The RFID component and reading costs was a function of animals read, ownership and operating costs associated with the RFID technology (e.g., electronic readers (panel and wand), data accumulator, software), and database charges. The following is a brief discussion of these components.

Animals Purchased or Transferred

It was assumed that tags would not have to be read when they were initially applied as this information would be recorded by the seller of the tag. That is, cow/calf operations that tag calves will not have to read these tags, they only will have to read tags of calves brought onto their premises from outside sources. To estimate the cost of reading RFID tags, the average number of animals brought onto buying premises was determined by using information found in the 1997 NAHMS Beef Report (USDA, 1997a). This study reported the average percentage of animals brought onto buying premises for the study year. Using this information, the average number of animals bought per buying premises was

determined by multiplying the total number of Cow/Calf operations by size with their corresponding percentages as shown in Table 4.1.

Bolte, Dhuyvetter, and Schroeder (2008) indicated that auction yards would likely install reading panels in their facilities as a service to customers. Thus, it was assumed that producers would not need to read electronic tags on any cattle purchased through an auction yard as they would already be read by the auction market. Schmitz, Moss, and Schmitz (2002) estimated that 72.2% of all cattle are sold through local and video auctions. Contained in that same report was a quote from a leading authority that suggested 67% of animals were sent through these two channels. The average of these two values (69.6%) was taken to attain the percentage of animals sold through an auction. The remaining cattle (30.4%) were assumed to be sold through channels other than auction markets (e.g., private treaty) and thus would need to have their RFID tags read at the time of sale.

The average number of cattle marketed through auction markets was applied uniformly to the number of cattle bought by operation size to find the number of cattle bought through the auction. [3] After this number was calculated, it was subtracted from the total number of animals brought onto the premises to find the total number of tags still needing to be read. For example table 4.1 shows that operations with 50-99 head bought an average of 18.2 head per year. If 69.6% of those were purchased through an auction market that would leave 5.5 head (30.4% × 18.2) that would need to have their tags read either at the farm or at some other location.

Panel readers miss up to 2.8% of all RFID tags (Reinholz et al., undated). To capture this and the extra time needed to ensure 100% read when using hand held readers, the number of animals needing to be read was increased by 2.8% to account for expected misreads. The combination of cattle needing to be read and misreads gives an estimate of the total tags read required for an operation on an annual basis.

[3] We believe that smaller operations tend to sell a larger percentage of their cattle through auction markets compared to larger operations. However, information substantiating this could not be found and thus the uniform assumption was used.

Table 4.1. Estimates of the Number of Cattle Brought onto a Cow/Calf Operation Premises by Operation Size

	Operation Size, head				
	Less Than 50	50-99	100 -500	500 or More	All Operations
Percent of operations that brought any beef or dairy cattle or calves onto the operation in 1996 by class and herd size:					
A. Any cattle or calves	32.9%	48.7%	63.2%	74.5%	38.7%
Number of cattle and calves brought onto the operation in 1996 as a percent of January 1, 1997, total inventory by herd size:					
B. Cattle and calves	36.8%	27.9%	24.8%	15.0%	26.6%
Calculated Cattle Buying Operations by Size in 2007					
C. Number of beef cows, 2007	9,174,406	6,160,432	12,817,672	4,968,090	33,120,600
D. New cattle in herd (B × C)	3,376,181	1,718,760	3,178,783	745,214	9,018,938
E. Number of cattle operations, 2007	585,050	94,490	72,855	5,505	757,900
F. Number of cattle buying operations (A × E)	192,481	46,017	46,044	4,101	293,307
G. Cattle bought per year per operation (D / E)[1]	5.8	18.2	43.6	135.4	11.9
H. Cattle bought per year per operation (D / F)[2]	17.5	37.4	69	181.7	30.7

[1] Based on total operations.

[2] Based on only operations that brought cattle onto their premises.

Electronic Readers

A US government compliant RFID tag is assigned a unique, 15-digit number (USDA, 2006a; USDA 2007d). This number is printed on the outside of the tag so it can be read visually, and it is recorded in a memory chip inside the tag so it can also be read electronically. For the purpose of this study, it was assumed that a producer had three options to electronically read the animal's unique, 15-digit ID: (1) custom hire, (2) a wand reader, or (3) a panel reader. It should be noted that even though the unique ID is a 15-digit number, producers would not have to visually "read" all 15 digits given the numbering system used (e.g., first three digits are country code). Nonetheless, visually reading the individual number on the tag was not considered because of the substantial amount of time involved which would cost the producer more than it would if the producer employed one of the other three options. Additionally, the potential for error when reading and recording a small, printed 15-digit number would be high.

The system used to read RFID tags was based on the number of animals read. If the cost of the RFID components divided by the total number of reads was greater than a custom read rate, then the operator would hire someone to read the tags on the animals. If the rate was smaller than a custom read rate, then the operator would own the equipment needed to perform the task. The equipment assumed to be owned in this case was either a wand or a panel reader, whichever had a lower cost on a per head basis.

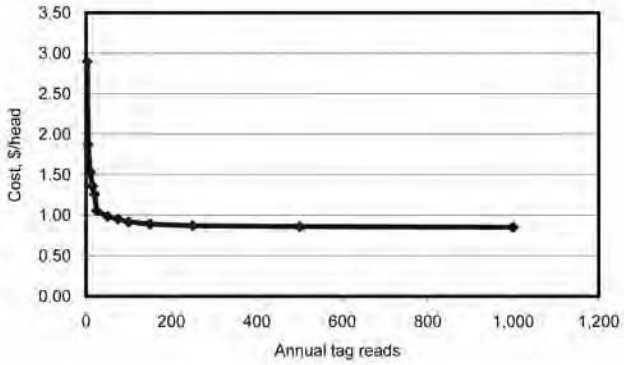
Based on work by Bass et al. (2007), the cost for RFID wand readers was based on an initial outlay of $1,091 and a useful life of three years. Using an interest rate of 7.75% along with the assumptions about initial outlay and useful life resulted in an annual cost of owning a wand reader of $422. RFID readers in this price category are able to capture and temporarily store RFID numbers until downloaded into a computer. While this type of reader is more expensive than those that do not store RFID data, some producers already own desktop computers and would not be able to move them to their chute area. Therefore, in order to account for computers already owned by producers, the system being used had to be flexible enough to allow interfacing with stationary or

portable accumulators. Panel readers were also based on Bass et al. (2007) and were annualized over four years with an initial outlay of $3,580. Panel systems were assumed to incur a $500 installation cost, which was annualized over a 10-year life. The annualized cost of purchasing and installing a panel reader was $1,150. It was assumed that there would be an annual maintenance cost of $500 for operations that employed a panel reader. While the annualized costs for panel readers are considerably higher than wand readers, the reading cost per head can be lower given sufficient volume of reads because there is minimal labor associated with running panel readers once in place.

A search of the literature did not reveal any unsubsidized, custom rates for reading RFID tags; therefore a rate needed to be estimated. To estimate these rates, 10 states with 15 unique brand inspection fees were analyzed.[4] Some of the inspection fee schedules included hours, which were charged at an hourly wage of $9.80 per hour (US Department of Labor, 2007) and some schedules included mileage. For custom tag reading, we assumed a 50-mile round trip at the government recommended reimbursement rate of $0.485 (US General Services Administration, 2007). The 15 brand inspection fee rates were applied to groups of cattle ranging from three head to 20,000 head. After this was done for each of the 10 states and 15 brand inspection rates, individual costs were weighted by the number of operations in each state to get a weighted average cost. The weighted average cost associated with the different breakpoints was used to determine the custom read cost. Figure 4.3 shows the relationship between the custom reading cost per head and the number of reads. This schedule of custom read rates exhibits large economies of size (i.e., costs decrease as volume increases). However, costs drop rapidly and plateau such that there are only small gains with really large numbers of reads. For example, the cost of reading five head is $1.87 per head compared to $0.98 per head for 50 head and $0.86 for 500 head.

[4] The states with brand inspection rates used for this analysis are the following: CA, CO, ID, MT, NM, NV, OR, SD, UT, and WY.

FIGURE 4.3. ESTIMATED RFID CUSTOM TAG READING COST PER HEAD AS NUMBER OF READS INCREASES



DATA ACCUMULATOR AND SOFTWARE

The data accumulator cost represents the average price for laptop computers obtained from six internet web sites. This cost was annualized over four years with a $0 salvage value. Given an initial investment of $692, a 4-year life, and an interest rate of 7.75%, the annual cost of a data accumulator is $208. Of this total annual cost, 50% was allocated to an animal ID program as it was assumed that a computer would have other uses in the operation. According to the NAHMS Beef report (USDA, 2008q), some operations already own computers and thus, would not need to purchase one. Large operations were more likely than smaller operations to already own a computer. For example, only 15.3% of operations with less than 50 cows owned computers compared to 48.2% for operations with 200 or more cows (USDA, 2008q). To account for operations that currently own computers, the annual cost of the data accumulator (i.e., computer) was multiplied by one minus the proportion of operations that currently own computers resulting in a weighted average cost per operation for each size category.

Many different software packages are available that would satisfy the software requirement of an eID system. The value used here is the

suggested retail price of Microsoft Office Professional (Microsoft, 2008). Because this software would have uses in addition to meeting the needs of an eID system, only 50% of the cost was allocated to the animal ID program. This software package includes Microsoft Office Word, Office Excel, Office PowerPoint, Office Access, and other programs. While most producers would not use some of the programs included in Office Professional, Microsoft Office Word and Microsoft Office Excel or Microsoft Office Access would need to be employed to keep track of reads and to write the necessary documents. Other software packages that also maintain management information likely would be utilized by producers, but the higher cost associated with these software packages are not appropriate to include in an animal ID system as these are providing value beyond that required by NAIS. In other words, producers might choose to spend more for additional management benefits, but this is not something they would need to adopt NAIS procedures. It was assumed that producers that already own computers would also own software that would satisfy the requirements of an eID system. Thus, as was done with data accumulators, the cost of software was reduced by the proportion of operations currently owning computers (USDA, 2008q).

Labor, Chute, and Other Costs Associated with Reading RFID Tags

In addition to the hardware and software required for reading RFID tags, other costs such as labor, chute, and human/animal injury would also be incurred. It was assumed that all Cow/Calf operations that buy cows run them through chutes for vaccinating, deworming, or other basic animal husbandry practices. Thus, the incremental labor cost of reading tags would only be the added time required given that the animal is already going through a chute. Therefore, the total number of animals that needed to be read on an operation was multiplied by 20 seconds to find the incremental time of reading RFID tags. The total time was multiplied by the labor rate of $9.80 per hour (US Department of Labor, 2007) and the total number of employees to find the cost of labor for reading tags. The number of employees needed to work cattle was broken into two groups: 1) the employee using the reader (if a panel reader was not used) and 2) other employees doing other tasks (herding, sorting, etc).

The other employee group had differing amount of people for different size operations, which was determined based on producer opinion.

The full chute charge was reduced by 75% because of the assumption that producers will already be working their animals when they read the RFID tags. The 25% applied towards the total cost represents the extra time the animals will spend in the chute.

Animal and human injury costs were added according to the amount of extra time the animal was in the chute being read. Shrink was not added to cows being read because these animals would be for breeding purposes. If operations brought animals in for purposes other than breeding (i.e., backgrounding or feedlot) a cost for shrink was included.

Database Charge

According to the NAIS business plan, "The most efficient, cost-effective approach for advancing the country's traceability infrastructure is to capitalize on existing resources—mainly, animal health programs and personnel, as well as animal disease information databases" (USDA, 2007f p. 4). As of May 2008, there were 17 approved Animal Tracking Databases or Compliant Animal Tracking Databases meeting the minimum requirements as outlined in the Integration of Animal Tracking Databases that were participating in the NAIS program and have a signed cooperative agreement with USDA Animal Plant Health Inspection Service (USDA, 2008d).

The research team attempted to contact multiple RFID database providers to obtain costs per head of their databases so an average cost for data storage could be ascertained. Not surprisingly, this information was not readily given out, and the information that was expressed was not specific enough for this study. To find a more accurate estimate, Kevin Kirk from Michigan's Department of Agriculture was contacted. Mr. Kirk, who oversees the Michigan State AID database, provided the total data storage cost for Michigan producers. Based on this information, a per-head charge of $0.085 was estimated. This per-head charge was included anytime an animal was assumed to have its RFID tag read.

Other/Fixed Charges

The time needed to submit the RFID reads to a central database and the internet fee was considered here. To determine clerical costs, the time required to submit a batch of RFID numbers and the number of batches submitted needed to be ascertained. The Wisconsin working group for pork found that it took 15 minutes to submit a batch (Wisconsin Pork Association (WPA), 2006). It was assumed that a minimum of four batches (one hour of clerical labor) would be assigned to the smallest size category operations and a total number of 16 batches (four hours of labor) would be assigned to the largest operations. Clerical labor was multiplied by the average secretary wage for the US (US Department of Labor, 2007) to find the total cost associated with recording and reporting animal ID information.

In order to be able to achieve a "48 hour trace back system" producers would need to submit their RFID numbers via an internet access point. An internet charge of $50 per month was assumed for 12 months. As with computers and software, the internet would have multiple uses and thus only 50% of the cost is allocated to the animal ID system. Additionally, because some operations already have a computer, it was assumed they likely also had internet access so a weighted cost of internet was used similar to what was done for the cost of data accumulators and software. Table A4.1.6 in Appendix A4 summarizes the costs associated with reading RFID tags by size of operation. In all cases the RFID system for reading eID tags is outsourced as opposed to owned in house (i.e., operations would rely on custom reading services to read their tags). This is because even the largest operations would not have sufficient numbers of cattle requiring their tags to be read annually to justify purchasing readers.

Premises Registration Costs

Currently premises registration is free and many states are trying to make the process as seamless as possible and NAIS reports that 33.8% of all operations with over $1,000 income have been registered as of September 29, 2008 (USDA, 2008d). While the premises registration is a free service, there are potential costs incurred with registering an

operation's premises (e.g., management time, mileage, paperwork). To capture this cost, it was assumed that a producer would incur a cost of $20 associated with time, travel, and supplies to register his/her premises. Theoretically, once premises are registered the registration lasts for the life of the operation as well. However, many producers will need to renew or modify their premises registration on a regular basis as their operations change. Thus, it was assumed that the lifespan of premises registration would be three years. The cost of renewing premises registration every three years was assumed to be 50% of the initial cost, or $10 per operation. When accounting for the time value of money, the initial premises registration cost of $20 and the renewal every three years of $10 equates to a cost of $4.64 per operation annually in current dollars.

Interest Costs

Investments required for an animal ID system that have useful lives of more than one year (e.g., tag applicators, readers, premises registration) were annualized using an interest rate of 7.75%. Annual operating cost such as tags for calves, labor, internet, etc. were charged an interest cost at this same rate for the portion of the year a producer's money would be tied up. For example, for operations that buy tags, interest was included in the cost of calf tags to account for a period of nine months, which reflects the amount of time that a producer bought the ear tags to the time that the calf was sold.

Summary of Beef Cow/Calf Costs

Tables 4.2 and 4.3 summarize the costs associated with an individual animal ID system that has full traceability included (i.e., Scenario 3 discussed earlier) by size of operation for operations that currently tag and those that do not, respectively. The cost per animal sold ranges from a low of $2.48 per head (largest operation currently tagging, table 4.2) to a high of $7.17 per head (smallest operation not currently tagging, table 4.3). Figure 4.4 shows the cost per head sold graphically for the two types of operations by operation size. Two things are readily apparent

from this figure. First, economies of size exist as larger operations have over a $2/head lower cost compared to the smallest operations. Second, operations that currently tag their cattle have lower costs. This is because the incremental cost of using their labor and facilities (i.e., chute) are lower than hiring tagging done by a third party and because of a higher shrink cost. Operations that tag calves at birth were assumed to have considerably lower costs associated with shrink compared to operations that tag their calves at sale time.

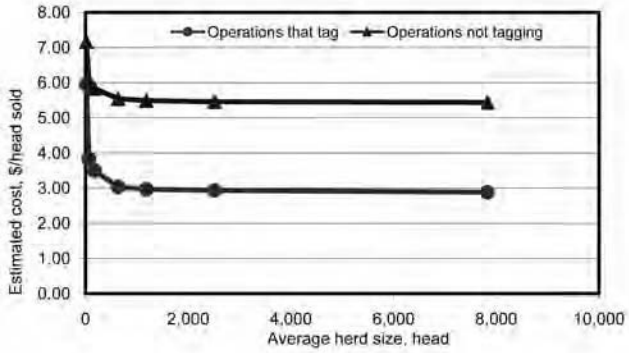
Table 4.2. Summary of RFID Costs for Beef Cow/Calf Operations by Size of Operation that Currently Tags Cattle

	Size of Operation, number of head						
	1-49	50-99	100-499	500-999	1000-1999	2000-4999	5,000+
Total annual cost, $/operation	$80	$215	$529	$1,655	$3,019	$6,350	$19,418
Total annual cost, $/head sold	$5.95	$3.83	$3.50	$3.04	$2.97	$2.94	$2.88
Total annual cost, $/cow	$5.12	$3.30	$3.01	$2.61	$2.55	$2.53	$2.48
Total number of operations	228,755	58,867	50,889	2,985	700	207	39
Total industry cost, thousand $	$18,365	$12,649	$26,944	$4,939	$2,112	$1,315	$763

Table 4.3. Summary of RFID Costs for Beef Cow/Calf Operations by Size of Operation Currently Not Tagging Cattle

	Size of Operation, number of head						
	1-49	100-499	500-999	1000-1999	2000-4999	5,000+	5,000+
Total annual cost, $/operation	$97	$340	$883	$3,022	$5,585	$11,792	$36,605
Total annual cost, $/head sold	$7.17	$6.07	$5.83	$5.55	$5.49	$5.46	$5.44
Total annual cost, $/cow	$6.16	$5.22	$5.02	$4.77	$4.72	$4.69	$4.68
Total number of operations	356,295	35,623	21,966	1,195	280	83	16
Total industry cost, thousand $	$34,436	$12,124	$19,385	$3,613	$1,565	$978	$576

FIGURE 4.4. ESTIMATED COST OF RFID FULL TRACEABILITY TECHNOLOGY ADOPTION FOR BEEF COW/CALF OPERATIONS BY OPERATION SIZE



4.2 DAIRY

4.2.1 TAGS AND TAGGING COSTS

OPERATION DISTRIBUTIONS

Similar to Beef Cow/Calf operations, dairy budgets were developed for different size category dairy operations and for operations that currently tag cattle versus those currently not tagging cattle. The distribution of Dairy operations and the average inventory of dairy operations were calculated using NASS statistics (USDA, 2008e) for the year 2007. For a more thorough discussion of the methods used to derive these numbers, see Section 4.1.1 in the Beef Cow/Calf section. While a similar procedure was used for determining the number of operations and average size of each operation for dairy as beef cow/calf operations, there were a couple of minor differences. USDA NASS reports eight size categories for dairy compared to only seven for beef. To maintain consistency regarding the budgets, the smallest two categories (1-29 head and 30-49) were combined. The cow inventory and operation numbers used for beef cow/calf operations were an average of January 1 and July 1, 2007 reported values. For the dairy budgets, only January 1, 2007 reported values were used for cow inventories and operation numbers.

To estimate the number of breeding bulls located on a dairy premises, Dr. Jason Lombard, contact for the 2007 NAHMS Dairy report (USDA, 2007a), was contacted and a special query was run on the 2007 NAHMS Dairy report data. The original request was for the number of bulls per operation by operation size; however, because of a large standard error, the query was adjusted to retrieve the average number of dairy breeding bulls for all operations. The average across all operations was 1.38 bulls per operation with a standard deviation of 0.07. This average was multiplied by the total number of operations to establish a total number of bulls used for dairy operations. Dividing this number with the 2007 inventory of dairy cattle, a bull to cow ratio was established at 92.8 cows per bull. This ratio was applied to the average number of dairy cows for the different size operations to find the average number of bulls per operation by operation size. Given the average number of cows per operation from the USDA NASS data and the estimated number of bulls, the total breeding herd inventory was calculated for the seven different size categories.

RFID Tags Placed

To calculate the number of tags purchased, the total number of animals tagged in a year was calculated. For operations that currently tag, total tags required is the sum of all calves born and alive within 48 hours after birth plus any re-tags required (calves, cows, and bulls) due to tags being lost. It was assumed that calves that died within 48 hours of birth were not tagged, but calves that died after 48 hours following birth were tagged. Death loss rates for heifer calves reported by NAHMS were used in this analysis. It was assumed that this rate plus an arbitrary one percent increase would apply to male animals (male calves are expected to have a slightly higher death loss rate because of more calving problems associated with male calves being larger than females). For operations that currently do not tag, the number of tags required is the total number of animals sold.

It was assumed that dairy operations will incur the same tag loss rate of 2.5% as the Beef Cow/Calf sector. Operations that currently tag will retag animals that lose tags before shipping to buyers. For operations that do

not currently tag cattle, tag loss rate is irrelevant as such cattle are not tagged until sold and it was assumed they would be tagged by an auction yard crew for a fee of $2.54 per head.

The cull rate impacts the number of tags required and varied from 23.4% to 24.1% between the different size operations, with larger operations having slightly higher cull rates (USDA, 2007a). The percent heifers retained was calculated by dividing the average (January 1, 2007 and July 1, 2007) inventory of Dairy Heifers, 500+ lbs by the annual average inventory of total number of Milk Cows (USDA, 2008e). The calculated heifer retention rate of 44.8% was held constant for all size operations and when combined with the cull rate was used to calculate the number of heifer calves that would be available for sale. Total animals sold was the sum of cull cows and bulls plus total calves born, less death loss and the number of heifers required to maintain a constant herd size. Cow death loss and calf death loss, both within and post 48 hours of birth, as well as calving rate varied by operation size based on NAHMS data (USDA, 2007a). Table A4.2.1 in Appendix A4.2 reports the number of dairy operations and various production and inventory level values by size of operation.

The 2007 NAHMS Dairy study reported approximately 4.1% of all dairy operations currently used electronic identification (Pedometers, Bar Code, RFID, etc.) (USDA, 2007a). It was assumed that all 4.1% of these operations currently employed the use of RFID tags on their premises.[5] Thus, total costs estimated for dairy operations that currently tag were adjusted by this amount accordingly in the final reported cost estimate for the dairy industry.

RFID Tags and Applicator Cost

Costs of RFID tags varied by purchase volume and the same rates used for the Beef Cow/Calf sector were used for the dairy sector. For the

[5] It is recognized that not all dairies currently using electronic ID use RFID tags as the identification method. However, because RFID tags are generally less expensive than some of the alternative electronic identification methods being used (e.g., electronic collars), moving to the RFID tag technology actually represents a cost savings to these dairies. Because we did not allow for a reduction in costs with the adoption of RFID, this component of our costs are overestimated.

discussion of tag costs see Section 4.1.1 in the Beef Cow/Calf section. Similarly, the costs of RFID tag applicators for dairy operations were calculated using the same assumptions as for beef cow/calf operations (see Section 4.1.1 for more details). Tables A4.2.2 and A4.2.3 in Appendix A4.2 report the number of tags and tag applicators required by size of operation for dairy operations that currently tag and those not currently tagging, respectively.

Labor and Chute Costs for Tagging Cattle

Labor and chute costs associated with tagging cattle for dairy operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see Section 4.1.1 in the Beef Cow/Calf section.

Injury Costs Associated with Tagging Cattle

Human and animal injury costs associated with tagging cattle for dairy operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see Section 4.1.1 in the Beef Cow/Calf section.

Cattle Shrink Associated with Tagging Cattle

The costs of cattle shrink due to tagging cattle for dairy operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see section 4.1.1 in the Beef Cow/Calf Operations section. One assumption that varied for dairy operations is that it was assumed calves would not shrink (beef calves were assumed to shrink 2.0 pounds per head). This was because the dairy calves were assumed to be sold shortly after birth and thus the lost gain or cost of gain would be minimal compared to a beef calf weighing over 500 pounds. Shrink on dairy cull cows and bulls were calculated the same as for beef cattle, but the price used to value the shrink was slightly lower ($45/cwt for dairy cattle

compared to $48/cwt for beef cattle). Tables A4.2.4 and A4.2.5 in Appendix A4.2 report the various tagging-related, or working cattle, costs for dairy operations that currently tag and those currently not tagging, respectively.

4.2.2 Reading Costs

The RFID component and reading costs for this study was a function of animals read, ownership and operating costs associated with the RFID technology (e.g., electronic readers (panel and wand), data accumulator, software), and database charges. The following is a brief discussion of each of the relevant components.

Animals Purchased or Transferred

As with beef cow/calf operations, dairy operations purchase cattle and bring them onto their premises. Cattle that are purchased through auction markets are assumed to have their tags read at the time of sale and thus only non-auction market purchase will be required to be read (see Section 4.1.2 in the Beef Cow/Calf section for additional discussion). However, the dairy industry is more complex in regards to animals moving between premises than the beef cow/calf industry because of how replacement heifers are raised. Dairy operations will at times hire people with off-site operations to raise their heifers. For producers that pursue this option, custom growers will raise a heifer until it is ready to calve and then return the bred heifer to the dairy. There are also those that choose to raise the heifer to 250-350 pounds, send it to another premises to have it finish the growing process and be bred, and then it is sent back to the premises of origin when it is ready to calve. In other words, it is not uncommon in the dairy industry for a replacement heifer to move to several premises before it ends up in the dairy herd as a lactating cow.

To account for these non-sale heifer movements, the percentage of operations that outsource any heifer growing (USDA, 2007a) was multiplied by the total number of dairy operations (USDA, 2008e) to find

the total number of operations that outsource heifer management. This was broken further into two categories: 1) operations that have heifers move to one premises to grow, and 2) operations that move replacement heifers to multiple premises to grow.

It was assumed that heifers that move to multiple premises would have their eID tags read 3.5 times on average and heifers that were moved to a single premises and back would have tags read two times. Weighting these values by the percentage of operations in each of the categories resulted in a weighted-average of 2.3 reads per heifer. Multiplying the number of operations by the average number of head and by the number of times read gave a total number of reads for each size category. This number was divided by the total number of operations in each size category to achieve an average number of reads of non-sale replacement heifers per operation by operation size. The number of non-sale reads were added to the number of animals purchased needing to be read (animals purchased but not bought through auction markets) to come up with the total number of animals needing to have their RFID tags read. Using this information the total number of RFID tag reads required per year per operation was estimated for the different size dairy operations (table 4.4).

Electronic Readers

See Section 4.1.2 in the Beef Cow/Calf section for discussion.

Data Accumulator and Software

See Section 4.1.2 in the Beef Cow/Calf section for discussion on data accumulator (computer) and related software costs. As was done with beef cow/calf operations, data accumulator and software costs were adjusted to reflect operations that currently own computers. According to the NAHMS Dairy report (USDA, 2007a) over 90% of the large operations had computerized record-keeping systems compared to less than 15% of the smaller operations. To account for operations that currently own computers, the annual cost of the data accumulator (i.e., computer) and software was multiplied by one minus the proportion of operations that currently own computers resulting in a weighted-average cost per operation for each size category. Also, for operations that

purchased computers and software, only 50% of the total cost was allocated to the animal ID program because it was assumed they would be used for other purposes as well.

Labor, Chute, and Other Costs Associated with Reading RFID Tags

Costs related to reading RFID tags for dairy operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section.

Database Charge

Charges for storing data for dairy operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section.

Other/Fixed Charges

Other identification-related costs for dairy operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section. Table A4.2.6 in Appendix A4.2 summarizes the costs associated with reading RFID tags by size of operation. Note that dairy operations having more than 500 cows would own an RFID system for reading tags, whereas smaller operations would outsource this function. This is because larger operations have a sufficient amount of tag reads required per year to justify owning readers and other associated computer hardware and software. The total RFID cost per read is considerably lower for the largest operations compared to the smallest operations ($0.31/head (2000+ cows) versus $1.62/head (1-49 cows)).

Table 4.4. Estimates of the Number of Cattle Brought onto Dairy Operation Premises by Size of Operation

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
Average cattle bought, head	2.9	9.5	19.3	43.9	134.4	264.2	709.6
Animals sold through auction, %[1]	69.6%	69.6%	69.6%	69.6%	69.6%	69.6%	69.6%
Average non-auction cattle bought, head	0.9	2.9	5.9	13.4	40.9	80.3	215.7
Heifers moved to new premises, head	9.6	31.9	62.5	142.3	319.8	628.8	1688.8
Average reads per heifer	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Total reads of replacement heifers	22.3	73.9	144.7	329.4	740.4	1455.8	3909.5
Non-auction cattle reads	23.2	76.8	150.6	342.8	781.3	1536.1	4125.2
Misread percentage	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Total animals misread	0.6	2.1	4.2	9.5	21.6	42.5	114.3
Total reads of RFID tags	23.8	78.9	154.7	352.2	802.9	1578.6	4239.5

[1] Cattle that are sold/purchased through an auction will have tags read at time of sale

Premises Registration Costs

Costs associated with registering dairy operation premises were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see Section 4.1.2 in the Beef Cow/Calf section.

Interest Costs

Interest costs for dairy operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see Section 4.1.2 in the Beef Cow/Calf section.

Summary of Dairy Costs

Tables 4.5 and 4.6 summarize the costs associated with an individual animal ID system that has traceability included (i.e., Scenario 3 discussed in Section 4 above) by size of operation for dairy operations that currently tag and those that do not, respectively. The cost per cow ranges from a low of $2.53 per head (largest operation currently tagging, table 4.5) to a high of $5.84 per head (smallest operation not currently tagging, table 4.5). Figure 4.5 shows the cost per cow graphically for the two types of operations at the various operation sizes. Several things are readily apparent from this figure. First, economies of size exist such that larger operations have considerably lower costs – larger operations have over a $2/head lower cost compared to the smallest operations. Second, operations that currently tag their cattle have slightly lower costs relative to those that do not tag. However, the difference between these two groups is not nearly as large as it was for beef cow/calf operations because a higher portion of the costs for dairy operations is associated with reading tags as opposed to tagging cattle. Furthermore, the cost for the smallest operations that currently tag is actually slightly higher than for the same sized operations that do not currently tag.

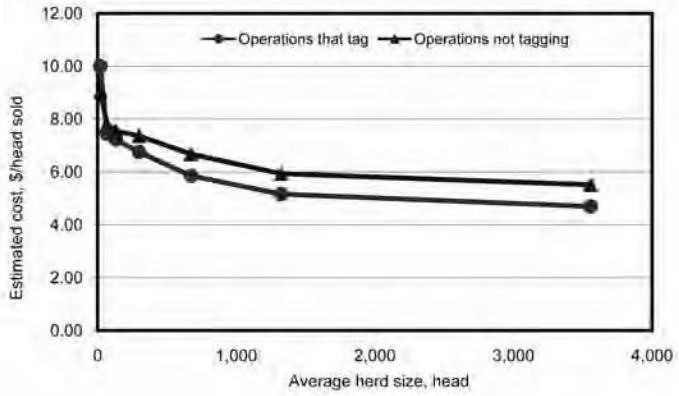
Table 4.5. Summary of RFID Costs for Dairy Operations by Size of Operation that Currently Tags Cattle

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
Total annual cost, $/operation	$118	$292	$525	$1,116	$2,126	$3,687	$9,007
Total annual cost, $/head sold	$10.01	$7.44	$7.23	$6.76	$5.85	$5.16	$4.70
Total annual cost, $/cow	$5.84	$4.34	$3.99	$3.72	$3.16	$2.78	$2.53
Total number of operations	28,921	18,148	8,066	3,940	1,471	796	515
Total industry cost, thousand $	$3,425	$5,299	$4,231	$4,397	$3,126	$2,934	$4,636

Table 4.6. Summary of RFID Costs for Dairy Operations by Size of Operation Currently Not Tagging Cattle

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2,000+
Total annual cost, $/operation	$107	$306	$548	$1,216	$2,425	$4,237	$10,577
Total annual cost, $/head sold	$9.05	$7.80	$7.55	$7.36	$6.68	$5.93	$5.52
Total annual cost, $/cow	$5.28	$4.55	$4.16	$4.06	$3.60	$3.20	$2.97
Total number of operations	4,514	2,832	1,259	615	230	124	80
Total industry cost, thousand $	$483	$867	$690	$748	$557	$526	$850

FIGURE 4.5. COST OF RFID FULL TRACEABILITY TECHNOLOGY ADOPTION FOR DAIRY OPERATIONS BY OPERATION SIZE



4.3 BACKGROUNDING (STOCKERS)

4.3.1 TAGS AND TAGGING COSTS

OPERATION DISTRIBUTIONS

Information on the number of backgrounding operations or the average inventory number of stocker cattle in the US are not regularly reported by any governmental agency. In order to determine if economies of size exist regarding animal identification costs for backgrounding cattle operations, the number of backgrounding operations needed to be established along with a distribution of average inventory to serve as size estimations for this segment of the beef industry.

To estimate a number of operations, USDA NASS was queried for the total number of cattle operations in 2007 (USDA, 2008e). From this number, the total number of Cow/Calf, Dairy, and Feedlot operations were subtracted leaving approximately 50,870 "other" operations. This residual value represents operations that have multiple livestock sectors (i.e., beef and dairy cattle, cow/calf and feedlot, etc.) and backgrounding or stocker operations. Because information was not available to break this value down further, this residual

number of operations was used for the total number of backgrounding operations.[5]

The 2002 census (USDA, 2002b) revealed that 73,509,165 head of cattle (beef and dairy) were sold in 2002. Dividing the 2007 total inventory by the 2002 inventory and multiplying it by the number of cattle sold in 2002 gives an estimated number of head sold for 2007. This derivation implicitly assumed that the number of head sold in a given year was directly related to the number of beef and dairy breeding animals. To estimate the number of stocker cattle bought for the purpose of backgrounding, known and calculated values of "non-stocker cattle" marketings were subtracted from the 2007-inventory-adjusted 2002 census value of total cattle marketings.

Non-stocker cattle marketings were assumed to be breeding animals (replacements and culls), cattle placed on feed, and fed cattle slaughtered. The total number of beef and dairy breeding animal culls (methods of calculating discussed in the previous sections) were added together and multiplied by a multiplier of 1.5. This adjustment was made to account for cull animals that are sold individually or in small groups to buyers who group them into larger lots and then resell them (i.e., adjustment accounts for culls that are marketed multiple times). The number of cattle brought into beef operations (see Section 4.1.2) was added to this cull number. In 2007, there were 553,900 mature bulls slaughtered (USDA, 2008e); therefore, it was assumed that an equal number of bulls were purchased to replace them. Thus, there would have been 1,107,800 bull marketings in 2007 (half being culls sent to slaughter and the other half being replacements entering the breeding herd). Other "non-stocker" cattle marketings are cattle placed on feed (for a discussion on this, see Section 4.4.1) excluding those in a retained ownership program. Retained ownership cattle are excluded as they would not be considered marketings since ownership does not change when they are placed on feed. The number of cattle placed on feed that were in a retained ownership program was based on the USDA APHIS feedlot management practices report (USDA, 2000). Adjusting total cattle placed on feed by the percentage of retained ownership cattle results in an estimate of net

[5] Because some of the operations in this residual value might actually be something other than backgrounding or stocker operations (e.g., cow/calf and feedlot), the estimated number of backgrounding operations is inflated relative to the actual number of operations. However, this also would imply that the number of other operations (e.g., cow/calf and feedlot) is under-estimated and thus this approach insures that the total number of beef operations is the U.S. is correct.

placements, which represents one of the categories of "non-stocker cattle" marketings.

Taking the total number of fed cattle marketed (USDA, 2008e) and adding the sum of cull cows sold, replacement stock bought by beef operations, cull and breeding bull sales, and net feedlot placements, revealed the total number of head sold by known sectors in 2007. Subtracting this total from the 2007-inventory-adjusted 2002 census value gives an estimate of 17,229,903 head for the number of stockers bought for backgrounding in 2007.

To calculate the number of operations and average inventories for different operation size groups several things were considered. To be consistent with other cattle sectors, the number of operations was assumed to decrease as the average herd size increased. Along with that assumption, the total number of backgrounding operations (50,870) and stocker cattle bought (17,299,903) were allocated over seven size categories. To arrive at a distribution where each successive size category had fewer operations than the previous one and total operations and inventory exactly equaled the target levels, Microsoft Excel Solver was employed. While it is recognized that there are many combinations of operations and inventories that will meet this requirement, the specific breakdown by size group is not as critical as making sure the total number of operations and inventory values match. The resulting number of operations and average animals purchased for the seven operation size categories are reported in table A4.3.1 in Appendix A4.3.

RFID Tags Placed

Under the current proposed NAIS, backgrounding operations will only have to replace RFID tags when they are lost. Therefore, the number of animals that backgrounders sell multiplied by the tag loss rate would give the total number of animals needing to be retagged. Assuming that death loss would be similar to those experienced by feedlots, the average number of calves purchased (i.e., inventory) was reduced by 1.3% (USDA, 2000) giving the total number of stockers sold by the backgrounders. Multiplying the number of cattle sold by 2.5%, the assumed tag loss rate (see Section 4.1.1), gives the number of backgrounded cattle worked (for RFID purposes) and RFID tags needing to be purchased.

RFID Tags and Applicator Cost

Costs of RFID tags varied by purchase volume and the same rates used for the beef cow/calf sector were used for the backgrounding sector. For the discussion of tags costs see Section 4.1.1 in the Beef Cow/Calf section. Similarly, the costs of RFID tag applicators for backgrounding operations were calculated using the same assumptions as for beef cow/calf operations (see Section 4.1.1 for more details). Table A4.3.2 in Appendix A4.3 reports the number of tags and tag applicators required by size of operation for backgrounding operations.

Labor and Chute Costs for Tagging Cattle

Labor and chute costs associated with tagging cattle for backgrounding operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see Section 4.1.1 in the Beef Cow/Calf section.

Injury Costs Associated with Tagging Cattle

Human and animal injury costs associated with tagging cattle for backgrounding operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see Section 4.1.1 in the Beef Cow/Calf section.

Cattle Shrink Associated with Tagging Cattle

The cost of cattle shrink due to tagging cattle for backgrounding operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see Section 4.1.1 in the Beef Cow/Calf Operations section. One assumption that varied for backgrounding operations is that it was assumed that the heavier feeder calves would shrink 2.75 pounds per head (beef calves were assumed to shrink 2.0 pounds per head). Because of the heavier weight cattle, the price used to calculate the cost of shrink was slightly lower than for beef cow/calf ($1.09/lb versus $1.21/lb). Table A4.3.3 in Appendix A4.3 reports the various tagging-related, or working cattle, costs for backgrounding operations.

4.3.2 Reading Costs

The RFID component and reading costs for this study was a function of animals read, ownership and operating costs associated with the RFID technology (e.g., electronic readers (panel and wand), data accumulator, software), and database charges. The following is a brief discussion of each of the relevant components.

Animals Purchased or Transferred

The nature of the backgrounding industry, as defined by this report, was to buy animals for the purpose of adding weight and reselling to a feedlot. Therefore, the average inventory for the different operation sizes reflects the average number of animals purchased. Cattle that are purchased through auction markets are assumed to have their tags read at the time of sale and thus only non-auction market purchases will be required to be read (see Section 4.1.2 in the Beef Cow/Calf section for additional discussion). Based on the assumption that 69.6% of cattle are sold through auctions, backgrounding operations would only have to read the RFID tags on 30.4% of the cattle they purchase annually.

Electronic Reader

See Section 4.1.2 in the Beef Cow/Calf section for discussion.

Data Accumulator and Software

See Section 4.1.2 in the Beef Cow/Calf section for discussion on cost of data accumulator (computer) and related software. It was assumed that a percentage of backgrounders would already own computers. Thus, as was done with beef cow/calf operations, data accumulator and software costs were adjusted to reflect operations that currently own computers. Because information specific to backgrounding operations was not available, proxies were substituted. It was assumed that the five smaller categories would follow an ownership distribution similar to the Cow/Calf sector (USDA, 1997); whereas, the two largest size categories were assumed to follow the percentage of feedlot owners who owned computers (USDA, 2000).

Labor, Chute, and Other Costs Associated with Reading RFID Tags

Costs related to reading RFID tags for backgrounding operations were calculated in the same manner and with most of the same basic assumptions as for beef cow/calf operations (see 4.1.2 in the Beef Cow/Calf section). However, there were several different assumptions used. Unlike beef and dairy operations, it was not assumed that all backgrounding operations would run their cattle through chutes to perform basic animal husbandry practices. Instead, it was assumed that backgrounders would follow the practice of beef feedlots. Less than a fourth (21.9%) of feedlots with an average inventory between 1,000-7,999 head do not work their cattle within 72 hours of receiving them (USDA, 2000). Thus, for a 48-hour traceability system to be realized, these animals would need to have their eID tags read before they are worked.

In order to comply with the 48-hour traceability goal, 21.9% of all backgrounding operations would incur the total cost of reading RFID tags. To calculate this cost, the number of animals that needed to be read on an operation was multiplied by 20 seconds to find the time required to read RFID tags. The total time was then multiplied by the labor rate and the total number of employees to find the total cost of RFID labor. The number of employees required to work the cattle was broken into two groups: 1) the reading employee and 2) other employees. The other employee group had differing amount of people for the different sized operations.

The full chute charge was reduced to 25% of the original charge because it was assumed that producers would not individually catch each animal, but they will take a group of animals and put them in a chute alley and read the tags from the alley via a wand or panel reader system. Animal and human injury costs were added according to the amount of time the animal was in the alley being read. A shrink of 2.25 pounds per head was added to the cost of reading the RFID tags to capture the missed weight gain of stocker animals.

The method of finding the costs for the other 78.1% of the operations (i.e., those that work their cattle upon arrival) are similar to those found in Section 4.1.2 in the Beef Cow/Calf section.

Database Charge

Charges for storing data for backgrounding operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section.

Other/Fixed Charges

Other identification-related costs for backgrounding operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section. Table A4.3.4 in Appendix A4.3 summarizes the costs associated with reading RFID tags by size of operation. Note that the largest size category of backgrounding operations, those purchasing about 3,000 head per year, would own the RFID system for reading tags, whereas the smaller operations would outsource this function. This is because the larger operations have a sufficient amount of tag reads required per year to justify owning readers and other associated computer hardware and software.

Premises Registration Costs

Costs associated with registering backgrounding operation premises were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section.

Interest Costs

Interest costs for backgrounding operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section.

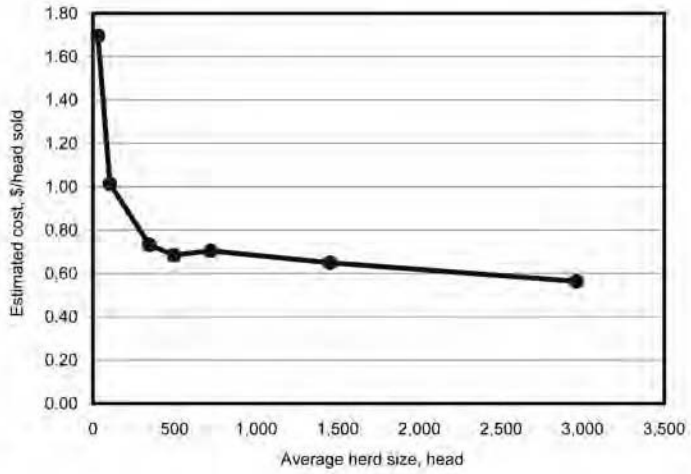
Summary of Backgrounding Costs

Table 4.7 summarize the costs associated with an individual animal ID system that has traceability included (i.e., Scenario 3 discussed in Section 4 above) by size of operation for backgrounding operations. The cost per head sold ranges from a low of $0.56 per head (largest operations) to a high of $1.70 per head (smallest operations). Figure 4.6 shows the cost per head sold graphically for backgrounding operations at the various operation sizes. Two things are readily apparent from this figure. First, cost per head sold for backgrounding operations is considerably lower than for cow/calf operations. This is due to the assumption that calves were tagged prior to coming into the backgrounding phase. Thus, the cost of tags and working cattle was only on cattle needing to be retagged. Second, economies of size exist such that larger operations have lower costs – larger operations have a lower cost of over $1.00/head compared to the smallest operations. However, most of the gains associated with operation size are captured quickly as size increases. That is, medium-sized operations have costs similar to the larger operations.

Table 4.7. Summary of RFID Costs for Backgrounding Operations by Size of Operation

	Size of Operation Size, number of head						
	31	104	345	496	722	1,453	2,963
Total annual cost, $/operation	$51	$104	$250	$335	$502	$931	$1,648
Total annual cost, $/head sold	$1.70	$1.01	$0.73	$0.68	$0.70	$0.65	$0.56
Total annual cost, $/head purchased	$1.67	$1.00	$0.72	$0.68	$0.69	$0.64	$0.56
Total number of operations	21,438	11,334	6,333	4,333	3,329	2,316	1,787
Total industry cost, thousand $	$1,096	$1,175	$1,580	$1,453	$1,670	$2,155	$2,944

FIGURE 4.6. COST OF RFID TECHNOLOGY FOR CATTLE BACKGROUNDING OPERATIONS BY OPERATION SIZE



4.4 FEEDLOTS

4.4.1 TAGS AND TAGGING COSTS

OPERATION DISTRIBUTIONS

USDA NASS reports the total number of feedlot operations as well as the number of operations with 1,000+ head capacity (USDA, 2008e). Using this information, the number of operations with less than 1,000 head was calculated as the difference between total of all operations and the total of 1,000+ head operations (the number of feedlots for all size categories is also reported in the USDA NASS February *Cattle on Feed* report).

Average inventory distributions were found for feedlot operators similar to the other cattle sectors. Because USDA NASS does not report feedlot placements for operations with less than 1,000 head capacity, placements were estimated from fed cattle marketings, which are reported for feedlots with less than 1,000 head (USDA, 2008e). The difference between feedlot marketings and feedlot placements is a

disappearance rate (cattlenetwork, 2006). For this analysis, disappearance is defined as any animal placed in a feedlot that (a) dies, (b) was returned to grazing forage, (c) was shipped to another feedlot, (d) was stolen, or (e) lost for other reasons. In 1999, NAHMS conducted a feedlot survey (USDA, 2000) that indicated 3% of animals placed in feedlots disappeared. Using this 3% disappearance rate, marketings were divided by 97% to estimate the total placements for all operations. table A4.4.1 in Appendix A4.4 reports the number of feedlot operations and various production and inventory level values by size of operation.

RFID Tags Placed

Similar to backgrounding operations, it was assumed that feedlots will only have to replace RFID tags when they are lost (see Section 4.1.3). Therefore, the number of animals that feedlots market multiplied by a tag loss rate would give the total number of animals needing to be retagged. Based on a feedlot death loss rate of 1.3% (USDA, 2000), the average number of calves placed on feed (i.e., placements) was reduced by 1.3% giving the total number of fed cattle sold by the feedlots. Multiplying the number of fed cattle sold by 2.5%, the assumed tag loss rate (see Section 1.2), gives the number of feedlot cattle worked (for RFID purposes) and RFID tags needing to be purchased.

RFID Tags and Applicator Cost

Costs of RFID tags varied by purchase volume and the same rates used for the beef cow/calf sector were used for the feedlot sector. For the discussion of tags costs see 4.1.1 in the Beef Cow/Calf section. Similarly, the costs of RFID tag applicators for feedlot operations were calculated using the same assumptions as for beef cow/calf operations (see Section 4.1.1 for more details). Table A4.4.2 in Appendix A4.4 reports the number of tags and tag applicators required by size of operation for feedlot operations.

Labor and Chute Costs for Tagging Cattle

Labor and chute costs associated with tagging cattle for feedlot operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see 4.1.1 in the Beef Cow/Calf section.

Injury Costs Associated with Tagging Cattle

Human and animal injury costs associated with tagging cattle for feedlot operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see 4.1.1 in the Beef Cow/Calf section.

Cattle Shrink Associated with Tagging Cattle

The cost of cattle shrink due to tagging cattle for feedlot operations were calculated in the same manner and using the same assumptions as they were for beef cow/calf operations. Thus, for a more detailed discussion of these costs see 4.1.1 in the Beef Cow/Calf Operations section. One assumption that varied for feedlot operations is that it was assumed that the heavier fed cattle would shrink 3.25 pounds per head (beef calves were assumed to shrink 2.0 pounds per head). Because of the heavier weight cattle, the price used to calculate the cost of shrink was slightly lower than for beef cow/calf ($0.95/lb versus $1.21/lb). Table A4.3.4 in Appendix A4.4 reports the various tagging-related, or working cattle, costs for feedlot operations.

4.4.2 Reading Costs

The RFID component and reading costs for this study was a function of animals read, ownership and operating costs associated with the RFID technology (e.g., electronic readers (panel and wand), data accumulator, software), and database charges. The following is a brief discussion of each of the relevant components.

Animals Purchased or Transferred

All animals placed into a feedlot were considered to be read at either the auction yard or the feedlot premises. Cattle that are purchased through auction markets are assumed to have their tags read at the time of sale and thus only non-auction market purchases will be required to be read (see 4.1.2 in the Beef Cow/Calf section for additional discussion). Based on the assumption that 69.6% of cattle are sold through auctions, feedlot operations would only have to read the RFID tags on 30.4% of the cattle they place on feed annually.

Electronic Reader

See 4.1.2 in the Beef Cow/Calf section for discussion.

Data Accumulator and Software

See 4.1.2 in the Beef Cow/Calf section for discussion on cost of data accumulator (computer) and related software. It was assumed that a percentage of feedlot operations would already own computers. Thus, as was done with beef cow/calf operations, data accumulator and software costs were adjusted to reflect operations that currently own computers. Information regarding computer usage in feedlots came from the 1999 NAHMS Feedlot report (USDA, 2000). Given that the NAHMS feedlot survey was conducted in 1999, it likely underestimates the percentage of feedlots that currently own computers and thus the costs estimated are likely biased upward (i.e., costs based on current computer ownership would likely be lower).

Labor, Chute, and Other Costs Associated with Reading RFID Tags

Costs related to reading RFID tags for feedlot operations were calculated in the same manner and with most of the same basic assumptions as for beef cow/calf operations (see Section 4.1.2 in the Beef Cow/Calf section). However, there were several different assumptions used. Unlike beef

and dairy operations, it was not assumed that all feedlot operations would run their cattle through chutes to perform basic animal husbandry practices. According to the 1999 NAHMS feedlot report, 21.9% of feedlot operations with an average inventory between 1,000-7,999 head and 12.5% with more than 7,999 head did not work their cattle within 72 hours of receiving them (USDA, 2000). Therefore, in order to comply with the 48-hour trace-back goal, 21.9% of operations with less than 8,000 head and 12.5% of operations with more than 7,999 head would incur the total cost reading RFID tags.

To calculate this cost, the number of animals read on an operation was multiplied by 20 seconds to find the time required to read RFID tags. The total time was then multiplied by the labor rate and the total number of employees to find the total cost of RFID labor. The number of employees needed to work the cattle was broken into two groups: the reading employee and the other employees. The other employee group had differing amount of people for different operations sizes.

The full chute charge was reduced to 25% of the original charge because it was assumed that producers would not individually catch each animal, but they will take a group of animals and put them in a chute alley and read the tags from the alley via a wand or panel reader system.

Animal and human injury costs were added according to the amount time the animal was in the alley being read. A shrink of 2.75 pounds per head was added to the cost of reading the RFID tags to capture the missed weight gain of the feeder cattle.

The method of finding the costs for the other 78.1% of operations with less than 8,000 head and for the other 87.5% of operations with more than 7,999 head (i.e., those that work their cattle upon arrival) are similar to those found in section 4.1.2 in the Beef Cow/Calf section.

Database Charge

Charges for storing data for feedlot operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see Section 4.1.2 in the Beef Cow/Calf section.

Other/Fixed Charges

Other identification-related costs for feedlot operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see Section 4.1.2 in the Beef Cow/Calf section. Table A4.4.4 in Appendix A4.4 summarizes the costs associated with reading RFID tags by size of feedlot operation. Note that feedlots with more than 4,000 head capacity would own the RFID system for reading tags, whereas operations smaller than this would outsource this function. This is because the larger operations have a sufficient amount of tag reads required per year to justify owning readers and other associated computer hardware and software.

Premises Registration Costs

Costs associated with registering feedlot operation premises were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section.

Interest Costs

Interest costs for feedlot operations were calculated in the same manner and with the same basic assumptions as for beef cow/calf operations. For a discussion of these costs see 4.1.2 in the Beef Cow/Calf section.

Summary of Feedlot Costs

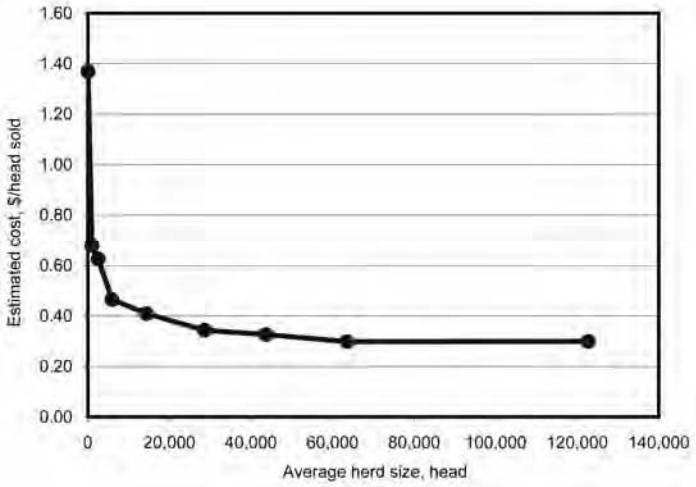
Table 4.8 summarize the costs associated with an individual animal ID system that has full traceability included (i.e., Scenario 3 discussed in Section 4 above) by size of operation for beef feedlot operations. The cost per head sold ranges from a low of $0.30 per head (largest operations) to a high of $1.37 per head (smallest operations). Figure 4.7 shows the cost per head sold graphically for feedlot operations at the various operation sizes. Two things are readily apparent from this figure.

First, cost per head sold for feedlot operations is considerably lower than for cow/calf operations. This is due to the assumption that calves were tagged prior to being placed on feed in the feedlot sector. Thus, the cost of tags and working cattle was only on cattle needing to be retagged. Second, economies of size exist such that larger operations have lower costs – larger operations have a cost advantage of over $1.00/head compared to the smallest operations. However, most of the gains associated with operation size are captured quickly. For example, the cost advantage for the largest feedlots (50,000+ head capacity) decreases to less than $0.40/head when compared to the second smallest size category (1,000-1,999 head capacity).

Table 4.8. Summary of RFID Costs for Feedlot Operations by Size of Operation

	Size of Operation, feedlot capacity (head)								
	1-999	1000-1999	2000-3999	4000-7999	8000-15999	16000-23999	24000-31999	32000-49999	50000+
Total annual cost, $/operation	$61	$670	$1,583	$2,736	$5,805	$9,701	$14,058	$18,706	$36,216
Total annual cost, $/head sold	$1.37	$0.68	$0.63	$0.47	$0.41	$0.34	$0.33	$0.30	$0.30
Total annual cost, $/head purchased	$1.36	$0.67	$0.62	$0.46	$0.40	$0.34	$0.32	$0.29	$0.30
Total number of operations	85,000	809	564	343	182	78	55	71	58
Total industry cost, thousand $	$5,174	$542	$893	$939	$1,057	$757	$773	$1,328	$2,101

FIGURE 4.7. COST OF RFID FULL TRACEABILITY TECHNOLOGY ADOPTION FOR CATTLE FEEDLOTS BY OPERATION SIZE



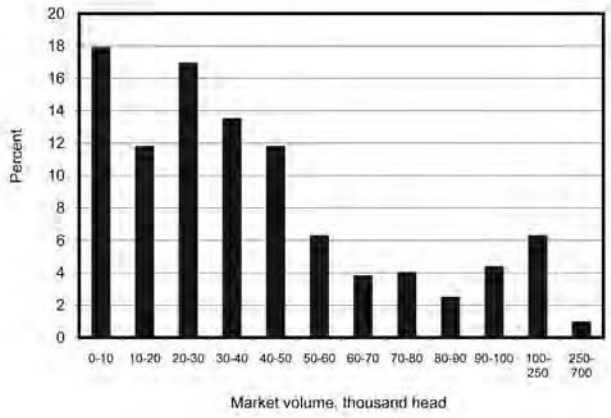
4.5 AUCTION MARKETS

The costs incurred at auction markets will vary depending on many factors, size of auction market, species, services offered, etc. While auction markets may be able to pass increased costs associated with an animal ID system on to their customers (i.e., cattle producers), these costs still have an impact on the industry. Furthermore, if different size auction markets have different costs (i.e., if economies of size exist) some of these added costs may not be able to be passed on to customers due to competition within the industry. For this analysis three costs at the auction market level were considered: 1) cost of tagging calves, 2) cost of reading RFID tags, and 3) cost of data storage

Operation Distributions

In order to determine how a national animal identification system might impact auction markets of various sizes, a distribution of markets was required. Information on auction market volume was obtained from the Livestock Marketing Association (LMA, 2008). LMA provided 2006 market volume data for 526 auction markets in the US and indicated this was representative of the variability of the estimated 1,050 auction markets in the US. Figure 4.8 shows the distribution of the 526 auction markets identified by LMA. Over 70% of the auction markets sell less than 50,000 head of cattle through their facilities annually.

Figure 4.8. Distribution of Livestock Auction Markets by Head of Cattle Sold Annually



Costs of Tagging Service

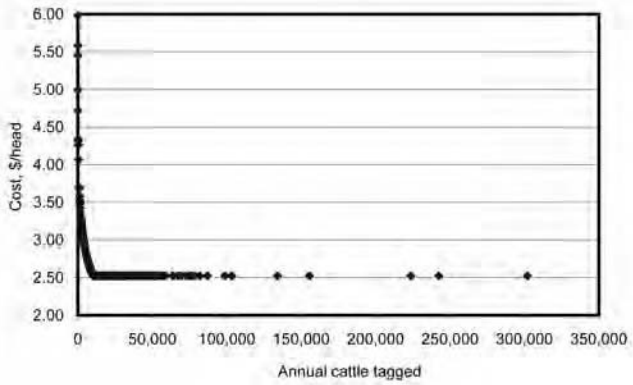
It was assumed that auction markets might provide tagging services to their customers if an animal identification system were adopted. The fee charged by an auction market for tagging was estimated as a function of the number of cattle tagged annually based on survey results from auction yards (Bolte, 2007). The estimated relationship between reported fees and market volume was not particularly strong (R^2 of 0.116), but it exhibited a decreasing cost as volume increased as expected and was relatively consistent with values observed in Michigan (Kirk, 2007). Figure 4.9 shows the estimated tagging fees for each of the 526 auction markets depicted in figure 4.8 assuming that 44.8% of cattle going through facility would be tagged (average of responses in Bolte survey). There are large economies of size as the very smallest markets have estimated costs twice as high as larger auction markets. However, the costs decrease rapidly and plateau at approximately 10,000 head of cattle tagged annually). The volume-weighted average of the 526 auction markets is $2.54 per head, which is the value used for this analysis. The cost of tagging was included in the livestock budgets directly and thus this cost shows up as a cost to producers and not to auction markets.

Cost of Reading Tags

It was assumed that cattle marketed through auction markets would have RFID tags read and thus they would not have to be read at another location (see Section 4.1.2). The type of reading system an auction market might use (i.e., wand reader versus panel reader) will depend somewhat on their volume and the actual design and layout of their facilities. The cost associated with reading RFID tags at auction markets was estimated as a function of the number of cattle being read annually based on survey results from auction yards (Bolte, 2007). The estimated cost function represents a mixture of reader types, with the smaller auctions generally using wand readers and the larger auctions using panel readers. Also, these costs did not include backup systems such that 100% reads could be guaranteed. While 100% read rate would be required for a system that relied upon this for inventory control, invoicing and payment, NAIS would not require that level of accuracy. The estimated relationship between tag reading cost and market volume was not particularly strong (R^2 of 0.179). As expected, reading cost per head

decreased as volume increased. Figure 4.10 shows the estimated costs of reading RFID tags for each of the 526 auction markets depicted in figure 4.8 assuming that 100% of cattle going through the facilities would be read. There are large economies of size as the very smallest markets have estimated costs significantly higher than larger auction markets.

FIGURE 4.9. ESTIMATED AUCTION MARKET FEE FOR TAGGING CATTLE SOLD THROUGH THE MARKET BY HEAD TAGGED ANNUALLY

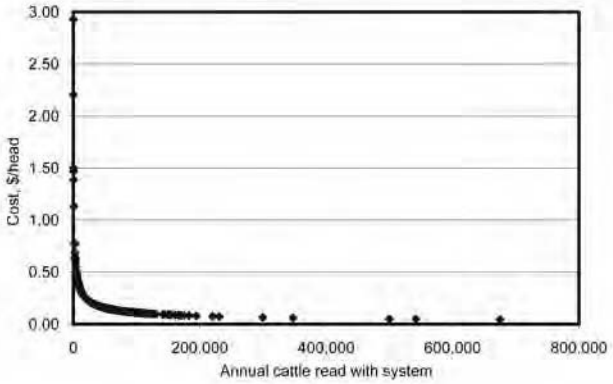


The simple average of the 526 markets is $0.27 per head, however, the volume-weighted average is $0.145 per head. The volume-weighted average is the value used for this analysis to estimate the total cost to the industry. While the cost of reading RFID tags would likely be passed on directly to producers through higher commissions, this cost was not included directly in the livestock budgets and thus is included here.

Cost of Data Storage

A per-head charge of $0.085 was included as a cost to auction markets for every animal read (see Section 4.1.2 for additional discussion of database costs). While the cost of data storage would likely be passed on to producers through higher commissions, this cost was not included directly in the livestock budgets and thus is included in this section.

Figure 4.10. Estimated Cost to Auction Market for Reading RFID Tags by Number of Cattle Read Annually



Summary of Auction Market Costs

Based on 69.6% of cattle being marketed through auctions, it was estimated there would be 38,128,769 cattle marketed through auctions annually. Based on an average cost of reading RFID tags of $0.145 per head and a data storage cost of $0.085 per head, there would be an estimated cost of slightly over $8.7 million. Assuming there are 1,050 auction markets in the US (LMA, 2008), this equates to over $8,000 per auction market per year.

4.6 Packers

The costs incurred at cattle packing plants will depend on numerous factors, but primarily on size of the plant. While packing plants may be able to pass increased costs associated with an animal ID system on to their customers (i.e., cattle producers), these costs still have an impact on the industry. Furthermore, if different size packing plants have different costs (i.e., if economies of size exist) some of these added costs may not be able to be passed on to producers because of competition within the industry. For this analysis the costs at packing plants was based on the costs of reading RFID tags.

Operation Distributions

In order to determine how a national animal identification system might impact packing plants of various sizes, a distribution of plant sizes was required. Information on the number and size of steer and heifer, cow and bull, and calf packing plants was obtained from USDA GIPSA (USDA, 2007g). Average values for 2001-2005 were used for the analysis and then adjusted to 2007 marketings. Figures 4.11-4.13 show the distribution of the number of plants and their shares of cattle slaughtered for steer and heifer plants, cow and bull plants, and calf plants, respectively. Patterns in these figures are consistent with the distribution of cattle production operations and auction markets. That is, there are a relatively large number of small operations, but the few largest operations account for the majority of the production.

FIGURE 4.11. SIZE DISTRIBUTION AND MARKET SHARE OF STEER AND HEIFER SLAUGHTER PLANTS BY PLANT SIZE, 2001-05 AVERAGE

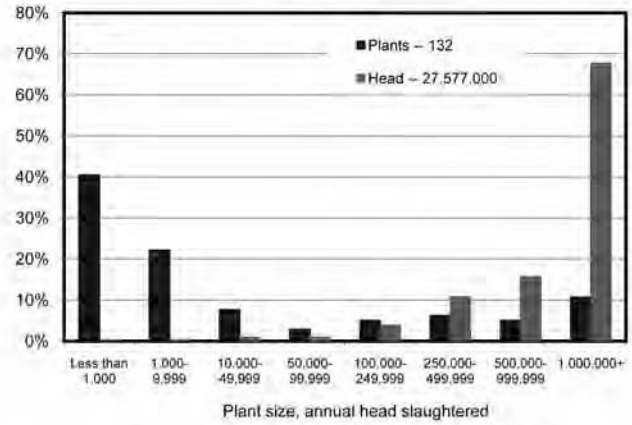


FIGURE 4.12. SIZE DISTRIBUTION AND MARKET SHARE OF COW AND BULL SLAUGHTER PLANTS BY PLANT SIZE, 2001-05 AVERAGE

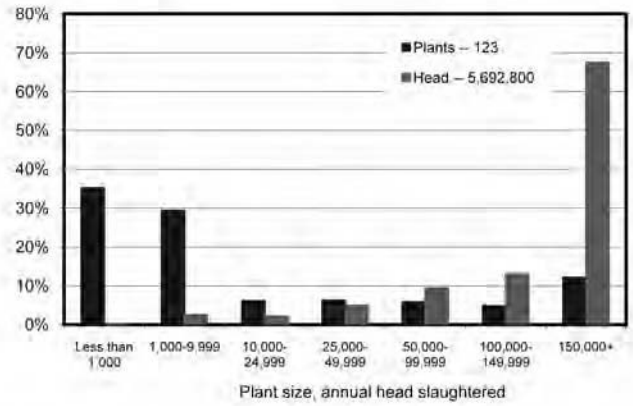
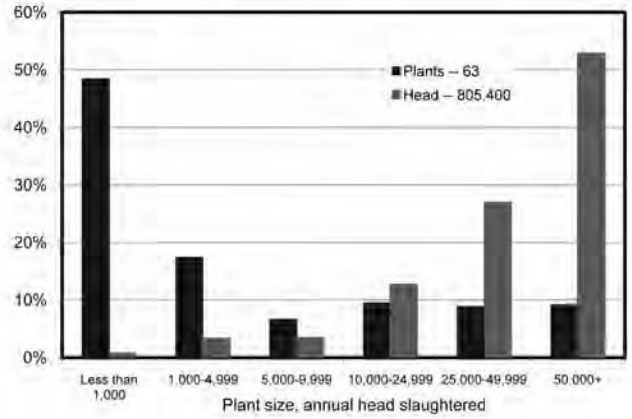


FIGURE 4.13. SIZE DISTRIBUTION AND MARKET SHARE OF CALF SLAUGHTER PLANTS BY PLANT SIZE, 2001-05 AVERAGE.



COST OF READING TAGS

It was assumed that all cattle processed through a packing plant would have RFID tags that need to be read. The type of reading system a packing plant would use (i.e., wand reader, panel reader, visual recording of data) will depend somewhat on their volume and the actual design and layout of their facilities. Specifically, very small plants might find it more economical to simply record the 15-digit ID manually rather to invest in an electronic reader. The cost associated with reading RFID tags at packing plants was estimated as a function of the number of cattle being processed annually based on survey results from packing plants of various sizes (Bass et al., 2008). Figures 4.14-4.16 show the estimated costs per head for reading RFID tags for steer and heifer, cow and bull, and calf packing plants, respectively, as size of plant varies. In all cases, costs decrease as volume increases indicating economies of size exist. In addition to the cost per head, the respective figures report the volume-weighted cost per head and the total cost to the industry assuming 2007 slaughter levels. Bass et al. (2008) included a cost of $0.085 per head for

data storage in their estimates, however, this cost likely will be covered by the government rather than the plants (USDA, 2008g). That is, packing plants will submit animal ID data they read to the government and they will enter it into a database and incur the cost of data storage. Because it was assumed that data storage was a fixed cost of $0.085 per head, the economies of size relationships estimated would still exist, but costs would simply be lower everywhere (i.e., the lines in figures 4.14-4.16 would simply shift down by $0.085 per head).

FIGURE 4.14. ANNUAL COST OF ADOPTING RFID TECHNOLOGY FOR STEER AND HEIFER SLAUGHTER PLANTS BY PLANT SIZE

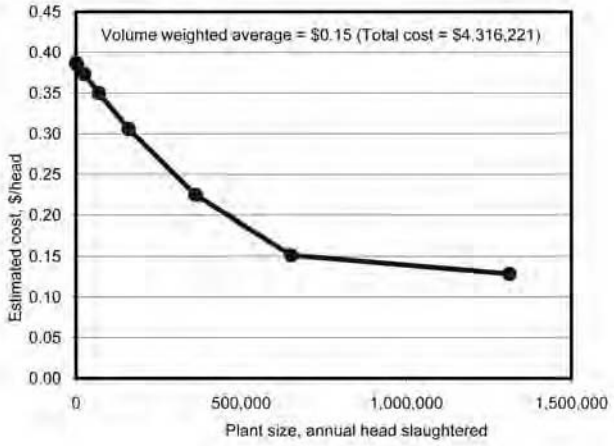


FIGURE 4.15. ANNUAL COST OF ADOPTING RFID TECHNOLOGY FOR COW AND BULL SLAUGHTER PLANTS BY PLANT SIZE

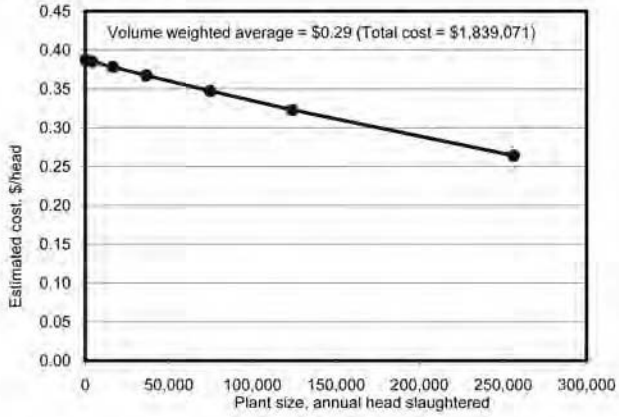
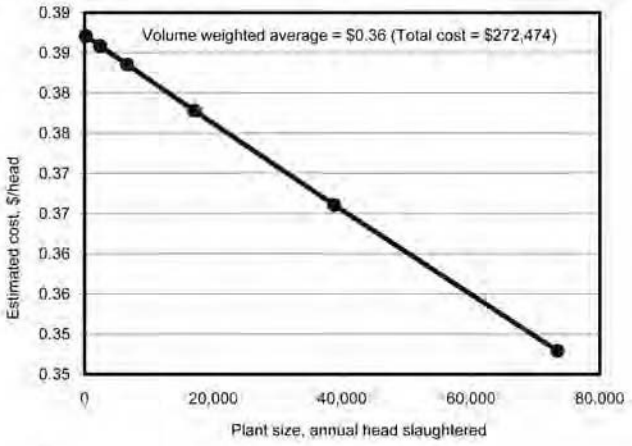


FIGURE 4.16. ANNUAL COST OF ADOPTING RFID TECHNOLOGY FOR CALF SLAUGHTER PLANTS BY PLANT SIZE



Summary of Packing Plant Costs

Based on reading 100% of cattle being slaughtered in 2007 (35,017,500 head), the total costs of reading RFID tags to the 318 beef packing plants in the US is estimated at just under $3.5 million, or an average of almost $11,000 per plant.

4.7 Cattle Industry Summary

Table 4.9 summarizes the total costs to the cattle industry by sector under scenario #3 (full traceability). Total costs are estimated at slightly over $209 million of which two-thirds of that amount is incurred in the beef cow/calf sector. Table 4.10 reports the sector totals with a partial breakdown by type of cost. On a percentage basis, just under half (46.7%) of the total costs to the industry are the costs of RFID tags. Keep in mind as technology increases this cost would be expected to decline (see figure 4.2 in Section 4.1.1). The next largest cost is chute charges, which basically represents working cattle. However, chute costs were not particularly high for operations that currently tag. This indicates that current management practices of a producer can have sizable impact on their cost of adopting an animal ID system. Collectively, about 17% of the costs were due to reading tags (e.g., readers, labor, injuries, data storage). However, this percent varied depending on which sector was considered. For example, reading costs were a big portion of the costs for backgrounders and feedlots because they only had to purchase tags for animals that needed to be retagged. Based on assumptions used in this analysis, a full traceability animal identification program in the cattle industry would add about $5.97 per head to the cost of cattle marketed.

Within each of the sectors in the cattle industry, economies of size associated with an animal identification system were present. Thus, smaller operations likely will be slower to adopt identification systems because they incur higher per unit costs. However, as a general rule for most sectors, most of the economies of size were typically captured quite

quickly such that average incremental costs for mid-sized producers were similar to costs of the largest operations.

Table 4.11 reports the total costs to the cattle industry by sector under the three different scenarios: 1) premises registration only, 2) bookend animal ID system, and 3) full traceability ID system for various adoption rates. The costs are reported for both a uniform adoption rate and a lowest-cost-first adoption rate. Given that animal identification is a voluntary program, the lowest-cost-first adoption rate likely better reflects what costs would be to the industry with something less than 100% adoption. Note that at 100% adoption the two methods are equal. The premises registration scenario (#1) reflects only costs associated with registering premises (see Section 4.1.2) for a discussion about how premises registration costs were estimated), which is significantly below the other two scenarios. However, it is also important to recognize that this represents no animal identification and no ability to trace animal movements. It can be seen in the lowest-cost-first adoption column that costs increase at an increasing rate with higher levels of adoption. This suggests that getting lower rates of adoption may not be that difficult with a voluntary program because costs are relatively low. However, to get a high adoption rate will be more difficult because this requires the higher cost operations to also participate.

The premises registration scenario (#1) reflects only costs associated with registering premises (see Section 4.1.2 for a discussion about how premises registration costs were estimated), which is significantly below the other two scenarios. However, it is also important to recognize that this represents no animal identification and no ability to trace animal movements.

Scenario #2 represents an animal identification system that reflects what is referred to as a bookend system. A bookend system simply means the cattle are identified at both ends of their lives (birth and death), but movements in between are not tracked. Because tags were a big portion of the total industry costs (table 4.9) and the bookend system still requires tags (and retags), this system has a total cost of approximately $165 million, which is 79% of the full traceability system (Scenario #3). The bookend system for cow/calf producers requires nearly the same

costs (93% of full tracing costs) as the full tracing system because for cow/calf producers the bookend and full tracing systems are nearly identical only differing by reading and recording costs when animals leave the farm.

Table 4.9. Summary of Cattle Industry Costs Under Scenario #3 (full traceability)

	Beef Cow/Calf	Dairy	Background	Feedlot	Auction Yards	Packers	Industry Total
% of Animals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Number of Operations	757,900	71,510	50,870	87,160	1,050	318	967,440
Average Inventory	33,120,600	9,158,000	17,229,903	26,964,948	38,128,769	35,017,500	100,953,011
Total Annual Cost, $	$139,764,146	$31,437,688	$12,072,978	$13,562,885	$8,765,395	$3,467,081	$209,070,173
Cost Per Animal in Inv.	$4.22	$3.43	$0.70	$0.50	$0.23	$0.10	$2.07
Cost Per Animal Marketed	$4.91	$6.21	$0.71	$0.51	$0.23	$0.10	$5.97
Total Cost Per Operation	$184	$440	$237	$156	$8,348	$10,889	$216

Table 4. 10. Breakdown of Cattle Industry Costs Under Scenario #3 (full traceability)

	Beef Cow/Calf	Dairy	Background	Feedlot	Auction Yards	Packers	Industry Total
Breakdown of Costs ($)							
Tags and Tagging Cost	**$126,277,143**	**$22,287,953**	**$3,722,199**	**$5,038,490**	**$0**	**$0**	**$157,325,784**
RFID Tag	$77,109,181	$17,953,248	$1,090,262	$1,474,334			$97,627,025
Applicator	$5,427,448	$1,041,849	$1,180,971	$1,267,772			$8,918,038
Labor	$3,001,888	$829,613	$581,894	$916,294			$5,329,689
Chute	$29,826,991	$2,073,135	$425,148	$666,169			$32,991,443
Shrink	$8,652,018	$145,099	$318,047	$516,229			$9,631,394
Injury	$2,259,617	$245,009	$125,878	$197,691			$2,828,195
Reading Costs	**$9,971,412**	**$8,831,629**	**$8,114,813**	**$8,120,096**	**$8,765,395**	**$3,467,081**	**$47,270,426**
RFID Capital	$7,520,444	$6,566,466	$5,172,111	$4,137,436			
Labor/Chute	$1,985,228	$2,029,050	$1,703,611	$2,757,631			
Shrink/Injury	$465,741	$236,113	$1,239,091	$1,225,028			
Premises Registration	**$3,515,591**	**$318,106**	**$235,965**	**$404,300**	**$0**	**$0**	**$4,473,962**
TOTAL	**$139,764,146**	**$31,437,688**	**$12,072,978**	**$13,562,885**	**$8,765,395**	**$3,467,081**	**$209,070,173**
Breakdown of Costs (%)							
Tags and Tagging Cost	**90.4%**	**70.9%**	**30.8%**	**37.1%**	**0.0%**	**0.0%**	**75.3%**
RFID Tag	55.2%	57.1%	9.0%	10.9%			46.7%
Applicator	3.9%	3.3%	9.8%	9.3%			4.3%
Labor	2.1%	2.6%	4.8%	6.8%			2.5%
Chute	21.3%	6.6%	3.5%	4.9%			15.8%
Shrink	6.2%	0.5%	2.6%	3.8%			4.6%
Injury	1.6%	0.8%	1.0%	1.5%			1.4%
Reading Costs	**7.1%**	**28.1%**	**67.2%**	**59.9%**	**100.0%**	**100.0%**	**22.6%**
RFID Capital	5.4%	20.9%	42.8%	30.5%			
Labor/Chute	1.4%	6.5%	14.1%	20.3%			
Shrink/Injury	0.3%	0.8%	10.3%	9.0%			
Premises Registration	**2.5%**	**1.0%**	**2.0%**	**3.0%**	**0.0%**	**0.0%**	**2.1%**
TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table 4.11. Total Cattle Industry Cost versus Adoption Rate Under Alternative Scenarios

Scenario #1 -- Premises Registration Only

Industry Sector	Premises Registration	Adoption rate	Uniformly adopted	Lowest cost adopted first
Beef cow/calf	$3,515,591	10%	$449,391	$17,923
Dairy	$331,706	20%	$898,782	$78,209
Background	$235,965	30%	$1,348,173	$171,464
Feedlot	$404,300	40%	$1,797,564	$269,120
Auction yards	$4,871	50%	$2,246,955	$369,892
Packers	$1,477	60%	$2,696,346	$576,690
TOTAL COST	$4,493,910	70%	$3,145,737	$853,119
		80%	$3,595,128	$1,724,410
		90%	$4,044,519	$2,915,856
		100%	$4,493,910	$4,493,910

Scenario #2 -- Bookend Animal ID System

Industry Sector	Book End Cost	Adoption rate	Uniformly adopted	Lowest cost adopted first
Beef cow/calf	$129,792,734	10%	$16,526,259	$11,042,459
Dairy	$22,601,817	20%	$33,052,517	$23,173,569
Background	$3,958,165	30%	$49,578,776	$35,408,252
Feedlot	$5,442,789	40%	$66,105,034	$47,857,435
Auction yards	$0	50%	$82,631,293	$61,313,638
Packers	$3,467,081	60%	$99,157,551	$79,128,199
TOTAL COST	$165,262,586	70%	$115,683,810	$98,289,501
		80%	$132,210,068	$118,145,015
		90%	$148,736,327	$140,285,046
		100%	$165,262,586	$165,262,586

Scenario #3 -- Full Traceability Animal ID System

Industry Sector	Traceability Cost	Adoption rate	Uniformly adopted	Lowest cost adopted first
Beef cow/calf	$139,764,146	10%	$20,907,017	$13,269,613
Dairy	$31,437,688	20%	$41,814,035	$28,030,002
Background	$12,072,978	30%	$62,721,052	$43,179,355
Feedlot	$13,562,885	40%	$83,628,069	$58,940,210
Auction yards	$8,765,395	50%	$104,535,087	$76,084,734
Packers	$3,467,081	60%	$125,442,104	$98,847,876
TOTAL COST	$209,070,173	70%	$146,349,121	$122,563,473
		80%	$167,256,139	$147,191,641
		90%	$188,163,156	$175,868,526
		100%	$209,070,173	$209,070,173

5. Direct Cost Estimates: Porcine

Direct costs of NAIS adoption were estimated for the swine (porcine) industry by breaking the industry into six main groups (referred to as operation types): 1) Farrow-to-Wean, 2) Farrow-to-Feeder, 3) Farrow-to-Finish, 4) Wean-to-Feeder (Nursery), 5) Feeder-to-Finish (Grow/Finish), and 6) Packers. The first five are referred to as production-type operations. The cattle industry included an auction market sector; however, because the vast majority of hogs are marketed direct this sector is not included for the swine industry. Estimating costs separately for different types of operations makes it possible to see how different sectors of the swine industry would be impacted with the adoption of an animal identification system.

The Farrow-to-Wean group was defined as producers who own gilts and sows and produce baby pigs that are sold as weaner pigs at weaning. Farrow-to-Feeder operations own gilts and sows and produce pigs that are held through the nursery phase and sold as feeder pigs (i.e., they feed the weaned pigs to weights of 50-60 pounds). Farrow-to-Finish operations own gilts and sows and produce pigs that are raised to slaughter weight at which time they are sold as market hogs to packers. Wean-to-Finish operations buy weaned pigs from Farrow-to-Wean operations and feed these pigs until they reach 50-60 pounds at which time pigs are sold to another producer for finishing. Feeder-to-Finish operations buy feeder pigs (either from Farrow-to-Feeder or Wean-to-Feeder operations) and feed them to final weight selling these market hogs to packers. Packers are defined as any operation that slaughters live animals, either market hogs or cull breeding stock, under government inspection to produce meat products for sale to the public.

The three production-type operations that include farrowing sell both pigs raised and cull breeding stock, while the other two production-type operations only market pigs/hogs (either as feeder pigs or market hogs) as they do not own breeding animals. This is an important distinction because consistent with current NAIS guidelines it was assumed that cull breeding stock would be required to be individually identified with a

visual premises tag, whereas other pigs (weaned, feeder, or market) are identified with a single group/lot ID.

The following discussion of swine industry costs is partitioned by the different types of costs and according to the six operation types. Also, the following discussion pertains to costs associated with all swine being identified, either individually (cull breeding stock) or as groups (weaned, feeder, and market pigs/hogs) and movements tracked (i.e., Scenario 3 discussed in Section 4). Costs of just premises registration (Scenario 1) and just bookend (Scenario 2) systems are summarized separately later in this section.

5.1 Swine Operations

5.1.1 Operation Distributions and Production Levels

One of the objectives of this study was to determine if the implementation cost of an animal identification system varied by operation type and size. To determine if economies of size exist, costs of adopting animal identification were estimated for various operation sizes. The USDA NASS reports the number of swine operations and the percent of inventory by size groups. However, other data are only reported in aggregate (e.g., pig crop, farrowings, inventories by class). More importantly for this analysis, USDA does not routinely report any of this information specifically by operation type. Thus, rather than using USDA NASS operation size groupings directly, the total number of operations for 2007 (USDA 2008e) which includes contract operations, was disaggregated by operation type and size using data from the 2004 USDA ERS Agricultural Resource Management Survey (ARMS) (Tonsor and Featherstone, 2008). Because of this approach, operation size categories do not match up exactly with those reported by USDA NASS. That is, the four size classes used for operations in this analysis are < 500 head; 500-1,999; 2,000-4,999; and 5000+ head. This compares to six size classes in NASS data. Size classes represent the maximum number of hogs in inventory at any time during the year (McBride, Ney, and Mathews, 2008).

The swine industry has been changing rapidly and thus using the 2004 ARMS data to identify current operation types and sizes may be problematic. For example, Nigel and McBride (2007) pointed out that "In 1992, 65 percent of hogs came from farrow-to-finish operations, while only 22 percent came from specialized hog-finishing operations. By 2004, only 18 percent came from farrow-to-finish operations, while 77 percent came from specialized hog finishers" (p. 14). While using the 2004 ARMS data to disaggregate USDA NASS totals is not without problems, it was the best information that could be obtained that identified the different types of operations.

Because data used to estimate the number and size of operations, by operation type, came from two sources and time periods (2004 ARMS and 2007 NASS), estimating the average inventory and production levels of the different sized operations was not straightforward. This was especially true when trying to get production numbers to reconcile with total marketings. For operations that farrow, a number of breeding sows was "picked" for the first three size categories (i.e., < 500; 500-1,999; and 2,000-4,999), where this number of sows when combined with farrowings/sow/year and pigs/litter resulted in an average inventory on the farm that approximately matched the respective size category. The number of sows for the fourth category was solved for to reconcile the total number of pigs produced in the sector. Using this approach ensured that the total number of pigs produced by sector, and ultimately the number of market hogs slaughtered, exactly matched the NASS reported values for 2007. However, the average inventories of some of the individual size categories deviated slightly from what was expected in some cases.[7]

Average inventories for Wean-to-Feeder and Feeder-to-Finish operations were calculated in a similar fashion as the operations that included farrowing. That is, the number of pigs purchased (weaned or feeders) for the first three size categories was simply "picked" such that the average inventory matched up with the respective size categories while taking

[7] This approach does not explicitly account for pigs (weaners, feeders, and market) that are imported from Canada. However, because we worked from total marketings in 2007 we have implicitly captured the Canadian pigs, but we have possibly over estimated the costs to U.S. swine producers (i.e., some of the data recording and reporting costs would be paid by Canadian producers).

into account the number of turns these operations will have per year (i.e., groups going through facilities annually). The number of pigs purchased by operations in the fourth size category was calculated such that the total feeder pigs (Wean-to-Feeder) and market hogs (Feeder-to-Finish) coming out of the sector reconciled with totals for the industry after accounting for death loss in the nursery and finishing phases. Table 5.1 reports the average death loss rates by production phase and size of operation reported in the 2006 NAHMS swine report (USDA, 2008f) that were used in this analysis.

Table 5.2 reports the number of operations, average inventories, and production levels for the different production-type operations by size. Breeding herd inventories were based on the given number of sows (either "picked" or solved for) and a sow-to-boar ratio of 39.9. This ratio was based on a combination of NASS sows bred and boar slaughter data (USDA, 2008e) and inventory data for sows and gilts versus boars from Canada (Statistics Canada, 2008).[8] Pigs per litter varied by operation size (average sow inventory) and were based on data from the 2006 NAHMS swine report (USDA, 2008f). Farrowings per sow per year were calculated using 2007 data on total farrowings and average breeding herd inventories (USDA, 2008e) and were held constant across operation size. Total pigs produced annually for Farrow-to-Wean operations were calculated as the number of sows × pigs/litter × farrowings/sow/year. To determine feeder pigs produced for Farrow-to-Feeder operations, the number of weaned pigs produced (i.e., number of sows × pigs/litter × farrowings/sow/year) was reduced by death loss in the nursery, which varied by operation size (table 5.1). The annual number of market hogs produced by Farrow-to-Finish operations was calculated the same as feeder pig production in Farrow-to-Feeder operations with an additional adjustment to account for death loss in the grow/finish phase (table 5.1).

5.1.2 Number of Tags and Groups

To adopt NAIS, cull breeding stock (i.e., sows and boars) are assumed to be individually identified with a visual premises tag. This type of tag will have an identification (ID) number that is unique to the premises selling

[8] USDA NASS reports an inventory number for all breeding hogs, but does not report inventory data for sows and boars separately.

the hog, but not necessarily unique to the individual animal. Non culls that are marketed (i.e., weaner, feeder, and market pigs) are assumed to be identified with a unique group/lot ID number.

To determine the annual number of tags purchased, the total number of cull sows and boars needed to be calculated. Cull sow rates by size of operation from the 2006 NAHMS swine report (USDA, 2008f) were adjusted such that the total number of sows culled annually was exactly equal to the total reported sow slaughter for 2007 (USDA, 2008e). The number of cull boars was a proportion of cull sows (similar to inventory) and at a cull rate that resulted in total cull boars being equal to the boar and stag slaughter reported for 2007 (USDA, 2008e). The sum of cull sows and cull boars equaled the total visual premises tags required. It was assumed that cull breeding stock would be tagged as they were marketed and thus there would be a 100% retention rate (i.e., no tags would be lost prior to, or during marketing).

The number of lots for cull breeding stock was based on inventory levels and how often culls would be sold. It was assumed that operations with less than 50 sows would market culls twice per year; operations with 50-150 sows would market culls quarterly; operations with 150-500 sows market culls every eight weeks; and operations with more than 500 sows would market culls monthly. Thus, the number of lots of cull animals was based on the average inventory of the operation. Lot sizes for weaner, feeder, and market pigs in farrowing operations was based on the minimum of pigs produced per group of sows farrowing or 1,200 head, where the pigs produced per group was based on average inventory and pigs/litter.[9] Lot sizes for feeder and market pigs in the non-farrowing operations were based on the number of pigs purchased per turn or 1,200 head, whichever was less. Table 5.3 reports the number of tags and group/lot IDs that would be required for the different types and sizes of operations.

[9] Sows farrowing as a group were calculated as 18.3% of total sow inventory (Dhuyvetter, Tokach, and Dritz, 2007). The maximum group size was set at 1,200 head as this coincides with the size of many nursery and finishing buildings and it was assumed producers would use an all-in all-out approach if possible.

Table 5.1. Death Loss Rate Assumptions Used in Swine NAIS Adoption Analysis

Farrowing				
Size of operation (number of sows)	Small < 250	Medium 250-499	Large 500+	All sites
Breeding age female death loss, %	2.5%	2.4%	5.0%	4.7%
Preweaning pig death loss, %	8.8%	12.2%	13.2%	12.9%

Feeding				
Size of operation (number of sows)	Small < 2,000	Medium 2,000-4,999	Large 5,000+	All sites
Death loss in nursery, %	3.4%	4.1%	4.0%	3.9%
Death loss in grow/finish, %	4.3%	4.8%	7.8%	6.0%

Table 5.2. Number of Swine Operations and Inventory and Production Levels by Type and Size of Operation

	Size of Operation, number of head				
	< 500	500-1999	2000-4999	5000+	Total/Avg
Farrow-to-Wean					
Number of operations	299	3,348	1,435	897	5,979
Average breeding herd inventory	20.5	184.5	676.6	1,845.7	3,249,807
Average inventory before death loss	55.0	494.7	2,007.6	5,476.6	9,464,705
Pigs/litter	9.2	9.2	10.3	10.3	10.2
Average farrowings/sow/year	1.96	1.96	1.96	1.96	1.96
Total farrowings/year	39.1	352.0	1,290.5	3,520.6	6,199,087
Weaned pigs sold	361.3	3,251.4	13,308.2	36,305.1	62,647,364
Total pigs sold (including breeding stock)	371.4	3,342.2	13,772.4	37,571.3	64,755,701
Farrow-to-Feeder					
Number of operations	1,805	1,418	387	688	4,297
Average breeding herd inventory	20.5	143.5	615.0	1,668.7	1,625,665
Average inventory before death loss	72.2	505.4	2,430.0	6,593.0	6,319,749
Pigs/litter	9.2	9.2	10.3	10.3	10.2
Average farrowings/sow/year	1.96	1.96	1.96	1.96	1.96
Total farrowings/year	39.1	273.8	1,173.2	3,183.1	3,100,997
Feeder pigs sold	349.0	2,442.9	11,602.3	31,511.4	30,246,388
Total pigs sold (including breeding stock)	359.1	2,513.5	12,024.3	32,656.2	31,314,955
Farrow-to-Finish					
Number of operations	8,605	6,761	3,073	2,049	20,489
Average breeding herd inventory	10.3	41.0	123.0	242.1	1,239,516
Average inventory before death loss	91.9	367.6	1,102.8	2,170.4	11,112,720
Pigs/litter	9.2	9.2	9.2	9.2	9.2
Average farrowings/sow/year	1.96	1.96	1.96	1.96	1.96
Total farrowings/year	19.6	78.2	234.6	461.8	2,364,409
Market hogs sold	167.0	668.0	1,979.0	3,775.8	19,771,901
Total pigs sold (including breeding stock)	172.0	688.1	2,039.5	3,894.9	20,381,497
Wean-to-Feeder					
Number of operations	262	1,046	2,302	1,622	5,231
Average inventory before death loss	108.9	522.7	1,519.2	3,081.0	9,068,570
Weaned pigs purchased	750.0	3,600.0	10,500.0	21,284.0	62,647,364
Feeder pigs sold	724.5	3,477.6	10,069.5	20,432.7	60,141,077
Feeder-to-Finish					
Number of operations	3,557	10,079	10,079	5,929	29,644
Average inventory before death loss	31.8	238.3	792.2	3,026.2	28,440,684
Feeder pigs purchased	100.0	750.0	2,500.0	9,698.9	90,614,814
Market hogs sold	95.7	717.8	2,380.0	8,942.4	84,579,799

Table 5.3. Number of Tags and Group/lot IDs Required by Type and Size of Operation

	Size of Operation, number of head				
	< 500	500-1999	2000-4999	5000+	Total/Avg
Farrow-to-Wean					
Cull sows sold, head	8.5	76.3	411.3	1,122.1	1,854,676
Cull boars sold, head	1.6	14.4	52.8	144.1	253,661
Total visual premises tags required	10.1	90.7	464.1	1,266.2	2,108,337
Weaned pigs sold	361	3,251	13,308	36,305	62,647,364
Average lot size, head	33.9	304.9	1,200.0	1,200.0	465.4
Number of lots sold per year	12.7	17.2	24.1	43.3	134,613
Farrow-to-Feeder					
Cull sows sold, head	8.5	59.4	373.9	1,014.6	941,677
Cull boars sold, head	1.6	11.2	48.0	130.2	126,890
Total visual premises tags required	10.1	70.6	422.0	1,144.8	1,068,567
Feeder pigs sold	349	2,443	11,602	31,511	30,246,388
Average lot size, head	33.9	237.1	1,134.3	1,200.0	385.5
Number of lots sold per year	12.3	14.3	23.2	39.3	78,462
Farrow-to-Finish					
Cull sows sold, head	4.2	17.0	50.9	100.2	512,846
Cull boars sold, head	0.8	3.2	9.6	18.9	96,749
Total visual premises tags required	5.0	20.2	60.5	119.1	609,596
Market hogs sold	167	668	1,979	3,776	19,771,901
Average lot size, head	16.9	67.7	203.2	400.0	76.9
Number of lots sold per year	11.9	11.9	13.7	15.9	257,131
Wean-to-Feeder					
Feeder pigs sold, head	725	3,478	10,070	20,433	60,141,077
Average lot size, head	109	523	1,200	1,200	1,081
Number of lots sold per year	6.7	6.7	8.4	17.0	55,628
Feeder-to-Finish					
Market hogs sold, head	96	718	2,380	8,942	84,579,799
Average lot size, head	32	238	792	1,200	732
Number of lots sold per year	3.0	3.0	3.0	7.5	115,537

Tags and Tagging Costs

5.1.3 Visual Premises Tags and Applicator Cost

In determining the cost associated with tagging cull sows and boars it was assumed that operations with average breeding herd inventories greater than 200 head already tag breeding animals for management purposes. To find the cost of visual premises tags, an internet search was conducted resulting in 20 companies located that offered visual tags. The prices ranged from a high of $1.10 to a low of $0.52, with the average cost being $0.75. The average cost was used for farrowing operations with less than 200 breeding animals (sows and boars). Farrowing operations with a breeding herd average inventory greater than 200 head were charged $0.17 per tag, which reflects the incremental cost of the NAIS premises ID tag compared to management tags currently being used (Webb, 2008). That is, because it was assumed that operations of this size are already using management tags, the unique premises ID tag could be used in place of tags currently being used for management purposes and thus only the incremental cost is included.

As this study focused on the additional cost of implementing an animal identification program, the cost of tag applicators were not included if operations were already tagging breeding animals. It was assumed that operations with less than 200 breeding animals (sows and boars) did not currently tag their animals and thus an animal identification program would require the purchase of a tag applicator. On the other hand, operations with average inventories of breeding animals exceeding 200 head were assumed to already tag sows and boars and thus there would be no additional tag applicator required.

An internet search was conducted to obtain cost estimates of conventional, plastic tag applicators. The costs of conventional applicators were obtained from multiple companies with prices ranging from a low of $15.25 to a high of $21.19, with an average of $18.62. It was assumed that the average life span of an applicator was four years and only one applicator would be needed (operations with breeding herd inventories exceeding 200 did not need any additional tag applicators). Based on an investment of $18.62, a useful life of four years, and an interest rate of 7.75%, the annual cost of an applicator was $5.59.

5.1.4 Labor and Costs for Tagging Cull Breeding Hogs

In addition to tag and tag applicator costs, producers who need to tag cull breeding hogs for an animal identification program will incur labor costs and potentially injuries related to tagging animals. It was assumed that it would take 15 minutes to setup for tagging and an additional one minute per animal tagged (Wisconsin Pork Association, 2006). The labor rate used for this study was $9.80 per hour (US Department of Labor, 2007). When tagging hogs there is a risk of injury to both the people doing the tagging and possibly to the hogs. However, because the animals needing to be tagged would typically be in a crate, it was assumed injury to the animals would be minimal and thus is not considered here. The cost of human injury associated with tagging hogs was calculated as the total labor cost times 10% as an estimate of workman's compensation. Table 5.4 reports the incremental costs related to tagging (tags, applicators, and labor) cull breeding sows and boars for the three farrowing operations by size of operation. As expected, total costs per operation increase as operation size increases, but the cost per pig sold decreases for larger operations indicating economies of size exist in tag adoption.

Table 5.4. Tag-Related Costs for Swine Operations by Type and Size of Operation.[1]

	Size of Operation, number of head				
	< 500	500-1999	2000-4999	5000+	Total/Avg
Farrow-to-Wean					
Total tags placed	10.1	90.7	464.1	1,266.2	2,108,337
Tag cost, $/tag	$0.75	$0.75	$0.17	$0.17	$0.29
Annual tag cost, $/operation	$7.58	$68.21	$79.41	$216.65	$615,910
Annual cost of tag applicators	$5.59	$5.59	$0.00	$0.00	$20,389
Setup time for tagging, minutes	15.00	15.00	15.00	15.00	89,679
Time to tag, minutes/animal	1.00	1.00	1.00	1.00	5,979
Total time to tag, hours	0.42	1.52	7.11	18.95	32,414
Total labor cost, $/operation	$4.10	$14.92	$69.64	$185.73	$317,656
Total injury cost, $/operation	$0.41	$1.49	$6.96	$18.57	$31,766
Operations that currently tag, %	0.0%	0.0%	100.0%	100.0%	
Total tagging labor cost, $/operation	$4.54	$16.52	$0.00	$0.00	$56,656
Total costs associated with tags, $/operation	$17.71	$90.32	$79.41	$216.65	$692,955
Total costs associated with tags, $/pig sold	$0.048	$0.027	$0.006	$0.006	$0.011
Farrow-to-Feeder					
Total tags placed	10.1	70.6	422.0	1,144.8	1,068,567
Tag cost, $/tag	$0.75	$0.75	$0.17	$0.17	$0.24
Annual tag cost, $/operation	$7.58	$53.05	$72.20	$195.87	$251,500
Annual cost of tag applicators	$5.59	$5.59	$0.00	$0.00	$18,018
Setup time for tagging, minutes	15.00	15.00	15.00	15.00	64,457
Time to tag, minutes/animal	1.00	1.00	1.00	1.00	4,297
Total time to tag, hours	0.39	1.24	6.48	17.16	16,769
Total labor cost, $/operation	$3.84	$12.15	$63.53	$168.16	$164,335.3
Total injury cost, $/operation	$0.38	$1.21	$6.35	$16.82	$16,434
Operations that currently tag, %	0.0%	0.0%	100.0%	100.0%	
Total tagging labor cost, $/operation	$4.25	$13.45	$0.00	$0.00	$26,736
Total costs associated with tags, $/operation	$17.42	$72.09	$72.20	$195.87	$296,253
Total costs associated with tags, $/pig sold	$0.049	$0.029	$0.006	$0.006	$0.009
Farrow-to-Finish					
Total tags placed	5.0	20.2	60.5	119.1	609,596
Tag cost, $/tag	$0.75	$0.75	$0.75	$0.17	$0.52
Annual tag cost, $/operation	$3.79	$15.16	$45.47	$20.37	$316,589
Annual cost of tag applicators	$5.59	$5.59	$5.59	$0.00	$103,094
Setup time for tagging, minutes	15.00	15.00	15.00	15.00	307,337
Time to tag, minutes/animal	1.00	1.00	1.00	1.00	20,489
Total time to tag, hours	0.32	0.53	1.10	1.92	13,670
Total labor cost, $/operation	$3.14	$5.22	$10.76	$18.81	$133,963.3
Total injury cost, $/operation	$0.31	$0.52	$1.08	$1.88	$13,396
Operations that currently tag, %	0.0%	0.0%	0.0%	100.0%	0.0%
Total tagging labor cost, $/operation	$3.48	$5.78	$11.92	$0.00	$105,644
Total costs associated with tags, $/operation	$12.86	$26.53	$62.98	$20.37	$525,327
Total costs associated with tags, $/pig sold	$0.075	$0.039	$0.031	$0.005	$0.026

[1] Only applies to operations with breeding stock (i.e., operations farrowing)

Data Recording, Reporting and Storage Costs

Because the technology assumed for the swine industry is different than the cattle industry, costs of NAIS adoption will differ. For example, it was assumed that the cattle industry would use radio frequency identification (RFID) and thus hardware and software for reading RFID tags was included. However, in the swine industry it is assumed that individual animal identification will be with visual premises ID tags for cull breeding stock and other pigs/hogs can be identified with group/lot identification. Thus, electronic readers are not required, but there will still be costs associated with recording, reporting, and storing data. The following is a brief discussion of these components.

5.1.5 Data Accumulator and Software

The data accumulator cost represents the average cost of six internet websites prices for laptop computers. This cost was annualized over four years and had a $0 salvage value. Given an initial investment of $692, a 4-year life, and an interest rate of 7.75%, the annual cost is $208. It was assumed that many operations, and especially the larger ones, would already own a computer and thus charging this cost to animal identification would not be appropriate. Data indicating computer usage by type and size of swine operations could not be found. Thus, it was assumed that computer ownership trends reported for the dairy industry in the NAHMS dairy report (USDA, 2007a) might be similar for hog operations. It was assumed that 12% of operations with less than 500 head; 49% of those with 500-1,999; 71% of operations with 2,000-4,999; and 93% of operations with 5,000+ head currently own computers and thus would not need to purchase one. To account for operations that currently own computers, the annual cost of the data accumulator (i.e., computer) was multiplied by one minus the proportion of operations that currently own computers resulting in a weighted-average cost per operation for each size category. The calculated annual cost of computers was multiplied by 50% to account for the fact that the entire cost of the computer likely should not be allocated to an animal identification program (i.e., swine operators would use the computer for other management or personal uses).

Many different software packages are available that would satisfy the software requirement of an eID system. The value used here is the suggested retail price of Microsoft Office Professional (Microsoft, 2008). This software package includes Microsoft Office Word, Office Excel, Office PowerPoint, Office Access, and other programs. While most producers would not use some of the programs included in Office Professional, Microsoft Office Word and Microsoft Office Excel or Microsoft Office Access would need to be employed to keep track of reads and to write the necessary documents. Other software packages that also maintain management information likely would be utilized by producers, but the higher cost associated with these software packages are not appropriate to include in an animal ID system as these are providing value beyond that required by NAIS. In other words, producers might choose to spend more for additional management benefits, but this is not something they would need to adopt NAIS procedures. As with data accumulators, annual software costs were adjusted by the percent of operations currently owning equipment. That is, it was assumed that if computers were already owned, software for managing the data would also be owned. Additionally, when software was purchased (i.e., those operations not currently owning computers), only 50% of the cost was allocated to the animal ID system.

5.1.6 Printing Costs Associated with Recording / Reporting Data

In addition to the hardware and software required for data analysis and reporting, it was assumed bar codes would be printed that could be sent with groups of hogs as they are marketed, i.e., affixed to bills of lading. These preprinted bar codes or labels would contain the group/lot ID required for NAIS. The cost per sheet of paper and labels that could be printed on were obtained from multiple internet sites and averaged $0.24 per lot, assuming two labels were printed per lot.

5.1.7 Other/Fixed Charges

The time needed to submit the group/lot ID numbers to a central database and internet fees were considered here. To determine clerical

costs, the time submitting a group/lot ID number and the number of groups submitted needed to be ascertained. The Wisconsin working group for pork found that it took 15 minutes to submit data (Wisconsin Pork Association, 2006). Thus, it was assumed that each lot would require 15 minutes of time to submit the data. Clerical labor was multiplied by the average secretary wage of $14.60 per hour for the US (US Department of Labor, 2007) to find the total cost associated with recording and reporting a group/lot animal ID number.

In order to be able to achieve a "48 hour trace back system" producers would need to submit their animal identification numbers (AIN) and/or group identification numbers (GIN) via an internet access point. An internet charge of $50 per month was assumed for 12 months. However, because some operations already have a computer, it was assumed they likely also had internet access so a weighted cost of internet was used similar to as done for the cost of data accumulators. As with computers and software, the calculated annual cost of internet fees was multiplied by 50% to account for the fact that the entire cost likely should not be allocated to an animal identification program (i.e., swine operators would use the internet for other management or personal uses).

5.1.8 Database Charge

According to the NAIS business plan, "The most efficient, cost-effective approach for advancing the country's traceability infrastructure is to capitalize on existing resources—mainly, animal health programs and personnel, as well as animal disease information databases" (USDA, 2007f, p. 4). As of May 2008, there were 17 approved Animal Tracking Databases or Compliant Animal Tracking Databases meeting the minimum requirements as outlined in the Integration of Animal Tracking Databases that were participating in the NAIS program and have a signed cooperative agreement with USDA Animal Plant Health Inspection Service (USDA, 2008d).

The research team attempted to contact multiple database providers to obtain costs/head (or lot) of their databases so an average cost for data storage could be ascertained. This information was not readily given out, and the information that was expressed was not specific enough for this

study. To find a more accurate estimate, Kevin Kirk from Michigan's Department of Agriculture was contacted. Mr. Kirk, who oversees the Michigan State AID database, provided the total data storage cost for Michigan producers (Kirk, 2007). Based on this information, a per-head charge of $0.085 was estimated and this same value was applied to group/lot records. This charge was included for the total number of lots that were sold by an operation as opposed to the number of animals they sold.

5.1.9 Premises Registration Costs

Currently premises registration is free and many states are trying to make the process as seamless as possible and NAIS reports that 33.8% of all operations with over $1,000 income have been registered (USDA, 2008d). While the premises registration is a free service, there are potential costs incurred with registering an operation's premises (e.g., time, mileage, paperwork). To capture this cost, it was assumed that a producer would incur a cost of $20 associated with management time, travel, and supplies to register his/her premises. Theoretically, once premises are registered the registration lasts for the life of the operation as well. However, many producers will need to renew or modify their premises registration on a regular basis as their operations change. Thus, it was assumed that the lifespan of the premises registration would be three years. The cost of renewing the premises every three years was assumed to be 50% of the initial cost $10 per operation. When accounting for the time value of money, the initial premises registration cost of $20 and the renewal every three years of $10 equates to a cost of $4.64 per operation annually in current dollars.

5.1.10 Interest Costs

Investments required for an animal ID system that have useful lives of more than one year (e.g., tag applicators, computers, premises registration) were annualized using an interest rate of 7.75%. Annual operating costs such as tags for cull sows and boars, labor, internet, etc. were charged an interest cost at this same rate for the portion of the year a producer's money would be tied up.

5.1.11 Summary of Swine Costs

Table 5.5 reports fixed costs related to data recording and reporting that are similar across operation types, but vary by operation size. Fixed costs are defined as costs that do not vary based on the number of groups marketed. Because it is assumed that a higher percentage of larger operations own computers, the costs associated with data accumulator (computer), software, and internet are lower per operation for larger operations. Costs associated with premises registration were the same for all operation sizes. Table 5.6 reports the fixed and variable costs related to data recording, storage, and reporting. [10] Variable costs are defined as costs that increase as the number of groups increase. The variable costs reported in the top portion of the table are constant on a per lot basis across operation types and sizes. In the final analysis, the cost per lot was not allowed to exceed $7.39 as this would represent one-half an hour of clerical time ($14.60/hour) plus the cost of data storage per lot. It was assumed that swine producers likely would not invest in computers, software, etc. if the costs are significantly higher than what they could do manually. Thus, any of the values in the "Total data cost, $/lot" rows in table 5.6 that exceed $7.39 are replaced with $7.39 in the final analysis.

Table 5.7 summarizes total costs, both as dollars per operation and cost per pig sold, by type and size of operation. Also reported are sector totals and average cost per pig sold for each sector. The average cost per pig sold for the different sectors ranges from a low of $0.01 for Wean-to-Feeder operations to a high of $0.13 per pig for Farrow-to-Finish operations. However, within each production sector there are relatively large economies of size. For example, in the three operation types that include farrowing, costs for the largest operations are below $0.04 per pig sold but they increase to about $0.30 to $0.60 per pig sold for the smallest size operations. Likewise, in the operations that feed pigs, costs are approximately $0.01 per pig sold for the largest operations but

[10] No attempt was made to differentiate costs between operations that own swine versus contract operations. To the extent that contract operations are not responsible for data recording and reporting (i.e., this would likely be done by the owner of the pigs) our total costs of data recording/reporting for the industry are likely overestimated.

increase to $0.07 to $0.28 for the smallest Wean-to-Finish and Feeder-to-Finish operations, respectively. Figures 5.1 and 5.2 show this same data graphically for the farrowing and feeding operations, respectively.

Table 5.5. Fixed Costs Related to Data Recording and Reporting for Swine by Size of Operation[1]

	Size of Operation, number of head			
	< 500	500-1999	2000-4999	5000+
Data accumulator (computer)				
Initial investment, $/operation	$692	$692	$692	$692
Ownership adjustment, %	12.0%	48.7%	70.7%	92.7%
Adjusted investment, $/operation	$609	$355	$203	$51
Annual cost, $/operation	$183	$107	$61	$15
Percent to NAIS	50%	50%	50%	50%
Annual cost, $/operation	$91	$53	$30	$8
Software				
Initial investment, $/operation	$400	$400	$400	$400
Ownership adjustment, %	12.0%	48.7%	70.7%	92.7%
Adjusted investment, $/operation	$352	$205	$117	$29
Annual cost, $/operation	$106	$62	$35	$9
Percent to NAIS	50%	50%	50%	50%
Annual cost, $/operation	$53	$31	$18	$4
Internet				
Annual cost	$600	$600	$600	$600
Ownership adjustment, %	12.0%	48.7%	70.7%	92.7%
Adjusted annual cost, $/operation	$569	$332	$189	$47
Percent to NAIS	50%	50%	50%	50%
Annual cost, $/operation	$284	$166	$95	$24
Fixed data cost, $/operation	$429	$250	$143	$36
Premises registration				
Annual cost, $/operation	$5	$5	$5	$5

[1] Applies to all five production-type operations.

Table 5.6. Data Storage and Reporting Costs for Swine by Operation Type and Size of Operation

	Size of Operation, number of head			
	< 500	500-1999	2000-4999	5000+
Cost, $/lot				
Printing cost	$0.24	$0.24	$0.24	$0.24
Data storage cost	$0.09	$0.09	$0.09	$0.09
Clerical labor	$3.93	$3.93	$3.93	$3.93
Total variable data cost, $/lot	$4.26	$4.26	$4.26	$4.26
Farrow-to-Wean				
Number of lots sold per year	12.7	17.2	24.1	43.3
Variable data cost, $/operation	$54	$73	$103	$184
Fixed data cost, $/operation	$429	$250	$143	$36
Total data cost, $/operation	$483	$323	$245	$220
Total data cost, $/lot*	$38.11	$18.82	$10.19	$5.08
Farrow-to-Feeder				
Number of lots sold per year	12.3	14.3	23.2	39.3
Variable data cost, $/operation	$52	$61	$99	$167
Fixed data cost, $/operation	$429	$250	$143	$36
Total data cost, $/operation	$481	$311	$242	$203
Total data cost, $/lot	$39.11	$21.74	$10.41	$5.17
Farrow-to-Finish				
Number of lots sold per year	11.9	11.9	13.7	15.9
Variable data cost, $/operation	$51	$51	$59	$68
Fixed data cost, $/operation	$429	$250	$143	$36
Total data cost, $/operation	$479	$300	$201	$103
Total data cost, $/lot	$40.41	$25.34	$14.65	$6.49
Wean-to-Feeder				
Number of lots sold per year	6.7	6.7	8.4	17.0
Variable data cost, $/operation	$28	$28	$36	$73
Fixed data cost, $/operation	$429	$250	$143	$36
Total data cost, $/operation	$457	$278	$179	$108
Total data cost, $/lot	$68.71	$41.83	$21.27	$6.35
Feeder-to-Finish				
Number of lots sold per year	3.0	3.0	3.0	7.5
Variable data cost, $/operation	$13	$13	$13	$32
Fixed data cost, $/operation	$429	$250	$143	$36
Total data cost, $/operation	$442	$263	$156	$67
Total data cost, $/lot	$146.59	$87.23	$51.78	$9.03

* If this cost exceeds $7.39, it was assumed data recording/reporting would be done manually at a cost of $7.39/lot.

Table 5.7. Summary of ID Costs for Swine Operations by Type and Size of Operation

	Size of Operation, number of head				
	< 500	500-1999	2000-4999	5000+	Total/Avg
Farrow-to-Wean					
Number of lots sold per year	12.7	17.2	24.1	43.3	134,613
Number of pigs sold per year	371	3,342	13,772	37,571	64,755,701
Tag-related costs (table 5.4)	$18	$90	$79	$217	$615,910
Data-related costs*	$94	$127	$178	$220	$905,444
Premises registration costs	$5	$5	$5	$5	$27,732
Total cost, $/operation	$116	$222	$262	$441	$1,549,086
Total cost, $/pigs sold	$0.31	$0.07	$0.02	$0.01	$0.02
Farrow-to-Feeder					
Number of lots sold per year	12.3	14.3	23.2	39.3	78,462
Number of pigs sold per year	349	2,443	11,602	31,511	30,246,388
Tag-related costs (table 5.4)	$17	$72	$72	$196	$296,253
Data-related costs*	$91	$106	$172	$203	$519,906
Premises registration costs	$5	$5	$5	$5	$19,933
Total cost, $/operation	$113	$182	$249	$403	$836,092
Total cost, $/pigs sold	$0.32	$0.07	$0.02	$0.01	$0.03
Farrow-to-Finish					
Number of lots sold per year	11.9	11.9	13.7	15.9	257,131
Number of pigs sold per year	167	668	1,979	3,776	19,771,901
Tag-related costs (table 5.4)	$13	$27	$63	$20	$525,327
Data-related costs*	$88	$88	$102	$103	$1,871,146
Premises registration costs	$5	$5	$5	$5	$95,041
Total cost, $/operation	$105	$119	$169	$129	$2,491,514
Total cost, $/pigs sold	$0.63	$0.18	$0.09	$0.03	$0.13
Wean-to-Feeder					
Number of lots sold per year	6.7	6.7	8.4	17.0	55,628
Number of pigs sold per year	725	3,478	10,070	20,433	60,141,077
Tag-related costs (table 5.4)	$0	$0	$0	$0	$0
Data-related costs*	$49	$49	$62	$108	$382,420
Premises registration costs	$5	$5	$5	$5	$24,266
Total cost, $/operation	$54	$54	$67	$113	$406,686
Total cost, $/pigs sold	$0.07	$0.02	$0.01	$0.01	$0.01
Feeder-to-Finish					
Number of lots sold per year	3.0	3.0	3.0	7.5	115,537
Number of pigs sold per year	96	718	2,380	8,942	84,579,799
Tag-related costs (table 5.4)	$0	$0	$0	$0	$0
Data-related costs*	$22	$22	$22	$55	$853,949
Premises registration costs	$5	$5	$5	$5	$137,506
Total cost, $/operation	$27	$27	$27	$60	$991,455
Total cost, $/pigs sold	$0.28	$0.04	$0.01	$0.01	$0.01

* Based on minimum of $7.39/lot or Total data cost reported in table 5.6 times number of lots sold per year.

FIGURE 5.1. ESTIMATED COST OF ANIMAL IDENTIFICATION FOR SWINE FARROWING OPERATIONS BY OPERATION SIZE

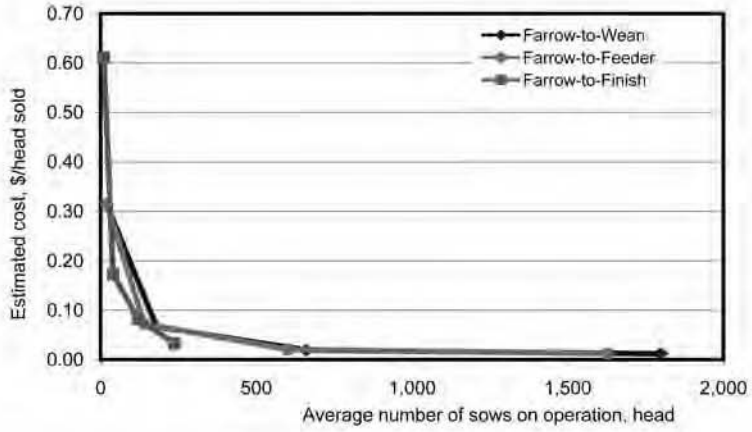
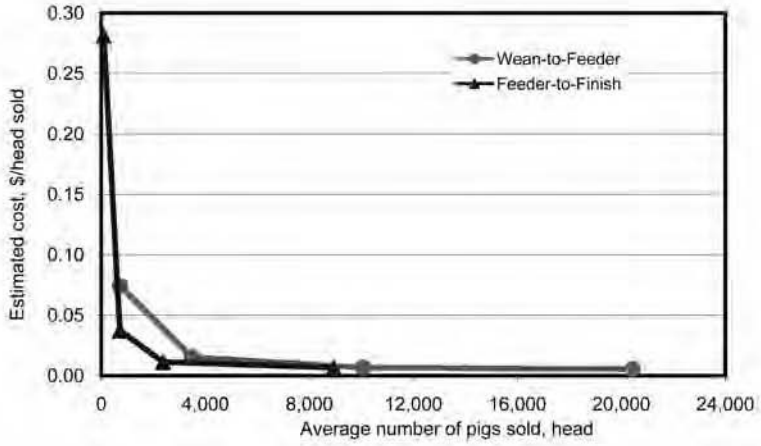


FIGURE 5.2. ESTIMATED COST OF ANIMAL IDENTIFICATION FOR SWINE FEEDING OPERATIONS BY OPERATION SIZE



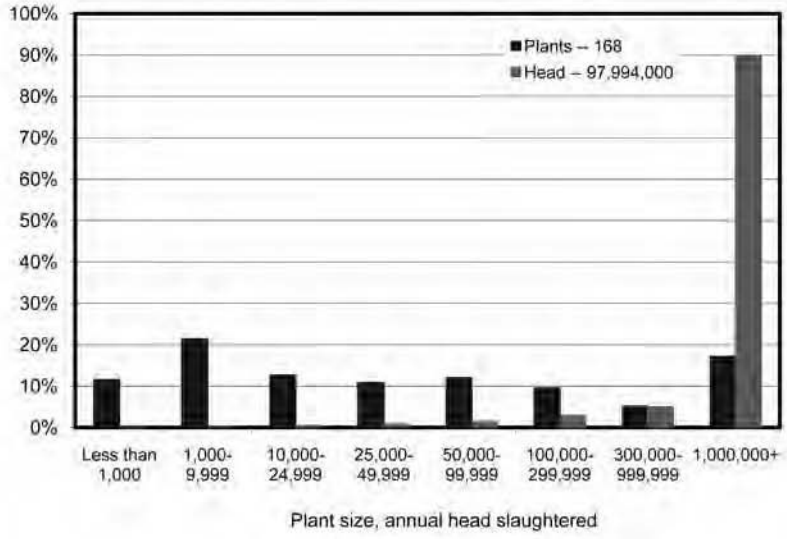
5.2 Packers

The costs incurred at swine packing plants will depend on numerous factors, but primarily on size of the plant. While packing plants may be able to pass costs associated with an animal ID system on to their suppliers (i.e., swine producers), these costs impact the industry. Furthermore, if different size packing plants have different costs (i.e., if economies of size exist) some of these added costs may not be able to be passed on to producers due to competition within the industry. For this analysis the costs at packing plants were based on the costs of recording and reporting data pertaining to group/lot IDs, however, for very small plants "groups" might actually represent individual hogs.

5.2.1 Operation Distributions

In order to determine how a national animal identification system might impact packing plants of various sizes, a distribution of plant size was required. Information on the number and size of hog slaughter plants was obtained from USDA GIPSA (USDA, 2007g). Average values for 2001-2005 were used for the analysis and then adjusted to 2007 marketings. Figure 5.3 shows the distribution of the number of plants and their shares of hogs slaughtered. The distribution of the number of plants is relatively uniform, i.e., there are a similar number of plants of all size categories. However, the largest plants (those with over a million head slaughtered per year) account for approximately 90% of all hogs slaughtered indicating that market share is heavily skewed to the largest plants.

FIGURE 5.3. SIZE DISTRIBUTION AND MARKET SHARE OF HOG SLAUGHTER PLANTS BY PLANT SIZE, 2001-05 AVERAGE

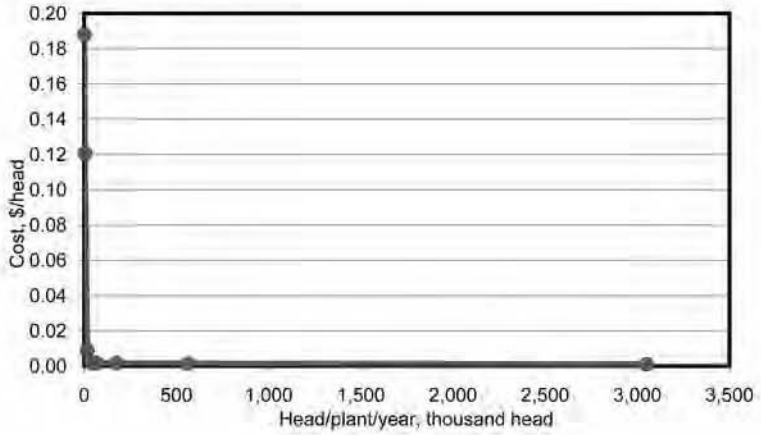


5.2.2 COST OF RECORDING AND REPORTING INFORMATION

It was assumed that swine processed through a packing plant would have identification information that would need to be recorded and reported to a central database. Information can generally be handled on a group basis, but for small packing plants that buy animals individually a group ID is the same as an individual ID. Packing plant costs were estimated as a function of plant size based on survey results from packing plants of various sizes (Bass et al., 2007). For large plants, costs were estimated as a function of the groups of hogs slaughtered per year and for small plants costs were estimated based on the number of head slaughtered per year. Ultimately, the relevant measure is costs per head slaughtered. Figure 5.4 shows how the cost per head associated with reading, recording, and reporting data varies as plant size increases. The impact of plant size on cost (i.e., economies of size) is economically significant. However, most of the gain to plant size is realized at relatively small plants. Basically, for

all but the smallest two sized plants (those slaughtering less than 10,000 head per year), the cost is economically insignificant.

FIGURE 5.4. ANNUAL COST OF ADOPTING ANIMAL IDENTIFICATION FOR SWINE SLAUGHTER PLANTS BY PLANT SIZE



5.2.3 SUMMARY OF PACKING PLANT COSTS

Based on recording and reporting group/lot ID information on 100% of swine being slaughtered in 2007 (109,171,600 head), the total costs to the 168 swine packing plants in the US is estimated at under $150,000, or less than $1,000 per plant.

5.3 SWINE INDUSTRY SUMMARY

TABLE 5.8 SUMMARIZES THE TOTAL COSTS to the swine industry by sector under scenario #3 (full traceability). Total costs are estimated at just under$6.5 million of which almost 40% of that is incurred in the farrow-to-finish sector. From the partial breakdown by type of cost, it can be seen that the majority of the cost (72.9%) is associated with recording/reporting data. This is not surprising given that tagging only

applies to cull breeding animals using visual tags (as opposed to electronic ID). To the extent that swine operations already have data management systems in place, some of the costs assumed for recording/reporting might already be incurred and thus the actual incremental cost would be lower than the estimate provided here. Also reported in table 5.8 is the cost per pig sold by sector and the total for the industry (based on total slaughter in 2007). Based on assumptions used in this analysis, a full traceability animal identification program in the swine industry would add about $0.06 per head to the cost of hogs produced.

Within each of the sectors in the swine industry, economies of size associated with an animal identification system were generally present. Thus, smaller operations likely will be slower to adopt identification systems because they incur higher per unit costs. However, as a general rule for most sectors, most of the economies of size were typically captured quite quickly such that costs for mid-sized operations were similar to costs of the largest operations.

Table 5.9 reports the total costs to the swine industry by sector under the three different scenarios: 1) premises registration only, 2) bookend animal ID system, and 3) full traceability ID system for various adoption rates. The costs are reported for both a uniform adoption rate and a lowest-cost-first adoption rate. Given that animal identification is a voluntary program, the lowest-cost-first adoption rate likely better reflects what costs would be to the industry with something less than 100% adoption. Note that at 100% adoption the two methods have equal costs. It can be seen in the lowest-cost-first adoption column that costs increase at somewhat of an increasing rate with higher levels of adoption. This suggests that getting lower rates of adoption may not be that difficult with a voluntary program because costs are relatively low. However, to get a high adoption rate will be more difficult because this requires the higher cost operations to also participate.

The premises registration scenario (#1) reflects only costs associated with registering premises (see Section 5.1.9 for a discussion about how premises registration costs were estimated), which is significantly below the other two. However, it is also important to recognize that this

represents no animal identification and no ability to trace animal movements.

Scenario #2 represents an animal identification system that reflects what is referred to as a bookend system. A bookend system simply means the swine are identified at both ends of their lives (birth and death), but movements in between are not tracked. Because recording and reporting data were a big portion of the total industry costs (table 5.8) and the bookend system would not require this information, this system has a total cost of less than $2 million, which is less than 30% of the full traceability system (Scenario #3).

Table 5.8. Summary of Annualized Animal ID Costs to Swine Industry

	Farrow-to Wean	Farrow-to-Feeder	Farrow-to-Finish	Wean-to-Feeder (Nursery)	Feeder-to-Finish (Grow/Finish)	Packers	Total
Total Operations	5,979	4,297	20,489	5,231	29,644	168	65,640
Pigs sold per year	64,755,701	31,314,955	20,381,497	60,141,077	84,579,799	109,171,600	109,171,600
Breakdown of costs ($)							
Tagging cost	$615,910	$296,253	$525,327	$0	$0		$1,437,491
Recording/reporting cost	$905,444	$519,906	$1,871,146	$382,420	$853,949	$147,489	$4,680,355
Premises registration	$27,732	$19,933	$95,041	$24,266	$137,506		$304,477
Total Annualized Cost	$1,549,086	$836,092	$2,491,514	$406,686	$991,455	$147,489	$6,422,323
Breakdown of costs (%)							
Tagging cost	39.8%	35.4%	21.1%	0.0%	0.0%	0.0%	22.4%
Recording/reporting cost	58.5%	62.2%	75.1%	94.0%	86.1%	100.0%	72.9%
Premises registration	1.8%	2.4%	3.8%	6.0%	13.9%	0.0%	4.7%
Total Annualized Cost	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost per pig sold, $/head*	$0.0239	$0.0267	$0.1222	$0.0068	$0.0117	$0.0014	$0.0588

* Total for industry is based on hogs slaughtered

Table 5.9. Total Swine Industry Cost versus Adoption Rate Under Alternative Scenarios

Scenario #1 -- Premises Registration Only

Industry Segment	Premises Registration	Adoption rate	Uniformly adopted	Lowest cost adopted first
Farrow-to-Wean	$27,732	10%	$30,526	$18,638
Farrow-to-Feeder	$19,933	20%	$61,052	$38,153
Farrow-to-Finish	$95,041	30%	$91,578	$58,248
Wean-to-Feeder	$24,266	40%	$122,103	$82,833
Feeder-to-Finish	$137,506	50%	$152,629	$116,895
Packers	$781	60%	$183,155	$153,609
TOTAL COST	$305,259	70%	$213,681	$190,792
		80%	$244,207	$228,349
		90%	$274,733	$266,447
		100%	$305,259	$305,259

Scenario #2 -- Bookend Animal ID System

Industry Segment	Book End Cost	Adoption rate	Uniformly adopted	Lowest cost adopted first
Farrow-to-Wean	$643,642	10%	$188,946	$115,895
Farrow-to-Feeder	$316,186	20%	$377,891	$238,321
Farrow-to-Finish	$620,368	30%	$566,837	$366,074
Wean-to-Feeder	$24,266	40%	$755,783	$524,582
Feeder-to-Finish	$137,506	50%	$944,729	$707,976
Packers	$147,489	60%	$1,133,674	$915,093
TOTAL COST	$1,889,457	70%	$1,322,620	$1,132,818
		80%	$1,511,566	$1,351,754
		90%	$1,700,512	$1,609,870
		100%	$1,889,457	$1,889,457

Scenario #3 -- Full Traceability Animal ID System

Industry Segment	Traceability Cost	Adoption rate	Uniformly adopted	Lowest cost adopted first
Farrow-to-Wean	$1,549,086	10%	$642,232	$556,877
Farrow-to-Feeder	$836,092	20%	$1,284,465	$1,132,810
Farrow-to-Finish	$2,491,514	30%	$1,926,697	$1,715,790
Wean-to-Feeder	$406,686	40%	$2,568,929	$2,315,409
Feeder-to-Finish	$991,455	50%	$3,211,162	$2,925,519
Packers	$147,489	60%	$3,853,394	$3,572,658
TOTAL COST	$6,422,323	70%	$4,495,626	$4,249,410
		80%	$5,137,859	$4,936,530
		90%	$5,780,091	$5,668,691
		100%	$6,422,323	$6,422,323

6. Direct Cost Estimates: Ovine

Ovine Operations

Costs of NAIS adoption were estimated for the sheep (ovine) industry by breaking the industry into two operation types or groups – producers and packers. Attempts were made to break production sectors into those that have breeding flocks and sell lambs and those that primarily feed lambs (feedlots), however, disaggregated data generally were not available to allow this. In addition to producers and packers, the cattle industry analysis included an auction market sector; however, because a large majority of lambs are marketed direct, and due to data availability issues, this sector is not included for the sheep industry.

Producers are defined as any operation that produces sheep or purchases and feeds sheep to slaughter weight. Packers are defined as any operation that slaughters live animals, either market lambs or cull breeding stock, under government inspection to produce meat products for sale to the public.

Because most breeding animals including culls are required to be individually identified under the current scrapie program, it was assumed that breeding sheep including culls would be individually identified and lambs moving to commercial feedlots or direct to slaughter would be identified as group/lots. The following discussion of sheep industry costs is partitioned by the different types of costs and according to the two operation types. Also, the following discussion pertains to costs associated with all sheep being identified, either individually (breeding stock) or as groups (lambs) and movements tracked (i.e., Scenario 3 discussed in Section 4). Costs of just premises registration (Scenario 1) and just bookend (Scenario 2) systems are summarized separately later in this section.

6.1 Operation Distributions

One of the objectives of this study was to determine if the implementation cost of an enhanced animal identification system for sheep beyond what is currently provided by the scrapie program varied by operation size. To determine if economies of size exist, costs of adopting enhanced animal identification were estimated for various operation sizes. The USDA NASS regularly report sheep industry information statistics such as number of operations, inventories, lamb crop, etc. (USDA, 2008e). Additionally, they report a percentage breakdown of operations and total inventory for four different operation sizes: < 100 head; 100-499; 500-4,999; and > 5,000 head (USDA, 2008h). Thus, these four size categories were used as breakpoints in this study. Sheep inventories, by class, for January 2007 and 2007 total lamb crop were extracted from NASS (USDA, 2008e). These data were matched with information on the 2006 and 2007 average percentage of operations and inventory by size group (USDA, 2008h). The total head of sheep per operation for each size category was found by multiplying the total sheep in the US by the respective percentage of inventory by size of operation. A similar procedure was done to determine the number of operations for each of the size categories (i.e., total operations were multiplied by percent of operations within each category). Dividing inventory by the number of operations provided an estimate of the average number of sheep per operation for each size category.

To estimate the number of rams located per premises it was assumed that operators would have the same percentage of the total ram inventory (USDA, 2008e) as they did sheep. Multiplying these together and dividing by the number of operations in each size category the total breeding herd inventory was calculated for the four different size categories.

Table 6.1 reports the number of operations, average inventories, and production levels by size of operation. Inventory values were taken directly from NASS data and allocated to the different size operations as previously discussed. Ewe and ram lambs retained for replacement were based on NASS reported data, but then were adjusted to maintain a static

herd size. That is, replacements were set equal to breeding herd disappearance (culls sold and death loss). Pre-weaning death loss on lambs and death loss on breeding stock were based on data reported in *Sheep and Lamb Predator Death Loss in the United States, 2004* (USDA, 2007h). Post-weaning death loss on lambs was imputed to attempt to reconcile total slaughter lamb numbers. Cull ewes and rams sold were calculated from inventories and cull rates reported in *Part I: Reference of Sheep Management in the United States, 2001* (USDA, 2002d).

Table 6.1. Number of Sheep Operations, Inventory and Production Levels by Size of Operation

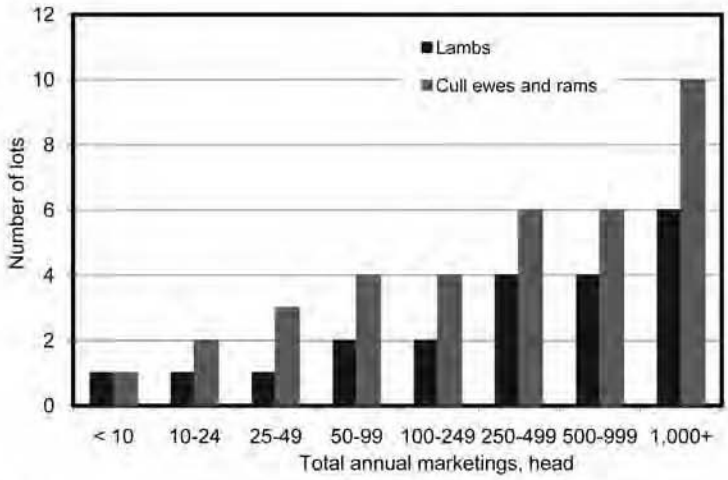
	Size of Operation, number of head				
	<100	100-499	500-4,999	5,000+	Total/Avg
Number of operations	64,202	5,294	1,024	71	70,590
Average sheep and lamb inventory, head	28.6	274.2	1,960.5	12,357.9	6,165,000
Total breeding herd inventory, head	21.4	205.1	1,466.0	9,240.9	4,610,000
Breeding ewes, head	17.1	164.4	1,175.4	7,408.8	3,696,000
Rams, head	0.9	8.7	62.0	390.9	195,000
Lamb crop before death loss, head	18.8	180.2	1,287.9	8,118.4	4,050,000
Ewe lambs retained or bought, head	4.3	40.9	292.1	1,841.5	918,651
Rams held back for replacement	0.3	2.8	19.8	124.9	62,287
Pre-weaning lamb death loss	1.8	16.9	121.1	763.1	380,700
Market lambs sold at weaning	12.5	119.6	854.9	5,388.9	2,688,362
Post-weaning lamb death loss	0.2	2.1	14.7	92.7	46,239
Market lambs sold for slaughter	12.2	117.5	840.2	5,296.2	2,642,123
Total breeding stock sold	3.3	32.2	229.9	1,448.8	722,778
Cull ewes sold, head	3.1	30.1	215.1	1,355.8	676,368
Cull rams sold, head	0.2	2.1	14.8	93.0	46,410
Total death loss, head	1.2	11.5	82.1	517.5	258,160
Total breeding stock left herd	4.5	43.6	311.9	1,966.3	980,938

6.1.2 Number of Tags and Groups

The National Scrapie Eradication Program mandates with some exceptions that any sheep that is sold other than into slaughter channels or that is older than 18 months and may be used for breeding must be individually identified with an official scrapie program identification device or tattoo (Sheep Working Group, 2006). Based on

recommendations from the Sheep Working Group (2006), it was assumed that the NAIS program for sheep would follow the same rules when determining if a producer will need to individually identify sheep and the AID tag used would be the metal or plastic scrapie program sheep tag. Thus, it was assumed that breeding stock including culls (i.e., ewes and rams) would be required to be individually identified with a scrapie program tag. It was assumed that all current breeding stock are already identified with scrapie tags and thus tags required would only be for replacement breeding stock and to replace lost tags. Table 6.1 reported the number of ewe and ram lambs held for replacement breeding stock and the average breeding stock inventories by operation size. Estimates of annual loss rate for plastic ear tags in breeding sheep vary widely. Ghirardi et al. (2005) report an annual loss rate of 3.3%; compared to annual losses of 8.3 to 12.8% reported by Saa, et al. (2005). Tags required annually were thus calculated as the total number of lambs held for replacement plus 6.93% (average tag loss rate) times the average breeding herd less an adjustment for death loss. Even though breeding stock needs to be individually identified with tags, cull breeding stock still will typically be sold in groups and thus the number of groups for both culls and lambs also needs to be identified. The number of group/lots was assumed to be a function of the number of sheep (culls and market lambs) sold and was based on producer opinion. Figure 6.1 shows the number of group/lots assumed for lambs (feeder and market) and cull ewes and rams at various levels of annual sheep marketings.

FIGURE 6.1. NUMBER OF GROUP/LOTS OF SHEEP MARKETED BY TOTAL ANNUAL MARKETINGS



TAGS AND TAGGING COSTS

6.1.3 TAGS AND APPLICATOR COST

Currently scrapie program tags and applicators are provided by USDA free of charge to sheep producers. The cost to USDA is approximately $0.08 per tag for metal tags and $0.27 per tag for plastic tags including costs of applicators, shipping and handling (Sutton, 2008). If the scrapie program did not exist or if USDA stopped providing tags, it is expected that tag costs would increase slightly due to increased handling costs and smaller individual orders associated with direct tag purchases by producers. To be consistent with the other species, it was assumed that producers would have to bear the cost of purchasing tags in the future, but they could do so in a similar fashion as the current scrapie program as it is considered compliant with NAIS. An average tag cost of $0.27 per tag was used, which was adjusted for volume of purchases using percentage differences from the cattle tag cost assumptions (see Section 4.1.1 in the bovine cost chapter). It was assumed that lambs (feeder and market) could be identified with unique group/lot ID and thus there were no tag costs for lambs. Because cull breeding animals are currently tagged as

part of the scrapie program, the incremental cost in the short-run associated with tag applicators would be zero (i.e., they already own applicators). However, producers would have to buy their own applicators in the future as current applicators provided through the scrapie program wear out. Thus, the cost of a conventional plastic ear tag applicator of $18.62 was included with larger operations owning multiple applicators.

6.1.4 Labor and Costs for Tagging Cull Breeding Sheep

Tagging breeding sheep (replacement and retags) would take time thus incurring labor costs and potentially injuries related to tagging animals. It was assumed that producers would spend 30 minutes to setup and prepare for tagging and one minute per animal tagging. Larger operations were assumed to have more employees involved with the tagging process. Table 6.2 reports the incremental costs related to tagging (tags, applicators, and labor) breeding stock (replacement ewes and ram lambs and breeding stock that lost their tags) by size of operation. The total costs per animal sold decreases as size of operation increases because of slightly lower tag costs, but primarily due to spreading tag applicator and labor costs over more head.

Table 6.2. Tag-Related Costs for Cull Breeding Sheep by Size of Operation.

	Size of Operation, number of head				
	<100	100-499	500-4,999	5,000+	Total/Avg
Total tags placed*	5.9	57.0	407.8	2,570.4	1,282,303
Tag cost, $/tag	$0.31	$0.27	$0.25	$0.23	$0.31
Annual tag cost**	$2.09	$17.79	$116.10	$696.98	$396,678
Annual cost of tag applicators	$6	$6	$11	$61	$404,318
Total tagging labor costs*	$7	$54	$363	$2,158	$1,289,952
Total costs associated with tags, $/operation	$15	$78	$491	$2,917	$2,090,948
Total costs associated with tags, $/animal sold	$0.958	$0.511	$0.452	$0.427	$0.613

* Total tags placed equals number of replacement ewe and ram lambs (table 6.1) and replacement tags on 6.93% of breeding herd inventory (adjusted for death loss).
** Annual tag cost includes an interest charge on tag investment.

Data Recording, Reporting and Storage Costs

Because the technology assumed for the sheep industry is different than the cattle industry, costs differ. For example, it was assumed that the cattle industry would use radio frequency identification (RFID) and thus hardware and software for reading RFID tags was included. However, in the sheep industry it is assumed that individual animal identification will be with visual ID tags (e.g., scrapie program tags) for breeding stock and lambs can be identified with group/lot identification. Thus, electronic readers are not required, but there are costs associated with recording, reporting, and storing data. The following is a brief discussion of these components.

6.1.5 Data Accumulator and Software

The data accumulator cost represents the average cost of six internet websites prices for laptop computers. This cost was annualized over four years and had a $0 salvage value. Given an initial investment of $692, a 4-year life, and an interest rate of 7.75%, the annual cost is $208. It was assumed that many operations, and especially the larger ones, would already own a computer and thus charging this cost to animal identification would not be appropriate. Data regarding computer usage was based on the 2001 Sheep NAHMS report (USDA, 2002d). This report indicated that 9.6%, 12.1%, 16.3%, and 26.5% of operations from smallest to largest, respectively, used computers. These data were increased by 50% to account for increases over time. To account for operations that currently own computers, the annual cost of the data accumulator (i.e., computer) was multiplied by one minus the proportion of operations that currently own computers resulting in a weighted-average cost per operation for each size category. Additionally, the calculated annual cost of computers was multiplied by 50% to account for the fact that the entire cost of the computer likely should not be allocated to an animal identification program (i.e., operators would use the computer for other management or personal uses).

Many different software packages are available that would satisfy the software requirement of an eID system. The value used here is the

suggested retail price of Microsoft Office Professional (Microsoft, 2008). This software package includes Microsoft Office Word, Office Excel, Office PowerPoint, Office Access, and other programs. While most producers would not use some of the programs included in Office Professional, Microsoft Office Word and Microsoft Office Excel or Microsoft Office Access would need to be employed to keep track of reads and to write the necessary documents. Other software packages that also maintain management information likely would be utilized by producers, but the higher cost associated with these software packages are not appropriate to include in an animal ID system as these are providing value beyond that required by NAIS. In other words, producers might choose to spend more for additional management benefits, but this is not something they would need to adopt NAIS procedures. As with data accumulators, annual software costs were adjusted by the percent of operations currently owning equipment. That is, it was assumed that if computers were already owned, software for managing the data would also be owned. Additionally, when software was purchased (i.e., those operations not currently owning computers), only 50% of the cost was allocated to the animal ID system.

6.1.6 Printing Costs Associated with Recording / Reporting Data

In addition to the hardware and software required for data analysis and reporting, it was assumed bar codes would be printed that could be sent with groups of sheep or lambs as they are marketed, i.e., affixed to bills of lading. That is, when selling group/lots, the seller will need to send papers with the shipment of sheep which contain the required information; this information was assumed to be contained both in text and a bar code format. This assumption was made based on the fact that auction yards and feedlots have high transaction volumes and these entities will require sellers to have bar codes on the identification papers to reduce transaction costs and human error.

This cost was calculated by finding label costs via the internet and multiplying by the cost of printing on a conventional printer. It was assumed that the producer would print two labels per group sold: one

for the operator's record and one for the buyer's record. The cost per sheet of paper and labels that could be printed on were obtained from multiple internet sites and averaged $0.24 per lot, assuming two labels were printed per lot. This was then multiplied by the number of groups to be sold to find the total bar code cost.

6.1.7 Other/Fixed Charges

The time needed to submit the group/lot ID numbers to a central database and internet fees were considered here. To determine clerical costs, the time submitting a group/lot ID number and the number of groups submitted needed to be ascertained. The Wisconsin working group for pork found that it took 15 minutes to submit data (Wisconsin Pork Association (WPA), 2006). Thus, it was assumed that each lot would require 15 minutes of time to submit the data. Clerical labor was multiplied by the average secretary wage of $14.60 per hour for the US (US Department of Labor, 2007) to find the total cost associated with recording and reporting a group/lot animal ID number.

In order to be able to achieve a "48 hour trace back system" producers would need to submit their animal identification numbers (AIN) or group identification numbers (GIN) via an internet access point. [11] An internet charge of $50 per month was assumed for 12 months. However, because some operations already have a computer, it was assumed they likely also had internet access, so a weighted cost of internet was used similar to was done for the cost of data accumulators and software. Also, as with computers and software, the calculated annual cost of internet fees was multiplied by 50% to account for the fact that the entire cost likely should not be allocated to an animal identification program (i.e., operators would use the internet for other management or personal uses).

[11] It should be pointed out that achieving 48-hour traceback could be difficult for operations with large numbers of individual animal numbers on breeding stock that have to be reported if this information is not available electronically. That is, the internet would allow the information to be submitted timely, however, this would still require somebody to enter the data into computer program. This is not an issue with group lot identification.

6.1.8 Database Charge

According to the NAIS business plan, "The most efficient, cost-effective approach for advancing the country's traceability infrastructure is to capitalize on existing resources—mainly, animal health programs and personnel, as well as animal disease information databases" (USDA, 2007f). As of May 2008, there were 17 approved Animal Tracking Databases or Compliant Animal Tracking Databases meeting the minimum requirements as outlined in the Integration of Animal Tracking Databases that were participating in the NAIS program and have a signed cooperative agreement with USDA Animal Plant Health Inspection Service (USDA, 2008d).

The research team attempted to contact multiple database providers to obtain costs/head (or lot) of their databases so an average cost for data storage could be ascertained. This information was not readily given out, and the information that was expressed was not specific enough for this study. To find a more accurate estimate, Kevin Kirk from Michigan's Department of Agriculture was contacted. Mr. Kirk, who oversees the Michigan State AID database, provided the total data storage cost for Michigan producers (Kirk, 2007). Based on this information, a per-head charge of $0.085 was estimated and this same value was applied to group/lot records. This charge was assessed to every GIN (group identification number) or AIN (animal identification number) stored into the database.

6.1.9 Premises Registration Costs

Currently premises registration is free and many states are trying to make the process as seamless as possible and NAIS reports that 33.8% of all operations with over $1,000 income have been registered (USDA, 2008c). While the premises registration is a free service, there are potential costs incurred with registering an operation's premises (e.g., time, mileage, paperwork). To capture this cost, it was assumed that a producer would incur a cost of $20 associated with time, travel, and supplies to register his/her premises. Theoretically, once premises are registered the registration lasts for the life of the operation as well. However, many producers will need to renew or modify their premises registration on a

regular basis as their operations change. Thus, it was assumed that the lifespan of the premises registration would be three years. The cost of renewing the premises every three years was assumed to be $10 per operation. When accounting for the time value of money, the initial premises registration cost of $20 and the renewal every three years of $10 equates to a cost of $4.64 per operation annually in current dollars.

6.1.10 Interest Costs

Investments required for an animal ID system that have useful lives of more than one year (e.g., tags in breeding stock, tag applicators, computers, premises registration) were annualized using an interest rate of 7.75%. Annual operating cost such as tags for breeding ewes and rams, labor, internet, etc. were charged an interest cost at this same rate for the portion of the year a producer's money would be tied up.

6.1.11 Summary of Sheep Costs

Table 6.3 reports fixed costs related to data recording and reporting that are similar across operation types, but vary by operation size. Fixed costs are defined as costs that do not vary based on the number of groups marketed. Because it is assumed that a higher percentage of larger operations own computers, the costs associated with data accumulator (computer), software, and internet are lower per operation for larger operations. Costs associated with premises registration were the same for all operation sizes. Table 6.4 reports the fixed and variable costs related to data recording, storage, and reporting. Variable costs are defined as costs that increase as the number of groups increase. The variable costs reported in the top portion of the table are constant on a per lot basis across operation types and sizes. In the final analysis, the data-related cost per lot was not allowed to exceed $7.39 as this would represent approximately one-half hour of clerical time plus the cost of data storage. It was assumed that sheep producers would not invest in computers, software, etc. if the costs are significantly higher than what they could do manually. Thus, any of the values in the "Total data cost, $/lot" rows in table 6.4 that exceed $7.39 are replaced with $7.39 in the final analysis.

Table 6.5 summarizes the total costs, both as total dollars per operation and total cost per animal (combination of lambs, ewes, and rams) sold, by size of operation. The average cost per animal sold ranges from a low of $0.44 for the largest operations to a high of $2.19 per head for the smallest operations indicating there are relatively large economies of size. Figure 6.2 shows these same data graphically.

Table 6.3. Fixed Costs Related to Data Recording and Reporting for Sheep by Size of Operation

	Size of Operation, number of head			
	<100	100-499	500-4,999	5,000+
Data accumulator (computer)				
Initial investment, $/operation	$692	$692	$692	$692
Ownership adjustment, %	14.4%	18.2%	24.5%	39.8%
Adjusted investment, $/operation	$592	$567	$523	$417
Annual cost, $/operation	$178	$170	$157	$125
Percent to NAIS	50%	50%	50%	50%
Annual cost, $/operation	$89	$85	$79	$63
Software				
Initial investment, $/operation	$400	$400	$400	$400
Ownership adjustment, %	14.4%	18.2%	24.5%	39.8%
Adjusted investment, $/operation	$342	$327	$302	$241
Annual cost, $/operation	$103	$98	$91	$72
Percent to NAIS	50%	50%	50%	50%
Annual cost, $/operation	$51	$49	$45	$36
Internet				
Annual cost	$600	$600	$600	$600
Ownership adjustment, %	14.4%	18.2%	24.5%	39.8%
Adjusted annual cost, $/operation	$514	$491	$453	$362
Percent to NAIS	50%	50%	50%	50%
Annual cost, $/operation	$277	$265	$244	$195
Fixed data cost, $/operation	$417	$399	$368	$294
Premises registration				
Annual cost, $/operation	$5	$5	$5	$5

Table 6.4. Data Storage and Reporting Costs for Sheep by Size of Operation

	Size of Operation, number of head			
	<100	100-499	500-4,999	5,000+
Cost, $/lot				
Printing cost	$0.24	$0.24	$0.24	$0.24
Data storage cost	$0.09	$0.09	$0.09	$0.09
Clerical labor	$3.65	$3.65	$3.65	$3.65
Total variable data cost, $/lot	$3.98	$3.98	$3.98	$3.98
Number of lots sold per year	2.0	5.0	8.0	16.0
Variable data cost, $/operation	$8	$20	$32	$64
Fixed data cost, $/operation	$417	$399	$368	$294
Total data cost, $/operation	$425	$419	$400	$357
Total data cost, $/lot*	$212.50	$83.73	$49.99	$22.33

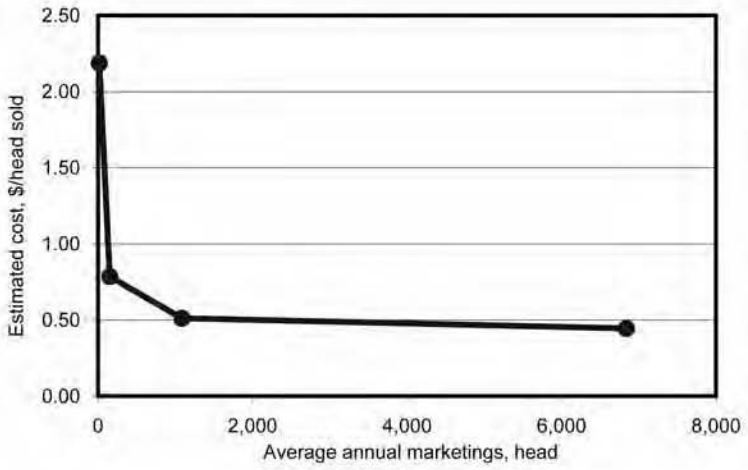
* If this cost exceeds $7.39, it was assumed data recording/reporting would be done manually at a cost of $7.39/lot.

Table 6.5. Summary of ID Costs for Sheep Operations by Type and Size of Operation

	Size of Operation, number of head				
	<100	100-499	500-4,999	5,000+	Total/Avg
Number of lots sold per year	2.0	5.0	8.0	16.0	164,192
Number of sheep sold per year	16	152	1,085	6,838	3,411,140
Tag-related costs (table 6.2)	$15	$78	$491	$2,917	$2,090,948
Data-related costs*	$15	$37	$59	$118	$1,213,562
Premises registration costs	$5	$5	$5	$5	$327,438
Total cost, $/operation	$35	$119	$554	$3,040	$3,631,949
Total cost, $/animal sold	$2.19	$0.79	$0.51	$0.44	$1.06

* Based on minimum of $7.39/lot or Total data cost reported in table 6.4 times number of lots sold per year.

FIGURE 6.2. ESTIMATED COST OF ANIMAL IDENTIFICATION FOR SHEEP OPERATIONS



6.2 PACKERS

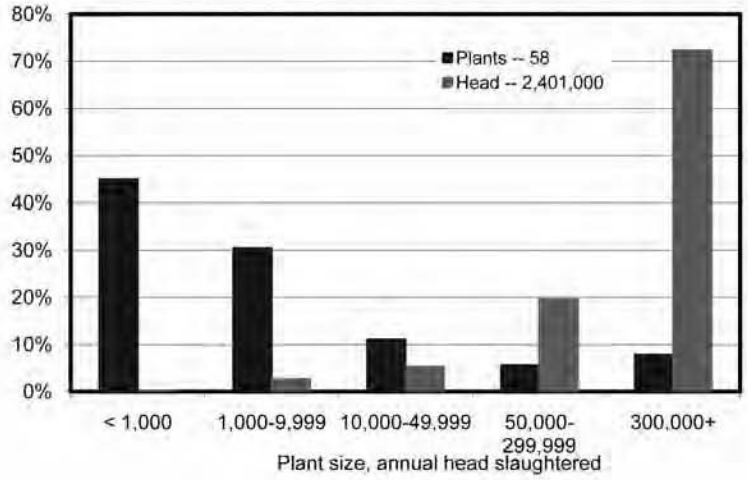
THE COSTS INCURRED AT LAMB PACKING PLANTS will depend on numerous factors, but primarily on size of the plant. While packing plants may be able to pass costs associated with an animal ID system on to their suppliers (i.e., sheep and lamb producers), these costs impact the industry. Furthermore, if different size packing plants have different costs (i.e., if economies of size exist) some of these added costs may not be able to be passed on to customers due to competition within the industry. For this analysis the costs at packing plants was based on the costs of recording and reporting data pertaining to group/lot IDs, however, for very small plants "groups" might actually represent individual sheep.

6.2.1 OPERATION DISTRIBUTIONS

In order to determine how a national animal identification system might impact packing plants of various sizes, a distribution of plant size was

required. Information on the number and size of sheep and lamb slaughter plants was obtained from USDA GIPSA (USDA, 2007g). Average values for 2001-2005 were used for the analysis and then adjusted to 2007 marketings. Figure 6.3 shows the distribution of the number of plants and their shares of sheep slaughtered. Approximately 75% of the plants slaughter less than 10,000 head annually, but they account for only about 3% of total marketings. The largest two plants sizes represent about 13.5% of all the plants, but they account for over 90% of the total slaughter. The distribution of the number of plants is relatively uniform, i.e., there are a similar number of plants of all size categories.

FIGURE 6.3. SIZE DISTRIBUTION AND MARKET SHARE OF SHEEP AND LAMB SLAUGHTER PLANTS BY PLANT SIZE, 2001-05 AVERAGE

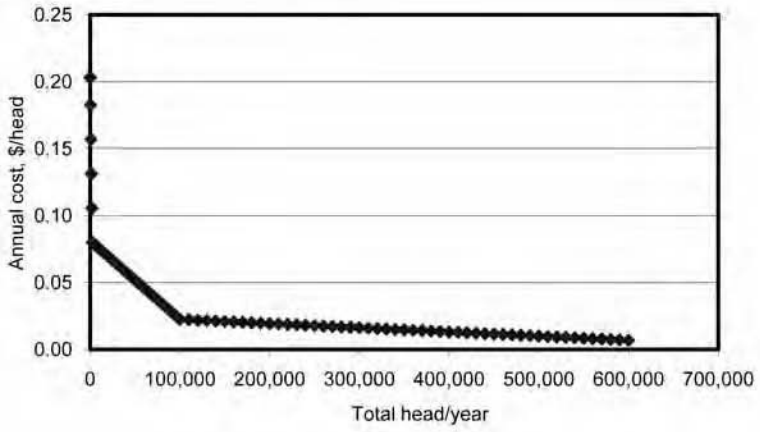


6.2.2 COST OF RECORDING AND REPORTING INFORMATION

It was assumed that sheep processed through a packing plant would have identification information that would need to be recorded and reported to a central database. Information can generally be handled on a group basis, but for small packing plants that buy animals individually a group ID is the same as an individual ID. Packing plant costs were estimated as a function of plant size based on survey results from packing plants of

various sizes (Bass et al., 2007). Costs were estimated as a function of the number of animals slaughtered per year (large plants were lambs and small plants tended to be cull breeding stock). Figure 6.4 shows how the cost per head associated with reading, recording, and reporting data varies as plant size increases. The impact of plant size on cost (i.e., economies of size) is economically significant.

FIGURE 6.4. ANNUAL COST OF ADOPTING ANIMAL IDENTIFICATION FOR SHEEP AND LAMB SLAUGHTER PLANTS BY PLANT SIZE



6.2.3 SUMMARY OF PACKING PLANT COSTS

Based on recording and reporting group/lot ID information on 100% of sheep and lambs being slaughtered in 2007 (2,693,700 head), the total costs to the 58 sheep and lamb packing plants in the US is estimated at approximately $32,000, or about $550 per plant.

SHEEP INDUSTRY SUMMARY

TABLE 6.6 SUMMARIZES THE TOTAL COSTS to the sheep industry by sector (producers and packers) under scenario #3 (full traceability). Total costs are estimated at slightly over $3.6 million. From the partial breakdown by type of cost, it can be seen that over half of the cost is based on tagging costs with slightly over a third associated with recording/reporting data. Tagging was only assumed for breeding stock, similar to what currently exists for the scrapie program. However, the costs of the tags, applicators and labor for tagging were included here even though some of these costs are currently provided by the government (e.g., tags and applicators). Costs associated with reading/reporting data were based on group lots and individual animal data handled "manually" as opposed to electronic readers. To the extent that sheep operations already have data management systems in place, some of the costs assumed for recording/reporting might already be in place and thus the actual incremental cost would be lower than the estimate provided here. Also reported in table 6.6 is the cost per head sold by sector and the total for the industry (based on total slaughter in 2007). Based on assumptions used in this analysis, a full traceability animal identification program in the sheep industry would add $1.06 cost per animal (lambs, ewes, and rams) producers sell and $1.39 per animal slaughtered. The reason the producer cost is lower per head is because it reflects the fact that sheep are sold multiple times before being slaughtered. This cost is relevant for producers analyzing how their costs are impacted with an animal identification program. However, from an industry perspective, the $1.39 is the relevant cost as this indicates how the cost of lamb (and mutton) is impacted relative to competing protein sources.

In both the production and packer sectors, economies of size associated with an animal identification system were generally present. Thus, smaller operations likely will be slower to adopt identification systems because they incur higher per unit costs. However, as a general rule for most sectors, most of the economies of size were typically captured quickly such that costs for mid-sized operations were similar to costs of the largest operations.

Table 6.7 reports the total costs to the sheep industry by sector under the three different scenarios: 1) premises registration only, 2) bookend animal ID system, and 3) full traceability ID system for various adoption rates. The costs are reported for both a uniform adoption rate and a lowest-cost-first adoption rate. Given that NAIS is a voluntary program, the lowest-cost-first adoption rate likely better reflects what costs would be to the industry with something less than 100% adoption. Note that at 100% adoption the two methods have equal costs.

The premises registration scenario (#1) reflects only costs associated with registering premises (see Section 6.1.9 for a discussion about how premises registration costs were estimated), which is significantly below the other two. However, it is also important to recognize that this represents no animal identification and no ability to trace animal movements. The scrapie program that currently exists allows for better traceability of sheep than only premises registration.

Scenario #2 represents an animal identification system that reflects what is referred to as a bookend system. A bookend system simply means the sheep and lambs are identified at both ends of their lives (birth and death), but movements in between are not tracked. Because recording and reporting data were a relatively large portion of the total industry costs (table 6.6) and the bookend system would not require this information, the costs of this system are only about two-thirds of the costs of the full traceability system (Scenario #3). Scenario #2 would be similar to the current scrapie program in terms of tracing breeding sheep and it would somewhat enhance the traceability of slaughter lambs, which currently are not identified at all. Scenario #3 would enhance the traceability further for both breeding and slaughter sheep by recording and reporting animal movement.

Table 6.6. Summary of Annualized Animal ID Costs to Sheep Industry Under Scenario #3 (full traceability)

	All Operations	Packers	Total
Total operations	70,590	58	70,590
Sheep and lambs sold per year	3,411,140	2,642,123	2,642,123
Breakdown of costs ($)			
Tagging Cost	$2,090,948		$2,090,948
Reader/Reading Cost	$1,213,562	$32,012	$1,245,574
Premises Registration	$327,438		$327,438
Total Cost, Annualized	$3,631,949	$32,012	$3,663,961
Breakdown of costs (%)			
Tagging Cost	57.6%	0.0%	57.1%
Reader/Reading Cost	33.4%	100.0%	34.0%
Premises Registration	9.0%	0.0%	8.9%
Total Cost, Annualized	100.0%	100.0%	100.0%
Cost per sheep sold, $/head*	$1.06	$0.01	$1.39

* Includes lambs and cull ewes and rams, total for industry is based on total head slaughtered

Table 6.7. Total Sheep Industry Cost versus Adoption Rate Under Alternative Scenarios

Scenario #1 -- Premises Registration Only

Industry Segment	Premises Registration	Adoption rate	Uniformly adopted	Lowest cost adopted first
All Operations	$327,438	10%	$35,945	$14,865
Packers	$32,012	20%	$71,890	$33,298
TOTAL COST	$359,450	30%	$107,835	$70,474
		40%	$143,780	$111,757
		50%	$179,725	$153,039
		60%	$215,670	$194,321
		70%	$251,615	$235,603
		80%	$287,560	$276,886
		90%	$323,505	$318,168
		100%	$359,450	$359,450

Scenario #2 -- Bookend Animal ID System

Industry Segment	Book End Cost	Adoption rate	Uniformly adopted	Lowest cost adopted first
All Operations	$2,418,387	10%	$245,040	$165,603
Packers	$32,012	20%	$490,080	$331,206
TOTAL COST	$2,450,398	30%	$735,119	$496,809
		40%	$980,159	$662,412
		50%	$1,225,199	$828,015
		60%	$1,470,239	$993,618
		70%	$1,715,279	$1,159,220
		80%	$1,960,319	$1,344,147
		90%	$2,205,358	$1,617,275
		100%	$2,450,398	$2,450,398

Scenario #3 -- Full Traceability Animal ID System

Industry Segment	Traceability Cost	Adoption rate	Uniformly adopted	Lowest cost adopted first
All Operations	$3,631,949	10%	$366,396	$286,959
Packers	$32,012	20%	$732,792	$573,918
TOTAL COST	$3,663,961	30%	$1,099,188	$860,877
		40%	$1,465,584	$1,147,837
		50%	$1,831,980	$1,434,796
		60%	$2,198,376	$1,721,755
		70%	$2,564,772	$2,008,714
		80%	$2,931,168	$2,314,996
		90%	$3,297,564	$2,709,481
		100%	$3,663,961	$3,663,961

7. Direct Cost Estimates: Poultry

Poultry Operations

Direct costs of NAIS adoption were estimated for the poultry industry by breaking the industry into three main groups (referred to as operation types): 1) Layers, 2) Broilers, and 3) Turkeys. The vast majority of poultry are marketed direct so an auction market sector is not included in the poultry industry cost estimation. Estimating costs separately for different types of operations makes it possible to see how different sectors of the poultry industry would be impacted with adoption of an animal identification system.

The Layer group was defined as producers who raise hens and produce eggs that are sold to the public. Broiler and Turkey operations raise meat poultry that are either owned privately or contracted by an integrator to feed. Packers are defined as any operation that slaughters live animals, either broilers, turkeys, or cull breeding stock, under government inspection to produce meat products for sale to the public. However, due to the vertically integrated nature of the poultry industry, costs were not estimated separately for packers. Hence the cost of recording and reporting group/lots at the packer level is already accounted for at the production level.

Layer operations market both eggs and cull hens, while the other two production-type operations only market poultry ready to be slaughtered as they do not typically own breeding animals. The game bird industry, family (backyard) flocks, road-side auctions, and hatcheries were not included in cost estimates here as the complexity and lack of information on these types of operations prevented any type of reliable analysis.

The following discussion of poultry industry costs is partitioned by the different types of costs and according to the three operation types. Also, the following discussion pertains to costs associated with all poultry group/lots being identified and movements tracked (i.e., Scenario 3 listed above). Costs of just premises registration (Scenario 1) are summarized

later in this section. The bookend scenario (Scenario 2) is not considered for poultry due to the integrated nature of the industry.

7.1 Operation Distributions

Table 7.1 reports the number of operations, average inventories, annual purchases and sales, and average number of lots for the different types of operations by operation size. Data on average lot size were not readily available. Thus birds per lot were estimated by operation size after accounting for death loss, length of production cycle (i.e., inventory turns/year) and based on the assumption that larger layer operations would generally sell spent hens in larger lot sizes.

7.1.1 Layers

The average number of layers a producer had was calculated using data from the 2002 Census (USDA, 2002b). The Census reported the number of poultry operations, which includes contract operations, and the total 20-weeks-or-older inventory of layers for these operations grouped by operation size. To estimate the average number of layers for each size category, total inventories were divided by the respective numbers of operations.

The number of group/lots was estimated based on the number of spent (culled) hens sold and an average turnover rate. To find the number of culled hens sold, the average number of dead hens (NAHMS, 1999) was subtracted from the average laying hen inventory and this was multiplied by the average turnover of layers in a year. Hen turnover was calculated by dividing the number of weeks in a year by the average number of weeks a layer is in production (Meunier and Latour, undated), adding a week to account for downtime. The following rules were used to determine number of lots sold by operation size, where the first value is birds sold per year and the value in parenthesis is maximum birds per lot: 0-499 (100), 500-2,499 (500), 2,500-4,999 (1,000), 5,000-49,999 (5,000), 50,000 and above (10,000). Using these rules the average number of lots sold per operation, by operation size, was estimated.

7.1.2 Broilers

The average number of broilers a producer had was calculated using data from the 2002 Census (USDA, 2002b) along with information on the average length of feeding period. The Census reported the number of operations and the total broilers sold by operation grouped by size. The total number sold was divided by 6.5 turns per year to provide an estimate of the average inventory, where the 6.5 was based on an average feeding period of seven weeks (Jacob and Mather, 2003; National Chicken Council, 2008) plus one week of cleanup time between groups. Dividing the estimated inventory by the number of operations provided an average broiler inventory for each size category.

The average number of lots sold per operation was estimated based on the 6.5 turns per year (52 weeks divided by eight weeks) assumption and setting a maximum lot size of 20,000 birds per lot. This maximum of 20,000 birds per group was based on the size of a typical grow-out house (National Chicken Council, 2008). Therefore, for operations that had more than 20,000 broilers per group, the total number of broilers per group was divided by 20,000 to find the number of lots that would require a unique GIN.

7.1.3 Turkeys

The average number of turkeys a producer had was calculated using data from the 2002 Census (USDA, 2002b) along with information on the average feeding period length. The Census reported the number of operations, which includes contract growers and the total turkeys sold by the operations grouped by size. The total number sold was divided by 2.3 turns per year to provide an estimate of the average inventory, where the 2.3 was based on an average feeding period of 151 days plus allowing one week cleanup time between groups. Dividing this estimated total inventory by the number of operations provided an estimate of the average turkey inventory for each operation size category.

The average number of lots sold per operation was estimated based on the 2.3 turns per year (365 days divided by 158 days) assumption and

setting a maximum lot size of 10,000 birds per lot. Thus, for operations that had more than 10,000 turkeys per group, the total number of turkeys was divided by 10,000 to find the number of lots that would require a unique GIN.

7.2 Group/lots

It was assumed that poultry operations would employ a Group Identification Number (GIN) to adopt NAIS, and that no physical animal identification or group identification tags would be applied to the animals. The average size of group/lots was estimated as described in the preceding section and the average number of lots sold per operation are reported in table 7.1. To estimate the cost of recording/reporting group lot movement information, the number of lots reported in table 7.1 was doubled to account for producers first receiving groups of poultry and then subsequently shipping them to a processor.

Table 7.1. Summary of Poultry Industry Operations and Operation Sizes by Type

	Layers (average inventory of 20-weeks old or older layers)									
	1-49	50-99	100-399	400 - 3,199	3,200-9,999	10,000-19,999	20,000-49,999	50,000-99,999	100,000 +	Total (thousands)
Number of operations	82,693	7,431	3,684	487	672	1,421	1,127	302	498	98.3
Average inventory	17	60	151	1,041	7,517	14,564	28,098	70,981	507,454	334,435
Average lots sold	1.0	1.0	1.0	4.0	5.8	5.6	10.8	27.2	38.9	147.2
Number sold annually	6.3	22.8	57.9	399	2,878	5,575	10,757	27,173	194,267	128,031
Number purchased annually	7.4	26.7	67.8	467	3,370	6,529	12,595	31,819	227,479	149,919

	Broilers (annual broilers sold)										
	1-1,999	2,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000-199,999	200,000-299,999	300,000-499,999	500,000-749,000	750,000 +	Total (thousands)
Number of operations	10,869	406	206	444	1,060	3,311	4,653	5,754	3,092	2,211	32.0
Average inventory	16	1,085	3,292	6,819	12,230	23,094	37,513	58,429	91,148	188,977	1,304,158
Average lots sold	6.5	6.5	6.5	6.5	6.5	7.5	12.2	19.0	29.7	61.6	504.0
Number sold annually	105	7,073	21,459	44,443	79,716	150,525	244,502	380,835	594,087	1,231,727	8,500,313
Number purchased annually	114	7,660	23,242	48,137	86,341	163,035	264,823	412,486	643,462	1,334,097	9,206,780

	Turkeys (annual turkeys sold)							
	1-1,999	2,000-7,999	8,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000 +	Total (thousands)
Number of operations	5,590	93	126	290	789	748	800	8.4
Average inventory	17	2,000	5,247	9,681	18,657	32,228	100,045	122,611
Average lots sold	2.3	2.3	2.3	2.3	4.3	7.4	23.1	41.5
Number sold annually	38.9	4,619	12,121	22,365	43,100	74,451	231,116	283,248
Number purchased annually	42.6	5,069	13,302	24,544	47,300	81,706	253,639	310,851

7.3 Data Recording, Reporting and Storage Costs

Because the technology assumed for the poultry industry is different than the cattle industry, costs of NAIS adoption differ. For example, it was assumed that the cattle industry would use radio frequency identification (RFID) and thus hardware and software for reading RFID tags was included. However, in the poultry industry it was assumed that individual animal identification will not be used and the poultry can be identified with group/lot identification. Thus, electronic readers are not required, but there will still be costs associated with recording, reporting, and storing data. The following is a brief discussion of these components.

7.3.1 Data Accumulator and Software

The data accumulator cost represents the average cost of six internet websites prices for laptop computers. This cost was annualized over four years and had a $0 salvage value. Given an initial investment of $692, a 4-year life, and an interest rate of 7.75%, the annual cost is $208. It was assumed that many operations, and especially the larger ones, would already own a computer and thus charging this cost to animal identification would not be appropriate. Data indicating computer usage by type and size of poultry operations could not be found. Thus, it was assumed that computer ownership trends reported for the dairy industry in the NAHMS dairy report (USDA, 2007a) might be similar for poultry operations. Computer ownership rates used by type of operation and operation size are reported in table 7.2 (Ownership adjustment, %). To account for operations that currently own computers, the annual cost of the data accumulator (i.e., computer) was multiplied by one minus the proportion of operations that currently own computers resulting in a weighted-average cost per operation for each size category. Additionally, the calculated annual cost of computers was multiplied by 50% to account for the fact that the entire cost of the computer likely should not be allocated to an animal identification program (i.e., poultry operators would likely use the computer for other management or personal uses).

Many different software packages are available that would satisfy the software requirement of an eID system. The cost of software used here is the suggested retail price of Microsoft Office Professional (Microsoft, 2008). This software package includes Microsoft Office Word, Office Excel, Office PowerPoint, Office Access, and other programs. While most producers would not use some of the programs included in Office Professional, Microsoft Office Word and Microsoft Office Excel or Microsoft Office Access would need to be employed to keep track of group/lots and their movements and to write the necessary documents. Other software packages that also maintain management information likely would be utilized by producers, but the higher cost associated with these software packages are not appropriate to include in an animal ID system as these are providing value beyond that required by NAIS. In other words, producers might choose to spend more for additional management benefits, but this is not something they would need to adopt NAIS procedures. As with data accumulators, annual software costs were adjusted by the percent of operations currently owning computers. That is, it was assumed that if computers were already owned, software for managing the data would also be owned. Additionally, when software was purchased (i.e., those operations not currently owning computers), only 50% of the cost was allocated to the animal ID system.

7.3.2 Printing Costs Associated with Recording / Reporting Data

In addition to the hardware and software required for data recording, analysis, and reporting, it was assumed bar codes would be printed that could be sent with lots of poultry as they are marketed, i.e., affixed to bills of lading. That is, when selling group/lots, the seller will need to send papers with the shipment of birds which contain the required information. These preprinted bar codes or labels would contain the group/lot ID required for NAIS. This assumption was made based on the fact that contract growers and processors have high transaction volumes and these entities will require sellers to have bar codes on the identification papers to reduce transaction costs and human error.

This cost was calculated by finding label costs via the internet and multiplying by the cost of printing on a conventional printer. It was assumed that the producer would print two labels per group sold: one for the operator's record and one for the buyer's record. The cost per sheet of paper and labels that could be printed on were obtained from multiple internet sites and averaged $0.24 per lot, assuming two labels were printed per lot. This was then multiplied by the number of groups to be sold to find the total bar code cost.

7.3.3 Other/Fixed Charge

The time needed to submit the group/lot ID numbers to a central database and internet fees were considered here. To determine clerical costs, the time submitting a group/lot ID number and the number of groups submitted needed to be ascertained. The Wisconsin working group for pork found that it took 15 minutes to submit data (Wisconsin Pork Association (WPA), 2006). Thus, it was assumed that each lot would require 15 minutes of time to submit the data. Clerical labor was multiplied by the average secretary wage of $14.60 per hour for the US (US Department of Labor, 2007) to find the total cost associated with recording and reporting a group/lot animal ID number.

In order to be able to achieve a "48 hour trace back system" producers would need to submit group/lot information via an internet access point. An internet charge of $50 per month was assumed for 12 months. However, because some operations already have a computer, it was assumed they likely also had internet access so a weighted cost of internet was used similar to as was done for the cost of data accumulators and software. Also, as with computers and software, the calculated annual cost of internet fees was multiplied by 50% to account for the fact that the entire cost likely should not be allocated to an animal identification program (i.e., poultry operators would likely use the internet for other management or personal uses).

7.3.4 Database Charge

According to the NAIS business plan, "The most efficient, cost-effective approach for advancing the country's traceability infrastructure is to capitalize on existing resources—mainly, animal health programs and personnel, as well as animal disease information databases" (USDA, 2007f, p. 4). As of May 2008, there were 17 approved Animal Tracking Databases or Compliant Animal Tracking Databases meeting the minimum requirements as outlined in the Integration of Animal Tracking Databases that were participating in the NAIS program and have a signed cooperative agreement with USDA Animal Plant Health Inspection Service (USDA, 2008d).

The research team attempted to contact multiple database providers to obtain costs/head (or lot) of their databases so an average cost for data storage could be ascertained. This information was not readily given out, and the information that was expressed was not specific enough for this study. To find a more accurate estimate, Kevin Kirk from Michigan's Department of Agriculture was contacted. Mr. Kirk, who oversees the Michigan State AID database, provided the total data storage cost for Michigan producers (Kirk, 2007). Based on this information, a per-head charge of $0.085 was estimated and this same value was applied to group/lot records. This charge was included for the total number of lots that were sold by an operation as opposed to the number of animals they sold.

7.3.5 Premises Registration costs

Currently premises registration is free and many states are trying to make the process as seamless as possible and NAIS reports that 32.1% of all operations with over $1,000 income have been registered (USDA, 2008d). While the premises registration is a free service, there are potential costs incurred with registering an operation's premises (e.g., time, mileage, paperwork). To capture this cost, it was assumed that a producer would incur a cost of $20 associated with management time, travel, and supplies to register his/her premises. Theoretically, once a premises is registered it will last for the life of the operation as well. However, many producers will need to renew or modify their premises registration on a

regular basis as their operations change. Thus, it was assumed that the lifespan of the premises registration would be three years. The cost of renewing the premises every three years was assumed to be $10 per operation. When accounting for the time value of money, the initial premises registration cost of $20 and the renewal every three years of $10 equates to a cost of approximately $4.64 per operation annually in current dollars.

7.3.6 Interest Costs

Investments required for an animal ID system that have useful lives of more than one year (e.g., computers, premises registration) were annualized using an interest rate of 7.75%. Annual operating cost were charged an interest cost at this same rate for the portion of the year a producer's money would be tied up.

7.4 Poultry Industry Summary

Tables 7.2-7.4 report fixed costs related to data recording and reporting that vary by operation size for layers, broilers, and turkeys, respectively. Fixed costs are defined as costs that do not vary based on the number of groups marketed. Because it is assumed that a higher percentage of larger operations own computers, the costs associated with data accumulator (computer), software, and internet are lower per operation for larger operations. Costs associated with premises registration were the same for all operation sizes. Tables 7.5-7.7 report the fixed and variable costs related to data recording, storage, and reporting by operation size for layers, broilers, and turkeys, respectively. Variable costs are defined as costs that increase as the number of groups increase. The variable costs reported in the top portions of the tables are constant on a per lot basis across operation sizes. It can be seen that there are large economies of size in the per lot costs based on these assumptions, however, this is being driven by the investment in computers, software, and internet charges which are very high per lot for the small operations. Thus, in the final analysis, the data-

related cost per lot was not allowed to exceed the cost associated with one-half hour of clerical time plus data storage (approximately $7.39). That is, it was assumed that poultry producers would not invest in computers, software, etc. if the costs are significantly higher than what they could do manually. Thus, any of the values in the "Total data cost, $/lot" rows in tables 7.5-7.7 that exceed $7.39 are replaced with $7.39 in the final analysis.

Table 7.8 summarizes the total costs, both as total dollars operation and total cost per bird (layers, broilers, and turkeys) sold by type and size of operation. For all three types of operations there are relatively large economies of size in that the smallest operations have significantly higher costs than the large operations. On average for the industry, costs per bird are $0.0195, $0.0007, and $0.0020 for layers, broilers, and turkeys, respectively. Thus, average industry costs are not particularly high, but for the smallest operations that is not the case. Thus, there would be much less incentive for small operations to adopt an animal (group) identification system due to the diseconomies of size that exist.

Table 7.2. Fixed Costs Related to Data Recording and Reporting for Layer Operations by Size of Operation.

	Layers (average inventory of 20-weeks old or older layers)								
	1-49	50-99	100-399	400-3,199	3,200-9,999	10,000-19,999	20,000-49,999	50,000-99,999	100,000+
Data accumulator (computer)									
Initial investment, $/operation	$692	$692	$692	$692	$692	$692	$692	$692	$692
Ownership adjustment, %	12.0%	30.4%	48.7%	56.0%	63.4%	70.7%	78.0%	85.4%	92.7%
Adjusted investment, $/operation	$609	$482	$355	$304	$254	$203	$152	$101	$51
Annual cost, $/operation	$183	$145	$107	$91	$76	$61	$46	$30	$15
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%	50%	50%
Annual cost, $/operation	$91	$72	$53	$46	$38	$30	$23	$15	$8
Software									
Initial investment, $/operation	$400	$400	$400	$400	$400	$400	$400	$400	$400
Ownership adjustment, %	12.0%	30.4%	48.7%	56.0%	63.4%	70.7%	78.0%	85.4%	92.7%
Adjusted investment, $/operation	$352	$279	$205	$176	$147	$117	$88	$59	$29
Annual cost, $/operation	$106	$84	$62	$53	$44	$35	$26	$18	$9
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%	50%	50%
Annual cost, $/operation	$53	$42	$31	$26	$22	$18	$13	$9	$4
Internet									
Initial investment, $/operation	$600	$600	$600	$600	$600	$600	$600	$600	$600
Ownership adjustment, %	12.0%	30.4%	48.7%	56.0%	63.4%	70.7%	78.0%	85.4%	92.7%
Adjusted investment, $/operation	$569	$450	$332	$284	$237	$189	$142	$95	$47
Annual cost, $/operation	50%	50%	50%	50%	50%	50%	50%	50%	50%
Percent to NAIS	$284	$225	$166	$142	$118	$95	$71	$47	$24
Fixed data cost, $/operation	$429	$339	$250	$214	$178	$143	$107	$71	$36
Premises registration									
Annual cost, $/operation	$5	$5	$5	$5	$5	$5	$5	$5	$5

Table 7.3. Fixed Costs Related to Data Recording and Reporting for Broiler Operations by Size of Operation.

	Broilers (annual broilers sold)									
	1-1,999	2,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000-199,999	200,000-299,999	300,000-499,999	500,000-749,000	750,000 +
Data accumulator (Computer)										
Initial cost, $	$692	$692	$692	$692	$692	$692	$692	$692	$692	$692
Ownership adjustment, %	12%	30%	49%	71%	74%	78%	82%	85%	89%	93%
Adjusted investment, $/Operation	$609	$482	$355	$203	$177	$152	$127	$101	$76	$51
Annual cost, $/Operation	$183	$145	$107	$61	$53	$46	$38	$30	$23	$15
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
NAIS cost, $/Operation	$91	$72	$53	$30	$27	$23	$19	$15	$11	$8
Software										
Initial cost, $	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400
Ownership adjustment, %	12.0%	30.4%	48.7%	70.7%	74.4%	78.0%	81.7%	85.4%	89.0%	92.7%
Adjusted investment, $/Operation	$352	$279	$205	$117	$103	$88	$73	$59	$44	$29
Annual cost, $/Operation	$106	$84	$62	$35	$31	$26	$22	$18	$13	$9
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
NAIS cost, $/Operation	$53	$42	$31	$18	$15	$13	$11	$9	$7	$4
Internet										
Annual cost	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600
Ownership adjustment	12.0%	30.4%	48.7%	70.7%	74.4%	78.0%	81.7%	85.4%	89.0%	92.7%
Annual cost, total $	$569	$450	$332	$189	$166	$142	$118	$95	$71	$47
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Annual cost, $	$284	$225	$166	$95	$83	$71	$59	$47	$35	$24
Fixed data cost, $/operation	$429	$339	$250	$143	$125	$107	$89	$71	$53	$36
Premises Registration Annual cost, $/operation	$5	$5	$5	$5	$5	$5	$5	$5	$5	$5

Table 7.4. Fixed Costs Related to Data Recording and Reporting for Turkey Operations by Size of Operation.

	Turkeys (annual turkeys sold)						
	1-1,999	2,000-7,999	8,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000+
Data accumulator (Computer)							
Initial cost, $	$692	$692	$692	$692	$692	$692	$692
Ownership adjustment, %	12.0%	49.0%	71.0%	76.5%	82.0%	87.5%	93.0%
Adjusted investment, $/Operation	$609	$353	$201	$163	$125	$87	$48
Annual cost, $/Operation	$183	$106	$60	$49	$37	$26	$15
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%
NAIS cost, $/Operation	$91	$53	$30	$24	$19	$13	$7
Software							
Initial cost, $	$400	$400	$400	$400	$400	$400	$400
Ownership adjustment, %	12.0%	49.0%	71.0%	76.5%	82.0%	87.5%	93.0%
Adjusted investment, $/Operation	$352	$204	$116	$94	$72	$50	$28
Annual cost, $/Operation	$106	$61	$35	$28	$22	$15	$8
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%
NAIS cost, $/Operation	$53	$31	$17	$14	$11	$8	$4
Internet							
Annual cost	$600	$600	$600	$600	$600	$600	$600
Ownership adjustment	12.0%	49.0%	71.0%	76.5%	82.0%	87.5%	93.0%
Annual cost, total $	$569	$330	$187	$152	$116	$81	$45
Percent to NAIS	50%	50%	50%	50%	50%	50%	50%
Annual cost, $	$284	$165	$94	$76	$58	$40	$23
Fixed data cost, $/operation	$429	$248	$141	$114	$88	$61	$34
Premises Registration							
Annual cost, $/operation	$5	$5	$5	$5	$5	$5	$5

Table 7.5. Data Storage and Reporting Costs for Layer Operations by Size of Operation.

	Layers (average inventory of 20-weeks old or older layers)								
	1-49	50-99	100-399	400-3,199	3,200-9,999	10,000-19,999	20,000-49,999	50,000-99,999	100,000+
Cost, $/lot									
Printing cost	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24
Data storage cost	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09
Clerical labor	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93
Total variable data cost, $/lot	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26
Software									
Number of lots sold per year	1.0	1.0	1.0	4.0	5.8	5.6	10.8	27.2	38.9
Variable data cost, $/operation	$4	$4	$4	$17	$25	$24	$46	$116	$166
Fixed data cost, $/operation	$429	$339	$250	$214	$178	$143	$107	$71	$36
Total data cost, $/operation	$433	$344	$254	$231	$203	$167	$153	$187	$201
Total data cost, $/lot*	$433.00	$343.60	$254.20	$58.01	$35.27	$29.87	$14.21	$6.89	$5.18

* If this cost exceeds $7.39, it was assumed data recording/reporting would be done manually at a cost of $7.39/lot.

Table 7.6. Data Storage and Reporting Costs for Broiler Operations by Size of Operation.

	Broilers (annual broilers sold)									
	1-1,999	2,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000-199,999	200,000-299,999	300,000-499,999	500,000-749,000	750,000+
Cost, $/lot										
Printing cost	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24
Data storage cost	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09
Clerical labor	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93
Total variable data cost, $/lot	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26
Software										
Number of lots sold per year	6.5	6.5	6.5	6.5	6.5	7.5	12.2	19.0	29.7	61.6
Variable data cost, $/operation	$28	$28	$28	$28	$28	$32	$52	$81	$127	$262
Fixed data cost, $/operation	$429	$339	$250	$143	$125	$107	$89	$71	$53	$36
Total data cost, $/operation	$457	$367	$278	$171	$153	$139	$141	$152	$180	$298
Total data cost, $/lot*	$70.04	$56.32	$42.61	$26.16	$23.42	$18.48	$11.55	$8.01	$6.06	$4.84

* If this cost exceeds $7.39, it was assumed data recording/reporting would be done manually at a cost of $7.39/lot.

Table 7.7. Data Storage and Reporting Costs for Turkey Operations by Size of Operation.

	Turkeys (annual turkeys sold)						
	1-1,999	2,000-7,999	8,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000+
Cost, $/lot							
Printing cost	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24	$0.24
Data storage cost	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09	$0.09
Clerical labor	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93	$3.93
Total variable data cost, $/lot	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26	$4.26
Software							
Number of lots sold per year	2.3	2.3	2.3	2.3	4.3	7.4	23.1
Variable data cost, $/operation	$10	$10	$10	$10	$18	$32	$98
Fixed data cost, $/operation	$429	$248	$141	$114	$88	$61	$34
Total data cost, $/operation	$439	$258	$151	$124	$106	$93	$133
Total data cost, $/lot*	$189.85	$111.82	$65.42	$53.82	$24.61	$12.44	$5.74

* If this cost exceeds $7.39, it was assumed data recording/reporting would be done manually at a cost of $7.39/lot.

Table 7.8. Summary of ID Costs for Poultry Operations by Type and Size of Operation

	Layers (average inventory of 20-weeks old or older layers)									
	1-49	50-99	100-399	400-3,199	3,200-9,999	10,000-19,999	20,000-49,999	50,000-99,999	100,000+	Total/Avg
Number of lots sold per year	1.0	1.0	1.0	4.0	5.8	5.6	10.8	27.2	38.9	147,217
Number of layers sold per year	6.3	22.8	57.9	399	2,878	5,575	10,757	27,173	194,267	128,031,003
Data-related costs*	$7.39	$7.39	$7.39	$29.46	$42.54	$41.21	$79.50	$187.10	$201.15	$2,036,425
Premises registration costs	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$456,043
Total costs, $/operation	$12.03	$12.03	$12.03	$34.10	$47.18	$45.85	$84.14	$191.74	$205.79	$2,492,469
Total costs, $/layer	$1.9014	$0.5270	$0.2077	$0.0855	$0.0164	$0.0082	$0.0078	$0.0071	$0.0011	$0.0195

	Broilers (annual broilers sold)										
	1-1,999	2,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000-199,999	200,000-299,999	300,000-499,999	500,000-749,000	750,000+	Total/Avg
Number of lots sold per year	6.5	6.5	6.5	6.5	6.5	7.5	12.2	19.0	29.7	61.6	504,017
Number of broilers sold per year	105	7,073	21,459	44,443	79,716	150,525	244,502	380,835	594,087	1,231,727	8,500,313,357
Data-related costs*	$48.17	$48.17	$48.17	$48.17	$48.17	$55.63	$90.36	$140.74	$180.02	$298.03	$5,911,451
Premises registration costs	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$148,463
Total costs, $/operation	$52.81	$52.81	$52.81	$52.81	$52.81	$60.27	$95.00	$145.38	$184.66	$302.67	$6,059,914
Total costs, $/broiler	$0.5008	$0.0075	$0.0025	$0.0012	$0.0007	$0.0004	$0.0004	$0.0004	$0.0003	$0.0002	$0.0007

	Turkeys (annual turkeys sold)							
	1-1,999	2,000-7,999	8,000-15,999	16,000-29,999	30,000-59,999	60,000-99,999	100,000+	Total/Avg
Number of lots sold per year	2.3	2.3	2.3	2.3	4.3	7.4	23.1	41,548
Number of turkeys sold per year	38.9	4,619	12,121	22,365	43,100	74,451	231,116	283,247,649
Data-related costs*	$17.07	$17.07	$17.07	$17.07	$31.86	$55.03	$132.60	$521,342
Premises registration costs	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$4.64	$39,131
Total costs, $/operation	$21.71	$21.71	$21.71	$21.71	$36.49	$59.67	$137.24	$560,473
Total costs, $/turkey	$0.5589	$0.0047	$0.0018	$0.0010	$0.0008	$0.0008	$0.0006	$0.0020

* Based on minimum of $15/lot or Total data cost reported in tables 7.5-7.7 times the number of lots sold per year.

Table 7.9 reports the total costs to the poultry industry by sector under two of the three different scenarios: 1) premises registration only and 3) full traceability ID system for various adoption rates. Scenario #2 (bookend only) is not reported here as it would be the same as the full traceability scenario (#3) given the integration assumption (i.e., processors also are producers). The costs are reported for both a uniform adoption rate and a lowest-cost-first adoption rate. Given that animal identification is a voluntary program, the lowest-cost-first adoption rate likely better reflects what costs would be to the industry with something less than 100% adoption. Note that at 100% adoption the two methods have equal costs.

The premises registration scenario (#1) reflects only costs associated with registering premises (see Section 7.3.5 for a discussion about how premises registration costs were estimated), which is significantly below Scenario #3. However, it is also important to recognize that this represents no animal or group/lot identification and no ability to trace animal movements. Scenario #3 is the full traceability system costs given different adoption rates.

Table 7.9. Total Poultry Industry Cost versus Adoption Rate Under Alternative Scenarios.

Scenario #1 -- Premises Registration Only

Industry Segment	Premises Registration	Adoption rate	Uniformly adopted	Lowest cost adopted first
Layers	$456,043	10%	$64,364	$6,388
Broilers	$148,463	20%	$128,728	$13,785
Turkeys	$39,131	30%	$193,091	$27,677
TOTAL COST	$643,638	40%	$257,455	$70,125
		50%	$321,819	$150,181
		60%	$386,183	$233,730
		70%	$450,546	$322,351
		80%	$514,910	$420,178
		90%	$579,274	$531,137
		100%	$643,638	$643,638

Scenario #3 -- Full Traceability Animal ID System

Industry Segment	Traceability Cost	Adoption rate	Uniformly adopted	Lowest cost adopted first
Layers	$2,492,469	10%	$911,286	$629,118
Broilers	$6,059,914	20%	$1,822,571	$1,283,803
Turkeys	$560,473	30%	$2,733,857	$2,020,954
TOTAL COST	$9,112,856	40%	$3,645,143	$2,829,849
		50%	$4,556,428	$3,734,503
		60%	$5,467,714	$4,703,411
		70%	$6,378,999	$5,719,316
		80%	$7,290,285	$6,841,228
		90%	$8,201,571	$7,976,271
		100%	$9,112,856	$9,112,856

8. Government Cost Estimates

8.1 Executive Summary/Chapter Overview

THE PURPOSE OF THIS CHAPTER was to examine governmental benefits and costs of NAIS. The chapter lays out findings regarding past and future federal NAIS budgets and summarizes findings from evaluations of select states. The data necessary to complete a robust empirical analysis were not always available. With that constraint in mind, this chapter provides: a) budgetary information on how NAIS funds have been allocated and utilized, b) a summary of experienced and potential governmental cost savings that may result from use of NAIS resources in animal disease response and surveillance efforts, and c) viewpoints and implications from animal ID coordinators in several key US states regarding NAIS issues and associated costs. The NAIS program is estimated to cost the federal governmental around $23.8 million to $33.0 million and combined state governmental costs total $2.1 to $3.4 million annually. The NAIS program is also estimated to possibly reduce bovine tuberculosis response costs of government animal health agencies by approximately $300,000 annually. In addition to sample estimated "direct cost savings," NAIS is identified to provide the government with an array of other "indirect benefits" that are difficult to empirically value.

8.2 Federal Government Analysis

8.2.1 Historical USDA NAIS Budgets

Our analysis of federal governmental expenditures on NAIS begins with a tabulation of historical governmental expenditures directly appropriated to the NAIS program. We obtained NAIS expenditure information from three data sources: 1) USDA NAIS Business Plan (USDA, 2007e), 2) an updated version (June 2008) of the USDA business plan provided by Mr. Neil Hammerschmidt (USDA, 2008g), 3) and the US Government Accountability Office report on NAIS (GAO, 2007). Collectively, these

sources identify the total amount of funds available to NAIS and the NAIS expenditures planned for fiscal years (FY) 2004 through 2009. Furthermore, the actual expenditures incurred for fiscal years 2004 through 2007 were collected. This information is summarized in tables 8.1-8.3.

Over the time period of FY 2004 to FY 2008, approximately $127.7 million was made available to USDA to implement NAIS (table 8.1). These funds are typically sub-allocated in NAIS budgets across four primary activities: 1) Information Technology, 2) Cooperative Agreements, 3) Communications and Outreach, and 4) Program Administration (USDA, 2008g). These four primary activities accounted for 14.4%, 51.2%, 9.9%, and 24.5%, respectively, of the actual NAIS obligations between FY 2004 and FY 2007 (table 8.2). These actual obligation allocations closely reflect the planned allocations of 18.1%, 50.5%, 7.7%, and 23.6%, respectively, made for the FY 2004 – FY 2008 period (table 8.3). Actual expenditures were less than planned expenditures over the FY 2004 – FY 2006 time period. Any unobligated funds were carried over, per Congress stipulation, and remained available to cover future NAIS expenditures (USDA, 2008g). This is why actual expenditures in FY 2007 were able to exceed planned expenditures by approximately $10.7 million. Furthermore, Congressional permission to carry over unobligated funds underlies USDA's ability to have planned obligations in 2008 (totaling $24.7 million) to exceed FY 2008 appropriations of $9.7 million (table 8.1).

Table 8.1. Appropriated Funds Available to Implement NAIS.

Dollars in Thousands

	Fiscal Year					
	2004 (CCC Funds)[a]	2005	2006	2007	2008	Total
Total Funds Available	$18,793	$33,197	$33,007	$33,053	$9,683	$127,732

* Sources: USDA, 2008g

[a]CCC denotes Commodity Credit Corporation

Table 8.2. Actual NAIS Obligations.

Dollars in Thousands

	Fiscal Year					
	2004	2005	2006	2007[a]	Total	% of Total
Actual Obligations						
Information Technology	$1,829	$4,140	$2,466	$6,260	$14,695	14.4%
Cooperative Agreements	$13,666	$12,936	$5,231	$20,311	$52,144	51.2%
Communications and Outreach	$2,134	$2,557	$2,422	$2,951	$10,064	9.9%
Program Administration	$357	$3,948	$6,424	$14,264	$24,993	24.5%
Total	$17,986	$23,581	$16,543	$43,786	$101,896	

* Sources: USDA, 2008g.

[a] FY 2007 actual obligations are as of September 2007 (USDA, 2008g).

Table 8.3. Planned NAIS Obligations.

Dollars in Thousands

	Fiscal Year								
	2004	2005	2006	2007	2008 Approp.	Total Approp.	% of Total Appropriated Funds	2008 Carry Over[a]	2008 Total[b]
Planned Obligations[a]									
Information Technology	$2,009	$6,858	$7,733	$5,224	$1,311	$23,135	18.1%	$2,753	$4,064
Cooperative Agreements	$14,357	$17,050	$13,882	$15,067	$4,182	$64,538	50.5%	$8,787	$12,969
Communications and Outreach	$2,137	$3,474	$1,940	$1,940	$392	$9,883	7.7%	$825	$1,217
Program Administration	$290	$5,815	$9,452	$10,822	$3,797	$30,176	23.6%	$2,635	$6,432
Total	$18,793	$33,197	$33,007	$33,053	$9,682	$127,732		$15,000	$24,682

* Sources: USDA, 2008g

[a] *2008 Carry-Over Funds* are planned expenditures using $15 million in unobligated funds from prior fiscal years (USDA, 2008c).

[b] *2008 Total* planned obligations include both Appropriated Funds ($9.7 million) and carry over funds ($15 million) (USDA, 2008c).

8.2.2 Future USDA NAIS Budgets

Table 8.4 shows three alternative future NAIS budgets. The first budget (columns 2 & 3) presents USDA's current budget plan for fiscal year 2009 (USDA, 2008g). This budget forecasts total expenditures of $24.1 million will be available. Allocations across the four primary budget activity categories are similar to actual expenditures over the FY 2004 – FY 2007 period, with small reductions (increases) in relative funding of cooperative agreements (program management).

As shown in table 8.1, the NAIS program was provided approximately $33 million in FY 2005 – 2007. As a comparison to the current forecast provided by USDA, which assumes a $24.1 million budget, table 8.4 (columns 4 & 5) also presents a budget assuming $33 million are available with allocations made consistent with actual expenditures incurred during the FY 2004 – FY 2007 time period (table 8.2).

As a final budget forecast, table 8.4 (columns 6 & 7) also provides a budget reflective of USDA plans to have NAIS information infrastructure (IT) in a "maintenance phase" by FY 2010 (USDA, 2008g). This will reduce expected IT expenditures to approximately $2 million per year (USDA, 2008g). Given these IT savings, table 8.4 presents a potential future budget of $23.8 million. Allocations to the three other core programs (Cooperative Agreement, Communications and Outreach, and Program Administration) reflect the average expenditures incurred during FY 2004 – 2007 (table 8.2).

It would be advantageous to forecast future federal NAIS budgets for alternative levels of NAIS adoption and goals. For instance, it would be useful to develop and compare NAIS budgets conditional on achieving 30%, 70%, or 90% registration of the nation's premises. However, sufficient budgetary information necessary to accurately generate these differential forecasts is simply not available at this time. Accordingly, we note that this is a subject that should be addressed in future research as a valuable area of focus given ongoing modification of NAIS goals and areas of focus.

Table 8.4. USDA NAIS Future Fiscal Year Planned and Forecasted Expenditures.

Dollars in Thousands

Planned Program Expenditures	FY 2009[a]	% of Total	$33 million budget [b]	% of Total	$23.8 million budget [c]	% of Total
Information Technology	$3,500	14.5%	$4,759	14.4%	$2,000	8.4%
Cooperative Agreements	$10,575	43.8%	$16,887	51.2%	$13,036	54.8%
Communications and Outreach	$800	3.3%	$3,259	9.9%	$2,516	10.6%
Program Administration	$9,269	38.4%	$8,094	24.5%	$6,248	26.3%
Total	$24,144		$33,000		$23,800	

[a] FY 2009 planned expenditures were obtained from USDA (USDA, 2008g).

[b] Forecasted budget of $33 million reflects USDA's forecasts as of December 2007 (USDA, 2007e).

[c] Forecasted budget of $23.8 million reflects potential reduction in *Information Technology* expenditures (USDA, 2008g and author calculations).

8.2.3 Governmental Costs of Disease Response and Surveillance

Careful examination of the costs incurred by governmental agencies in responding to animal disease events is critical in assessing the potential cost savings that NAIS may provide. That is, resources available through implementation of NAIS may be useful in governmental response or surveillance of animal diseases. Since associated response and surveillance are not a component of NAIS budgets (and hence do not fit into the preceding discussions), a separate analysis is warranted.

This animal disease response and surveillance costs section of our analysis is comprised of three main components. The first briefly highlights the magnitudes of select past animal disease events to provide some scope to the governmental costs at discussion. Subsequently, we overview the potential cost savings that may be experienced by leveraging NAIS resources with a new software application developed by APHIS for on-farm disease testing and reporting. Finally, we summarize how differences in governmental costs incurred following a range of hypothetical, simulated animal disease events characterized by varied levels of traceability capabilities should be evaluated in future research and why this was not conducted in our analysis.

8.2.3.1 Scope of Costs

It has been well documented that federal government expenditures can be substantial when responding to domestic animal disease events. While multiple events are provided by the literature, a select sample is highlighted in table 8.5. Table 8.5 documents the diversity in magnitude, duration, geographical location, and disease type that likely require governmental animal health agency responses.

Bovine tuberculosis (TB) is one endemic disease that has had ongoing concerns in the United States. Since 2002, detections of bovine TB in six different states (Arizona, California, Michigan, Minnesota, New Mexico, and Texas) have required the destruction of over 25,000 cattle and corresponding USDA owner indemnification and control expenses of over $130 million (USDA, 2007i). Moreover, since 2004 USDA has tested over 787,000 animals for bovine TB (USDA, 2007i). As evidence of state

governmental cost magnitudes; in addition to federal expenditures, the state of Minnesota has spent approximately $1.4 million on TB control and eradication efforts since 2006 (Radintz, 2008).

In addition to bovine TB, USDA-APHIS conducts an ongoing bovine brucellosis eradication program. While the national herd prevalence rate is rather low (0.0001% in fiscal year 2007), APHIS routinely tests a significant number of animals. For instance, in 2007, APHIS tested 835,200 head on farms or ranches, in addition to an estimated 7.995 million head tested as part of the Market Cattle Identification (MCI) program (USDA, 2007j). While some select aggregated cost estimates are available (i.e., $138.9 million in Federal eradication efforts corresponding to the noted Exotic Newcastle event in table 8.5), information at a more allocated (e.g., salary, travel, and indemnification allocations) level of detail is difficult, if not impossible to find. Moreover, multiple USDA-APHIS reports (USDA 2004, 2006c, 2007e, 2008k) have documented the mixed success in the ability to quickly (if at all) identify critical animals and herds in responding to disease events. For instance, despite a 48-day investigation, APHIS was not able to identify the herd of origin in the 2006 BSE response in Alabama (USDA 2006b, 2008g). This is particularly important for our assessment of NAIS costs and benefits as one significant *potential* benefit that NAIS may provide is: a) an increase in the likelihood of identifying critical animals/herds and b) a reduction in governmental costs in responding to animal diseases. To thoroughly appraise these potential cost savings, solid estimates are needed of incurred governmental expenditures over a range of disease types and scopes that are further characterized by inherent differences in the traceability capabilities available in each response. Unfortunately, this detailed historical information simply was not available for this analysis.

Detailed government animal health emergency response cost information is generally not available for two primary reasons. First, traditionally the core priority of governmental responses to animal diseases is containment and eradication, not detailed record-keeping of associated resources used to arrest the disease. While this makes sense, there is certainly value as well in more thorough record-keeping of expenditures and corresponding results during a disease investigation. Second, there is not sufficient historical frequency, nor diversity of

events, to facilitate a "detailed, real-world evaluation" of how even aggregate-level governmental expenditures vary when different levels of traceability capabilities are present and utilized.

8.2.3.2 Mobile Information Management (MIM) Cost Savings

A benefit offered by NAIS is a reduction in governmental expenditures associated with animal disease eradication as well as surveillance and testing. We evaluated the potential governmental costs savings at the individual herd level in on-going animal health surveillance programs. Namely, we examined the relative cost differences of conducting animal surveillance activities using technology making use of NAIS resources with surveillance activities not utilizing technology that leverages NAIS resources. One such technology is the Mobile Information Management (MIM) system supported by APHIS. MIM was originally developed by the Michigan Department of Agriculture (under the name of RegTest) to assist with the state's bovine TB surveillance and eradication efforts (Munger, 2008a). While additional details and visual depictions on the MIM system and its operations are available in Munger (2008a) and Baca (2007), we succinctly note here that MIM is a PDA (personal digital assistant) based application that utilizes RFID (radio frequency identification) or barcode technologies to increase the efficiency and accuracy of bovine TB testing.

Table 8.5. History of Select Government Animal Disease Responses.

Species	*Event*	*Initiation Year*	*Notes**	*Source*
Cattle	BSE – Alabama	2006	Investigation of 37 farms took 48 days.	USDA, 2008g
Cattle	BSE – Texas	2005	Investigation of 1,919 animals (8 herds) lasted 61 days.	USDA, 2008g
Cattle	BSE - Washington	2003	255 animals from 10 premises were destroyed; investigation of over 75,000 animals (189 herds) took 46 days	USDA, 2008g
Cattle	TB – California	2008	Tested over 150,000 animals (105 herds)	Bennett et al. (2008)
Cattle	TB - New Mexico	2007	Tested 20,150 animals (16 herds); 14 State & Federal personnel; $35 million in Federal funds allocated for indemnification	USDA, 2008g
Cattle	TB – Minnesota	2005	Over 3,500 animals have been depopulated; USDA has incurred over $5 million costs ($3.9 million in indemnities)	USDA, 2008g
Cattle	TB – California	2002	875,616 animals (687 herds) tested; 13,000 animals depopulated	USDA, 2008g
Poultry	Exotic New Castle - California, Nevada, Arizona, Texas, New Mexico	2002	2,700 infected premises; nearly 4.5 million birds were euthanized; peak eradication response consisted of 1,600 personnel; total investigation period of 350 days; Federal eradication effort expenses of $138.9 million	CNA Corporation (2004) USDA, 2008g

* Amounts noted are projections/estimates directly obtained from the sources indicated.

Use of the MIM system requires a PDA, RFID wand for animal scanning, and Bluetooth capabilities (Munger, 2008b). Combined, this system allows for disease surveillance to be conducted in an electronic manner. Munger indicates that MIM results in fewer testing errors as the software replaces the need for manually reading and recording data. Moreover, Munger advocates that, while economies of scale may exist in the direct cost saving justification for using MIM, data quality resulting from use of MIM is enhanced regardless of the evaluated herd size. Since the MIM system is currently in use for bovine TB testing in several states including Michigan, Minnesota, and New Mexico, we attempted to obtain additional feedback on the benefits MIM provides from practitioners in these states. Feedback was obtained from three different sources: 1) a weekly status report from Ray Scheierl (State of Minnesota), 2) a direct cost analysis of MIM from Diana Darnell (USDA-APHIS), and 3) email correspondence between Diana Darnell (USDA-APHIS) and three MIM users in Michigan.

On July 24, 2008, Ray Scheierl (State of Minnesota) submitted a report to APHIS following the state of Minnesota's first week of using the MIM system in its TB surveillance efforts. The report estimates the start-up cost of each MIM system to be $3,500 ($850 for a RFID wand reader, $2,500 for a PDA, and $0 for the MIM software provided by APHIS). According to Scheierl's calculations, use of MIM pays for itself in the form of TB test cost savings after use on 1,800 animals. The cost savings underlying MIM's use originate from observed reductions in both veterinarian time (valued at $70/hour) and data entry personnel time (valued at $30/hour) required in test reporting as data entry and results reporting are automated by MIM (Scheierl, 2008). Scheierl also notes that in addition to cost savings of labor reductions, MIM provides indirect value in a reduction in data errors (electronic vs. manual entry) and duration of production interruption imposed on producers of herds being tested.

More specifically, Scheierl estimates that the time of testing on day 2 of a herd's evaluation is reduced by 10-20% relative to TB testing without the MIM system.[12] While these "indirect benefits" of data quality and on-farm production interruption are difficult to empirically estimate, they certainly are noteworthy. As additional evidence that the MIM system provides net benefits to those with MIM experience, Scheierl noted that the state of Minnesota is equipping 10 state veterinarians with the PDA/RFID wand/MIM software systems to conduct the 40,000 TB tests anticipated to be necessary by December 2008.

In addition to the analysis by Ray Scheierl, we obtained an analysis from Diana Darnell (USDA-APHIS). Darnell's analysis was based upon a herd of 3,692 animals that was tested in Michigan in July of 2008 (Darnell, 2008). The National TB MIMS software was used in conducting the TB tests. Comparable manual time of testing calculations was obtained by a survey Darnell conducted of animal health technicians and field veterinarians. Using the assumptions proposed by Darnell (2008), table 8.6 suggests using the MIMS software in a TB test of approximately 3,700 animals results in cost savings of approximately $9,000 (or approximately $2.44/head).[13]

Finally, we supplement the information provided by Scheierl and Darnell by correspondence Darnell has had with Michigan TB test practitioners. Commentary by both Dr. Tom Flynn (USDA-APHIS) and Dr. Dan Robb (Michigan Department of Agriculture) suggests that there is economies of size to the TB cost savings provided by MIM. In particular, Flynn indicates no time savings in creation of TB test charts in herds with less than 20 head while use of MIM on a 100-head herd may reduce test chart creation time from 1 hour (manual) to 15 minutes (MIM). Robb suggests that test charts for 50- and 100-head herds may be conducted 1 and 2.5 hours quicker, respectively, by using MIM. This suggests that not only is there economies of size to MIM's cost savings, but that these cost savings occur at an increasing rate. This corresponds with Robb's proposition

[12] It is worth briefly noting that TB tests typically involve injecting each individual animal initially (day 1) and returning to the herd in question three days later to evaluate and diagnose each individual animal. As such, electronic entry of information on day one may provide benefits in the return visit three days later.

[13] The actual amounts deviate slightly from Darnell's original calculations due to rounding differences.

that test chart creation with MIM takes about 15 minutes regardless of herd size, while manual test chart creation is directly a function of herd size. In addition to the suggested test chart creation time savings, both Flynn and Robb confirmed Scheierl and Munger's points regarding additional benefits provided by MIM in the form of notable data entry error reduction. For instance, Flynn noted that MIM prevents occurrences of a specific experience he had where in evaluating the test chart of a 1,000 head herd, he spent over 1 week correcting mistakes from manual data entry. Regarding accuracy, Robb suggests that using eID tags has increased accuracy of testing from an error rate of 5-10% in reading metal tags to an error rate of about 1% in using eID tags. Moreover, Robb noted that the level of specificity required in federal paperwork accompanying the depopulation is better met and with more confidence when using the MIM system.

Also note that MIM may further reduce cost of testing in situations where the same herd is repeatedly tested as the information from prior tests is available and the herd is already partially (net of reasonable tag loss and herd turnover rates) tagged with RFID ear tags. An example situation is the annual whole herd testing of all animals 12 months of age or older conducted of Michigan producers operating in the MA (Modified Accredited) Zone (MDA, 2006). Discussions with Munger and Scheierl suggest that MIM may provide additional cost savings in these scenarios. That is, the above discussion primarily stems from cost savings gained on the second day of TB testing. In cases of repeated testing of a same herd, additional cost savings on both test days may be experienced. Moreover, Scheierl notes that having a test chart electronically created based upon prior testing of a given herd not only reduced the time of testing a herd, it also enhances the testing procedure quality as specific animals now have to be accounted for.

Our analysis was unable to identify any comprehensive efforts to assess the benefits that MIM may provide at a more aggregated level. The above information obtained from Scheierl, Darnell, Flynn, and Robb is certainly a useful first-step that supports the use of MIM. However, in the future we encourage a more through attempt by animal health officials to conduct analysis similar to that of Darnell's study of one 3,692 head dairy that would better enable a rigorous examination of cost

savings experienced for herds of different sizes. This seems particularly relevant as APHIS is considering development of equivalent MIM software packages for other surveillance activities including Pseudorabies, Avian Influenza, and Johne's disease (Baca, 2007).

Nonetheless, for purposes of developing an estimate based upon the current state of knowledge noted above, we believe that use of an automated system like MIM may save the government approximately $1.50 for each TB tested animal. Coupling this estimate with the fact that in recent years approximately 200,000 animals have been TB tested annually (USDA, 2007i), produces a total, annual cost savings estimate of $300,000. Given that MIM appears to work most efficiently with NAIS resources already in place, this can be used as an approximation of the reduction in annual TB testing expenditures afforded by NAIS.

This procedure likely underestimates the cost savings provided by NAIS. For instance, APHIS is considering expansion of MIM to other surveillance programs. As MIM is expanded, the cost savings noted above will be enhanced. Moreover, while not a "direct governmental costs," NAIS and associated use of programs like MIM may provide "indirect benefits" in the form of more content and compliant producers as testing procedures are shorter in duration and likely more tolerable to producers.

8.2.3.3 Simulated Animal Disease Events

In addition to the cost savings of surveillance efforts, NAIS may provide a reduction in governmental expenditures associated with animal disease control and eradication. When this project was initiated, we anticipated using an epidemiological disease spread model to provide associated insights on the cost savings of alternative traceability capabilities. Unfortunately, models available to use were parameterized only for small geographical regions and a limited number of diseases. Accordingly, we were not able to obtain national estimates of government costs associated with mitigating a contagious disease outbreak with or without the impact of animal ID and tracing on such government costs. As such, we strongly encourage future research to use epidemiological disease spread models once data for animal populations and densities are

adequately specified for broader, more national consideration of potential animal disease events.

While these limitations unfortunately prohibit current empirical estimation of the benefits NAIS provides in reducing government costs following different animal disease events, a couple points are worthwhile. Namely, by definition, any system that provides additional information on the location of farms (e.g., premises registration) and the movement of animals (e.g., animal tracking) will enhance governmental disease response. That is, NAIS provides benefits in this manner and we leave it to future research, enabled by better data and model capabilities; to empirically estimate these benefits for potential animal disease events. As such, our analysis under-estimates the government benefits, in the form of cost savings, provided by NAIS.

Table 8.6. TB Test Costs Comparisons: MIM vs. Manual*

	MIMS TB Testing		*Manual TB Testing*	
	Costs	Notes	Costs	Notes
Animal ID & Data Collection				
On Injection Day	$1,429	(7.5 hours for 6 AHTs)	$4,572	(12 hours for 12 AHTs)
On Read Day	$1,048	(5.5 hours for 6 AHTs) -- 3 teams of 2 people (1 runs PDA, 1 scan and read tags)	$4,572	(12 hours for 12 AHTs) -- 6 teams of 2 people (1 writes down data, 1 manually reads tags)
Test Chart Creation				
	$16	(0.5 hour for 1 AHT to download herd inventory on injection day)	$2,096	(66 hours for 1 AHT)
	$32	(1 hour for 1 AHT to reload PDA with data prior to re-read day)	$100	(2 hours for 1 V for error checking/signing)
	$50	(1 hour for V to check errors, sign chart)		
	$48	(1.5 hours for AHT to merge PDA data, error check, print charts)		
Data Entry into FAIR	$3	(5 minutes for 1 AHT)	$288	(21 hours for 1 DE)
Total Costs:	$2,624		$11,627	
Cost Savings of MIM**:	$9,003			

Source: Darnell (2008)

* Assumptions: Veterinarian (V), Animal Health Technician (AHT), and Data Entry (DE) wages are $50/hr, $31.75/hr, and $13.75/hr, respectively. Manual test chart writing takes 1.5 hours per 100 animals, error-checking and correction of 3,700 animal test chart takes 10 hours, and Data Entry clerk manually enters animals at a rate of 180/hour.

** Values slightly differ due to rounding in Darnell (2008).

8.3 State Government Analysis

8.3.1 Michigan's Experience

Given the state of Michigan's status as the only US state with a mandatory individual animal identification program in operation, Michigan provides a good model to initially evaluate in developing estimates of state expenditures associated with NAIS adoption. Furthermore, between January 1, 2000 and June 1, 2006 over 18,000 herds and 1,191,063 animals (average tested herd size of approximately 66 head) were TB tested in Michigan (MDA, 2006). Accordingly, in October 2007 members of our research team visited with personnel at the Michigan Department of Agriculture (MDA) as well as producers and auction market managers throughout Michigan. The Animal Industry Division of MDA is responsible for the state's animal identification program. The research team held discussions with key MDA personnel including Kevin Kirk (MDA Director's Special Assistant) and Roberta Bailey (MDA accountant) to obtain detailed information regarding expenditures the state has incurred in administering its animal identification program. Bailey provided the research team with detailed summaries of the Michigan Department of Agriculture Animal Identification Program expenditures for fiscal years 2006 and 2007.

These expenditures are shown in table 8.7 and segmented into five categories. Consistent with their name, the *Payroll*, *Travel*, and *Materials, Brochures, and Supplies* categories encompass all salary and benefit; travel; and materials, brochures, and supplies expenditures, respectively. The *Equipment* category includes expenditures incurred in purchasing RFID reading equipment for locations of public animal transactions including auction markets and slaughterhouses. These expenses were incurred in implementing the state-wide program, as Michigan subsidized building the state's infrastructure to expedite the implementation process. The *Grants* category is directly associated with bills the state has received from Holstein Association USA, Inc. (HAUI). The state of Michigan currently uses HAUI to process all RFID transaction reads, to obtain RFID tags (Michigan provided 100% of the tags needed in the state's tuberculosis zone (north-east region) free-of-charge, but required producers outside of this zone to purchase their own tags), and

to provide the state with weekly summary reports on the number of RFID reads made in each market. As shown in table 8.7, the majority (approximately 80%) of total funds in fiscal years 2006 and 2007 were allocated to *Payroll* and *Grants*.

Revenue used to cover these expenditures came from two sources: Federal Funds and Michigan Ag Equine Funds. As shown in table 8.7, Federal Funds covered $191,498 and $226,385 (35% - 40% of total expenditures) of MDA's expenditures in fiscal years 2006 and 2007, respectively. The remaining funds (60% - 65%) were covered by revenue allocated to MDA from the state's Ag Equine Funds, which is a resource the state obtains from horse race track revenues.

The preceding paragraphs summarized experiences incurred by Michigan in the most recent two complete fiscal years. In order to project future expenditures for the state, a number of key assumptions must be made including:

- *Payroll expenditures* will remain the same in future years as no adjustments in staff capacity are anticipated.
- *Travel expenditures* will remain the same in future years as no adjustments are anticipated.
- *Materials, supplies, phone charges, etc.* will reduce to an average of $30,000 in futures years. This reduction is based on the assumption that most advertising, promotional, informative flyers and other materials are primarily "up-front" expenditures that will be reduced in frequency and quantity in future years.
- *Equipment expenses* will be $0 in future years. This assumes that future upgrades and maintenance of RFID reading equipment will be the responsibility of owners at those facilities (an assumption consistent with the direct cost estimates for individual industry segments presented in Sections 4-7 of this report).
- *Holstein Association USA, Inc. (HAUI) expenditures* will be reduced to an estimate of $6,300 per month. Over the three-month period of March, April, and June in 2007 these expenses averaged $21,052. However, approximately 70% of these expenses were for RFID tag purchases, shipping of these products, site inspections, and tag order processing fees. All of these expenses

were initially incurred by MDA to facilitate implementation of the program. The assumption of $6,300/month is based on an estimate of future expenditures being 30% of previous values and that future RFID purchases and related HAUI expenses will be the responsibility of cattle owners, regardless of their TB-zone status (an assumption consistent with the direct cost estimates for individual industry segments presented in Sections 4-7 of this report).

Based upon these assumptions and corresponding discussions with MDA personnel, projections were made regarding future expenditures of the Michigan Department of Agriculture Animal Identification Program. Table 8.8 shows a summary of these projections. The total annual expenditure ($287,833) is forecasted to be approximately 51% - 53% of the totals realized in fiscal years 2006 and 2007. Furthermore, cost sharing of the state's expenditures with federal sources is assumed to stop in future projections. This assumption can be reversed if NAIS cooperative agreements are assumed to persist into the future; in which case, it seems the best forecast given current information would be for federal and state sources to each contribute approximately 50% of funding consistent with fiscal years 2006 and 2007.

The final analysis we conducted of MDA Animal Identification Program expenditures was to identify how these expenditures were allocated across the three core NAIS components of Premises Identification, Animal Identification Systems, and Animal Movement Data Access. These allocations are based primarily on an analysis of historical budgets (fiscal years 2006 and 2007) and consultation with MDA personnel. Table 8.9 shows a summary of these allocations based on actual fiscal year 2006 and 2007 expenditures. A general observation is that a significant portion of expenditures in each of the five budget sub-categories were occurred in efforts associated with premises registration and/or animal identification systems. To project future 2008 and onward allocations, we consulted further with MDA personnel and utilized expected future expenditures in table 8.8 allocated them across NAIS components. Table 8.10 presents a summary of these allocations (in 2007 dollars). Relative to fiscal years 2006 and 2007 (table 8.9), a notably higher proportion of expenditures are expected to be incurred in activities regarding animal

identification systems and/or animal movement data access. This anticipation is consistent with the notion that as more premises are registered, fewer resources will be needed for premises registration and may be reallocated to animal identification systems or animal movement data access activities.

Table 8.7. Michigan Dept. of Agriculture Animal Identification Program Expenditures: Fiscal Years 2006 and 2007.

Description	FY 2006 Total Expenditure	FY 2006 % Paid By MI Funds	FY 2006 % Paid By Federal Funds	FY 2007 Total Expenditure	FY 2007 % Paid By MI Funds	FY 2007 % Paid By Federal Funds
Payroll	$260,485	53%	47%	$231,275	38%	62%
Travel	$5,899	27%	73%	$5,407	38%	62%
Materials, Brochures, Supplies	$87,453	44%	56%	$67,263	31%	69%
Equipment	$18,472	14%	86%	$27,077	35%	65%
Grants	$168,970	100%	0%	$231,493	93%	7%
Totals	$541,279	$349,780	$191,498	$562,515	$336,129	$226,385

Table 8.8. *Projected Future* MDA Animal Identification Program Expenditures.

Description	Projected Annual Expenditures Total Expenditure	% of FY 2006 & 2007 Expenditures	% Paid By MI Funds	% Paid By Federal Funds
Payroll	$245,880	100%	100%	0%
Travel	$5,653	100%	100%	0%
Materials, Brochures, Supplies	$30,000	*NA*	100%	0%
Equipment	$0	0%	100%	0%
Grants	$6,300	30%	100%	0%
Totals	$287,833			

Table 8.9. Allocation of MDA Animal Identification Program Expenditures (2006-2007) by NAIS Component.

Description	*% to Premises Registration*	*% to Animal Identification Systems*	*% to Animal Movement Data Access*
Payroll	35%	60%	5%
Travel	15%	80%	5%
Materials, Brochures, Supplies	45%	50%	5%
Equipment	5%	75%	20%
Grants	15%	75%	10%

Table 8.10. Allocation of *Future MDA* Animal Identification Program Expenditures by NAIS Component.

Description	*% to Premises Registration*	*% to Animal Identification Systems*	*% to Animal Movement Data Access*
Payroll	15%	30%	55%
Travel	0%	45%	55%
Materials, Brochures, Supplies	10%	20%	70%
Equipment	5%	50%	45%
Grants	10%	45%	45%

8.3.2 Other States

In addition to the insights provided by examining the state of Michigan, information was also gathered from other states. In particular, given time and resource constraints prohibiting a thorough evaluation of each individual state, we visited with key personnel in twelve other states (Arkansas, Colorado, Idaho, Indiana, Iowa, Kansas, Minnesota, North Carolina, Oklahoma, Tennessee, Texas, and Wisconsin). These states were identified to both cover a geographic spectrum of states while also including multiple states ranking in the top 5 regarding cattle (Texas, Oklahoma, Kansas), swine (Iowa, North Carolina, Minnesota, Indiana), and broiler/turkey (Minnesota, North Carolina, Arkansas) inventories as recorded by USDA-NASS (2008e).

Contacts at each of these states were interviewed with two main goals in mind. The first goal was to obtain budget information regarding historical expenditures incurred in each state associated with implementation of NAIS. The second goal was to assess benefits that each state may have realized by their participation in NAIS. This information was obtained by phone and email interviews with key personnel, the names and associations of individual contacts interviewed are provided in Appendix A8.1.

Notable variation was identified in the ability of individual states to provide historical expenditure information that conveyed how each year's budget was allocated across key categories such as personnel, travel, and contractual arrangement. Moreover, there was limited ability to provide budgets allocating expenditures across the three NAIS components (Premises Identification, Animal Identification Systems, and Animal Movement Data Access). This, in combination with the confirmed diversity in state-specific issues, resources, and constraints lead us to purposely avoid making any empirical assessment of the "representative state" regarding cost and benefits of NAIS. Moreover, discussions with all contacted states (with the notable exception of Wisconsin) revealed significant reliance on USDA cooperative agreements to fund state-level NAIS activities. In particular, the majority of contacted states noted that, besides those used in recent years to meet USDA cost share requirements, no additional in-state resources have historically been available to conduct NAIS-related activities. This point is especially

important for three reasons. First, future decision makers need to be aware of the dependency of state-level NAIS activities on availability of federal NAIS funds. Second, this confirms that the experience in Michigan is *not* representative of many other states.[14] Third, this point suggests that when assessing governmental cost of the national NAIS program, it is reasonable to base much of that analysis on federal government expenditures. One of the core components of past federal NAIS budgets (see tables 8.2 and 8.3 above) has been cooperative agreements. Identification of nearly complete reliance of individual states on cooperative agreement funding leads us to focus on federal governmental budgets and infer implications for states from federal budgets. In this spirit, tables 8.11-8.14 present a summary of premises registration rates (a core focus of most cooperative agreements to date), cooperative agreement amounts, and expenditures to-date for each of the 50 states.

Tables 8.11 and 8.12 provide information regarding the overall success of the NAIS program since 2004 in registering premises. Between January 2005 and August 2008, there have been a total of 453,856 premises registered, representing about 33.8% of premises. Table 8.12 reveals that, as of August 2008, 12 states have over 50% of premises registered, 10 have 25-50%, and 28 states have fewer than 25% of their premises registered. This documents the wide range in success to date of states (characterized by diverse geographic, economic, livestock inventory, and other factors) registering premises. [15]

Returning our discussion to cooperative agreement budgets, we observe in table 8.13 that federal support of efforts in individual states has varied both within and across states over the analyzed 2004-2008 period. More specifically, every year except FY 2006 is characterized by a range of $0 to over $750,000 allocations across states. Moreover, awards allocated within individual states including Colorado, Idaho, Kansas, and Texas have

[14] That is MI is less (+/- 50%) reliant on federal funding than most other states (+/-80%). This is not to suggest valuable inferences cannot be obtained by examining Michigan. Rather this suggests that caution should be exerted in generalizing Michigan's experiences to other states.

[15] We thank a reviewer for noting that more narrowly examining the array of factors leading to differential premises registrations and associated NAIS costs experienced to date was beyond the focus of this national cost-benefit study, but is worthy of future research.

varied by over $800,000 over the 2004-2008 period. This variation was noted in our discussions with key personnel in other states. Namely, multiple personnel suggested that volatility in year-to-year NAIS funding allocations to their state has resulted in ongoing adjustments in personnel that have deviated resources from their intended purpose of enhancing premises registration rates.

Forecasts of state government expenses associated with NAIS can also be developed using information in table 8 13. In particular, recall previous points that most states are heavily dependent on federal NAIS cooperative agreement funding. Given the recent requirement for 20% matching of state funds for every dollar provided federally in cooperative agreements (USDA, 2008g), we can estimate the future costs to individual state governments by assuming: a) the 20% matching requirement is sustained, b) total funding of future NAIS cooperative agreements are consistent with the three alternatives presented previously in table 8.4, and c) allocations to individual states are made consistent with those experienced over the FY 2004-2008 period as shown in table 8.13. Combined, this generates the alternative forecasts summarized in table 8.15.

Table 8.15 suggests that this forecasting procedure results in total state governmental expenditures ranging from $2.1 to $3.4 million dollars and average expenditures across the 50 states ranging from approximately $42,300 to $67,549 depending on whether $10.575 or $16.887 million dollars are made available in federal cooperative agreement funds. Moreover, table 8.15 implies notable differences across states in forecasts expenditures. For instance, while Delaware and Rhode Island are forecasted to experience no expenditures, Texas, California, Nebraska, and Oklahoma are forecasted to have expenditures consistently in excess of $100,000.

It may seem appropriate at first glance to use the information provided in tables 8.11-8.14 to answer questions such as "on average, how many premises have been registered for each additional dollar of cooperative agreement expenditures?" However, we purposely do not make such calculations as we deem them as inappropriate. That is, cooperative agreements were engaged in by both federal and state parties with more

than just premises registration enhancement goals. Given the current absence of additional, detailed budget allocation information on every single cooperative agreement (for each state and each year), one can not accurately assess things like "the national, premises weighted-average cost of each additional registration." That is, an attempt based upon the information available (mainly in tables 8.11-8.14) would only generate an "exaggerated upper-bound" estimate of premises registration results from cooperative agreement expenditures as it would over estimate appropriate costs. Moreover, we attempt to more directly assess this in a survey of state ID coordinators discussed in the next section of this report.

Table 8.11. History of Premises Registrations in Each State.

State	Estimated Number of Premises	Jan. 2005	Aug. 2005	Jan. 2006	Aug. 2006	Jan. 2007	Aug. 2007	Jan. 2008	Aug. 2008
Alabama	35,538	125	1,007	1,417	2,385	3,125	4,909	6,501	8,484
Alaska	354	0	2	2	3	41	60	86	111
Arizona	5,170	6	103	172	510	524	617	887	1,049
Arkansas	37,614	0	1,614	4,467	6,284	6,912	7,516	7,573	7,741
California	32,500	0	1,202	1,768	3,325	4,365	5,262	5,682	6,320
Colorado	22,951	46	493	920	5,355	5,569	6,511	6,769	7,583
Connecticut	2,539	0	0	0	0	16	18	19	44
Delaware	1,553	0	74	74	494	651	651	652	652
Florida	28,731	19	835	1,655	3,099	3,735	4,065	4,611	4,923
Georgia	35,431	0	533	857	2,203	2,491	3,980	4,093	4,270
Hawaii	1,391	0	9	72	214	282	291	323	358
Idaho	18,754	1,878	13,860	14,774	15,321	17,915	18,062	18,307	18,524
Illinois	30,046	318	1,108	1,922	5,093	6,213	8,325	10,742	14,355
Indiana	34,790	45	1,674	2,578	11,936	24,613	29,702	30,579	32,068
Iowa	47,273	0	1	473	6,986	11,635	19,062	20,708	23,285
Kansas	39,346	63	1,399	2,076	3,805	4,513	5,187	5,470	6,049
Kentucky	61,251	0	1,726	2,699	7,479	9,909	12,326	12,976	14,094
Louisiana	19,677	0	349	416	620	952	1,157	1,825	2,150
Maine	4,213	2	134	276	376	399	416	419	427
Maryland	7,837	1	2	918	1,178	1,301	1,340	1,355	1,429
Massachusetts	3,555	0	6	8	1,423	1,683	1,685	8,064	8,066
Michigan	29,011	1	180	9,052	14,604	16,223	18,975	19,700	20,509
Minnesota	44,193	0	6,404	8,075	9,547	11,496	11,877	12,126	12,544
Mississippi	29,312	0	0	377	833	1,197	1,472	1,582	4,682
Missouri	79,018	373	3,965	6,680	8,305	12,133	13,600	13,954	14,659
Montana	19,708	1	83	189	567	764	810	837	956
Nebraska	30,841	322	699	3,000	9,212	10,533	13,842	16,099	16,598
Nevada	2,522	0	281	869	1,044	1,132	1,241	1,281	1,385
New Hampshire	2,277	0	2	7	28	36	40	43	51
New Jersey	5,315	0	38	53	475	988	994	997	1,013
New Mexico	11,250	1	92	402	731	834	989	1,168	1,402
New York	25,559	877	9,687	11,551	13,554	13,342	16,753	19,108	20,312
North Carolina	36,142	4	1,843	2,358	3,054	4,837	9,701	10,681	12,168
North Dakota	14,085	4	627	5,878	7,613	7,909	8,313	8,391	8,520
Ohio	48,073	41	535	1,069	1,849	2,180	5,945	6,310	7,066
Oklahoma	71,420	48	1,573	2,428	3,413	4,834	7,342	8,058	9,096
Oregon	28,634	0	0	1,683	2,195	2,332	2,534	2,602	2,672

Table 8.11. History of Premises Registrations in Each State (continued).

State	Estimated Number of Premises	Jan. 2005	Aug. 2005	Jan. 2006	Aug. 2006	Jan. 2007	Aug. 2007	Jan. 2008	Aug. 2008
Pennsylvania	42,302	12,934	15,348	15,788	29,971	26,299	28,206	28,760	29,463
Rhode Island	504	0	0	0	0	5	6	6	8
South Carolina	16,120	75	750	1,090	1,636	1,861	3,734	4,370	4,651
South Dakota	22,356	16	1,086	2,515	4,218	4,694	4,976	5,058	5,134
Tennessee	68,010	0	1,256	6,295	10,557	12,354	14,299	16,253	17,782
Texas	187,118	214	2,606	4,724	18,511	23,312	28,986	29,803	31,953
Utah	12,460	20	5,530	6,538	7,578	8,090	8,671	8,945	9,388
Vermont	4,438	2	54	77	79	293	310	319	360
Virginia	37,673	10	1,278	2,112	3,152	4,001	4,680	5,116	9,100
Washington	22,155	3	722	864	1,154	1,370	1,421	1,539	1,691
West Virginia	17,670	910	6,614	7,114	7,822	8,418	8,738	8,817	9,135
Wisconsin	51,373	4,581	15,844	41,430	53,015	54,133	58,654	59,390	60,728
Wyoming	8,227	0	0	139	400	742	1,540	1,709	1,788
50 State Sum	1,438,280	22,940	103,228	179,901	293,206	343,186	409,791	440,663	476,796
Raw Average	28,766	459	2,086	3,643	5,935	6,940	8,263	8,860	9,557
Premises Weighted Average		670	2,865	5,266	9,743	11,634	14,084	14,820	16,003

Source: John Wiemers

Table 8.12. History of Premises Registrations in Each State (%).

State	Estimated Number of Premises	Jan. 2005	Aug. 2005	Jan. 2006	Aug. 2006	Jan. 2007	Aug. 2007	Jan. 2008	Aug. 2008
Alabama	35,538	0.35%	2.83%	3.99%	6.71%	8.79%	13.81%	18.29%	23.87%
Alaska	354	0.00%	0.56%	0.56%	0.85%	11.58%	16.95%	24.29%	31.36%
Arizona	5,170	0.12%	1.99%	3.33%	9.86%	10.14%	11.93%	17.16%	20.29%
Arkansas	37,614	0.00%	4.29%	11.88%	16.71%	18.38%	19.98%	20.13%	20.58%
California	32,500	0.00%	3.70%	5.44%	10.23%	13.43%	16.19%	17.48%	19.45%
Colorado	22,951	0.20%	2.15%	4.01%	23.33%	24.26%	28.37%	29.49%	33.04%
Connecticut	2,539	0.00%	0.00%	0.00%	0.00%	0.63%	0.71%	0.75%	1.73%
Delaware	1,553	0.00%	4.76%	4.76%	31.81%	41.92%	41.92%	41.98%	41.98%
Florida	28,731	0.07%	2.91%	5.76%	10.79%	13.00%	14.15%	16.05%	17.13%
Georgia	35,431	0.00%	1.50%	2.42%	6.22%	7.03%	11.23%	11.55%	12.05%
Hawaii	1,391	0.00%	0.65%	5.18%	15.38%	20.27%	20.92%	23.22%	25.74%
Idaho	18,754	10.01%	73.90%	78.78%	81.69%	95.53%	96.31%	97.62%	98.77%
Illinois	30,046	1.06%	3.69%	6.40%	16.95%	20.68%	27.71%	35.75%	47.78%
Indiana	34,790	0.13%	4.81%	7.41%	34.31%	70.75%	85.38%	87.90%	92.18%
Iowa	47,273	0.00%	0.00%	1.00%	14.78%	24.61%	40.32%	43.81%	49.26%
Kansas	39,346	0.16%	3.56%	5.28%	9.67%	11.47%	13.18%	13.90%	15.37%
Kentucky	61,251	0.00%	2.82%	4.41%	12.21%	16.18%	20.12%	21.18%	23.01%
Louisiana	19,677	0.00%	1.77%	2.11%	3.15%	4.84%	5.88%	9.27%	10.93%
Maine	4,213	0.05%	3.18%	6.55%	8.92%	9.47%	9.87%	9.95%	10.14%
Maryland	7,837	0.01%	0.03%	11.71%	15.03%	16.60%	17.10%	17.29%	18.23%
Massachusetts	3,555	0.00%	0.17%	0.23%	40.03%	47.34%	47.40%	226.84%	226.89%
Michigan	29,011	0.00%	0.62%	31.20%	50.34%	55.92%	65.41%	67.91%	70.69%
Minnesota	44,193	0.00%	14.49%	18.27%	21.60%	26.01%	26.88%	27.44%	28.38%
Mississippi	29,312	0.00%	0.00%	1.29%	2.84%	4.08%	5.02%	5.40%	15.97%
Missouri	79,018	0.47%	5.02%	8.45%	10.51%	15.35%	17.21%	17.66%	18.55%
Montana	19,708	0.01%	0.42%	0.96%	2.88%	3.88%	4.11%	4.25%	4.85%
Nebraska	30,841	1.04%	2.27%	9.73%	29.87%	34.15%	44.88%	52.20%	53.82%
Nevada	2,522	0.00%	11.14%	34.46%	41.40%	44.89%	49.21%	50.79%	54.92%
New Hampshire	2,277	0.00%	0.09%	0.31%	1.23%	1.58%	1.76%	1.89%	2.24%
New Jersey	5,315	0.00%	0.71%	1.00%	8.94%	18.59%	18.70%	18.76%	19.06%
New Mexico	11,250	0.01%	0.82%	3.57%	6.50%	7.41%	8.79%	10.38%	12.46%
New York	25,559	3.43%	37.90%	45.19%	53.03%	52.20%	65.55%	74.76%	79.47%
North Carolina	36,142	0.01%	5.10%	6.52%	8.45%	13.38%	26.84%	29.55%	33.67%
North Dakota	14,085	0.03%	4.45%	41.73%	54.05%	56.15%	59.02%	59.57%	60.49%
Ohio	48,073	0.09%	1.11%	2.22%	3.85%	4.53%	12.37%	13.13%	14.70%
Oklahoma	71,420	0.07%	2.20%	3.40%	4.78%	6.77%	10.28%	11.28%	12.74%
Oregon	28,634	0.00%	0.00%	5.88%	7.67%	8.14%	8.85%	9.09%	9.33%

Table 8.12. History of Premises Registrations in Each State (continued).

State	*Estimated Number of Premises*	*Jan. 2005*	*Aug. 2005*	*Jan. 2006*	*Aug. 2006*	*Jan. 2007*	*Aug. 2007*	*Jan. 2008*	*Aug. 2008*
Pennsylvania	42,302	30.58%	36.28%	37.32%	70.85%	62.17%	66.68%	67.99%	69.65%
Rhode Island	504	0.00%	0.00%	0.00%	0.00%	0.99%	1.19%	1.19%	1.59%
South Carolina	16,120	0.47%	4.65%	6.76%	10.15%	11.54%	23.16%	27.11%	28.85%
South Dakota	22,356	0.07%	4.86%	11.25%	18.87%	21.00%	22.26%	22.62%	22.96%
Tennessee	68,010	0.00%	1.85%	9.26%	15.52%	18.16%	21.02%	23.90%	26.15%
Texas	187,118	0.11%	1.39%	2.52%	9.89%	12.46%	15.49%	15.93%	17.08%
Utah	12,460	0.16%	44.38%	52.47%	60.82%	64.93%	69.59%	71.79%	75.35%
Vermont	4,438	0.05%	1.22%	1.74%	1.78%	6.60%	6.99%	7.19%	8.11%
Virginia	37,673	0.03%	3.39%	5.61%	8.37%	10.62%	12.42%	13.58%	24.16%
Washington	22,155	0.01%	3.26%	3.90%	5.21%	6.18%	6.41%	6.95%	7.63%
West Virginia	17,670	5.15%	37.43%	40.26%	44.27%	47.64%	49.45%	49.90%	51.70%
Wisconsin	51,373	8.92%	30.84%	80.65%	103.20%	105.37%	114.17%	115.61%	118.21%
Wyoming	8,227	0.00%	0.00%	1.69%	4.86%	9.02%	18.72%	20.77%	21.73%
50 State Raw Average	28,766	1.26%	7.50%	12.78%	20.61%	24.33%	28.24%	33.65%	36.09%
Premises Weighted Average		1.59%	7.18%	12.51%	20.39%	23.86%	28.49%	30.64%	33.15%

Source: John Wiemers

Table 8.13. History of Cooperative Agreements in Each State (Current Award Amounts).

State	CCC (FY 2004)	FY 2005	FY 2006	FY 2007	FY 2008	Total 2004 - 2008
Alabama	$115,000	$245,000	$0	$276,000	$165,630	$801,630
Alaska	$0	$34,710	$0	$60,660	$42,400	$137,770
Arizona	$0	$169,000	$84,351	$160,200	$111,650	$525,201
Arkansas	$115,000	$281,000	$203,000	$249,300	$174,500	$1,022,800
California	$670,072	$625,000	$346,909	$517,500	$361,900	$2,521,382
Colorado	$1,214,579	$255,904	$191,066	$330,087	$263,200	$2,254,836
Connecticut	$0	$0	$0	$20,000	$39,785	$59,785
Delaware	$0	$0	$0	$0	$0	$0
Florida	$531,840	$273,000	$98,721	$184,510	$176,645	$1,264,716
Georgia	$77,480	$42,173	$198,900	$197,891	$134,620	$651,064
Hawaii	$0	$98,316	$0	$61,121	$55,600	$215,036
Idaho	$1,164,000	$230,783	$60,349	$267,826	$194,600	$1,917,557
Illinois	$130,000	$245,000	$141,000	$180,000	$134,620	$830,620
Indiana	$106,493	$150,457	$80,331	$178,090	$133,872	$649,243
Iowa	$130,000	$410,878	$0	$474,000	$481,800	$1,496,678
Kansas	$805,000	$685,000	$0	$396,043	$210,000	$2,096,043
Kentucky	$269,093	$326,276	$0	$375,000	$280,459	$1,250,828
Louisiana	$12,247	$0	$0	$82,704	$78,310	$173,261
Maine	$78,343	$94,000	$21,500	$80,000	$41,250	$315,093
Maryland	$105,000	$85,952	$0	$81,000	$53,915	$325,867
Massachusetts	$0	$95,348	$0	$80,000	$59,831	$235,179
Michigan	$120,000	$206,953	$0	$179,000	$183,872	$689,825
Minnesota	$434,578	$339,140	$202,957	$278,914	$193,814	$1,449,403
Mississippi	$153,327	$170,129	$43,294	$171,883	$133,872	$672,504
Missouri	$484,875	$496,973	$72,931	$0	$0	$1,054,779
Montana	$431,928	$349,000	$0	$251,100	$176,000	$1,208,028
Nebraska	$125,401	$672,000	$448,000	$672,000	$470,400	$2,387,801
Nevada	$97,939	$128,241	$80,000	$76,903	$57,400	$440,483
New Hampshire	$0	$17,547	$0	$35,000	$2,100	$54,647
New Jersey	$100,000	$92,000	$72,108	$80,000	$59,831	$403,939
New Mexico	$0	$244,000	$203,000	$248,400	$246,350	$941,750
New York	$93,000	$204,152	$178,791	$275,980	$183,400	$935,323
North Carolina	$111,630	$196,989	$0	$179,000	$133,872	$621,490
North Dakota	$515,000	$176,225	$0	$160,856	$193,900	$1,045,982
Ohio	$117,135	$192,560	$112,786	$275,283	$206,418	$904,181
Oklahoma	$675,000	$629,000	$166,860	$517,500	$362,200	$2,350,560
Oregon	$0	$169,322	$0	$75,815	$192,194	$437,331

Table 8.13. History of Cooperative Agreements in Each State, (Current Award Amounts) (continued).

State	CCC (FY 2004)	FY 2005	FY 2006	FY 2007	FY 2008	Total 2004 - 2008
Pennsylvania	$614,147	$257,000	$142,238	$199,009	$139,087	$1,351,481
Rhode Island	$0	$0	$0	$0	$0	$0
South Carolina	$186,727	$139,000	$141,000	$177,000	$132,377	$776,104
South Dakota	$505,240	$334,277	$0	$426,000	$298,200	$1,563,717
Tennessee	$130,000	$264,611	$82,678	$251,100	$209,000	$937,389
Texas	$1,000,000	$1,038,975	$201,065	$1,069,302	$756,000	$4,065,342
Utah	$149,586	$194,000	$0	$179,000	$125,300	$647,886
Vermont	$84,059	$104,125	$0	$0	$60,579	$248,763
Virginia	$112,636	$237,831	$0	$249,300	$207,126	$806,893
Washington	$104,313	$206,000	$60,854	$179,000	$240,800	$790,967
West Virginia	$95,090	$108,862	$58,942	$155,488	$132,377	$550,758
Wisconsin	$100,000	$243,605	$0	$378,000	$265,468	$987,073
Wyoming	$361,929	$235,000	$141,000	$248,000	$173,600	$1,159,529
50 State Sum	$12,427,687	$11,995,314	$3,834,630	$11,240,764	$8,730,124	$48,228,520
Raw Average	$248,554	$239,906	$76,693	$224,815	$174,602	$964,570
Premises Weighted Average	$390,894	$400,881	$105,369	$371,957	$277,491	$1,546,592

Source: Neil Hammerschmidt

Table 8.14. History of Cooperative Agreements in Each State (Current Expenditures).

State	CCC (FY 2004)	FY 2005	FY 2006	FY 2007	FY 2008	Total 2004 - 2008
Alabama	$115,000	$245,000	$0	$276,000		$636,000
Alaska	$0	$34,710	$0	$30,225	$0	$64,935
Arizona	$0	$169,000	$84,351	$160,200	$47,801	$461,352
Arkansas	$115,000	$281,000	$203,000	$249,300	$130,875	$979,175
California	$670,072	$492,090	$346,909	$517,500		$2,026,572
Colorado	$1,157,140	$255,904	$191,066	$330,087	$105,848	$2,040,045
Connecticut	$0	$0	$0	$20,000		$20,000
Delaware	$0	$0	$0	$0		$0
Florida	$531,840	$273,000	$98,721	$184,510	$67,446	$1,155,517
Georgia	$77,480	$42,173	$198,900	$191,262		$509,816
Hawaii	$0	$98,316	$0	$61,121	$13,900	$173,336
Idaho	$960,553	$230,783	$60,349	$267,826	$25,095	$1,544,605
Illinois	$130,000	$245,000	$141,000	$134,272	$67,418	$717,690
Indiana	$106,493	$150,457	$80,331	$109,936		$447,218
Iowa	$130,000	$410,878	$0	$474,000	$290,669	$1,305,547
Kansas	$523,531	$527,500	$0	$285,056	$52,500	$1,388,587
Kentucky	$246,002	$326,276	$0	$375,000	$35,160	$982,438
Louisiana	$12,247	$0	$0	$82,704		$94,951
Maine	$78,343	$94,000	$21,500	$64,000	$12,000	$269,843
Maryland	$105,000	$85,952	$0	$81,000		$271,952
Massachusetts	$0	$95,348	$0	$80,000		$175,348
Michigan	$120,000	$206,953	$0	$179,000		$505,953
Minnesota	$430,372	$339,140	$202,957	$278,914	$21,513	$1,272,896
Mississippi	$124,806	$170,129	$43,294	$171,883	$21,809	$531,920
Missouri	$484,874	$496,973	$72,931	$0		$1,054,779
Montana	$431,928	$349,000	$0	$150,000		$930,928
Nebraska	$125,401	$672,000	$448,000	$672,000	$92,885	$2,010,287
Nevada	$97,939	$128,241	$80,000	$76,903		$383,083
New Hampshire	$0	$17,547	$0	$1,395	$0	$18,942
New Jersey	$75,000	$92,000	$72,108	$80,000	$14,958	$334,066
New Mexico	$0	$244,000	$203,000	$248,400		$695,400
New York	$93,000	$204,152	$178,791	$275,980	$28,490	$780,413
North Carolina	$111,630	$196,989	$0	$178,536	$25,698	$512,852
North Dakota	$468,631	$176,225	$0	$160,856	$30,160	$835,873
Ohio	$117,135	$192,560	$112,786	$275,283	$52,435	$750,198
Oklahoma	$548,532	$629,000	$166,860	$517,500	$103,067	$1,964,959
Oregon	$0	$169,322	$0	$75,815	$0	$245,137

Table 8.14. History of Cooperative Agreements in Each State, (Current Expenditures) (continued).

State	CCC (FY 2004)	FY 2005	FY 2006	FY 2007	FY 2008	Total 2004 - 2008
Pennsylvania	$614,147	$257,000	$142,238	$166,856	$12,426	$1,192,667
Rhode Island	$0	$0	$0	$0		$0
South Carolina	$186,727	$139,000	$141,000	$177,000	$7,953	$651,681
South Dakota	$481,032	$334,277	$0	$257,605	$78,223	$1,151,137
Tennessee	$130,000	$264,611	$82,678	$251,100	$99,627	$828,016
Texas	$1,000,000	$1,038,975	$201,065	$1,069,302	$257,261	$3,566,603
Utah	$149,586	$194,000	$0	$179,000		$522,586
Vermont	$84,059	$104,125	$0	$0		$188,184
Virginia	$115,000	$237,831	$0	$249,300	$80,789	$682,920
Washington	$104,313	$206,000	$60,854	$0		$371,167
West Virginia	$95,090	$108,862	$58,942	$155,488	$33,777	$452,157
Wisconsin	$100,000	$243,605	$0	$160,950	$80,027	$584,583
Wyoming	$361,929	$235,000	$141,000	$248,000	$15,549	$1,001,478
50 State Sum	$11,609,832	$11,704,905	$3,834,630	$10,231,065	$1,905,360	$39,285,791
Raw Average	$232,197	$234,098	$76,693	$204,621	$59,542	$785,716
Premises Weighted Average	$370,790	$393,569	$105,369	$350,576	$77,702	$1,298,006

Source: Neil Hammerschmidt

Table 8.15. Future State Governmental Costs Estimates (Dollars in thousands).

State	Estimate 1: $10.575 million in USDA Cooperative Agreements	Estimate 2: $16.887 million in USDA Cooperative Agreements	Estimate 3: $13.036 million in USDA Cooperative Agreements
Alabama	$35.15	$56.14	$43.34
Alaska	$6.04	$9.65	$7.45
Arizona	$23.03	$36.78	$28.39
Arkansas	$44.85	$71.63	$55.29
California	$110.57	$176.57	$136.30
Colorado	$98.88	$157.91	$121.89
Connecticut	$2.62	$4.19	$3.23
Delaware	$0.00	$0.00	$0.00
Florida	$55.46	$88.57	$68.37
Georgia	$28.55	$45.59	$35.20
Hawaii	$9.43	$15.06	$11.62
Idaho	$84.09	$134.29	$103.66
Illinois	$36.43	$58.17	$44.90
Indiana	$28.47	$45.47	$35.10
Iowa	$65.63	$104.81	$80.91
Kansas	$91.92	$146.79	$113.31
Kentucky	$54.85	$87.60	$67.62
Louisiana	$7.60	$12.13	$9.37
Maine	$13.82	$22.07	$17.03
Maryland	$14.29	$22.82	$17.62
Massachusetts	$10.31	$16.47	$12.71
Michigan	$30.25	$48.31	$37.29
Minnesota	$63.56	$101.50	$78.35
Mississippi	$29.49	$47.10	$36.36
Missouri	$46.26	$73.87	$57.02
Montana	$52.98	$84.60	$65.31
Nebraska	$104.71	$167.22	$129.08
Nevada	$19.32	$30.85	$23.81
New Hampshire	$2.40	$3.83	$2.95
New Jersey	$17.71	$28.29	$21.84
New Mexico	$41.30	$65.95	$50.91
New York	$41.02	$65.50	$50.56
North Carolina	$27.25	$43.52	$33.60
North Dakota	$45.87	$73.25	$56.55
Ohio	$39.65	$63.32	$48.88
Oklahoma	$103.08	$164.61	$127.07
Oregon	$19.18	$30.63	$23.64

Table 8.15. Future State Governmental Costs Estimates (Dollars in thousands), continued.

State	Estimate 1: $10.575 million in USDA Cooperative Agreements	Estimate 2: $16.887 million in USDA Cooperative Agreements	Estimate 3: $13.036 million in USDA Cooperative Agreements
Pennsylvania	$59.27	$94.64	$73.06
Rhode Island	$0.00	$0.00	$0.00
South Carolina	$34.04	$54.35	$41.96
South Dakota	$68.57	$109.51	$84.53
Tennessee	$41.11	$65.65	$50.67
Texas	$178.28	$284.70	$219.77
Utah	$28.41	$45.37	$35.02
Vermont	$10.91	$17.42	$13.45
Virginia	$35.39	$56.51	$43.62
Washington	$34.69	$55.39	$42.76
West Virginia	$24.15	$38.57	$29.77
Wisconsin	$43.29	$69.13	$53.36
Wyoming	$50.85	$81.20	$62.68
Sum	$2,115.00	$3,377.47	$2,607.20
Raw Average	$42.30	$67.55	$52.14
Minimum	$0.00	$0.00	$0.00
Maximum	$178.28	$284.70	$219.77

Notes: These cost forecasts assume a) mandated 20% matching of funds by each state and b) individual state allocations are made consistent with allocations of awards during the FY 2004-2008 period (table 8.13).

8.3.3 Survey of Animal ID Coordinators

To supplement the above information, and obtain answers to standardized questions not ascertained in the initial interviews, we also asked key personnel in 14 states (the 12 noted above with the addition of California and Michigan) to complete a short survey (that is included in Appendix A8.2). Summary statistics of answers from 13 respondents (92.9% response rate) are provided in table 8.16.

The first set of questions asked in this survey focused on premises registration details. Responses suggest approximately 19 new applications can be processed per hour by one employee. Assuming a rate of $13.75/hour for a data entry clerk wages (consistent with Darnell (2008) analysis previously discussed), this suggests that the governmental cost of processing new premises registration applications is approximately $0.72/application. WLIC (2006) suggest that 100-125 premises registrations can be processed per work day. Assuming an 8-hour work day and the $13.75/hour wage rate, this provides a higher processing cost estimate of $0.88 - $1.10/application.

The surveyed respondents also suggest that hard-copy applications, relative to internet-based applications, are characterized by a higher need for follow-up activities necessary to complete new applications and maintain data integrity. In particular, the weighted-average error/omission frequency rates are 8.04% (n=13) and 3.65% (n=8), respectively, for hard-copy and internet-based applications. Five of the 13 respondents indicated their state does not currently accept internet-based applications. [16] This appears to be due to requirements in those states for physical, hard-copy signatures to accompany all premises registration applications. Moreover, WLIC (2006) suggest that processing applications with exceptions (application with missing or invalid information) takes approximately four times as long as complete applications to process.

[16] If only the states accepting both hard-copy and internet-based applications are considered, weighted average frequencies are 9.06% and 3.65%, respectively. This suggests that the difference in error rates between hard-copy and internet submissions may be higher than suggested in table 8.16.

To gain additional insight on the total cost of establishing new premises registrations, the survey included the question: *What do you believe is the cost (including all costs of efforts related to soliciting new applications, processing applications, addressing application errors/omissions, etc.) of currently establishing new premises in your state?* Responses to this question varied notably from *$0-$15/premise* to *Over $90/premise.* Without disclosing individual responses, it is important to note that the three respondents indicating cost estimates of over $90 operate in states ranking high in terms of NASS estimated cattle inventories. This finding supports USDA's decision to increase its focus on cattle premises registrations and its planned "*840 Start Up*" campaign for FY 2009 (USDA, 2008g). Conversely, three of the four respondents suggesting cost estimates in the $0-$30 range were from states that have mandatory premises registration. This divergence in responses is consistent with the notion (and corresponding phone interviews) that states with mandatory premises registration have, at least in relation to the magnitude of premises located in their state, superior alignment of resources with premises registration. The weighted-average cost estimate for registering new premises in the 13 states is $45.17 per registration. Valuable information for comparison is also provided by WLIC (2006) suggesting premises registration costs of $128 and $17 per premises, respectively, during the 2004 and 2005 periods. The stark difference in cost estimates is primarily reflective of a surge in registration volume in 2005 as premises registration became mandatory in Wisconsin on January 1, 2006. Overall, the average cost of premises registrations by WLIC between January 2004 and December 2005 is estimated to be $26/premises.

Penny Page (Animal ID Coordinator in North Carolina) provided detailed statistics on a December 2006 mass mailing effort she initiated to enhance premises registrations in North Carolina. This effort targeted 27,332 producers, cost a total of $65,788.60, and resulted in 3,933 premises registrations. This implies a 14.4% registration success rate at an average cost of $16.73 pre premises, not including state processing (Page, 2008). To assess the representativeness of these figures, we included a corresponding question in our survey. The weighted-average response suggests a forecasted 12.9% "success rate" would be

experienced by similar mass mailing efforts in other states. That is, if resources were allocated in the surveyed states using similar mass mailing procedures, we would anticipate about 13% of recipients to register their premises. It should be noted that this reflects a wide range of prior mass mailing histories across these states (i.e., this would be at least the 2nd mass mailing in North Carolina). Furthermore, resulting premise registrations would likely diminish over subsequent mailings as each additional effort would inherently be targeting producers previously revealing an unwillingness to register.

Our survey also included questions to further assess the current NAIS infrastructure development and current ability to respond to animal diseases in individual states. When asked *"If tomorrow a livestock disease was identified in your state, to what extent would you use information available to you through your state's current participation in the national NAIS system?"* Two-thirds responded that they *would use NAIS information, but less than other in-state resources* and one-third responded that they *would use NAIS information more than other in-state resources*. Accordingly, we followed this question up to assess perceived abilities to currently respond to animal diseases. As shown in table 8.16, the weighted-average response time to notify all livestock producers within 15 and 30 miles of an outbreak is estimated to be 70.5 and 97.5 hours (approximately 3 and 4 days), respectively. While this weighted-average response time estimate is useful, the range in responses is arguably more telling. For instance, response times for a 15-mile notification circle ranged from less than 5 hours to over 1 week. This finding is consistent with previous comments regarding the diversity in individual state situations (e.g., range in perceived costs of establishing new premises registrations).

Table 8.16 Summary Statistics of Key State Personnel Survey

Questions	Multiple-Choice Options	Frequency of Responses	Weighted Average[a]
# 1: How many new applications for NAIS premises registration can your office typically process in one hour?	0-20	61.54%	19.23
	21-40	30.77%	
	41-60	7.69%	
	61-80	0.00%	
	81-100	0.00%	
	101-120	0.00%	
	Over 120	0.00%	
#2: What is the frequency of premises registration applications that contain some sort of error or omission requiring follow-up investigations?	For hard-copy applications		
	0%-5% frequency	53.85%	8.04%
	6%-10% frequency	7.69%	
	11-15% frequency	23.08%	
	16-20% frequency	7.69%	
	Over 20 %	7.69%	
	For internet-based applications		
	0%-5% frequency	23.08%	3.65%
	6%-10% frequency	38.46%	
	11-15% frequency	0.00%	
	16-20% frequency	0.00%	
	Over 20 %	0.00%	
	Not applicable[b]	38.46%	
#3: What do you believe is the cost (including all costs of efforts related to soliciting new applications, processing applications, addressing application errors/omissions, etc.) of currently establishing new premises in your state?	$0/ - $15/premise	16.67%	$45.17
	$16/ - $30/premise	16.67%	
	$31/ - $45/premise	41.67%	
	$46/ - $60/premise	0.00%	
	$61/ - $75/premise	0.00%	
	$76/ - $90/premise	0.00%	
	Over $90/premise	25.00%	
#4: Assume tomorrow you were provided the necessary funds, with the intent of enhancing premises registration rates in your state, to conduct an extensive mass mailing effort to all known individuals within your state that have not yet registered their premises (but are suspected to have premises that ideally would be registered with NAIS). What do you believe would be the overall response?	0-10% of those contacted would register their premises	46.15%	12.88%
	11-20% of those contacted would register their premises	46.15%	
	21-30% of those contacted would register their premises	0.00%	
	31-40% of those contacted would register their premises	0.00%	
	Over 40% of those contacted would register their premises	7.69%	

Table 8.16 Summary Statistics of Key State Personnel Survey (continued)

Questions	Multiple-Choice Options	Frequency of Responses	Weighted Average[a]
#5: Approximately what portion of the funds received in the USDA cooperative agreements your state has received to date were used primarily for premises registration activities?	0-20%	7.69%	68.46%
	21%-40%	15.38%	
	41%-60%	0.00%	
	61%-80%	30.77%	
	81%-100%	46.15%	
#6: Looking forward over the next three years, what portion of your state's NAIS related activities do you expect to be focused on premises registration?	0-20%	15.38%	54.62%
	21%-40%	23.08%	
	41%-60%	15.38%	
	61%-80%	15.38%	
	81%-100%	30.77%	
#7: If tomorrow a livestock disease was identified in your state, to what extent would you use information available to you through your state's current participation in the national NAIS system?	Not at all, I would not use NAIS information	0.00%	*N/A*
	I would use NAIS information, but less than other in-state resources	66.67%	
	I would use NAIS information more than other in-state resources	33.33%	
	I would rely almost exclusively on NAIS information	0.00%	
#8: Continuing with the prior question, if a livestock disease was identified in your state, how long do you believe it would currently take to notify all livestock producers operating within the following distances of the outbreak?	WITHIN 15 miles:		
	less than 1 hour	0.00%	70.46 (hours)
	1-5 hours	8.33%	
	6-12 hours	0.00%	
	13-24 hours	16.67%	
	25-48 hours	25.00%	
	49-96 hours	25.00%	
	5-7 days	16.67%	
	Over 1 week	8.33%	
	WITHIN 30 miles:		
	less than 1 hour	0.00%	97.45 (hours)
	1-5 hours	0.00%	
	6-12 hours	9.09%	
	13-24 hours	9.09%	
	25-48 hours	27.27%	
	49-96 hours	9.09%	
	5-7 days	18.18%	
	Over 1 week	27.27%	

Notes: See Appendix 8.2 for a copy of the full survey.
[a] The presented averages are weighted using mid-points of the multiple-choice ranges. For open-ended responses to questions 1, 2, 3, 4, and 8, values of 130, 22%, $97, 44.5%, and 8 days, respectively were used in calculations.
[b] The survey did not include a *Not Applicable* option in question #2. This is included in this table to reflect the fact that multiple respondents noted their state does not accept or utilize internet application procedures. These "Not applicable" responses are not included in the mid-point weighted average calculations.

8.4 Conclusions

The purpose of this chapter was to examine government benefits and costs of NAIS adoption. This chapter provided a summary of past and forecasted future governmental NAIS budgets. Alternative future federal NAIS budgets are presented that range from $23.8 to $33.0 million annually. Moreover, forecasts of future state governmental NAIS expenditures are made with annual combined totals ranging from $2.1 to $3.4 million.

This chapter also provides estimates on the cost savings that NAIS may provide federal and state governments in conducting animal disease surveillance activities. A preliminary estimate of approximately $300,000 is provided of the annual herd level bovine tuberculosis testing cost reductions that NAIS may provide. We also note the need of future work, enabled by improved data and epidemiological modeling abilities, to estimate the impacts of NAIS on animal disease response, rather than surveillance, activities. Moreover, we note that our analysis under-estimates the government benefits, in the form of cost savings, provided by NAIS.

Finally, this chapter provides a summary of results obtained in a small survey of individual state animal ID coordinators and leaders. Results suggest that governmental processing cost of new premises registration applications are approximately $0.72/premises. Moreover, total costs of obtaining new premises registrations are estimated at $45.17/premises. These and other estimates presented throughout this chapter are provided to aid in future NAIS resource allocation decisions.

9. Economic Model Benefit-cost Welfare Impacts: Modeling Market Effects of Animal Identification

Chapter Overview

THE PREVIOUS SECTIONS PRESENTED cost estimates for a variety of animal identification/tracking scenarios. These species-specific costs were also dependent upon the degree of program adoption. A variety of effects are caused by adding costs to a marketing system. In general, added costs are dispersed throughout a vertically-related marketing chain and prices and quantity exchanged in the market are detrimentally impacted. Furthermore, changes in prices for one commodity meat product influences the demand for substitute meat products.

It is also possible that the adoption of an animal identification/tracking program could positively influence the domestic and/or export demand for meat products. However, the extent of these potential changes is difficult to forecast.

This chapter addresses various combinations of these issues. We develop an equilibrium displacement model (EDM) to simulate the effects of non-governmental costs of animal identification/tracking programs on meat/livestock prices, quantities exchanged, and producer/consumer surplus. Various adoption rates of premises identification, bookend identification, and full animal identification/tracking systems are considered. Changes in producer and consumer surplus are estimated because these metrics measure changes in producer/consumer well-being. We focus on the beef, pork, lamb, and poultry industries.

In addition, we simulate the size of export and domestic demand increases that would be necessary to offset increased costs of animal identification/tracking programs. Because we are unable to forecast domestic and foreign consumer responses to such programs, we evaluate the sizes of these potential changes that would be required to cause those in the meat sectors to be indifferent with respect to the

implementation of an animal identification/tracking program. It is important to note that we evaluate these impacts in an aggregate environment. That is, while an entire livestock sector may be indifferent (in terms of producer surplus generation) to such programs, it may be the case that individual producers within a sector may not be indifferent. We also evaluate various combinations of domestic and export demand increases on prices, quantities, and producer/consumer surplus.

Finally, an epidemiological disease spread model is used to evaluate a hypothetical foot-and-mouth disease (FMD) outbreak in southwest Kansas under alternative animal tracing strategies. The equilibrium displacement model is used in conjunction with the disease spread model to simulate the economic impacts on the livestock industry.

Equilibrium Displacement Models

An equilibrium displacement model is used to estimate the impacts on meat and livestock prices, quantities, and producer and consumer surplus resulting from the adoption of an animal identification program. The model accounts for interrelationships along the meat marketing chain and the substitutability of meats at the consumer level. This type of modeling technique has been well developed and is widely used in the economics literature to assess net impacts on society of a variety of private technology adoption and/or public policy regulations and initiatives. We estimate cumulative changes in consumer surplus at the retail level and producer surplus at each level of the meat marketing chain associated with an animal identification and tracking program.

Estimates of changes in consumer and producer surplus are useful for evaluating the impacts of policy changes on markets. Consumer surplus is a measure of the difference between what consumers are *willing* to pay for a product and the price that they *actually* pay for a product. That is, at any given product price, some consumers are just willing to pay that price for a product. However, many other consumers are willing to pay more for the product than the current market price. This concept is clearly illustrated by increases in the price of any food product. Suppose

the price of a food product increases because poor weather has reduced the supply of an important ingredient. The resulting price increase certainly reduces the quantity sold, but some consumers will continue to purchase the product in spite of the price increase. Clearly, these consumers were willing to pay more for the product prior to its price increase. This difference between willingness to pay for a product and the amount actually paid is a measure of a consumer's gain from a voluntary transaction with a producer. Increases in consumer surplus represent improvements in the collective well-being of consumers in general. This does not mean that every consumer benefits when consumer surplus increases. Rather, consumers in aggregate are better-off when consumer surplus increases.

Producer surplus represents an analog to consumer surplus. That is, at any given market price, some (but not all) producers would be *willing* to produce a product even if prices were lower than that being currently offered by the market. Essentially, aggregate producer surplus is the difference between an industry's total revenue and the total variable costs of producing a product. Note that this is not synonymous with profit because measures of profit must include costs which do not vary with output (i.e., fixed costs). Increases in producer surplus represent an aggregate improvement in the economic well-being of producers within a sector of an industry.

Estimates of total consumer and producer surplus are not heavily relied upon themselves as they contain measurement and methodological error. However, an equilibrium displacement model can be used to effectively measure *changes* in consumer and producer surplus associated with changing economic conditions. The model measures these changes in response to changes in demand for products, supply of products, or both. Consumer demand changes occur for a variety of reasons (e.g., changes in income, prices of substitute goods, tastes and preferences, product attributes, trade policies, etc.). The supply of products may also change for a variety of reasons (e.g., changes in input costs, technology, regulations, etc.). The equilibrium displacement model is used to simulate a number of these impacts caused by the potential implementation of an animal identification and tracking program. By adopting such a program producers will certainly incur direct costs, but

adoption could also have a positive effect on international and domestic consumer demand if consumers value this attribute.

Equilibrium displacement models are based on estimates of supply and demand elasticities. Consequently, the model's results are dependent upon those estimates. Our methodology includes a process in which distributions of supply and demand elasticities are used to estimate changes in prices, quantities, and consumer and producer surplus resulting from the implementation of a variety of animal identification program scenarios. Monte Carlo simulations are conducted in which 1,000 sampled sets of related elasticity estimates are drawn from the distributions and used to estimate potential changes in the variables of interest for each scenario.

9.1 Model Development

THIS SECTION DESCRIBES THE MODELING STRATEGY for estimating changes in consumer and producer surplus resulting from the implementation of a variety of animal identification programs. An equilibrium displacement model is presented and used as the primary approach to estimating changes in welfare effects. Later sections describe parameterization of the model and simulation results.

9.1.1 Modeling Strategy

We develop an EDM to estimate the distribution of net societal benefits and costs of an animal identification program among producers, processors, and consumers. For example, the adoption of an animal identification program will impose differential costs on suppliers at each market level. Conceptually, such costs shift relevant supply functions upward and to the left in each affected sector. A reduction in supply at the retail level causes a reduction in quantity demanded at that level. Concurrently, this change causes reductions in derived demand at each upstream level in the marketing chain. In a competitive market, the impacts and distribution of added marketing costs on prices and

quantities at each market level are determined by the size of cost impacts and relative supply and demand elasticities at each level.

Figure 9.1 illustrates the relevant market linkages for a simplified case in which, for example, the beef industry marketing chain is separated into a retail and farm sector. To simplify the illustration, fixed input proportions between the farm input (feeder cattle) and marketing services are assumed. Retail demand (D_r) and farm (feeder) supply (S_f) are considered the "primary" relations, while the demand for feeder cattle (D_f) and the retail supply of beef (S_r) are considered "derived" relations (Tomek and Robinson, 1990). The intersection of demand and supply at each level determines relative market-clearing prices (P_r) and (P_f) and market-clearing quantity (Q_0). In this case, the farm-level market-clearing quantity is represented graphically on a retail weight equivalent basis. The difference in equilibrium prices ($P_r - P_f$) represents the farm–retail price spread or marketing margin.

If an animal identification program increased costs only at the retail level, retail supply would shift from S_r to S_r' and the farm-level derived demand for feeder cattle would decline to D_f' (figure 9.1). Retail price would increase to P_r' and farm price would decline to P_f'. Marketing cost increases would be reflected by a larger marketing margin ($P_r' - P_f'$), and a new equilibrium quantity would be established at Q_1. If retail demand were relatively inelastic, consumer expenditures would increase, but farm revenues and producer surplus would decline along with farm price and quantity.

FIGURE 9.1. EFFECTS ON THE BEEF SECTOR OF INCREASED COSTS FROM AN IDENTIFICATION PROGRAM ON THE RETAIL LEVEL

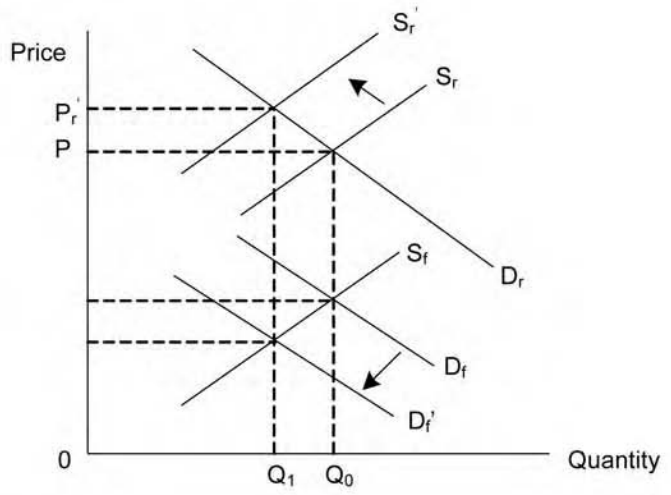


Figure 9.2 extends this simplified case by illustrating a situation in which procurement costs increase at both the retail and farm levels. The initial equilibrium occurs at P_r, P_f, and Q_0. Increased costs associated with an animal identification program are reflected in reductions in both derived retail supply ($S_r^{"}$) and primary farm supply ($S_f^{"}$). The derived demand for cattle declines to $D_f^{"}$. The new equilibrium prices are at $P_r^{"}$ and $P_f^{"}$, and the new equilibrium quantity is Q_2. Whether $P_f^{"}$ is higher or lower than P_f depends on relative supply and demand shifts and elasticities at each level. However, Q_2 is unambiguously less than Q_0. That is, the quantity of cattle traded decreases because of increased marketing costs.

In figure 9.2, the new equilibrium farm price P_f^* is higher than the original farm price of P_f. Nonetheless, the higher farm price does not mean that producers are better off because of associated declines in farm output. Producer welfare effects can be measured by the change in producer surplus that results from moving from the original equilibrium (P_f, Q_0) to the new equilibrium (P_f^*, Q_2). In figure 9.3, shaded area A represents farm-level producer surplus at the original equilibrium price and quantity, and shaded area B represents farm-level producer surplus as a result of increased marketing costs that affect the retail and farm levels. Assuming linear supply and demand functions, elasticity estimates and equilibrium prices and quantities can be used to calculate the sizes of the shaded areas. Absent a consumer demand increase, the change in producer surplus illustrated in figure 9.3 must be negative and is expressed as

$$\Delta PS = B - A = [1/2(P_f^* - \alpha_1)Q_2] - [1/2(P_f - \alpha_0)Q_0] \qquad (9.1)$$

where ΔPS represents the change in producer surplus.

FIGURE 9.2. EFFECTS ON THE BEEF SECTOR OF INCREASED RETAIL AND FARM LEVEL COSTS CAUSED BY AN ANIMAL IDENTIFICATION PROGRAM

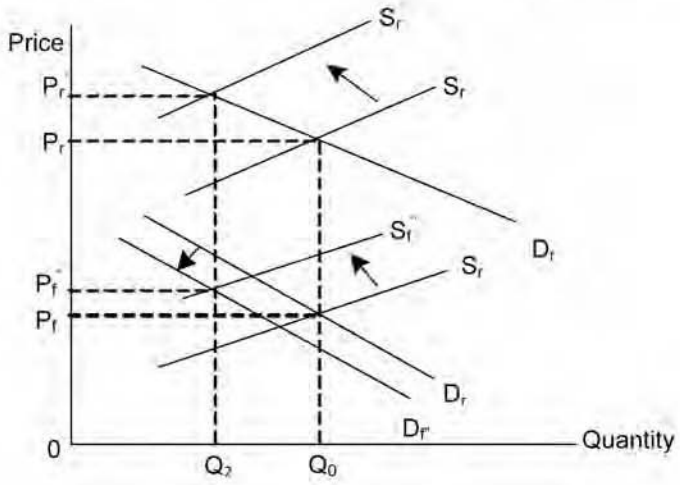
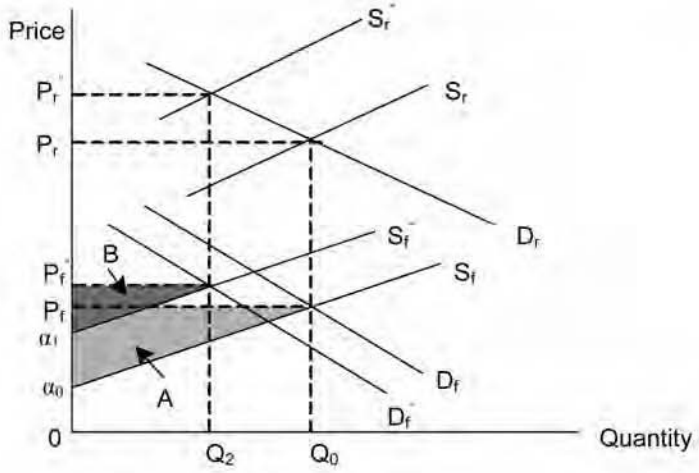


FIGURE 9.3. CHANGES IN FARM-LEVEL PRODUCER SURPLUS RESULTING FROM INCREASED RETAIL AND FARM COSTS CAUSED BY AN ANIMAL IDENTIFICATION PROGRAM



9.1.2 An Equilibrium Displacement Model of the US Meat Industry

An equilibrium displacement model is a linear approximation to a set of underlying and unknown demand and supply functions. The model's accuracy depends on the degree of nonlinearity of the true demand and supply functions and the magnitude of deviations from equilibrium being considered. If these deviations are relatively small, then a linear approximation of the true demand and supply functions should be relatively accurate (Brester, Marsh, and Atwood, 2004; Brester and Wohlgenant, 1997; Wohlgenant, 1993). Although total producer surplus measurements obtained from linear supply functions may or may not reflect actual values, changes in producer surplus caused by shifts in linear supply or demand functions should approximate actual changes provided that such shifts are relatively small.

A general structural model of supply and demand relationships in the US meat industry provides the framework for an equilibrium displacement model. The meat industry is modeled as a series of primary and derived demand and supply relations for the beef, pork, lamb, and poultry industries. The model uses quantity transmission elasticities between the supply and demand sectors to reflect variable input proportions among live animals and marketing service inputs (Brester, Marsh, and Atwood, 2004; Tomek and Robinson, 1990; Wohlgenant, 1993). The transmission elasticities incorporate variable input proportion technologies by allowing production quantities to vary across market levels as input substitution occurs in response to changing output and input prices (Wohlgenant, 1989).

We model the beef and lamb marketing chains by considering four distinct sectors: retail (consumer), wholesale (processor), slaughter (feedlot), and farm (feeder and cow/calf). The pork industry includes three sectors: retail, wholesale, and slaughter. The poultry industry consists of only the retail and wholesale sectors. The pork and poultry industries are modeled with fewer market levels than the beef and lamb industries because of higher degrees of vertical market integration. International trade is included for each industry at various sectors depending upon market structures. For example, beef and pork imports and exports are considered at the wholesale level. Likewise, poultry

exports are considered at the wholesale level while poultry imports are not modeled because they are virtually nonexistent. Lamb imports are considered at the retail level because most imported lamb retains its country-of-origin branding. Consequently, domestic lamb and imported lamb are considered distinctly different products at the retail level. However, imported beef and imported pork are generally indistinguishable at the retail level from their domestic counterparts though enactment of country of origin labeling could alter this somewhat in the future. Hence, imports of beef and pork are additions to US wholesale supplies of each. Beef, pork, imported lamb, domestic lamb, and poultry are considered meat substitutes in the primary demand functions.

In general terms, the structural supply and demand model is given by the following equations (error terms have been omitted):

BEEF SECTOR:

Retail Beef Sector:

Retail beef primary demand:

$$Q_B^{rd} = f_1\left(P_B^{rd}, P_K^{rd}, P_{Ld}^{rd}, P_{Li}^{ni}, P_Y^{rd}, \boldsymbol{Z}_B^{rd}\right) \tag{9.2}$$

Retail beef derived supply:

$$Q_B^{rs} = f_2\left(P_B^{rs}, Q_B^{ws}, \boldsymbol{W}_B^{rs}\right) \tag{9.3}$$

Wholesale Beef Sector:

Wholesale beef derived demand:

$$Q_B^{wd} = f_3\left(P_B^{wd}, Q_B^{rd}, \boldsymbol{Z}_B^{wd}\right) \tag{9.4}$$

Wholesale beef derived supply:

$$Q_B^{ws} = f_4\left(P_B^{ws}, Q_B^{ss}, Q_{Bi}^{ws}, Q_{Be}^{wd}, \boldsymbol{W}_B^{ws}\right) \tag{9.5}$$

Imported wholesale beef derived demand:

$$Q_{Bi}^{wd} = f_5\left(P_{Bi}^{wd}, Q_B^{wd}, \mathbf{Z}_{Bi}^{wd}\right) \quad (9.6)$$

Imported wholesale beef derived supply:

$$Q_{Bi}^{ws} = f_6\left(P_{Bi}^{ws}, \mathbf{W}_{Bi}^{ws}\right) \quad (9.7)$$

Exported wholesale beef derived demand:

$$Q_{Be}^{wd} = f_7\left(P_B^{wd}, \mathbf{Z}_{Be}^{wd}\right) \quad (9.8)$$

Slaughter Cattle Sector:

Slaughter cattle derived demand:

$$Q_B^{sd} = f_8\left(P_B^{sd}, Q_B^{wd}, \mathbf{Z}_B^{sd}\right) \quad (9.9)$$

Slaughter cattle derived supply:

$$Q_B^{ss} = f_9\left(P_B^{ss}, Q_B^{fs}, \mathbf{W}_B^{ss}\right) \quad (9.10)$$

Feeder Cattle Sector:

Feeder cattle derived demand:

$$Q_B^{fd} = f_{10}\left(P_B^{fd}, Q_B^{sd}, \mathbf{Z}_B^{fd}\right) \quad (9.11)$$

Feeder cattle primary supply:

$$Q_B^{fs} = f_{11}\left(P_B^{fs}, \mathbf{W}_B^{fs}\right) \quad (9.12)$$

PORK SECTOR:

Retail Pork Sector:

Retail pork primary demand:

$$Q_K^{rd} = f_{12}\left(P_K^{rd}, P_B^{rd}, P_{Ld}^{rd}, P_{Li}^{rd}, P_Y^{rd}, \mathbf{Z}_K^{rd}\right) \quad (9.13)$$

Retail pork derived supply:

$$Q_K^{rs} = f_{13}\left(P_K^{rs}, Q_K^{ws}, \boldsymbol{W}_K^{rs}\right) \tag{9.14}$$

Wholesale Pork Sector:

Wholesale pork derived demand:

$$Q_K^{wd} = f_{14}\left(P_K^{wd}, Q_K^{rd}, \boldsymbol{Z}_K^{wd}\right) \tag{9.15}$$

Wholesale pork derived supply:

$$Q_K^{ws} = f_{15}\left(P_K^{ws}, Q_K^{ss}, Q_{Ki}^{ws}, Q_{Ke}^{wd}, \boldsymbol{W}_K^{ws}\right) \tag{9.16}$$

Imported wholesale pork derived demand:

$$Q_{Ki}^{wd} = f_{16}\left(P_{Ki}^{wd}, Q_K^{wd}, \boldsymbol{Z}_{Ki}^{wd}\right) \tag{9.17}$$

Imported wholesale pork derived supply:

$$Q_{Ki}^{ws} = f_{17}\left(P_{Ki}^{ws}, \boldsymbol{W}_{Ki}^{ws}\right) \tag{9.18}$$

Exported wholesale pork derived demand:

$$Q_{Ke}^{wd} = f_{18}\left(P_K^{wd}, \boldsymbol{Z}_{Ke}^{wd}\right) \tag{9.19}$$

Slaughter Hog Sector:

Slaughter hog derived demand:

$$Q_K^{sd} = f_{19}\left(P_K^{sd}, Q_K^{wd}, \boldsymbol{Z}_K^{sd}\right) \tag{9.20}$$

Slaughter hog primary supply:

$$Q_K^{ss} = f_{20}\left(P_K^{ss}, \boldsymbol{W}_K^{ss}\right) \tag{9.21}$$

LAMB SECTOR:

Retail Lamb Sector:

Domestic retail lamb primary demand:

$$Q_{Ld}^{rd} = f_{21}\left(P_{Ld}^{rd}, P_{Li}^{rd}, P_{B}^{rd}, P_{K}^{rd}, P_{Y}^{rd}, \boldsymbol{Z}_{Ld}^{rd}\right) \quad (9.22)$$

Domestic retail lamb derived supply:

$$Q_{Ld}^{rs} = f_{22}\left(P_{Ld}^{rd}, Q_{L}^{ws}, \boldsymbol{W}_{Ld}^{rs}\right) \quad (9.23)$$

Imported retail lamb primary demand:

$$Q_{Li}^{rd} = f_{23}\left(P_{Li}^{rd}, P_{Ld}^{rd}, P_{B}^{rd}, P_{K}^{rd}, P_{Y}^{rd}, \boldsymbol{Z}_{Li}^{rd}\right) \quad (9.24)$$

Imported retail lamb derived supply:

$$Q_{Li}^{rs} = f_{24}\left(P_{Li}^{rs}, \boldsymbol{W}_{Li}^{rs}\right) \quad (9.25)$$

Wholesale Lamb Sector:

Wholesale lamb derived demand:

$$Q_{L}^{wd} = f_{25}\left(P_{L}^{wd}, Q_{Ld}^{rd}, \boldsymbol{Z}_{L}^{wd}\right) \quad (9.26)$$

Wholesale lamb derived supply:

$$Q_{L}^{ws} = f_{26}\left(P_{L}^{ws}, Q_{L}^{ss}, \boldsymbol{W}_{L}^{ws}\right) \quad (9.27)$$

Slaughter Lamb Sector:

Domestic slaughter lamb derived demand:

$$Q_{L}^{sd} = f_{27}\left(P_{L}^{sd}, Q_{L}^{wd}, \boldsymbol{Z}_{L}^{sd}\right) \quad (9.28)$$

Domestic slaughter lamb derived supply:

$$Q_{L}^{ss} = f_{28}\left(P_{L}^{ss}, Q_{L}^{fs}, \boldsymbol{W}_{L}^{ss}\right) \quad (9.29)$$

Feeder Lamb Sector:

Domestic feeder lamb derived demand:

$$Q_{L}^{fd} = f_{29}\left(P_{L}^{fd}, Q_{L}^{sd}, \boldsymbol{Z}_{L}^{fd}\right) \quad (9.30)$$

Domestic feeder lamb primary supply:

$$Q_L^{fs} = f_{30}\left(P_L^{fs}, \boldsymbol{W}_L^{fs}\right) \tag{9.31}$$

POULTRY SECTOR:

Retail Poultry Sector:

Retail poultry primary demand:

$$Q_Y^{rd} = f_{31}\left(P_Y^{rd}, P_B^{rd}, P_K^{rd}, P_{Lm}^{rd}, P_{Ld}^{rd}, \boldsymbol{Z}_Y^{rd}\right) \tag{9.32}$$

Retail poultry derived supply:

$$Q_Y^{rs} = f_{32}\left(P_Y^{rs}, Q_Y^{ws}, Q_{Ye}^{rd}, \boldsymbol{W}_Y^{rs}\right) \tag{9.33}$$

Exported retail poultry derived demand:

$$Q_{Ye}^{rd} = f_{33}\left(P_Y^{rd}, \boldsymbol{Z}_{Ye}^{rd}\right) \tag{9.34}$$

Wholesale Poultry Sector:

Wholesale poultry derived demand:

$$Q_Y^{wd} = f_{34}\left(P_Y^{wd}, Q_Y^{rd}, \boldsymbol{Z}_Y^{wd}\right) \tag{9.35}$$

Wholesale poultry primary supply:

$$Q_Y^{ws} = f_{35}\left(P_Y^{ws}, \boldsymbol{W}_Y^{ws}\right) \tag{9.36}$$

Each of the endogenous price and quantity variables, as well as the exogenous vectors, are presented in the form of X_{kl}^{ij} for which *i* represents a market level (i.e., *r* = retail, *w* = wholesale/processor, *s* = slaughter/feedlot, and *f* = feeder/farm level). In each case, the superscript *j* indicates either a demand function (*d*) or a supply function (*s*). The subscript *k* represents the species being considered (i.e., *B* = beef, *K* = pork, *L* = lamb, and *Y* = poultry). Finally, the subscript *l* represents either an import (*i*) or export (*e*) function where appropriate. This subscript is omitted for domestic market variables. Within each

species, market levels are linked by downstream quantity variables among the demand equations and upstream quantity variables among the supply equations (Wohlgenant, 1993). The vectors Z_{kl}^{j} and W_{kl}^{j} represent demand and supply shifters, respectively.

Variable definitions and estimates are presented in table 9.1. It is assumed that market clearing conditions hold for each pair of demand and supply functions. Hence, the superscript *j* is omitted for each price and quantity endogenous variable in table 9.1 and the equilibrium displacement model.

The equilibrium displacement model is developed by totally differentiating equations (9.2) – (9.36). The results were then converted to log differentials so that each relation can be expressed in terms of elasticities. Table 9.2 presents the variable definitions and table 9.3 presents the elasticity definitions and estimates used in the log differential model. Finally, table 9.4 presents the quantity transmission elasticity definitions and estimates.

Table 9.1. Variable Definitions and Estimates for the Structural and Equilibrium Displacement Models, 2007.

Symbol	Definition	Mean[a]
Q_B^r	Quantity (consumption) of retail beef, billions pounds (retail weight)	19.81
P_B^r	Price of Choice retail beef, cents per pound	415.80
P_K^r	Price of retail pork, cents per pound	287.10
P_{La}^r	Price of retail domestic lamb, cents per pound	547.92
P_{Li}^r	Price of retail imported lamb, cents per pound	657.67
P_Y^r	Price of retail poultry, cents per pound	165.11
Q_B^w	Quantity of wholesale beef, billions pounds (carcass weight)	26.56
P_B^w	Price of wholesale Choice beef, cents per pound	149.83
Q_B^s	Quantity of beef obtained from slaughter cattle, billions pounds (live weight)	43.64
Q_{Bi}^w	Quantity of wholesale beef imports, billions pounds (carcass weight)	3.05
Q_{Be}^w	Quantity of wholesale beef exports, billions pounds (carcass weight)	1.43
P_{Bi}^w	Price of wholesale beef imports, cents per pound	149.92
P_B^s	Price of slaughter cattle, $/cwt (live weight)	91.82
Q_B^f	Quantity of beef obtained from feeder cattle, billions pounds (live weight)	28.02
P_B^f	Price of feeder cattle, $/cwt	108.23
Q_K^r	Quantity (consumption) of retail pork, billions pounds (retail weight)	15.31
Q_K^w	Quantity of wholesale pork, billions pounds (carcass weight)	21.94
P_K^w	Price of wholesale pork, cents per pound	67.55
Q_K^s	Quantity of pork obtained from slaughter hogs, billions pounds (live weight)	29.32

Table 9.1. Variable Definitions and Estimates for the Structural and Equilibrium Displacement Models, 2007, Continued.

Symbol	Definition	Mean
Q_{Ki}^{w}	Quantity of wholesale pork imports, billions pounds (carcass weight)	0.97
Q_{Ke}^{w}	Quantity of wholesale pork exports, billions pounds (carcass weight)	3.14
P_{Ki}^{w}	Price of wholesale pork imports, cents per pound	42.47
P_{K}^{s}	Price of slaughter hogs, $/cwt (live weight)	47.26
Q_{Ld}^{r}	Quantity (consumption) of retail domestic lamb, billions pounds (retail weight)	0.16
Q_{L}^{w}	Quantity of wholesale lamb, billions pounds (carcass weight)	0.18
Q_{Li}^{r}	Quantity (consumption) of retail imported lamb, billions pounds (retail weight)	0.17
P_{L}^{w}	Price of wholesale lamb, cents per pound	194.31
Q_{L}^{s}	Quantity of lamb obtained from slaughter lamb, billions pounds (live weight)	0.37
P_{L}^{s}	Price of slaughter lamb, $/cwt (live weight)	84.94
Q_{L}^{f}	Quantity of lamb obtained from feeder lamb, billions pounds (live weight)	0.30
P_{L}^{f}	Price of feeder lamb, $/cwt	103.84
Q_{Y}^{r}	Quantity (consumption) of retail poultry, billions pounds (retail weight)	31.07
Q_{Y}^{w}	Quantity of wholesale poultry, billions pounds (RTC)	57.35
Q_{Ye}^{w}	Quantity of retail poultry exports, billions pounds (retail weight)	4.68[b]
P_{Y}^{w}	Price of wholesale poultry, cents per pound	77.14
$\boldsymbol{Z}_{kl}^{i}$	Demand shifters at the *i*th market level for the *k*th commodity and *l*th market (domestic/import)	-[c]
$\boldsymbol{W}_{kl}^{i}$	Supply shifters at the *i*th market level for the *k*th commodity and *l*th market (domestic/import)	-[c]

[a] Source: Livestock Marketing Information Center
[b] We converted wholesale poultry export to retail poultry export by multiplying the wholesale poultry export by 0.74.
[c] Variables without means are inputs to the model and thus do not have data values.

Table 9.2. Variable Definitions for the Log Differential Equilibrium Displacement Model.

z_B^r	Change in consumer demand for retail beef consumption caused by an animal identification program
z_B^w	Change in demand for wholesale beef caused by an animal identification program
z_{Bi}^w	Change in demand for wholesale beef imports caused by an animal identification program
z_{Be}^r	Change in export consumer demand for wholesale beef consumption caused by an animal identification program
z_B^s	Change in demand for slaughter cattle caused by an animal identification program
z_B^f	Change in demand for feeder cattle caused by an animal identification program
z_K^r	Change in consumer demand for retail pork caused by an animal identification program
z_K^w	Change in demand for wholesale pork caused by an animal identification program
z_{Ki}^w	Change in demand for imported wholesale pork caused by an animal identification program
z_{Ke}^w	Change in export consumer demand for wholesale pork caused by an animal identification program
z_K^s	Change in demand for slaughter hogs caused by an animal identification program
z_{Ld}^r	Change in consumer demand for retail domestic lamb consumption caused by an animal identification program
z_{Li}^r	Change in consumer demand for retail imported consumption caused by an animal identification program
z_L^w	Change in demand for wholesale domestic lamb caused by an animal identification program
z_L^s	Change in demand for slaughter lamb caused by an animal identification program
z_L^f	Change in demand for feeder lamb caused by an animal identification program
z_Y^r	Change in consumer demand for retail poultry consumption caused by an animal identification program
z_Y^w	Change in demand for wholesale poultry caused by an animal identification program

Table 9.2. Variable Definitions for the Log Differential Equilibrium Displacement Model, Continued.

z^{e}_{Pe}	Change in export consumer demand for wholesale poultry caused by an animal identification program
w^{r}_{B}	Changes in costs of supplying retail beef caused by an animal identification program
w^{w}_{B}	Changes in costs of supplying wholesale beef caused by an animal identification program
w^{w}_{Bi}	Changes in costs of supplying wholesale beef imports caused by an animal identification program
w^{s}_{B}	Changes in costs of supplying slaughter cattle caused by an animal identification program
w^{f}_{B}	Changes in costs of supplying feeder cattle caused by an animal identification program
w^{r}_{K}	Changes in costs of supplying retail pork caused by an animal identification program
w^{w}_{K}	Changes in costs of supplying wholesale pork caused by an animal identification program
w^{w}_{Ki}	Changes in costs of supplying wholesale pork imports caused by an animal identification program
w^{s}_{K}	Changes in costs of supplying slaughter hogs caused by an animal identification program
w^{r}_{Ld}	Changes in costs of supplying retail domestic lamb caused by an animal identification program
w^{r}_{Li}	Changes in costs of supplying retail imported lamb caused by an animal identification program
w^{w}_{L}	Changes in costs of supplying wholesale lamb caused by an animal identification program
w^{s}_{L}	Changes in costs of supplying slaughter lamb caused by an animal identification program
w^{f}_{L}	Changes in costs of supplying feeder lamb caused by an animal identification program
w^{r}_{Y}	Changes in costs of supplying retail poultry caused by an animal identification program
w^{w}_{Y}	Changes in costs of supplying wholesale poultry caused by an animal identification program

Table 9.3. Elasticity Definitions and Estimates for the Log Differential Equilibrium Displacement Model.

Symbol	Definition	Estimate	
		Short Run	Long Run
η_B^r	Own-price elasticity of demand for retail beef	-0.86[b]	-1.17[b]
η_{BK}^r	Cross-price elasticity of demand for retail beef with respect to the price of retail pork	0.10[a]	
$\eta_{BL,d}^r$	Cross-price elasticity of demand for retail beef with respect to the price of domestic retail lamb	0.05[c]	
$\eta_{BL,i}^r$	Cross-price elasticity of demand for retail beef with respect to the price of imported retail lamb	0.05[c]	
η_{BY}^r	Cross-price elasticity of demand for retail beef with respect to the price of retail poultry	0.05[a]	
ε_B^r	Own-price elasticity of supply for retail beef	0.36[d]	4.62[d]
η_B^w	Own-price elasticity of demand for wholesale beef	-0.58[b]	-0.94[b]
ε_B^w	Own-price elasticity of supply for wholesale beef	0.28[d]	3.43[b]
η_{Bi}^w	Own-price elasticity of demand for wholesale beef imports	-0.58[c]	-0.94[c]
ε_{Bi}^w	Own-price elasticity of supply for wholesale beef imports	1.83[e]	10.00[e]
η_{Be}^w	Own-price elasticity of demand for wholesale beef exports	-0.42[f]	-3.00[f]
η_B^s	Own-price elasticity of demand for slaughter cattle	-0.40[h]	-0.53[h]
ε_B^s	Own-price elasticity of supply for slaughter cattle	0.26[g]	3.24[g]
η_B^f	Own-price elasticity of demand for feeder cattle	-0.14[h]	-0.75[h]
ε_B^f	Own-price elasticity of supply for feeder cattle	0.22[h]	2.82[h]
η_K^r	Own-price elasticity of demand for retail pork	-0.69[a]	-1.00[c]
η_{KB}^r	Cross-price elasticity of demand for retail pork with respect to the price of retail beef	0.18[i]	
$\eta_{K,L,d}^r$	Cross-price elasticity of demand for retail pork with respect to the price of domestic retail lamb	0.02[c]	
$\eta_{K,L,i}^r$	Cross-price elasticity of demand for retail pork with respect to the price of imported retail lamb	0.02[c]	
η_{KY}^r	Cross-price elasticity of demand for retail pork with respect to the price of retail poultry	0.02[i]	
ε_K^r	Own-price elasticity of supply for retail pork	0.73[d]	3.87[d]
η_K^w	Own-price elasticity of demand for wholesale pork	-0.71[d]	-1.00[c]
ε_K^w	Own-price elasticity of supply for wholesale pork	0.44[d]	1.94[d]

Table 9.3. Elasticity Definitions and Estimates for the Log Differential Equilibrium Displacement Model, Continued.

Symbol	Definition	Estimate	
		Short Run	Long Run
η_{Ki}^{w}	Own-price elasticity of demand for wholesale pork imports	-0.71[c]	-1.00[c]
ε_{Ki}^{w}	Own-price elasticity of supply for wholesale pork imports	1.41[e]	10.00[e]
η_{Ke}^{w}	Own-price elasticity of demand for wholesale pork exports	-0.89[j]	-1.00[c]
η_{K}^{s}	Own-price elasticity of demand for slaughter hogs	-0.51[k]	-1.00[c]
ε_{K}^{s}	Own-price elasticity of supply for slaughter hogs	0.41[l]	1.80[l]
η_{Ld}^{r}	Own-price elasticity of demand for domestic retail lamb	-0.52[h]	-1.11[b]
η_{LdLi}^{r}	Cross-price elasticity of demand for domestic retail lamb with respect to the price of imported retail lamb	0.29[b]	
η_{LdB}^{r}	Cross-price elasticity of demand for domestic retail lamb with respect to the price of retail beef	0.05[c]	
η_{LdK}^{r}	Cross-price elasticity of demand for domestic retail lamb with respect to the price of retail pork	0.02[c]	
η_{LdY}^{r}	Cross-price elasticity of demand for domestic retail lamb with respect to the price of retail poultry	0.02[c]	
ε_{Ld}^{r}	Own-price elasticity of supply for domestic retail lamb	0.15[b]	3.96[b]
η_{Li}^{r}	Own-price elasticity of demand for imported retail lamb	-0.41[b]	-0.63[b]
η_{LiLd}^{r}	Cross-price elasticity of demand for imported retail lamb with respect to the price of domestic retail lamb	0.78[b]	
η_{LiB}^{r}	Cross-price elasticity of demand for imported retail lamb with respect to the price of retail beef	0.05[c]	
η_{LiK}^{r}	Cross-price elasticity of demand for imported retail lamb with respect to the price of retail pork	0.02[c]	
η_{LiY}^{r}	Cross-price elasticity of demand for imported retail lamb with respect to the price of retail poultry	0.02[c]	
ε_{Li}^{r}	Own-price elasticity of supply for imported retail lamb	10.00[b]	10.00[b]
η_{L}^{w}	Own-price elasticity of demand for wholesale lamb	-0.35[b]	-1.03[b]
ε_{L}^{w}	Own-price elasticity of supply for wholesale lamb	0.16[b]	3.85[b]
η_{L}^{s}	Own-price elasticity of demand for slaughter lamb	-0.33[b]	-0.87[b]
ε_{L}^{s}	Own-price elasticity of supply for slaughter lamb	0.12[b]	2.95[b]
η_{L}^{f}	Own-price elasticity of demand for feeder lamb	-0.11[b]	-0.29[b]
ε_{L}^{f}	Own-price elasticity of supply for feeder lamb	0.09[b]	2.26[b]

Table 9.3. Elasticity Definitions and Estimates for the Log Differential Equilibrium Displacement Model, Continued.

Symbol	Definition	Estimate	
		Short Run	Long Run
η_Y^r	Own-price elasticity of demand for retail poultry	-0.29[j]	-1.00[c]
η_{YB}^r	Cross-price elasticity of demand for retail poultry with respect to the price of retail beef	0.18[i]	
η_{YK}^r	Cross-price elasticity of demand for retail poultry with respect to the price of retail pork	0.04[i]	
$\eta_{YL,d}^r$	Cross-price elasticity of demand for retail poultry with respect to the price of domestic retail lamb	0.02[c]	
$\eta_{YL,i}^r$	Cross-price elasticity of demand for retail poultry with respect to the price of imported retail lamb	0.02[c]	
ε_Y^r	Own-price elasticity of supply for retail poultry	0.18[d]	13.10[d]
	Own-price elasticity of demand for retail poultry exports	-0.31[e]	-1.00[c]
η_Y^w	Own-price elasticity of demand for wholesale poultry	-0.22[d]	-1.00[d]
ε_Y^w	Own-price elasticity of supply for wholesale poultry	0.14[d]	14.00[d]

[a]Brester and Schroeder (1995); [b]GIPSA RTI Meat Marketing Study (2007); [c]Authors best estimate; [d]Brester, Marsh, and Atwood (2004); [e]Estimated by authors; [f]Zaho, Wahl, and Marsh (2006); [g]Marsh (1994); [h]Marsh (2003); [i]Brester (1996); [j]Paarlberg et al. (2008); [k]Wohlgenant (2005); [l]Lemieux and Wohlgenant (1989).

Table 9.4. Quantity Transmission Elasticity Definitions and Estimates for the Log Differential Equilibrium Displacement Model.

Symbol	Definition	Estimate[a]	Standard Deviation[a]
γ_B^{wr}	Percentage change in retail beef supply given a 1% change in wholesale beef supply	0.771	0.072
τ_B^{rw}	Percentage change in wholesale beef demand given a 1% change in retail beef demand	0.995	0.095
γ_B^{sw}	Percentage change in wholesale beef supply given a 1% change in slaughter cattle supply	0.909	0.024
τ_B^{ws}	Percentage change in slaughter cattle demand given a 1% change in wholesale beef demand	1.09	0.024
γ_B^{fs}	Percentage change in slaughter cattle supply given a 1% change in feeder cattle supply	1.07	0.351
τ_B^{sf}	Percentage change in feeder cattle demand given a 1% change in slaughter cattle demand	0.957	0.036
γ_K^{wr}	Percentage change in retail pork supply given a 1% change in wholesale pork supply	0.962	0.038
τ_K^{rw}	Percentage change in wholesale pork demand given a 1% change in retail pork demand	0.983	0.037
γ_K^{sw}	Percentage change in wholesale pork supply given a 1% change in slaughter hog supply	0.963	0.039
τ_K^{ws}	Percentage change in slaughter hog demand given a 1% change in wholesale pork demand	0.961	0.037
γ_L^{wr}	Percentage change in retail domestic lamb supply given a 1% change in wholesale lamb supply	0.908	0.103
τ_L^{rw}	Percentage change in wholesale lamb demand given a 1% change in retail domestic lamb demand	0.731	0.058
γ_L^{sw}	Percentage change in wholesale lamb supply given a 1% change in slaughter lamb supply	1.007	0.002
τ_L^{ws}	Percentage change in slaughter lamb demand given a 1% change in wholesale lamb demand	0.993	0.002
γ_L^{fs}	Percentage change in slaughter lamb supply given a 1% change in feeder lamb supply	0.864	0.142
τ_L^{sf}	Percentage change in feeder lamb demand given a 1% change in slaughter lamb demand	0.962	0.025
γ_Y^{wr}	Percentage change in retail poultry supply given a 1% change in wholesale poultry supply	0.806	0.022
τ_Y^{rw}	Percentage change in wholesale poultry demand given a 1% change in retail poultry demand	1.035	0.103

[a]These estimates are obtained from the structural model that is presented later in the report.

BEEF SECTOR:

$$EQ_B^r = \eta_B^r EP_B^r + \eta_{BK}^r EP_K^r + \eta_{BL,d}^r EP_{L,d}^r + \eta_{BL,i}^r EP_{L,i}^r + \eta_{BY}^r EP_Y^r + Ez_B^r \quad (9.37)$$

$$EQ_B^r = \varepsilon_B^r EP_B^r + \gamma_B^{wr} EQ_B^w = Ew_B^r \quad (9.38)$$

$$EQ_B^w = \eta_B^w EP_B^w + \tau_B^{rw} EQ_B^r + Ez_B^w \quad (9.39)$$

$$EQ_B^w = \varepsilon_B^w EP_B^w + \gamma_B^{sw}(Q_B^s / Q_B^w)EQ_B^s + (Q_{Bl}^w / Q_B^w)EQ_{Bl}^w - (Q_{Be}^w / Q_B^w)EQ_{Be}^w + Ew_B^w \quad (9.40)$$

$$EQ_{Bi}^w = \eta_{Bi}^w EP_{Bi}^w + \tau_{Bi}^{rw} EQ_{Bi}^w + (Q_{Bi}^w / Q_B^w)Ez_{Be}^w + Ez_{Bi}^w \quad (9.41)$$

$$EQ_{Bi}^w = \varepsilon_{Bi}^w EP_{Bi}^w + Ew_{Bi}^w \quad (9.42)$$

$$EQ_{Be}^w = \eta_{Be}^w EP_B^w + Ez_{Be}^w \quad (9.43)$$

$$EQ_B^s = \eta_B^s EP_B^s + \tau_B^{ws} EQ_B^w + (Q_{Be}^w / Q_B^w)Ez_{Be}^w + Ez_B^s \quad (9.44)$$

$$EQ_B^s = \varepsilon_B^s EP_B^s + \gamma_B^{fs} EQ_B^f + Ew_B^s \quad (9.45)$$

$$EQ_B^f = \eta_B^f EP_B^f + \tau_B^{sf} EQ_B^s + Ez_B^f \quad (9.46)$$

$$EQ_B^f = \varepsilon_B^f EP_B^f + Ew_B^f \quad (9.47)$$

PORK SECTOR:

$$EQ_K^r = \eta_K^r EP_K^r + \eta_{KB}^r EP_B^r + \eta_{KL,d}^r EP_{L,d}^r + \eta_{KL,i}^r EP_{L,i}^r + \eta_{KY}^r EP_Y^r + Ez_K^r \quad (9.48)$$

$$EQ_K^r = \varepsilon_K^r EP_K^r + \gamma_K^{wr} EQ_K^w = Ew_K^r \quad (9.49)$$

$$EQ_K^w = \eta_K^w EP_K^w + \tau_K^{rw} EQ_K^r + Ez_K^w \quad (9.50)$$

$$EQ_K^w = \varepsilon_K^w EP_K^w + \gamma_K^{sw}(Q_K^s / Q_K^w)EQ_K^s + (Q_{Ki}^w / Q_K^w)EQ_{Ki}^w - (Q_{Ke}^w / Q_K^w)EQ_{Ke}^w + Ew_K^w \quad (9.51)$$

$$EQ_{Ki}^w = \eta_{Ki}^w EP_{Ki}^w + \tau_K^{rw} EQ_K^w + (Q_{Ki}^w / Q_K^w)Ez_{Ke}^w + Ez_{Ki}^w \quad (9.52)$$

$$EQ_{Ki}^w = \varepsilon_{Ki}^w EP_{Ki}^w + Ew_{Ki}^w \quad (9.53)$$

$$EQ_{Ke}^w = \eta_{Ke}^w EP_K^w + Ez_{Ke}^w \quad (9.54)$$

$$EQ_K^s = \eta_K^s EP_K^s + \tau_K^{ws} EQ_K^w + (Q_{Ke}^w / Q_K^w)Ez_{Ke}^w + Ez_K^s \quad (9.55)$$

$$EQ_K^s = \varepsilon_K^s EP_K^s + Ew_K^s \quad (9.56)$$

LAMB SECTOR:

$$EQ^r_{Ld} = \eta^r_{Ld} EP^r_{Ld} + \eta^r_{LdLi} EP^r_{Li} + \eta^r_{LdB} EP^r_B + \eta^r_{LdK} EP^r_K + \eta^r_{LdY} EP^r_Y + Ez^r_{Ld} \quad (9.57)$$

$$EQ^r_{Ld} = \varepsilon^r_{Ld} EP^r_{Ld} + \gamma^{wr}_L EQ^w_L + Ew^r_{Ld} \quad (9.58)$$

$$EQ^r_{Li} = \eta^r_{Li} EP^r_{Li} + \eta^r_{LiLd} EP^r_{Ld} + \eta^r_{LiB} EP^r_B + \eta^r_{LiK} EP^r_K + \eta^r_{LiY} EP^r_Y + Ez^r_{Li} \quad (9.59)$$

$$EQ^r_{Li} = \varepsilon^r_{Li} EP^r_{Li} + Ew^r_{Li} \quad (9.60)$$

$$EQ^w_L = \eta^w_L EP^w_L + \tau^{rw}_L EQ^r_{Ld} + Ez^w_L \quad (9.61)$$

$$EQ^w_L = \varepsilon^w_L EP^w_L + \gamma^{sw}_L EQ^s_L + Ew^w_L \quad (9.62)$$

$$EQ^s_L = \eta^s_L EP^s_L + \tau^{ws}_L EQ^w_L + Ez^s_L \quad (9.63)$$

$$EQ^s_L = \varepsilon^s_L EP^s_L + \gamma^{fs}_L EQ^f_L + Ew^s_L \quad (9.64)$$

$$EQ^f_L = \eta^f_L EP^f_L + \tau^{sf}_L EQ^s_L + Ez^f_L \quad (9.65)$$

$$EQ^f_L = \varepsilon^f_L EP^f_L + Ew^f_L \quad (9.66)$$

POULTRY SECTOR:

$$EQ^r_Y = \eta^r_Y EP^r_Y + \eta^r_{YB} EP^r_B + \eta^r_{YK} EP^r_K + \eta^r_{YLd} EP^r_{Ld} + \eta^r_{YLi} EP^r_{Li} + Ez^r_Y \quad (9.67)$$

$$EQ^r_Y = \varepsilon^r_Y EP^r_Y + \gamma^{wr}_Y EQ^w_Y - (Q^r_{Ye} / Q^r_Y) EQ^r_{Ye} + Ew^r_Y \quad (9.68)$$

$$EQ^r_{Ye} = \eta^r_{Ye} EP^r_Y + Ez^r_{Ye} \quad (9.69)$$

$$EQ^w_Y = \eta^w_Y EP^w_Y + \tau^{rw}_Y EQ^r_Y + (Q^r_{Ye} / Q^r_Y) Ez^r_{Ye} + Ew^w_Y \quad (9.70)$$

$$EQ^w_Y = \varepsilon^w_Y EP^w_Y + Ew^w_Y \quad (9.71)$$

The term E represents a relative change operator (e.g., $EQ^r_B = \partial Q^r_B / Q^r_B = \partial \ln^r_B$). Table 9-2 provides definitions for all parameters. In addition, each z^i_B and w^i_B represent single elements of the demand (Z^i_k) and supply (W^i_k) shifters, respectively. Specifically, these elements represent percentage supply or demand changes from initial equilibria caused by an animal identification program. That is, z^i_k

represents potential changes in demand for meat products resulting from an animal identification program. Similarly, w_k^j represents costs that shift supply which may result from an animal identification program. All other elements of (Z_k^j) and (W_k^j) are assumed to be unchanged by implementation of an animal identification program.

The equilibrium displacement model was implemented by placing all of the endogenous variables in equations (9.37) through (9.71) onto the left-hand side of each equation:

BEEF SECTOR:

$$EQ_B^r - \eta_B^r EP_B^r - \eta_{BK}^r EP_K^r - \eta_{BL,d}^r EP_{L,d}^r - \eta_{BL,i}^r EP_{L,i}^r - \eta_{BY}^r EP_Y^r = Ez_B^r \tag{9.72}$$

$$EQ_B^r - \varepsilon_B^r EP_B^r - \gamma_B^{wr} EQ_B^w = Ew_B^r \tag{9.73}$$

$$EQ_B^w - \eta_B^w EP_B^w - \tau_B^{rw} EQ_B^r = Ez_B^w \tag{9.74}$$

$$EQ_B^w - \varepsilon_B^w EP_B^w - \gamma_B^{sw}(Q_B^s / Q_B^w)EQ_B^s - (Q_{Bh}^w / Q_B^w)EQ_{Bh}^w + (Q_{Be}^w / Q_B^w)EQ_{Be}^w = Ew_B^w \tag{9.75}$$

$$EQ_{Bi}^w - \eta_{Bi}^w EP_{Bi}^w - \tau_B^{rw} EQ_B^w = (Q_{Bi}^w / Q_B^w)Ez_{Bw}^w + Ez_{Bi}^w \tag{9.76}$$

$$EQ_{Bi}^w - \varepsilon_{Bi}^w EP_{Bi}^w = Ew_{Bi}^w \tag{9.77}$$

$$EQ_{Be}^w - \eta_{Be}^w EP_B^w = Ez_{Be}^w \tag{9.78}$$

$$EQ_B^s - \eta_B^s EP_B^s - \tau_B^{ws} EQ_B^w = (Q_{Be}^w / Q_B^w)Ez_{Be}^w + Ez_B^s \tag{9.79}$$

$$EQ_B^s - \varepsilon_B^s EP_B^s - \gamma_B^{fs} EQ_B^f = Ew_B^s \tag{9.80}$$

$$EQ_B^f - \eta_B^f EP_B^f - \tau_B^{sf} EQ_B^s = Ez_B^f \tag{9.81}$$

$$EQ_B^f - \varepsilon_B^f EP_B^f = Ew_B^f \tag{9.82}$$

PORK SECTOR:

$$EQ_K^r - \eta_K^r EP_K^r - \eta_{KB}^r EP_B^r - \eta_{KL,d}^r EP_{L,d}^r - \eta_{KL,i}^r EP_{L,i}^r - \eta_{KY}^r EP_Y^r = Ez_K^r \tag{9.83}$$

$$EQ_K^r - \varepsilon_K^r EP_K^r - \gamma_K^{wr} EQ_K^w = Ew_K^r \tag{9.84}$$

$$EQ_K^w - \eta_K^w EP_K^w - \tau_K^{rw} EQ_K^r = Ez_K^w \quad (9.85)$$

$$EQ_K^w - \varepsilon_K^w EP_K^w - \gamma_K^{sw}(Q_K^s / Q_K^w)EQ_K^s - (Q_{Ki}^w / Q_K^w)EQ_{Ki}^w + (Q_{Ke}^w / Q_K^w)EQ_{Ke}^w = Ew_K^w \quad (9.86)$$

$$EQ_{Ki}^s - \eta_{Ki}^w EP_{Ki}^w - \tau_K^{rw} EQ_K^w = (Q_{Ki}^w / Q_K^w)Ez_{Ke}^w + Ez_{Ki}^w \quad (9.87)$$

$$EQ_{Ki}^w - \varepsilon_{Ki}^w EP_{Ki}^w = Ew_{Ki}^w \quad (9.88)$$

$$EQ_{Ke}^w - \eta_{Ke}^w EP_K^w = Ez_{Ke}^w \quad (9.89)$$

$$EQ_K^s - \eta_K^s EP_K^s - \tau_K^{rrs} EQ_K^w = (Q_{Ke}^w / Q_K^w)Ez_{Ke}^w + Ez_K^s \quad (9.90)$$

$$EQ_K^s - \varepsilon_K^s EP_K^s = Ew_K^s \quad (9.91)$$

LAMB SECTOR:

$$EQ_{La}^r - \eta_{La}^r EP_{La}^r - \eta_{LaLi}^r EP_{Li}^r - \eta_{LaB}^r EP_B^r - \eta_{LaK}^r EP_K^r - \eta_{LaY}^r EP_Y^r = Ez_{La}^r \quad (9.92)$$

$$EQ_{La}^r - \varepsilon_{La}^r EP_{La}^r - \gamma_L^{wr} EQ_L^w = Ew_{La}^r \quad (9.93)$$

$$EQ_{Li}^r - \eta_{Li}^r EP_{Li}^r - \eta_{LiLa}^r EP_{La}^r - \eta_{LiB}^r EP_B^r - \eta_{LiK}^r EP_K^r - \eta_{LiY}^r EP_Y^r = Ez_{Li}^r \quad (9.94)$$

$$EQ_{Li}^r - \varepsilon_{Li}^r EP_{Li}^r = Ew_{Li}^r \quad (9.95)$$

$$EQ_L^w - \eta_L^w EP_L^w - \tau_L^{rw} EQ_{La}^r = Ez_L^w \quad (9.96)$$

$$EQ_L^w - \varepsilon_L^w EP_L^w - \gamma_L^{sw} EQ_L^s = Ew_L^w \quad (9.97)$$

$$EQ_L^s - \eta_L^s EP_L^s - \tau_L^{wrs} EQ_L^w = Ez_L^s \quad (9.98)$$

$$EQ_L^s - \varepsilon_L^s EP_L^s - \gamma_L^{fs} EQ_L^f = Ew_L^s \quad (9.99)$$

$$EQ_L^f - \eta_L^f EP_L^f - \tau_L^{srf} EQ_L^s = Ez_L^f \quad (9.100)$$

$$EQ_L^f - \varepsilon_L^f EP_L^f = Ew_L^f \quad (9.101)$$

POULTRY SECTOR:

$$EQ_Y^r - \eta_Y^r EP_Y^r - \eta_{YB}^r EP_B^r - \eta_{YK}^r EP_K^r - \eta_{YLa}^r EP_{La}^r - \eta_{YLi}^r EP_{Li}^r = Ez_Y^r \quad (9.102)$$

$$EQ_Y^r - \varepsilon_Y^r EP_Y^r - \gamma_Y^{wr} EQ_Y^w + (Q_{Ye}^r / Q_Y^r)EQ_{Ye}^r = Ew_Y^r \quad (9.103)$$

$$EQ_{Ye}^r - \eta_{Ye}^r EP_Y^r = Ez_{Ye}^r \quad (9.104)$$

$$EQ_Y^n - \eta_Y^n EP_Y^n - \tau_Y^{rn} EQ_Y^r = (Q_{Yn}^r / Q_Y^r) Ez_{Yn}^r + Ew_Y^n \quad (9.105)$$

$$EQ_Y^w - \varepsilon_Y^w EP_Y^w = Ew_Y^w \quad (9.106)$$

For any given set of elasticity estimates, equations (9.72) through (9.106) can be used to determine the relative changes in endogenous quantities and prices for any given exogenous changes in costs and/or consumer demand. In matrix notation, equations (9.72) through (9.106) can be written as:

$$\mathbf{A} \times \mathbf{Y} = \mathbf{B} \times \mathbf{X} \quad (9.107)$$

where A is a 35x35 nonsingular matrix of elasticities; **Y** is a 35x1 vector of changes in the endogenous price and quantity variables; **B** is a 35x35 matrix of parameters associated with the exogenous variables; and **X** is a 35x1 vector of percentage changes in the exogenous supply and demand variables. Relative changes in the endogenous variables (**Y**) caused by relative changes in animal identification costs and benefits (**X**) are calculated by solving equation (9.107) as

$$\mathbf{Y} = \mathbf{A}^{-1} \times \mathbf{B} \times \mathbf{X} \quad (9.108)$$

9.2 DATA

COMPLETE PRICE AND QUANTITY DATA for 2007 were available for all variables included in the model. All price and quantity data were obtained from the Livestock Marketing Information Center.

9.3 Elasticity Estimates

Elasticity estimates are required to implement the EDM model. When possible, estimates are obtained from the extant literature. In addition, the demand and supply quantity transmission elasticities were estimated from publically-available data. In all cases, Monte Carlo simulations are conducted using random sampling from a range of these elasticities. The Monte Carlo simulations allow the construction of empirical probability distributions for changes in endogenous variables and surplus measures. The Monte Carlo simulations are conducted assuming that elasticity estimates are correlated among vertical demand and supply sectors within each species. Discussion on the Monte Carlo simulations can be found in Appendix A9.1.

9.3.1 Elasticities Obtained From The Literature

The elasticities reported in table 9.3 were generally selected from previously published studies. When several estimates were available, we selected "mid-range" estimates. In other cases, elasticity estimates were unavailable. In these cases, we selected elasticity estimates that were similar to others in the model. For example, the derived demand for imported wholesale beef and imported wholesale pork were assumed to be the same as the derived demand elasticity for domestic wholesale beef and pork, respectively.

Estimates of cross-price elasticities with respect to lamb at the retail level were particularly sparse in the literature. Consequently, the cross-price elasticities of demand for beef with respect to the price of domestic lamb and imported lamb were assumed to be the same as the cross-price elasticity of demand for beef with respect to the price of poultry (0.05). Likewise, the cross-price elasticities of demand for pork with respect to the price of domestic lamb and imported lamb were assumed to be the same as the cross-price elasticity of demand for pork with respect to the price of poultry (0.02).

The cross-price elasticities of domestic lamb to beef, pork, and poultry are assumed to be the same as the cross-price elasticity of beef, pork, and poultry to domestic lamb, respectively (0.05). Similarly, the cross-price elasticities of imported lamb to beef, pork, and poultry are assumed to be the same as the cross-price elasticity of beef, pork, and poultry to imported lamb.

9.3.2 Estimated Demand Quantity Transmission Elasticities

Estimates of demand quantity transmission elasticities are used in the equilibrium displacement model to provide linkages between vertically connected demand sectors. These estimates are obtained from Seemingly Unrelated Regression (SUR) estimation of three equations for both beef and lamb. Because the pork and poultry industries are more vertically integrated compared to the beef and lamb industries, the demand quantity transmission elasticities for pork are obtained from the SUR estimation of two equations while the poultry demand quantity transmission elasticities are obtained from a single ordinary least squares equation. Double log specifications are used so that resulting parameter estimates are interpreted as transmission elasticities. All demand quantity transmission equations are corrected for first-order autocorrelation. Demand quantity transmission elasticity estimates are summarized in table 9.4.

Tables 9.5 through 9.8 present the regression results for the demand quantity transmission regressions. Annual data for the years 1970 through 2007 were used to estimate the transmission elasticities. The quantity data were obtained from the Livestock Marketing Information Center.

Table 9.5. SUR (Double Log) Demand Quantity Transmission Elasticities for Beef.

	Dependent Variables		
Regressors	Wholesale Beef Quantity (Q_B^w)	Slaughter Cattle Quantity (Q_B^s)	Feeder Cattle Quantity (Q_B^f)
Constant	0.34 (0.36)	-0.85 (-3.40)	11.565 (14.2291)
Retail Beef Quantity (Q_B^r)	0.99 (10.44)		
Wholesale Beef Quantity (Q_B^w)		1.09 (44.99)	
Slaughter Cattle Quantity (Q_B^s)			0.96 (26.29)
Regression Statistics:			
Adjusted R^2	0.909	0.992	0.944
Log mean of the dependent variable	10.10	10.18	12.65

[a]These estimates are obtained from the structural model presented later in the report.

Table 9.6. SUR (Double Log) Demand Quantity Transmission Elasticities for Pork.

	Dependent Variables	
Regressors	Wholesale Pork Quantity (Q_K^W)	Slaughter Hogs Quantity (Q_K^S)
Constant	5.39 (18.52)	0.27 (0.74)
Retail Pork Quantity (Q_K^r)	0.98 (26.47)	
Wholesale Pork Quantity (Q_K^w)		0.97 (26.12)
Regression Statistics:		
Adjusted R^2	0.992	0.991
Log mean of the dependent variable	9.70	9.72

[a]These estimates are obtained from the structural model presented later in the report.

Table 9.7. SUR (Double Log) Demand Quantity Transmission Elasticities for Lamb.

	Dependent Variables		
Regressors	Wholesale Lamb Quantity (Q_L^w)	Slaughter Lamb Quantity (Q_L^s)	Feeder Lamb Quantity (Q_L^f)
Constant	4.9 (89.75)	0.05 (5.36)	3.03 (5.76)
Domestic Retail Lamb Quantity (Q_L^r)	0.73 (12.69)		
Wholesale Lamb Quantity (Q_L^w)		0.99 (580.73)	
Slaughter Lamb Quantity (Q_L^s)			0.96 (38.86)
Regression Statistics:			
Adjusted R^2	0.987	0.999	0.991
Log mean of the dependent variable	5.69	5.73	6.23

[a]These estimates are obtained from the structural model presented later in the report.

Table 9.8. OLS (Double Log) Demand Quantity Transmission Elasticity for Poultry.

	Dependent Variable
Regressors	Wholesale Poultry Quantity (Q_r^w)
Constant	-5.85 (-0.05)
Retail Poultry Quantity (Q_r^r)	1.035 (10.05)
Regression Statistics:	
Adjusted R^2	0.999
Log mean of the dependent variable	10.28

[a]These estimates are obtained from the structural model presented later in the report.

9.3.3 Estimated Supply Quantity Transmission Elasticities

Estimates of supply quantity transmission elasticities are used in the equilibrium displacement model to provide linkages between vertically connected supply sectors. These estimates are obtained from the SUR estimation of three equations for both beef and lamb. Because the pork and poultry industries are more vertically integrated compared to the beef and lamb industries, the supply quantity transmission elasticities for pork are obtained from the SUR estimation of two equations while the poultry supply quantity transmission elasticities are obtained from a single ordinary least squares equation. Double log specifications are used so that resulting parameter estimates are interpreted as transmission elasticities. All supply quantity transmission equations are corrected for first-order autocorrelation. Supply quantity transmission elasticity estimates are summarized in table 9.4.

Tables 9.9 through 9.12 provide the estimation results for the supply quantity transmission models. Annual data for the years 1970 through 2007 were used to estimate the transmission elasticities. The quantity data were obtained from the Livestock Marketing Information Center

Table 9.9. SUR (Double Log) Supply Quantity Transmission Elasticities for Beef.

	Dependent Variables		
Regressors	Retail Beef Quantity (Q_B^r)	Wholesale Beef Quantity (Q_B^w)	Slaughter Cattle Quantity (Q_B^s)
Constant	2.03	0.84	-3.23
	(2.79)	(3.38)	(-0.73)
Wholesale Beef Quantity (Q_B^w)	0.771		
	(10.77)		
Slaughter Cattle Quantity (Q_B^s)		0.91	
		(37.35)	
Feeder Cattle Quantity (Q_B^f)			1.07
			(3.05)
Regression Statistics:			
Adjusted R^2	0.898	0.991	0.638
Log mean of the dependent variable	9.83	10.10	10.18

[a]These estimates are obtained from the structural model presented later in the report.

Table 9.10. SUR (Double Log) Supply Quantity Transmission Elasticities for Pork.

	Dependent Variables	
Regressors	Retail Pork Quantity (Q_K^r)	Wholesale Hogs Quantity (Q_K^w)
Constant	-4.99 (-10.71)	0.23 (0.58)
Wholesale Pork Quantity (Q_K^w)	0.97 (25.32)	
Slaughter Hogs Quantity (Q_K^s)		0.98 (24.85)
Regression Statistics:		
Adjusted R^2	0.938	0.992
Log mean of the dependent variable	3.93	9.7

[a]These estimates are obtained from the structural model presented later in the report.

Table 9.11. SUR (Double Log) Supply Quantity Transmission Elasticities for Lamb.

	Dependent Variables		
Regressors	Domestic Retail Lamb Quantity (Q_t^r)	Wholesale Lamb Quantity (Q_t^w)	Slaughter Lamb Quantity (Q_t^s)
Constant	-5.99 (-2.87)	-0.05 (-5.24)	0.34 (0.40)
Wholesale Retail Lamb Quantity (Q_t^w)	0.91 (8.82)		
Slaughter Lamb Quantity (Q_t^s)		1.01 (571.09)	
Feeder Lamb Quantity (Q_t^f)			0.86 (6.10)
Regression Statistics:			
Adjusted R^2	0.993	0.999	0.979
Log mean of the dependent variable	0.086	5.72	5.73

[a]These estimates are obtained from the structural model presented later in the report.

Table 9.12. OLS (Double Log) Supply Quantity Transmission Elasticity for Poultry.

	Dependent Variable
Regressors	Retail Poultry Quantity (Q_r^r)
Constant	1.5
	(6.49)
Wholesale Poultry Quantity (Q_r^w)	0.81
	(36.62)
Regression Statistics:	
Adjusted R^2	0.999
Log mean of the dependent variable	9.78

[a]These estimates are obtained from the structural model presented later in the report.

9.3.4 Simulated Elasticities

Whether obtained from the literature or estimated, Monte Carlo simulations are conducted after selecting prior distributions for each of the elasticities used in the model. We use Beta (4,4) distributions as priors in all cases. The Beta distribution is used because it allows for truncation while the alpha and beta parameters approximates a normal distribution across the two truncation points. In addition, demand elasticities are constrained to always be negative and supply elasticities to always be positive.

After reviewing the literature, ranges for each short run demand, supply, cross-price, and transmission elasticity were established by multiplying each estimate by 0.50 to establish the lower bound (in absolute value) and by 1.50 to establish the upper bound (in absolute value).

For each Monte Carlo replication, each randomly selected elasticity was allowed to multiplicatively approach its long run elasticity estimate reported above. The approach allows for supply and demand adjustments to occur as both consumers and producers respond to exogenous shocks.

Each simulation includes 1,000 iterations. Empirical probability distributions are generated for each endogenous variable and for all estimates of changes in consumer and producer surplus. We use these empirical distributions to develop reported means (Brester, Marsh, and Atwood, 2004).

9.3.5 Correlations

A sensitivity analysis of an equilibrium displacement model should consider both variations of elasticity estimates and correlations among these estimates (Davis and Espinoza, 1998). We assume that demand elasticities are uncorrelated with supply elasticities. Furthermore, we assume that supply and demand elasticities are uncorrelated across species. Because we obtained supply and demand elasticity estimates from the literature, estimated correlation among supply and demand elasticities are not available. However, estimated correlations among the demand and supply quantity transmissions indicated that vertical

correlations averaged about 0.20. In addition, correlation estimates for both the beef sector and lamb sector also indicated correlations of about 0.20 (GIPSA RTI Meat Marketing Study, 2007). Consequently, we selected 0.20 as the correlation coefficient to be used among vertically related supply and demand elasticities.

9.4 Simulation Scenarios

Various simulation scenarios are presented below to illustrate the impact of combinations of animal identification policies, adoption rates, and potential export and domestic beef demand responses. The costs on the beef industry are proportionally larger than for the other meat species. Consequently, export and domestic beef demand shocks dominate all others. Thus, the various scenarios focus on shocks to beef demand rather than the potential impacts on demand for other species. Scenarios estimate producer and consumer surplus under 30, 50, 70, and 90% NAIS adoption rates (with few noted exceptions) to illustrate how different adoption rates cause different impacts. The scenarios are separated into five general areas:

1. Effects of Various Adoption Rates of Full Animal Identification/Tracing

The impacts of increased costs of full animal identification/tracing are simulated assuming 30, 50, 70, and 90% adoption rates. This set of simulations are conducted assuming that both export and domestic demand for meat are unaffected by the adoption of a full animal identification/tracing program. In essence these scenarios reflect where costs of NAIS adoption accrue in the short and long run if there are no benefits at all from adoption.

2. Effects of a 50% Adoption Rate for Premises Registration, Bookend, and Full Animal Identification/Tracing

The impacts of a 50% adoption rate of three animal identification programs, 1) premises registration, 2) bookend, and 3) full animal identification/tracing, are simulated. The simulations are conducted assuming that both export and domestic demand for meat are unaffected by the 50% adoption of these three programs. This set of scenarios enables us to compare how additional costs of bookend and full animal tracing alone without any changes in demand would affect producers and consumers. These scenarios again reflect only costs of adoption assuming no benefits.

3. Increases in Export Beef Demand Needed to Offset Various Adoption Rates of Full Animal Identification/Tracing

Regardless of adoption rates, the implementation of a full animal identification/tracing program increases costs. However, it is possible that such systems may increase foreign consumer confidence in the US meat system. Hence, the size of an increase in beef export demand needed to just offset adoption costs is simulated assuming 30, 50, 70, and 90% adoption rates. The focus is on beef exports rather than exports of other meats because the beef sector dominates the simulation model. That is, since costs of adoption are by far largest in the beef sector, it is the sector that is most affected. The simulation involves adjusting the size of the increase in beef export demand to the point where none of the wholesale, slaughter cattle, nor feeder cattle (which includes cow/calf producers) sectors lose any (10-year discounted present value) producer surplus. These sectors were selected because they are the sectors in the beef industry that incur direct costs of an individual animal ID and tracing system with NAIS adoption. In essence, these scenarios measure how much of a beef export demand enhancement would be needed (assuming constant domestic demand) to encourage beef producer adoption of NAIS for each adoption rate.

4. Increases in Domestic Beef Demand Needed to Offset Various Adoption Rates of Full Animal Identification/Tracing

Adoption of an animal identification/tracing program could increase consumer confidence in the US meat system. Hence, the size of an increase in domestic beef demand needed to just offset the costs of such a program is simulated assuming 30, 50, 70, and 90% adoption rates. In these scenarios, the focus is on domestic beef demand rather than the domestic demand for other meats because the beef sector dominates the simulation model. The simulation involves adjusting the size of an increase in domestic beef demand to the point where neither the wholesale beef, slaughter cattle, nor feeder cattle sectors lose any (10-year discounted) producer surplus. In essence, these scenarios measure how much of a domestic beef demand enhancement would be needed (assuming constant domestic demand) to encourage beef producer adoption of NAIS for each adoption rate.

5. Loss of Export Beef Demand if Animal Identification/Tracing is Not Implemented

Animal identification systems are rapidly developing through the world (see Table 12.1 for a summary comparing global cattle identification and traceability systems). World Trade Organization guidelines allow members to maintain higher sanitary and phytosanitary standards than internationally accepted if there is scientific justification to impose such standards. Furthermore, as international adoption of animal identification and tracing systems are adopted, they raise internationally accepted standards. The United States could begin to lose access to international beef export markets if the United States falls behind world standards on adoption of an animal identification/tracing system.

According to USDA-APHIS (2007), the U.S. needs to develop and implement an animal identification system that can "protect U.S. exports and meet the growing international market demand for systems that provide timely animal identification capabilities..." (page 2). Furthermore, Murphy et al. (2008) states that animal identification systems "are becoming prerequisites to international trade" (page 284).

As a result, status quo of doing nothing going forward to increase adoption of NAIS is likely to reduce US access to specific international markets. Exactly how much access and at what timing is not certain, but reduced access is probable. To estimate how such reduced export market access, all else constant, we estimate a set of scenarios where loss of the beef export markets are evaluated at 10%, 25%, and 50% losses assuming the United States does not implement an animal identification/tracing system. These scenarios demonstrate potential losses of not having NAIS as animal identification and tracing becomes an international norm.

9.5 Animal Identification Program Cost Estimates

Exogenous (percentage) changes in an animal identification program at the wholesale, slaughter, and farm levels of the beef, pork, lamb, and poultry industries were estimated (see Sections 4-7 for discussion on the animal identification program cost estimates). There are no changes in costs at the retail levels. The annual operation costs estimates resulting from a 90% adoption of an animal identification program for beef, pork, lamb, and poultry would increase by $175.87 million, $5.67 million, $2.71 million, and $7.98 million, respectively.

Of the $192.22 million annual increase in operating costs, the beef industry will bear the largest portion of this with a $175.87 million annual increase in operating costs. Costs associated with several sectors within the beef industry are aggregated for use in the simulation model. For example, Beef cow/calf and Auction yard costs are combined into the feeder cattle sector. Dairy, Background, and Feedlot costs are aggregated into the slaughter cattle sector. Packer costs are referred to as wholesale costs in the simulation model. Thus, beef industry costs are estimated to be distributed as: $126.69 million to the feeder cattle sector, $46.48 million to the slaughter cattle sector, and $2.69 million to the wholesale sector. Using 2007 prices and quantities for each market level, these costs estimates represent the following percentage increases in costs relative to total value: 0.42% at the farm level, 0.12% at the slaughter cattle level, and 0.007% at the wholesale beef level (see column 5, table 9.13). Each of these percentage increases in costs represent upward shifts (reductions in supply) of the respective supply functions [equations (9.47), (9.45), and (9.40)].

Costs associated with the pork industry are aggregated into specific sectors within the simulation model. Identification costs associated with Farrow-to-Wean, Farrow-to-Feeder, Farrow-to-Finish, Wean-to-Feeder, and Feeder-to-Finish are aggregated into the slaughter hog sector. Packer costs are represented in the simulation model by the wholesale level. These costs will be distributed throughout the pork industry as follows: $5.54 million to the slaughter hog sector and $0.13 million to the

wholesale pork (packer) sector. These translate to the following percentage increases in costs relative to total value: 0.04% at the slaughter hog level, and 0.0009% at the wholesale pork level (column 5, table 9.13). Each of these percentage increases in costs represents upward shifts of the respective supply functions [equations (9.56) and (9.51)].

One-half of the costs associated with All Operations in the lamb industry are allocated to the feeder lamb level, while the other one-half of All Operations costs are allocated to the slaughter lamb sector. Packer costs are included in the wholesale level in the simulation model. The $2.71 million annual increase in lamb industry costs will be distributed as: $1.34 million, $1.34 million, and $0.029 million to the feeder lamb, slaughter lamb, and wholesale marketing levels, respectively. These costs increases represent the following percentage increases relative to total value at the feeder, slaughter, and wholesale levels: 0.43%, 0.43%, and 0.008%, respectively (column 5, table 9.13). Each of these percentage increases in costs represents upward shifts of the respective supply functions [equations (9.66), (9.64), and (9.62)].

All of the costs incurred by the poultry industry are assigned to the wholesale level in the simulation model. Increased costs to the poultry sector are attributed to the wholesale level and represent a 0.02% increase in wholesale costs relative to total value. This percentage increase represents an upward shift in the respective supply function [equation (9.71)].

The percentage changes in animal identification costs for the alternate scenarios (e.g., 30% adoption for Full Identification/Tracing, 50% adoption for Full Identification/Tracing, etc.) at each market level are estimated in a similar manner. These percentage increases in costs are presented in table 9.13.

Table 9.13. Exogenous Supply Changes Used in the Equilibrium Displacement Model. (%)

	No Change in Demand						
	30% adoption	50% adoption	70% adoption	90% adoption	50% adoption	50% adoption	50% adoption
	Full ID & Tracing	Full ID & Tracing	Full ID & Tracing	Full ID & Tracing	Prem. Registration	Bookend	Full ID & Tracing
Beef Sector:							
Wholesale	0.0019%	0.0032%	0.0046%	0.0068%	0.0000%	0.0032%	0.0032%
Slaughter	0.0303%	0.0538%	0.0815%	0.1160%	0.0001%	0.0319%	0.0538%
Farm	0.0997%	0.1755%	0.2905%	0.4178%	0.0011%	0.1558%	0.1755%
Pork Sector:							
Wholesale	0.0003%	0.0005%	0.0007%	0.0009%	0.0000%	0.0005%	0.0005%
Slaughter	0.0121%	0.0206%	0.0299%	0.0399%	0.0008%	0.0046%	0.0206%
Lamb Sector:							
Wholesale	0.0027%	0.0045%	0.0063%	0.0081%	0.0045%	0.0045%	0.0045%
Slaughter	0.1371%	0.2286%	0.3200%	0.4318%	0.0221%	0.1308%	0.2286%
Farm	0.1350%	0.2249%	0.3149%	0.4250%	0.0217%	0.1287%	0.2249%
Poultry Sector:							
Wholesale	0.0046%	0.0084%	0.0129%	0.0180%	0.0003%	NA*	0.0084%

*There are no costs in the bookend approach for poultry.

9.6 Animal Disease Management

An epidemiological disease spread model is used to evaluate a hypothetical foot-and-mouth disease (FMD) outbreak in southwest Kansas under alternative animal tracing strategies. The disease spread in this exercise is confined to the southwest Kansas region and is not allowed to jump outside of the region, though in all likelihood FMD would spread beyond this region if it occurred. The main reason for confining the disease to this area is that it is the only region for which we have well-calibrated reliable animal location and movement data which are critical inputs into the disease spread model. Restricting the model to this geographic area likely underestimates both the disease spread and its duration. However, the equilibrium displacement model results presented below resulting from a highly contagious FMD outbreak are driven more off of export market losses than animal losses associated with disease outbreak.

The tracing strategies used in the disease spread model are 30, 50, 70, and 90% successful one-step forward traces which we use as a proxy for ID and tracing adoption rates used in other scenarios. However, successful one-step forward traces are not the same as industry animal ID and tracing adoption rates. The specific epidemiological model used is the *North American Animal Disease Spread Model* (NAADSM). NAADSM is a stochastic, spatial, state-transition simulation model that is designed to simulate the spread and control of highly contagious diseases in a population of susceptible animals (Harvey, et al.). Results from the disease spread model are then incorporated into the equilibrium displacement model.

The disease spread model used in this study was developed by the US Department of Agriculture's Animal and Plant Health Inspection Service (USDA/APHIS) in collaboration with Colorado State University, University of Guelph, Canadian Food Inspection Agency, and Ontario Ministry of Agriculture, Food, and Rural Affairs. Several recent studies including Paarlberg et al. (2008), Pendell et al. (2007), Pendell (2006), and Reeves et al. (2006) have used the NAADSM to analyze impacts of FMD outbreaks.

9.6.1 Impacts of Foot-and-Mouth Disease Outbreak with Various Decreases in Export Beef Demand Given Various Adoption Rates of Full Animal Identification/Tracing.

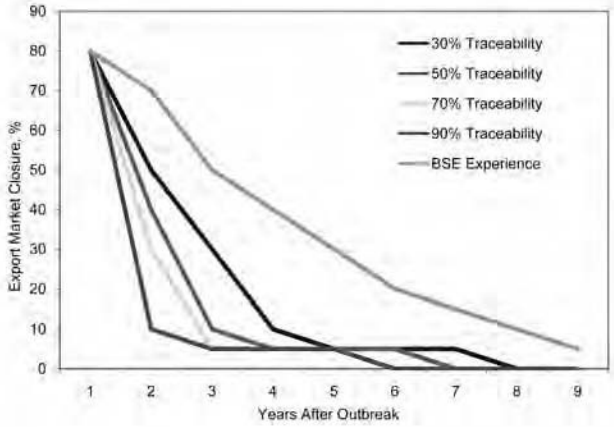
This set of simulations considers increased levels of animal tracing at 30, 50, 70, and 90% tracing adoption rates simultaneously with various changes in export beef demand. In each scenario a first-year reduction in exports of 80% was assumed following an FMD outbreak. The rationale for this is that major export markets would immediately completely close in similar fashion to what the US experienced with the BSE event that resulted in an 80% first-year export market reduction. FMD is a much more well understood and common disease in the world than BSE and is not considered a food safety threat. As such, resumption of trade with an FMD outbreak is assumed to occur faster than the US experienced with BSE. Furthermore, as animal tracing adoption increases, it is assumed that regionalization would enable for more rapid export market re-opening so the export market is assumed to be re-opened more quickly with higher levels of animal tracing adoption.

With 30% tracing adoption, it is assumed that an FMD outbreak would result in an 80% decrease in export beef demand in the first year, a 50% decrease in export beef demand in the second year, a 30% decrease in export beef demand in the third year, 10% decrease in export beef demand in the fourth year, a 5% decrease in export beef demand in years five, six, and seven, and by year eight, the markets would be back to pre-FMD export beef demand levels. A second simulation considers a 50% tracing adoption rate assuming an 80, 40, 10, 5, 5, and 5% loss in export beef demand in years one through six, respectively, with the last four years at pre-FMD beef export levels following the FMD outbreak. A third model simulates a 70% adoption rate tracing adoption rate assuming a 80, 30, 5, 5, and 5% loss in export beef demand in years one through five, respectively, following the FMD outbreak with the last five years at pre-FMD beef export levels. A fourth model considers a 90% adoption rate, and losses of 80, 10, 5, 5, and 5% in export beef demand in years one through five, respectively, with the last five years at pre-FMD beef export levels.

Figure 9.4 presents the alternate tracing adoption rates and the associated export market losses by year following a FMD outbreak and for comparison illustrates the export market losses by year as a result of the BSE event in the US. The BSE event occurred in late 2003, so we have only realized just under

five years of export market access since that time. Export market forecasts from the Livestock Marketing Information Center were used for years five, six, seven, eight, and nine, after the BSE event in figure 9.4.

FIGURE 9.4. ASSUMED EXPORT MARKET LOSS BY YEAR FOLLOWING A FOOT-AND-MOUTH DISEASE OUTBREAK WITH DIFFERENT BOVINE AND SWINE TRACEABILITY LEVELS AND ACTUAL AND FORECASTED BSE EXPERIENCED EXPORT MARKET LOSS



9.6 SIMULATION RESULTS

IN THIS SECTION, WE PRESENT EDM SIMULATION RESULTS for a variety of scenarios that evaluate the cost impacts of implementing an animal identification program on the meat industry. In each case, percentage changes in prices and quantities for livestock and meat prices are presented for both short run (1 year) and long run (10 year) time horizons. Each percentage change is relative to 2007 average prices and quantities. In addition, changes in producer surplus at each market level and for each species are presented as are changes in consumer surplus at the retail level.

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Changes in producer and consumer surplus are presented for short run and long run time horizons as well as cumulative effects over a ten-year period. Changes in producer and consumer surplus for the various simulations can be found in the tables in Appendix A.9.2.

9.6.1 Simulated Effects of Various Adoption Rates of Full Animal Identification/Tracing

Table 9.14 presents median percentage changes in prices and quantities for all endogenous variables resulting from a 90% adoption of a full animal identification/tracing program. The first column shows the short run (first year) results. Retail and wholesale beef prices increase by 0.73% and 0.87%, respectively, while quantities decrease by 0.52% and 1.03%. Prices and quantities for imported wholesale beef, slaughter cattle, and feeder cattle all decline. Exported wholesale beef quantities also decline.

Retail, wholesale, and imported pork prices and quantities all increase slightly (but by less than 0.11%). This occurs because the demand for pork increases as the retail price of beef increases. This demand increase is large enough to offset additional costs imposed on the pork sector by the 90% adoption of full animal identification/tracing program. Slaughter hog prices increase by 0.09%, but quantities decline slightly as do quantities of pork exports. Higher domestic pork prices encourages imports which displaces some domestic and export production.

The retail price of domestic lamb increases by 1.1%, while quantity declines by about 0.5%. Thus, retail demand (as a result of higher beef and pork prices) for lamb does not increase enough to offset higher costs of full animal identification/tracing. However, the retail demand for imported lamb increases. The prices of wholesale and slaughter lamb increase while quantities decline. Feeder lamb prices and quantities both decline. Retail and wholesale poultry prices and quantities increase, while poultry exports decline slightly.

In the long run, most of these relationships are similar. However, all of the long run estimates are quite small indicating that the meat industry adjusts to the animal identification/tracing program over time.

Table 9.14. Median Changes from 90% Adoption of a Full Animal Identification/Tracing Program

Endogenous Variables	Short Run	Long Run
Retail Beef Quantity	-0.522%	-0.003%
Retail Beef Price	0.729%	0.003%
Wholesale Beef Quantity	-1.029%	-0.021%
Wholesale Beef Price	0.866%	0.020%
Imported Wholesale Beef Quantity	-0.766%	-0.019%
Imported Wholesale Beef Price	-0.418%	-0.002%
Exported Wholesale Beef Quantity	-0.359%	-0.059%
Slaughter Cattle Quantity	-0.812%	-0.055%
Slaughter Cattle Price	-0.711%	0.061%
Feeder Cattle Quantity	-0.562%	-0.130%
Feeder Cattle Price	-1.469%	0.102%
Retail Pork Quantity	0.104%	-0.001%
Retail Pork Price	0.082%	0.002%
Wholesale Pork Quantity	0.043%	-0.010%
Wholesale Pork Price	0.080%	0.008%
Imported Wholesale Pork Quantity	0.027%	-0.009%
Imported Wholesale Pork Price	0.020%	-0.001%
Exported Wholesale Pork Quantity	-0.073%	-0.008%
Slaughter Hog Quantity	-0.005%	-0.020%
Slaughter Hog Price	0.086%	0.011%
Domestic Retail Lamb Quantity	-0.505%	-0.008%
Domestic Retail Lamb Price	1.126%	0.008%
Imported Retail Lamb Quantity	0.907%	0.006%
Imported Retail Lamb Price	0.090%	0.001%
Wholesale Lamb Quantity	-0.747%	-0.042%
Wholesale Lamb Price	1.057%	0.035%
Slaughter Lamb Quantity	-0.900%	-0.166%
Slaughter Lamb Price	0.511%	0.145%
Feeder Lamb Quantity	-0.609%	-0.191%
Feeder Lamb Price	-2.245%	0.103%
Retail Poultry Quantity	0.080%	0.001%
Retail Poultry Price	0.280%	0.000%
Exported Retail Poultry Quantity	-0.085%	0.000%
Wholesale Poultry Quantity	0.021%	-0.001%
Wholesale Poultry Price	0.276%	0.002%

Table 9.15 presents changes in producer and consumer surplus that occur because of the 90% adoption of a full animal identification/tracing program. As expected, the short run impacts are larger than the long run effects. In the short run, the slaughter and feeder cattle sectors each lose about $570 million. The costs of a full animal identification/tracing program with 90% adoption are approximately $173 million for the slaughter and feeder cattle sectors. These costs cause the supply of both slaughter and feeder cattle to be reduced, thus increasing the price of cattle. However, the increase in price of slaughter and feeder cattle will ultimately raise the price at the retail level causing consumers to substitute away from beef to pork, poultry and/or lamb. This reduction in demand for beef results in a decrease in the derived demand for slaughter and feeder cattle, thus lowering the price and quantity. In year 10, the entire beef industry loses $24 million of producer surplus. Over the entire 10-year period, the discounted present value of producer surplus losses for the beef industry totals $4.52 billion or about 1% of the discounted present value of the 10-year total surplus for the industry.

The pork industry realizes a small gain in producer surplus of $76 million in year 1 as higher beef prices caused by relatively higher animal identification costs causes pork to be a more attractive consumption substitute for beef. Over the entire 10-year period, the pork industry gains only about 0.06% of discounted total producer surplus.

The entire lamb industry loses about $5.3 million of producer surplus in year 1, and a discounted present value of $31.5 million over the entire 10 years. The latter amount represents a 0.35% decline.

The poultry industry gains producer surplus as a result of the implementation of an animal identification program because relatively lower costs are being added to the poultry sector. Thus, as prices for substitute meats increase, the demand for poultry increases. The poultry sector gains $274 million of producer surplus (0.16%) in terms of the discounted present value over the 10-year period.

Assuming that no changes in the domestic or export demand for meats occur as a result of the implementation of an animal identification program, beef consumer surplus declines by 0.45%, pork consumer surplus increases by 0.01%, and domestic lamb consumer surplus declines by 0.55%. Imported lamb consumer surplus increases by 0.35% and poultry consumer surplus

increases by 0.01%. In terms of all US meat consumers, consumer surplus declines by $1.33 billion over the 10-year period which represents a 0.11% decline.

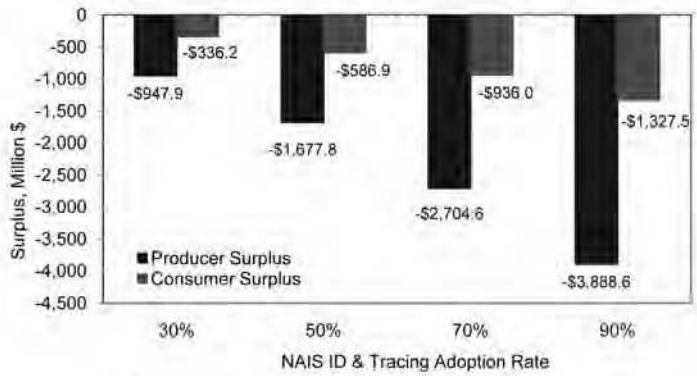
Figure 9.5 presents changes in the total discounted present value of producer and consumer surplus assuming 30, 50, 70, and 90% adoption rates of a full animal identification/tracing program. The losses increase with adoption rates. Of course, each of these scenarios assumes that neither export nor domestic demand for meat are affected by such programs. As such, these scenarios estimate societal impacts of NAIS adoption assuming no benefits accrued.

Table 9.15. Producer and Consumer Surplus Changes from 90% Adoption of a Full Animal Identification/Tracing Program.[a]

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-55.57	-0.50	-613.13	-534.79	-0.177%
Wholesale Beef	-152.95	-2.46	-919.68	-786.85	-0.474%
Slaughter Cattle	-568.31	-6.84	-1,946.61	-1,693.05	-0.862%
Feeder Cattle	-570.12	-13.93	-1,869.94	-1,628.31	-1.038%
Total Beef Producer Surplus	-1,354.51	-23.66	-5,260.73	-4,520.48	-0.991%
Retail Pork	56.29	-0.15	142.13	127.27	0.107%
Wholesale Pork	13.02	-0.75	26.96	25.34	0.041%
Slaughter Hog	6.41	-1.55	-0.78	2.04	0.003%
Total Pork Producer Surplus	76.18	-2.45	167.57	155.70	0.064%
Retail Domestic Lamb	3.84	-0.02	3.99	4.18	0.105%
Wholesale Lamb	0.55	-0.04	-2.50	-1.78	-0.108%
Slaughter Lamb	-1.32	-0.17	-9.45	-7.62	-0.485%
Feeder Lamb	-8.39	-0.27	-30.79	-26.57	-1.539%
Total Lamb Producer Surplus	-5.31	-0.50	-38.41	-31.51	-0.352%
Retail Poultry	160.29	0.03	347.86	314.21	0.171%
Wholesale Poultry	114.25	-0.04	270.96	245.33	0.138%
Total Poultry Producer Surplus	274.28	-0.02	614.87	560.83	0.156%
Total Meat Producer Surplus	-1,018.66	-26.78	-4,537.21	-3,888.63	-0.489%
Consumer Surplus					
Retail Beef	-550.31	-2.19	-1,642.31	-1,448.50	-0.446%
Retail Pork	14.40	-0.74	44.28	39.88	0.019%
Retail Domestic Lamb	-9.00	-0.06	-29.08	-25.66	-0.554%
Retail Imported Lamb	12.29	0.05	34.87	30.89	0.346%
Retail Poultry	-2.16	0.14	69.85	57.70	0.014%
Total Meat Consumer Surplus	-522.82	-2.87	-1,503.37	-1,327.48	-0.109%

[a] Totals are not identical to sums of individual surpluses because they are averages of simulations.

FIGURE 9.5. CUMULATIVE PRESENT VALUE OF 10-YEAR TOTAL PRODUCER AND CONSUMER SURPLUS CHANGES, FULL TRACING, WITH VARYING ADOPTION RATES, WITH NO DOMESTIC OR EXPORT DEMAND CHANGES*

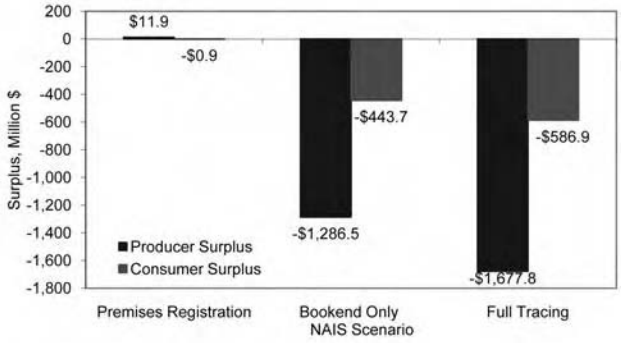


*Information for figure 9.5 can be found in table 9.15 and A9.2.1 – A9.2.3.

9.6.2 SIMULATED EFFECTS OF A 50% ADOPTION RATE FOR PREMISES REGISTRATION, BOOKEND, AND FULL ANIMAL IDENTIFICATION/TRACING

Simulations were conducted based upon a 50% adoption rate of premises registration, bookend, and full animal identification/tracing programs. Once again, the simulations are conducted assuming that both export and domestic demand for meat are unaffected by a 50% adoption of these three programs. In other words, they assume no direct benefits of adoption. Figure 9.6 illustrates the results in terms of 10-year cumulative total discounted present value of producer and consumer surplus. The impacts on producer and consumer surplus are negligible in the case of premises registration because associated costs are relatively small. However, the costs for bookend and full animal identification/tracing are relatively larger, and cause large changes in total producer and consumer surplus. For the bookend program and full animal identification/traceability program with a 50% adoption rate, total meat producer surplus declines by $1.3 and $1.7 billion, respectively. Of course, each of these scenarios assumes that neither export nor domestic demand for meat are affected by such programs.

FIGURE 9.6. CUMULATIVE PRESENT VALUE OF 10-YEAR TOTAL PRODUCER AND CONSUMER SURPLUS CHANGES, PREMISES REGISTRATION, BOOKEND, FULL TRACING, 50% ADOPTION RATES, NO DEMAND CHANGES*



*Information for figure 9.6 can be found in tables A9.2.4 – A9.2.6.

9.6.3 INCREASES IN BEEF EXPORT DEMAND NEEDED TO OFFSET VARIOUS ADOPTION RATES OF FULL ANIMAL IDENTIFICATION/TRACING

A large and growing body of research suggests that US consumers, as well as those in many other countries, value animal traceability or attributes made available through traceability of food products. Many consumers demand and demonstrate willingness-to-pay for food products that are traceable to the farm or ranch. "The improved food safety from increased traceability increases consumers' willingness to pay for the (safer) product. This creates an additional incentive to improve the food safety reputation of the industry" (Pouliot and Sumner, 2008, p. 25).

International consumers have demonstrated demand for traceability and/or product attributes (e.g., Buhr, 2003; Cuthbertson and Marks, 2007; Gracia and Zeballos, 2005; Hobbs, 1996; Hobbs et al., 2005; Schroeder et al., 2006;

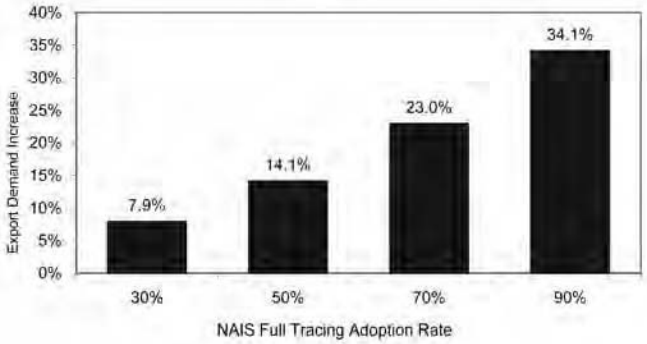
Tonsor et al., 2005). Dickinson and Bailey (2005) concluded that consumers in Japan, Canada, US, and the UK were willing to pay on average from 7% to 25% more for beef and pork sandwiches containing traceable meat. Japanese consumers, a very important market for US beef and pork, was the highest at 25%. Results from this body of literature reveals that the United States livestock industries lagging behind other major producing regions in animal ID and traceability (as documented in an earlier section of this report), reduces its competitiveness and demand for its product relative to other major exporters in the global market.

Regardless of adoption rates, the advent of full animal identification/tracing increases costs. However, it is possible that such systems may increase foreign consumer confidence in the US meat system. Hence, the size of an increase in beef export demand needed to just offset these costs are simulated assuming 30, 50, 70, and 90% adoption rates. The focus is on beef exports rather than exports of other meats because the beef sector dominates the simulation model. The simulation involves adjusting the size of the increase in beef export demand to the point where none of the wholesale, slaughter cattle, nor feeder cattle (which includes cow/calf producers) sector lose any (10-year discounted) producer surplus.

Figure 9.7 illustrates the simulation results. Assuming a 30% adoption rate of a full animal identification/tracing program, an 7.9% increase in beef export demand over 2007 levels would be required so that the wholesale beef, slaughter cattle, and feeder cattle sectors do not lose producer surplus because of the implementation of an animal identification program. With an 7.9% increase in beef export demand, slaughter and feeder cattle sectors gain $1,037 and $549 million, respectively, while the wholesale sector is virtually no worse off (table A.9.2.7). Given that industry costs increase with adoption rates, a 34.1% increase in beef export demand would be required under a 90% adoption rate to so that none of these three sectors of the beef industry would lose any producer surplus. A 34.1% increase in beef export demand leads to an increase producer surplus in the slaughter and feeder cattle sectors by $4,621 and $2,549 million, respectively (table A.9.2.10). To put such an increase into perspective, South Korea's beef export market share prior to the 2003 US BSE discovery was 23%. Since that time, South Korea's beef market has generally been closed to US beef exports. South Korea's trade negotiators have, at least indirectly, hinted that a lack of a US

animal identification system is one of the barriers to the normalization of beef trade between the two countries. Finally, it is likely that adoption rates and export demand increases are likely to be positively correlated.

FIGURE 9.7. CHANGE IN BEEF EXPORT DEMAND NEEDED SO THAT WHOLESALE BEEF, SLAUGHTER CATTLE, AND FEEDER CATTLE SECTORS DO NOT LOSE ANY CUMULATIVE PRESENT VALUE 10-YEAR SURPLUS OF FULL TRACING BY ADOPTION RATES *



*Information for figure 9.7 can be found in tables A9.2.7 – A9.2.10.

9.6.4 Increases in Domestic Beef Demand Needed to Offset Various Adoption Rates of Full Animal Identification/Tracing

Based on the large body of literature demonstrating consumer demand for meat traceability and associated credence and food safety enhancements that are associated with tracing, likely domestic consumer demand would be greater for meat produced under a viable animal tracing system. Exactly how much demand might increase as a result of animal tracking is difficult to determine. However, past research includes willingness to pay premiums for traceability alone of more than 7% (Dickinson and Bailey, 2002).

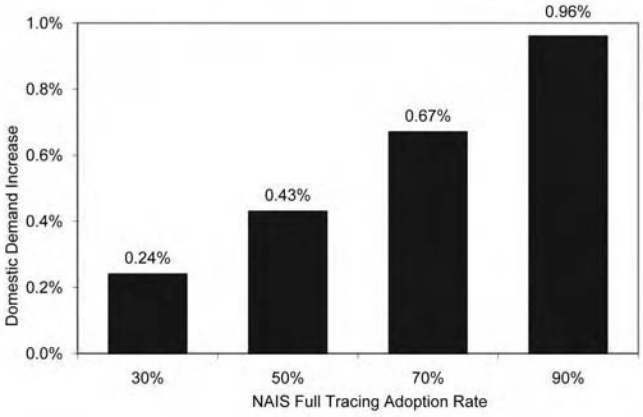
Dickinson and Bailey (2002) conducted binding experiments using beef and pork sandwiches with base prices of $3.00 and actual dollar exchange to determine consumer willingness-to-pay for traceability. Participants were willing-to-pay on average $0.23 more for traceability to the farm for beef and $0.50 for pork. Umberger et al. (2003) concluded that on average consumers in Chicago and Denver were willing to pay from 10% (steak) to 23% (ground beef) more for beef with a US country to origin guarantee. Loureiro and Umberger (2003) determined that consumers were willing to pay $1.53/lb more for steak and $0.70/lb more for ground beef that was "US Certified Beef". Other studies find similar support of US consumers demanding animal and meat traceability (e.g., Loureiro and Umberger, 2004; Ward, Bailey, and Jensen, 2005). Traceability alone appears to be less valuable than what traceability better enables the food supply chain to deliver in regards to food safety assurances, enhanced product quality, origin labeling, and related product credence characteristics (Hobbs et al., 2005; Schroeder et al., 2006; Verbeke and Ward, 2006).

Mennecke et al. (2007) conducted a national survey of 1,171 consumers in addition to surveys of 76 business and animal science students and 221 other students about beef steak attribute preferences. Region of origin was overall the highest ranked important product attribute followed by growth promoters, cost, tenderness, traceability, organic certification, animal breed, steak cut, and animal feed. They concluded "Our results clearly indicate that information about the region of origin, the use or nonuse of growth promoters, guaranteed tenderness, and traceability could all be critical elements of consumer decision making" (p. 2653).

Simulations were conducted to evaluate the potential impacts of increases in domestic consumer demand as a result of various adoption rates of a full animal identification/tracing program. Because the beef industry faces the largest costs, we focus on that sector. The model was used to determine the size of an increase in domestic beef demand that would be required so that none of the wholesale beef, slaughter cattle, nor feeder cattle sectors lose any producer surplus (i.e., 10-year discounted present value) associated with animal identification. Figure 9.8 presents these results, and indicates that a permanent 0.24% increase in domestic beef demand would just offset these costs for the entire industry if a 30% adoption occurred. Under a 90% adoption rate, a permanent domestic demand increase of 0.96% would be required so that no sector of the beef industry would incur any loss of producer surplus based upon the present discounted values occurring over a 10-year time period.

Since 2000, annual beef demand has varied from an increase of 8.9% to a decline of 3.7%. Hence, a 1% increase is certainly within the range of recent demand changes.

FIGURE 9.8. CHANGE IN DOMESTIC BEEF DEMAND NEEDED SO THAT WHOLESALE BEEF, SLAUGHTER CATTLE, AND FEEDER CATTLE SECTORS DO NOT LOSE ANY CUMULATIVE PRESENT VALUE 10-YEAR SURPLUS OF FULL TRACING BY ADOPTION RATES*



*Information for figure 9.8 can be found in tables A9.2.11 – A9.2.14.

9.6.5 IMPACTS OF DECREASES IN EXPORT BEEF DEMAND IF ANIMAL IDENTIFICATION/TRACING IS NOT IMPLEMENTED

This set of simulations considers decreases in export beef demand of 10, 25, and 50% if the US loses access to beef export markets because it does not implement an animal identification/tracing system.

Table 9.16 presents median percentage changes in prices and quantities that would result from a permanent 50% decrease in export demand. The first column shows the short run (first year) results. Retail and wholesale beef prices decrease by 0.79% and 1.03%, respectively, while quantities increase by 0.66% and 1.32%. Imported wholesale beef prices and both import and export quantities decrease. Both slaughter and feeder cattle quantities (0.45% and 0.18%) and prices (2.06% and 1.78%) decline.

With the exception of export pork and poultry quantities, all other pork, lamb and poultry prices and quantities decrease. Because there is a larger supply of beef in the US (because of the decrease in export beef demand), the price at the retail level for beef falls, thus reducing the retail demand for pork, lamb, and poultry.

The long run results are slightly different from the short run results. Specifically, most of the long run results are positive. However, the long run results are much smaller than the short run results.

Table 9.16. Median Changes in the Absence of an Animal Identification/Tracing Program and a 50% Permanent Loss of Beef Export Markets.

Endogenous Variables	Short Run	Long Run
Retail Beef Quantity	0.662%	-0.108%
Retail Beef Price	-0.786%	0.092%
Wholesale Beef Quantity	1.317%	-0.700%
Wholesale Beef Price	-1.025%	0.640%
Imported Wholesale Beef Quantity	-3.383%	-5.879%
Imported Wholesale Beef Price	-1.869%	-0.588%
Exported Wholesale Beef Quantity	-49.581%	-51.920%
Slaughter Cattle Quantity	-0.452%	-3.339%
Slaughter Cattle Price	-2.062%	-0.212%
Feeder Cattle Quantity	-0.180%	-2.511%
Feeder Cattle Price	-1.781%	-0.890%
Retail Pork Quantity	-0.111%	0.016%
Retail Pork Price	-0.051%	0.000%
Wholesale Pork Quantity	-0.068%	0.014%
Wholesale Pork Price	-0.047%	0.001%
Imported Wholesale Pork Quantity0.359%	-0.043%	0.012%
Imported Wholesale Pork Price	-0.031%	0.001%
Exported Wholesale Pork Quantity	0.041%	-0.001%
Slaughter Hog Quantity	-0.028%	0.009%
Slaughter Hog Price	-0.069%	0.005%
Domestic Retail Lamb Quantity	-0.013%	0.004%
Domestic Retail Lamb Price	-0.064%	0.000%
Imported Retail Lamb Quantity	-0.092%	0.005%
Imported Retail Lamb Price	-0.009%	0.000%
Wholesale Lamb Quantity	-0.004%	0.003%
Wholesale Lamb Price	-0.016%	0.000%
Slaughter Lamb Quantity	-0.001%	0.003%
Slaughter Lamb Price	-0.007%	0.000%
Feeder Lamb Quantity	-0.001%	0.002%
Feeder Lamb Price	-0.006%	0.001%
Retail Poultry Quantity	-0.076%	0.016%
Retail Poultry Price	-0.229%	0.000%
Exported Retail Poultry Quantity	0.068%	0.000%
Wholesale Poultry Quantity	-0.029%	0.015%
Wholesale Poultry Price	-0.213%	0.002%

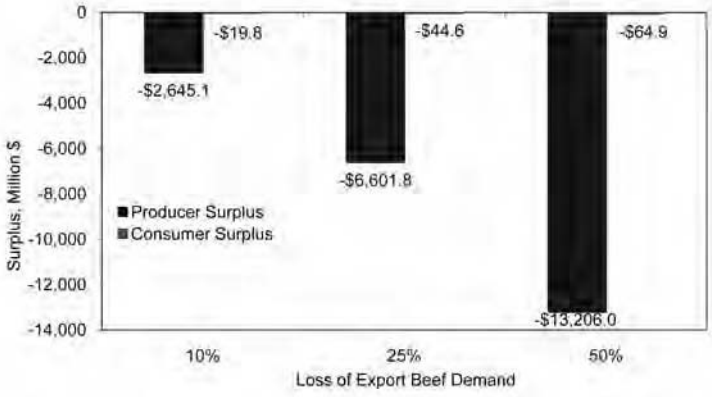
Table 9.17 presents changes in producer and consumer surplus that occur because of a permanent 50% decrease in export demand. The cumulative discounted present value of producer surplus decreases for all sectors. Total beef producer surplus decreases by 2.8%, pork producer surplus by 0.02%, poultry producer surplus by 0.07%, while lamb producer surplus declines by 0.005%. Overall, total meat producer surplus decreases by 1.7%.

Figure 9.9 presents changes in the total discounted present value of producer and consumer surplus assuming 10, 25, and 50% losses in the beef export markets. Given the beef export demand decreases assumed above, producer surplus decreases by $2.6, $6.6, and $13.2 billion for a 10, 25, and 50% loss of demand in beef exports, respectively. Consumer surplus decreases by a much smaller amount, $19.8, $44.6, and $64.9 million for export demand decreases of 10, 25, and 50%, respectively.

Table 9.17. Producer and Consumer Surplus Changes in the Absence of an Animal Identification/Tracing Program and a 50% Permanent loss of Beef Export Markets.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative As A Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	404.48	28.21	706.35	610.00	0.211%
Wholesale Beef	681.50	85.42	962.24	833.61	0.535%
Slaughter Cattle	-1,123.01	-246.75	-10,583.12	-8,579.86	-4.533%
Feeder Cattle	-539.41	-266.60	-7,282.04	-5,774.09	-3.801%
Total Beef Producer Surplus	-556.29	-400.03	-16,056.28	-12,770.44	-2.834%
Retail Pork	-44.81	0.98	-22.82	-29.75	-0.025%
Wholesale Pork	-15.31	0.63	-2.07	-5.66	-0.009%
Slaughter Hog	-9.53	0.67	2.58	-0.72	-0.001%
Total Pork Producer Surplus	-71.25	2.33	-23.37	-36.73	-0.015%
Retail Domestic Lamb	-0.66	0.01	-0.50	-0.54	-0.013%
Wholesale Lamb	-0.07	0.00	-0.02	-0.03	-0.002%
Slaughter Lamb	-0.03	0.00	0.04	0.02	0.001%
Feeder Lamb	-0.02	0.00	0.08	0.05	0.003%
Total Lamb Producer Surplus	-0.79	0.01	-0.40	-0.49	-0.005%
Retail Poultry	-168.46	0.39	-170.41	-166.58	-0.092%
Wholesale Poultry	-94.25	0.67	-67.80	-75.00	-0.042%
Total Poultry Producer Surplus	-264.87	1.10	-247.88	-248.81	-0.070%
Total Meat Producer Surplus	-911.67	-396.57	-16,383.05	-13,206.04	-1.694%
Consumer Surplus					
Retail Beef	640.52	-75.61	-427.37	-112.74	-0.034%
Retail Pork	-20.81	3.41	28.91	15.36	0.007%
Retail Domestic Lamb	0.16	0.02	0.43	0.36	0.008%
Retail Imported Lamb	-1.22	0.04	-0.64	-0.79	-0.009%
Retail Poultry	-6.61	4.10	83.27	57.66	0.014%
Total Meat Consumer Surplus	607.12	-68.01	-324.94	-64.89	-0.005%

FIGURE 9.9 CUMULATIVE 10-YEAR PRESENT VALUE OF TOTAL PRODUCER AND CONSUMER SURPLUS CHANGES, IN THE ABSENCE OF AN ANIMAL IDENTIFICATION/TRACING PROGRAM, WITH PERMANENT LOSS OF ACCESS TO BEEF EXPORT MARKETS *

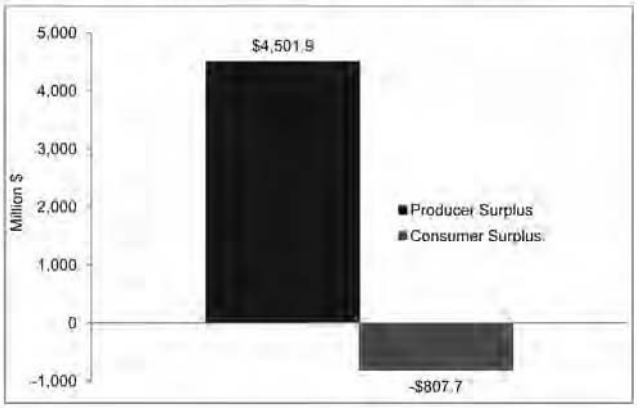


*Information for figure 9.9 can be found in tables 9.17 and A9.2.15 – A9.2.16.

9.6.6 Impacts of Foot-and-Mouth Disease Outbreak with Various Decreases in Export Beef Demand Given Various Adoption Rates of Full Animal Identification/Tracing.

Simulations were conducted to evaluate the potential impacts of closures in the export markets with various animal tracing rates as a result of a FMD outbreak. Figure 9.10 presents the difference in the total discounted present value of producer and consumer surplus between 90 and 30% ID and tracing adoption rates with an FMD. That is, the scenarios presented illustrate potential gains in the event of a FMD (or similar highly contagious disease) at different levels of animal ID. Producer surplus losses for a 90% animal identification/tracing program are $4,501.9 million less than a 30% animal identification/tracing program in the FMD outbreak scenarios with changes in the beef export markets (figure 9.10). Consumer surplus decreases as animal tracing adoption rates rise. The difference between the 90 and 30% animal identification/tracing program is a consumer loss of $807.7 million. The loss in consumer surplus is a result of increased demand in the beef export markets, thus less quantity of beef supplied at the retail level. Combined the societal gain (producer gain less consumer loss) from having 90% vs. 30% tracing is $3,694.2 million.

FIGURE 9.10. DIFFERENCE IN THE 10-YEAR CUMULATIVE PRESENT VALUE OF TOTAL PRODUCER AND CONSUMER SURPLUS BETWEEN 90% AND 30% ID AND TRACING ADOPTION RATES WITH A FOOT-AND-MOUTH DISEASE OUTBREAK



9.7 Conclusions

An equilibrium displacement model of the beef, pork, lamb, and poultry sectors was developed to evaluate the impacts on producers and consumers from costs incurred as a result of implementing animal identification/tracking programs. Several programs were evaluated including various adoption rates of premises identification, bookend identification, and full animal identification.

Assuming no changes in either domestic or export demand, the 90% adoption of a full animal identification/tracing program causes a 10-year discounted present value loss of beef industry producer surplus of $4.52 billion (about 1%). Over the entire 10-year period, the pork industry gains about 0.06% of discounted total producer surplus. The gain occurs because the beef industry's relatively larger increase in costs makes pork a more attractive consumption substitute. Conversely, the domestic lamb industry loses about $32 million over the entire 10 years (a 0.4% decline). The poultry industry gains a small amount of producer surplus ($561 million or 0.2%) as a result of the implementation of an animal identification program because relatively lower costs are being added to the poultry sector. Thus, as prices for substitute meats increase, the demand for poultry increases.

Assuming that no changes in the domestic or export demand for meats occur as a result of the implementation of an animal identification program, beef consumer surplus declines by 0.45%, pork consumer surplus increases by 0.02%, and domestic lamb consumer surplus declines by 0.55%. Imported lamb consumer surplus increases by 0.35% and poultry consumer surplus increases by 0.01%. In terms of all US meat consumers, consumer surplus declines by $1.33 billion over the 10 year period which represents a 0.11% decline.

It is possible that export demand for US meat could increase as a result of adopting some type of animal identification system. Because the costs of each of these programs are relatively larger on the beef sector, export demand is the crucial factor that determines changes in producer surplus across all species. Consequently, the simulation model determined the magnitude of an increase in beef export demand increase necessary so that the wholesale beef, slaughter cattle, and feeder cattle sectors would lose no producer surplus for 30, 50, 70, and 90% industry adoption rates. A 23% increase in beef export demand would completely pay for 70% adoption of full animal ID and tracing in the US beef herd over a 10-year period. Parenthetically, South Korea's beef export market share prior to the 2003 US BSE discovery was 23%. No other benefits beyond these would be necessary to make the investment in NAIS economically viable.

Research indicates that domestic beef demand is likely to be greater for products having animal ID and traceability. Small increases in domestic beef demand, with all else constant, would also completely pay for full animal ID and tracing in the beef industry. This scenario was evaluated for a full animal ID and tracing program with 30, 50, 70 and 90% adoption rates. A 0.67% increase in domestic beef demand would be enough to fully pay for 70% adoption of cattle ID and tracing even if no other benefits (i.e., increased export demand) occurred over a 10-year period. This is a relatively modest increase in beef demand relative to changes that have occurred (for a variety of reasons) over the past decade. The overall societal gain under this scenario (producer plus consumer surplus) is a 10-year cumulative net present value of $7.2 billion. In other words, NAIS adoption results in large positive net returns to producers and consumers with even a very small increase in domestic beef demand resulting from NAIS adoption.

If nothing were done in regards to animal identification/tracing, it is possible that we could begin to lose access to export markets as countries around the

world adopt animal identification/tracing systems. If the US experiences a 25% permanent loss of the beef export markets, slaughter cattle, feeder cattle, domestic retail lamb, wholesale lamb, all producer sectors of pork and poultry lose economic surplus while retail and wholesale beef and slaughter and feeder lambs gain economic surplus. Consumers of pork, lamb, and poultry gain a small amount of economic surplus while beef consumer surplus declines. The overall societal loss under this scenario (producer plus consumer surplus) is a 10-year cumulative net present value of $6.65 billion.

Finally, simulations were conducted to evaluate the potential impacts of closures in the export markets with various animal tracing rates as a result of an FMD outbreak given 30, 50, 70, and 90% adoption rates of a full animal identification/tracking program. The scenarios illustrate potential gains in the event of a FMD (or similar highly contagious disease) if the different levels of animal ID tracing were already present. Producer surplus losses for a 90% animal identification/tracing program are $4.5 billion less than a 30% animal identification/tracing program. In addition, losses of consumer surplus decline as animal tracing adoption rates rise. Consumers lose $807.7 million more if adoption rates are only 30% adoption relative to 90%. The combined societal gain (producer gain less consumer loss) from a 90% versus 30% adoption rate is $3.7 billion over the 10-year period.

10. EQUINE

10.1 THE EQUINE INDUSTRY

THE EQUINE INDUSTRY, BOTH IN THE UNITED STATES and world-wide, is one that is unique in many aspects and characteristics, making it difficult to describe, classify, and research. The equine industry combines the world of companion animals with the livestock industry – many owners consider their horses to be their pets, while others use them for business. Two main sources of information were used to define the state of the United States equine industry for this project – the NAHMS Equine 2005 project, published in three sections over 2006-2007, and the American Horse Council (AHC) Deloitte Survey, for the calendar year 2003 and published in 2005. In addition to these two major sources, several other sources are noted as discussed. The two primary information sources used greatly differing methods of data collection, with varying results. This is especially apparent in the estimated number of equids in the United States. However, a great deal of important information can still be obtained from these sources.

The actual number of equids in the United States is difficult to ascertain, due to the fact that the USDA Census, conducted every five years, only applies to "on-farm" livestock. As stated in the Equine 2005 project, Part II (p. 18), "The US equine population is difficult to enumerate because of the diversity of the equine industry, the geographic breadth of the equine population, and the suburban areas not included in the traditional livestock enumeration." Horses are different from other livestock because of their companion animal status. Therefore, many horses are not located on "farms," as defined by the USDA as a property that can or has produced more than $1,000 of agricultural goods on an annual basis, and/or (as of 1987) has five or more equids owned by the same owner, not including boarding stables (where horses are owned by multiple individuals) or commercial enterprises such as racetracks. The Equine 2005 Part II Booklet states (p. 7), "There is no accurate estimate of the current total number of equids in the United States because the number of equids on nonfarm operations does not exist." This same source

suggests that the on-farm estimation may only constitute 50-60% of the total equine population.

The only USDA estimates for the total number of equids in the United States come from the NASS Surveys in 1998-1999. The January 1, 1998 estimate for horse numbers by USDA was 5.25 million head, with 3.20 million on farms and 2.05 million on non-farms. On January 1, 1999 the estimate was 5.32 million head. The 1997 Census suggested there were 3.02 million head on farms, compared to the 3.20 million head the next year, and the 2002 Census states that there were 3.64 million head. At the very least, we can see an upward trend in on-farm horse numbers, which likely represents an upward trend in total horse numbers, though they are not documented by USDA. If we assume the same percentage of horses are on or off farms in 2002 as in 1998, then we can take the estimated 3.64 million head of horses on farms as 60.95% of the total, and come up with a total number of horses in the US in 2002 as 5.97 million head (which would mean there were approximately 2.33 million off-farm horses in 2002). The USDA-APHIS *Business Plan to Advance Animal Disease Traceability* quotes June 2007 equine population estimate as 5.8 million horses in approximately 570,000 locations.

Another organization which has conducted numerous surveys on the horse population is the American Horse Council (AHC). In 1986, an AHC commissioned study estimated 5.25 million equids in the United States. In 1996, another AHC survey estimated 6.9 million horses and other equine, and the most recent AHC commissioned Deloitte survey for the calendar year of 2003, published in 2005, suggested there were 9.2 million horses. A 2007 Oklahoma State University Extension Publication also lists the American Veterinarian Medical Association (AVMA) estimates since 1986. The AVMA estimates horses that are specifically owned by "households" which do not include those owned by ranches, farms, or other operations – they specifically estimated horses that are treated by their owners more as "pets." The 1986 AVMA estimate was 6.6 million horses, the 1991 estimate was 4.9 million head and the 1996 estimate was only 4 million head. However, the most recent AVMA study mentioned in the publication, from 2001, estimates 5.1 million horses owned as "pets" in the US. The conclusion of this publication states that all the sources seem to agree that the United States horse population has

had an annual growth rate of between 3 and 5% over the last decade. The most common breed of horses in the United States is the American Quarter Horse, with the leading registry of these horses being the American Quarter Horse Association (AQHA). The AQHA 2007 annual report states that there were 2.9 million Quarter Horses in the United States. This total is down by just over 28,000, and new registrations were also down by over 26,000. This is the first time in recent history that AQHA registration numbers declined. Most people familiar with the equine industry agree that the market for horses is down currently, and this may be an explanation for the downturn in AQHA numbers. AQHA also keeps track of transfer numbers, and had a total of 188,907 ownership transfers in 2007, some being within the United States and some internationally. There are 902,453 registered owners of AQHA Quarter Horses in the United States. A summary of all equine population estimates obtained can be seen in table 10.1.

Table 10.1. Equine Population Estimates.

Year	Group	Estimate (million head)	Notes
1986	AHC	5.25	All equids
1986	AVMA	6.60	"Pet" equids only
1991	AVMA	4.90	"Pet" equids only
1996	AHC	6.90	All equids
1996	AVMA	4.00	"Pet" equids only
1997	USDA Census	3.02	On farms only
1998	USDA-NASS	5.25	All equids
1999	USDA-NASS	5.35	All equids
2001	AVMA	5.10	"Pet" equids only
2002	USDA Census	3.64	On farms only
2003	AHC	9.20	All equids, published 2005
2007	AQHA	2.90	AQHA Registered Horses
2007	APHIS Business Plan	5.80	All equids

The 2007 AHC Horse Industry Directory listed 125 Breed Organizations in the United States. These are organizations that register horses and usually assign horses a registration number and some sort of certificate of identification. AHC also found 31 educational organizations involved in the equine industry, 29 equine welfare organizations, 23 general interest organizations, 18 health and research organizations, 28 equine veterinary schools, 19 libraries and museums, 70 racing organizations, 6 rodeo associations, 66 show and sport organizations (some of which were the same as breed organizations), 48 state horse councils, and 20 trail organizations. In addition, they listed 40 National Steeplechase Association Meetings, and 177 Pari-Mutuel Racetracks in their directory, which should constitute the majority of race meetings in the United States. All of these organizations have some involvement in the equine industry and could be sources of education and information for studying the equine industry.

The Deloitte survey utilized 13 different show organizations, the Equibase and Project Steering Committee databases for racetracks, and a total of 80 horse related organizations to construct a survey list of horse owners. The survey was sent out in 2004 and respondents were asked to complete it for the year 2003. Deloitte found 4,865 organizations that managed or held horse shows and they identified 122 primary racing tracks in the United States for the survey.

To breakdown the numbers of horses in the United States, the most recent AHC survey had a total population estimate of 9.2 million horses, with 844,531 of those in racing, 2.7 million in showing, 3,9 million in recreation, and 1.8 million horses used for other purposes. A 95% confidence interval on this estimate is + or – 352,989 horses (American Horse Council, 2005b). As mentioned above, Quarter Horses are the most common breed of horses, with 3.3 million in this survey, and the only other breed broken out was Thoroughbreds, with 1.3 million horses. Other horses included other breed's registered horses and grade (non-registered, non-pedigreed) horses (American Horse Council, 2005a).

Equine 2005 reports horses in different (and more numerous) categories than the AHC survey. These reports only looked at farm operations with five or more equids (as meets the definition of "farm" for the USDA

Census). Small operations (5-9 head) had 36.1% of all equids, medium operations (10-19 head) had 34.2%, and large operations with 20 or more equids housed 29.7% of all equids in this survey. The percentage of equids on the property by primary purpose of the operation were as follows: boarding/training, 5.9%; breeding farm, 14.4%; farm/ranch, 40.3%; residence with equids for personal use 37.0%; and other, (including carriage services, guest ranches, and riding stables) was 2.4%. Small operations were most likely to state their primary purpose was having equids for personal use, at 46.0%, while large operations only said this was their primary function 10.4% of the time. Large operations were boarding/training facilities or breeding farms more often than medium and small operations. Broken down by primary use of equids, the percentages were: pleasure, 45.7%; lessons/school, 1.4%; show/competition, 9.6%; breeding, 15.9%; racing, 1.4%; farm/ranch work, 24.8%; and other (such as horse trader, carriage or pony rides, etc.), 1.2%. The comparison of Equine 1998 to Equine 2005 indicates that more horses are on smaller operations than before; the percentage of large operations has decreased while medium and small operations have increased, and 10% less horses are on the large operations in 2005 as compared to 1998. Some of this information is summarized in table 10.2.

Table 10.2. Equine Industry Premises Size and Use.

	Operation Size		
	Small (5-9 head)	Medium (10-19 head)	Large (20+ head)
Premises (%)	66.1	26.1	7.8
Total Equids (%)	36.1	34.2	29.7
Residence w/ Equids for personal use (%)	46.0	22.2	10.4
Boarding/Training Facilities (%)	2.8	10.4	17.2
Breeding Operations (%)	9.2	21.8	34.1

Source: NAHMS Equine 2005 Part I.

Equine age is another unique point for the industry, as horses tend to live much longer than other livestock species. The 2005 NAHMS survey reported that 35.6% of operations overall had a foal under 6 months of age when they received the survey, and 33.6% of operations had an equine birth within the 12-month period the survey queried. More of the large operations (72.7%) had births than small operations (20.4%). From 1998-2005, the percentage of operations having foals on their property decreased from 42.2% to 33.6%. Approximately 0.8% of the equine population is in the age range from birth to 30 days. Foals have a 4.9% mortality rate within 30 days after birth for various reasons. The overall equid death percentage for horses over 30 days of age was 1.8% in the year this study covered. The highest mortality rate by age group was horses over 30 years of age, followed by horses 20-30 years old. In 2005, 10.2% of equids over 20 years of age died.

The 2002 Census of Agriculture reported that the number of horses and ponies sold from farms in their surveys was 470,423, in addition to 17,385 mules, burros, and donkeys. Of the total of 487,808 horses, ponies, mules, burros, and donkeys sold, the value was approximately $1,328,733,000. Using these numbers, we can obtain an average value for the horses sold as approximately $2,724. In the 1998-1999 equine reports, the total equine sales were approximately 539,600 head in 1997 for a value of $1,641,196,000 with an average of $3,042, and in 1998 the equine sales numbers were approximately 557,600 head for $1,753,996,000 with an average sale amount of $3,146. These values are summarized in table 10.3. The Deloitte Survey reported the equine industry generates an estimated $39 billion in direct economic impacts and $102 billion in annual impacts when indirect and induced spending is included. The recreational segment generates most of this total, with $32.0 billion attributed to this branch of the industry. Showing, racing, and other segments generated approximately $28.8, $26.1, and $14.7 billion each, respectively. One important point from a financial standpoint is that of US live animal exports, the equine industry consistently exports several times greater value than any other livestock industry. In 2005, the last estimate conducted showed that live equid exports were approximately $461,541,000, with the closest number to that being live poultry exports at $95,522,000 (USDA, 2006e).

Further information from the most recent AHC survey is also of financial interest. The majority of horse owners (56%) earn under $75,000 per year in household income, with 16% earning between $75,000 and $100,000, 15% between $100,000 and $150,000, $9% over $150,000, and 4% not reporting that information in their survey. The "average" horse in the industry earns $1,172 annually, and costs the owner $2,882 annually – notably, however, the recreational industry only makes $536 per horse and costs $2,319 annually. The two largest expenses in all segments are Feed, Bedding, and Grooming Supplies, and Boarding and Training. Veterinary services annually cost an average across the industry of $251 per horse. The top five states of the 15 breakout states specifically surveyed in the AHC/Deloitte Survey are listed by four different measurements, shown in table 10.4.

The NAHMS Equine 2005 report included a section on how horse owners identified their horses. According to NAHMS, approximately 1.5% of horses are microchipped, approximately 47.8% of horses have registration papers, and other forms of identification include: hot iron brand, freeze brand, tattoos, permanent brand inspection, Coggins test papers, halters/collars with name/number, passport, and other unique identification. According to the data, 49.3% of operations had at least one resident equid that had no unique form of identification, and 28.7% of equids had no form of unique identification in their sample. The comparison between 1998 and 2005 equine identification data shows that both premises using unique identifications and actual number of equines with unique identification had increased. However, the additional options in the 2005 survey (Coggins/EIA test paperwork and Passport) which were not offered in the 1998 survey, and could have reduced the numbers of horses with no unique identification. Overall, fewer horses were being identified using hot iron branding, tattooing, and permanent brand inspections, while freeze branding of individual equids had increased. Microchipping numbers in horses were similar across the years (1.1% in 1998 to 1.5% in 2005), but 3.1% of premises had at least one microchipped horse in 2005, compared to only 2.1% in 1998.

Table 10.3. Equine Sales and Average Value.

Year	Number Sold (head)	Total Value	Average Value ($/head)
1997	539,600	$1,641,196,000	$3,042
1998	557,600	$1,753,996,000	$3,146
2002	487,808	$1,328,733,000	$2,724

Sources: USDA Census Data and NASS Equine 1998 Survey

Table 10.4. Top Five Equine States.

Rank	By Total Effect on GDP	By Number of Horses	By Number of Industry Participants	By Total Effect on Full-Time Equivalent Employment
1	California	Texas	Texas	California
2	Texas	California	Florida	Florida
3	Florida	Florida	California	Texas
4	Kentucky	Oklahoma	Kentucky	Kentucky
5	Louisiana	Kentucky	Ohio	Missouri

Source: American Horse Council Foundation Economic Impact Survey

10.2 Horse Movement and Competition

The Equine 2005 report states that 36.6% of horse properties did not have a horse leave their premises during the year, while premises that reported having equids leave and return to their property had the largest percentage (22.2%) travel between 100 and 499 miles from home, and 19.0% had horses that traveled between 10 and 49 miles. Small operations (5-9 equids) have less horses move off the property, with 41.8% of small operations reporting no equids leaving and returning in the past year, compared to only 27.5% of medium operations (10-19 equids) and 20.6% of large operations (20+ equids). By type of operation, pleasure, farm/ranch operations, and breeding operations were the highest categories reporting no equids moving off and back onto the

premises in the past year. Small operations were less likely to have horses leave and return after contact with other equids than large operations. By type of operation, show/competition, lessons/school, racing, and breeding operations had higher percentages of horses that left the property then returned after contact with outside horses than pleasure or farm/ranch work operations. The comparison portion indicates that horses traveled less and for shorter distances when they did travel in 2005 than in 1998. The number of operations not having horses that left the premises increased from 19.3% in 1998 to 36.6% in 2005. The report also states that transporting equine with vehicles had declined, with 73.5% of premises doing this in 1998 versus 58.4% in 2005. The study states that out-of-state travel increased, in-state travel decreased, and contact with outside equids on trips decreased from 1998 to 2005.

The NAHMS 2005 study also included a portion specifically on equine events, though it was specifically from only six states, as it was the first attempt to survey equine events. For all types of horse events, approximately 39.0% of events included horses that came from "beyond adjacent states," while 40.9% were events with only in-state horses. The remaining 20.1% were regional events, or events where horses came from only within the state and adjacent states. Overall, 9.6% of events had horses that came from outside the United States; most of these were race/polo events or western events/fairs/rodeos. The average event lasted 3.3 days, and had 151.0 equids at the event on a typical day during the duration of the event. Race/polo events lasted longer than shows or western events on average. National events and race/polo meets averaged higher numbers than regional or state events and then shows, western events, or "other" events, respectively. Over the entire course of an event, an average number of 270.9 equids attended. National events averaged 499.9 equids attending the event, compared to 124.5 and 123.9 for regional and state events, respectively. The majority of equine events has horses that are 5 to 20 years of age (also the most common age category for horses in the NAHMS studies), with the next most common being 18 months to 5 years, followed by horses more than 20 years old. At these events, cattle were on the premises 28.8% of the time on average. The frequency of events that had other species on the

same premises as the equids were goats, 5.7%, sheep 4.7%, pigs 2.4%, camelids (such as alpacas) 1.8%, and "other" animals 2.0%. About half (48.8%) of events required verification of individual animal identification, which is a process that may be simplified with the use of microchips. Some of the forms of individual identification used to verify identity of equids were tattoos, markings, and drawings from registration papers or Coggins papers. "Microchip scanned" and "smart cards" were each used to verify identification at 0.1% of events. Over 90% of events recorded the participant/owner's name, address, and phone number, with 70.8% of events requiring the horse registration/ID number, as well. On average, 20.3% of events required health certificates for all equids, and 22.4% required certificates from equids from out of state. Events that required health certificates required that they be inspected visually by an official at the event 70.7% of the time. 10.8% of these events received health certificates in electronic form. Only 17.1% of events recorded the information on the certificates as part of the event. EIA testing was required more often, at 64.7% of events overall. State and regional events required EIA tests more often, due to the requirements for Coggins tests in crossing state lines. Vaccinations were required by 14.3% of events overall, and the required vaccines included Herpesvirus, Influenza, Strangles, VEE, Rabies, and to a lesser extent Tetanus, WNV, EEE, and others. Slightly under one-fourth (22.8%) of events hire on-site veterinarians to monitor for illness or provide care to equids. Selected data from this section is summarized in table 10.5.

Table 10.5. Event Requirements/Records

Requirement	Percent Events Requiring
Verification of Animal ID	48.8%
Used Microchips	0.1%
Used Smart Cards	0.1%
Health Certificates - All Equids	20.3%
Health Certificates - Out of State Only	22.4%
EIA Test	64.7%
Vaccinations	14.3%
Recording	
Participant/Owner Name	96.8%
Participant/Owner Address	93.0%
Participant/Owner Phone	91.1%
Horse ID/Registration	70.8%

Source: NAHMS Equine 2005 Events Survey

The actual number of events that occurs on an annual basis is as hard to quantify as equine numbers, but it is safe to say that it's in the tens of thousands, based on numbers we do have from individual organizations. The Professional Rodeo Cowboys Association (PRCA) sanctions approximately 650 rodeos in 12 circuits in North America, which includes approximately 50 rodeos in Canada. The National High School Rodeo Association (NHSRA) sanctions approximately 1,200 rodeos annually nationwide. The United States Equestrian Federation (USEF) licenses approximately 2,500 competitions annually, most of which are dressage, jumping, cross country, eventing, or any combination of the above. They reported holding approximately 2,600 shows with 85,000 unique horses competing at these shows and reported a membership of 92,000 in 2007. AQHA, the largest breed organization in the United States, reports 2,088 approved shows and 537 special events (including organized trail rides and charity events) in 2007. Approximately 250 individuals across the nation are certified as AQHA show managers. AQHA also reports that the average number of entries for all shows in the 49 states holding sanctioned AQHA shows was 329 entries, and the average number of

participants in special events, which were held in 34 states, was 63. The AQHA totals for 2007, including international shows and events, were 2,449 shows, 554 special events, 351 average entries per show, 860,529 total show entries, 33,738 total special event entries, for a grand total of 893,991 total show and event entries. In addition to these numbers, American Quarter Horses held 9,274 races in 2007 with 16,607 total starters in those races. Finally, for the recreational segment of AQHA, the AQHA Ride Program organizes trail rides for AQHA members and hosted 110 trail rides with 6,314 participants in 2007. The AQHA horseback riding program, which is a program where individuals record their riding time on AQHA horses to collect prizes, had 13,481 people enrolled (meaning they recorded at least one ride on an AQHA horse in 2007) and additionally had 1,124 people enrolled in the all-breeds category in 2007.

In summary, the equine species in the United States is incredibly difficult to quantify and track. There are anywhere from 5-9.5 million head of horses in the United States according to the most recent available studies. Such a large range of horse population estimates across studies provides motivation for premises registration to better determine animal density and location of equine in the United States to improve surveillance and disease management. Horses tend to be highly valued on an individual basis, have considerable domestic and export market sales, have long lives, and participate in a wide, varied, and growing array of events. Because of their frequent movement around the country and commingling with other horses at competitions, ID and animal tracing is challenging, but also potentially very important for disease management. The current studies only constitute a small portion of the information needed to fully construct a benefit-cost analysis on this industry. In the following sections, we outline the recommendations, lay out the process for constructing a cost-benefit analysis on NAIS in the equine species, show some costs and benefits of this system, and discuss further information and research which needs to be conducted before such a system can be fully evaluated and mandated.

10.3 NAIS IN THE EQUINE SPECIES

TO CONDUCT BENEFIT-COST ANALYSIS of NAIS adoption for equine, guidelines of how the system would work are important to describe. *A Business Plan to Advance Animal Disease Traceability*, by APHIS and the most recent available Equine Species Working Group (ESWG) recommendations are relied upon to formulate assumptions for benefit-cost analysis. The Business Plan outlines the priorities for NAIS in the livestock industry. The plan is currently based on voluntary participation; that the system will only hold limited information to protect confidentiality; if an animal leaves its property and comingles with other livestock, it needs to be officially identified to support disease traceability efforts; and the system is technology neutral on animal identification devices. The three stages, or components, of the NAIS system are Premises ID, Animal ID, and Animal Tracing. The goal of NAIS is to have at least 70% participation for each species. Specific to the equine industry, Tier 1 Medium priority designation horses require either an official EIA test or health certificate when moved. Tier 2 includes horses that do not move around and comingle with other equine as much as the Tier 1 horses. The general plan for the NAIS also notes that Electronic Certificates of Veterinary Inspection (eCVI's) could provide a useful tracking system for livestock, especially horses, since the top priority for horses are those that require health certificates.

Specific to the equine industry, the business plan estimates horse population at 5.8 million in June 2007, and states (p. 24) that a "significant number of horses are individually identified." Estimates on number of horses and the number that are individually identified, based on earlier discussions of other surveys, are debatable. In reference to the equine industry structure, the Business Plan comments on the uniqueness of horses in their lifespan, generally higher value, and greater rates of transportation interstate, internationally, and through importation and exportation. They also note that many horses are already identified, especially if they are competing in racing or the show industry, and that these existing identification programs can be used in disease traceability efforts. Horses are divided into two major categories of priority for identification. Tier one horses are horses that require

health documents to travel or compete, including the subgroups of race horses and show horses. The subgroup race horses are defined by The Jockey Club, United States Trotting Association, and AQHA. Show horses are identified through the USEF Horses Identification Program. Tier two includes all other horses.

As far as tracing capabilities already in place in the equine industry, the Business Plan states that EIA tests are done on about 2.2 million horses each year. EIA testing provides an opportunity to check for and institute some level of equine tracking, as well as allowing for some simplification of the CVI, Brand Inspection, and EIA testing process; having a microchip will make it easier to definitively match the right test to the right horse, instead of just going by markings, color, and hair whorls as is commonly done with grade and even registered horses currently. The plan also notes that many horses are registered in the numerous breed registries in the United States. Both the traceability plan and the ESWG recommendations are that horses that need an official EIA test and/or CVI when moved be a priority due to their movement intensity, as well as their often higher values.

The Business Plan further states that developing national EIA testing requirements for interstate movement and change of ownership would be an excellent way to implement a tracking system. Horses have to be identified on the EIA test certificates, and if premises registration was required along with the EIA test, horses and premises identified would both substantially increase. Through show registration information, as well as the information recorded on CVIs prior to a horse traveling interstate, some tracking abilities already exist. With the addition of the EIA testing requirement at change of ownership, EIA tests increased three-fold in the state of Texas, and it is likely that at least some sort of increase would be experienced if change of ownership testing was a nationwide requirement. Finally, the ESWG recommends ISO-compliant microchips to be the required form of ID for horses.

In summary, the Business Plan recommends: implementing and standardizing the use of PIN's on EIA and CVI paperwork for destinations, premises of origin, and exportation; expanding the use of interstate electronic CVI's; work with established equine organizations to integrate

the use of the AIN "840" devices (in the case of horses, the 840 microchips); and establish some sort of communication systems between industry efforts for automated data capture at equine events and interfaces with APHIS-VS systems. The Business Plan states that they want 70% of horses linked to an EIA test or interstate CVI to be at a level of 48-hour trace-back by October 2009, and 90% by October 2010. Through utilization of EIA and CVI requirements, they want competition horses identified with NAIS-compliant methods, of which the only currently NAIS approved identification is the ESWG recommended 840 ISO-compliant equine microchips.

The Equine Species Working Group published specific recommendations for the application of NAIS to the equine species. These will be listed and discussed here, and provided part of the guidance for the following benefit-cost analysis. In general, the horse industry agrees that they need a national identification plan for the following reasons: to control disease outbreaks, protect human health, address bio-terrorism threat, protect food industry livestock from zoonotic diseases, stabilize the equine economic environment, provide a 48-hour trace-back capability, prevent diseases from stopping equine movements, sustain the ecological environment, and simply to be a responsible member of the livestock industry. The most recent ESWG recommendations are broken down by categories, Premises Identification, Animal Identification, Data Reporting Recommendations, and General Recommendations. The ESWG presented original recommendations in 2004, and updated them in 2006.

For Premises Identification, they recommend that a firm definition of what a premise is in the equine world is necessary, and that State Animal Health Officials, Area Veterinarians, and producers when necessary should be involved in describing unique geographic identities to the premises. The 2004 Recommendations by the ESWG gave the following list of equine premises that is in order of their priority for identification:

- Ports of Entry
- Quarantine Facilities
- Auctions and Sales
- Breeding Farms
- Boarding Facilities
- Training Facilities
- Equine Clinics and Hospitals
- Racetracks
- Show/Exhibition/Competition Facilities
- Public and Private Stables
- Rodeo Arenas
- Fairgrounds
- National or State Parks
- Universities (Educational/Research Facilities/Diagnostic Laboratories)
- Ports of Exit
- Dude Ranches

For Animal Identification, the ESWG suggests that CVI requirements be standardized across states, with identification including electronic ID and a more complete description of the horse. They recommend that any horse that requires a brand inspection, CVI, VS 127 permit, or ICVI because of traveling to a different location should be a priority for official identification. They also recommend the ISO/ANSI compliant 11784/11785, 134.2 kHz microchip be the recommended standard of equine identification, implanted in the nuchal ligament on the left side of the neck. However, they note that NAIS should incorporate the older 125 kHz microchips and other existing forms of identification as much as possible, but not recommend them. Additionally, they recommend to reader/scanner manufacturers to make all purpose readers for both the ISO compliant chips and the 125 kHz chips, so as to prevent missing a microchip. They recommend that new technologies should be continuously pursued to make the process more efficient, accurate, and cost effective. The current rate of technological advancement in animal ID, coupled with a possible increase in demand for electronic ID, the technologies will advance and costs may decrease as competitors enter the market and veterinarians gain more knowledge and skill with the process. Finally, ESWG recommends that the buyer/seller be responsible to report changes of ownership, as is currently the case with most horses

registered with breed associations (the buyer and seller must send in transfer papers if the buyer chooses to keep the registration papers up to date).

The ESWG recommends that movement tracking not be included in the NAIS system for the equine species, but rather that animal health officials rely on current files of CVI's, Brand Inspections, VS-127 permits, and any other current paperwork to find out where horses are or have been if a disease problem arises. Animal Health Officials can look to existing state databases that keep track of CVI and EIA testing information in the case of a disease outbreak. ESWG recommends that animal health data should be electronic so that the speed of tracking can be increased, rather than going through lots of paperwork. They made the recommendation that the equine industry should not have to report any additional movements due to the fact that these systems are already common business practices in the equine species and that reporting all equine movements on and off premises would place a major burden on premises managers at the current levels of technology and reporting capabilities.

The ESWG recommends a voluntary testing period for any NAIS system, that the information is FOIA-exempt, and that no mandated system should be required before 2010. They also note that, "horses are livestock," and list various reasons why the equine industry should stay under that designation. The 2004 ESWG notes that due to the nearly 200 race tracks and tens of thousands of horse shows held across the United States on an annual basis, horses regularly move from their home premises to other locations and regularly comingle with horses and other livestock species. They state that hundreds of thousands of Americans ride every week at shows, tracks, and other equine events. They also note that due to the wide variety of levels of competitions, the ability for some of the horse-related activities to comply with NAIS standards will vary widely. The 2006 ESWG recommendations give the following list of characteristics that differentiate the equine industry from other livestock industries in the NAIS agenda, to highlight reasons that the equine industry must be handled differently than other livestock species when implementing a NAIS. The unique size, scope, and uses of horses create a

difficult environment in which to apply an animal identification system. To quote the ESWG list, horses:

- Have longest life expectancy of livestock species (20 – 35 years).
- Are generally more valuable on an individual basis.
- Are transported more often and for greater distances.
- Participate in internationally recognized competitions including the Olympics.
- Require accurate identification to insure the integrity of a multi-billion dollar racing industry with state regulated pari-mutuel wagering.
- Are imported and exported on a regularly basis at significant expense.
- Are at great risk of theft.
- And, are in many instances already properly identified by the appropriate breed registry or horse identification services.

Another general recommendation of the ESWG is that NAIS should provide benefits that outweigh the costs to the horse industry. The system should provide definite benefits which justify the costs to industry stakeholders. NAIS should also be as compatible as possible with other nations, especially Canada and Mexico due to their close nature and common importation/exportation of equines with the United States. ESWG recommends that identification and movement databases should be exempt from the Freedom of Information Act (FOIA), and that only approved state and federal animal health staff be allowed to use and see the information for the express purpose of disease surveillance, monitoring, and prevention.

Recommendations from APHIS and the ESWG provide a guideline for developing a cost-benefit analysis for applying NAIS to the equine species. However, some of the recommendations and comments about the equine industry also suggest needs for further research. In addition to these recommendations, the ESWG has published a list of diseases of concern in the equine species, to emphasize the importance of including the equine species in an animal identification system, which are discussed in the benefits section.

10.3.1 Process of Evaluating NAIS for Horses

The entire process of developing a benefit-cost analysis for the equine species in the United States is challenging. NAIS adoption costs are not readily available and have to be estimated, especially as related to animal movement recording database and labor costs. Benefits of NAIS adoption are difficult to enumerate because many of the benefits are realized in the event of crisis management of events with unknown probability of occurrence. The horse industry is an exceptionally large, diverse industry that is difficult to track or quantify. As the ESWG mentions, horses live longer, travel more, and experience a greater diversity in their life than any other livestock species, and probably than most "pet" species, as well. Horses are also valued higher than most livestock species.

The initial step in benefit cost analysis was to gather articles, publications, studies, and whatever written or online information was available on the horse industry, since one of the biggest problems with researching this industry is a lack of information. Comparisons of the proposed NAIS in the United States to identification systems in place in other nations for the equine industry did not appear to be useful. Most other nations that ID horses have more centralized governments, in some cases going so far as to have horse registries as part of the national government, and the industries are not as diverse as in the United States. Numerous interviews were conducted with various members of the equine industry to define the industry and create a comprehensive list of costs, benefits, and concerns about NAIS adoption in the United States equine industry. This section outlines the information gathered on the costs, benefits, and concerns of NAIS adoption in equine species.

10.4 Equine Industry Costs

THE MAIN COSTS ASSOCIATED with NAIS adoption in the equine industry are:

- The microchip electronic identification mechanism
- Cost of veterinary services to insert the microchip
- Universal readers
- Database costs
- Training and labor costs for each step

These and a few other relatively minor costs are discussed in this section. A couple of general notes are that before a horse can have a microchip implant, the premises where the horse is located must have a premises identification number. Also, the costs discussed here apply to the horse industry as it currently is, as time goes on and older horses are implanted, costs of implanting will decline.

10.4.1 Microchip Costs

A great deal of information was gathered on the equine microchips. Only two microchips are currently approved by NAIS, and are ISO/ANSI Compliant. They are both Destron-Fearing chips, which are also approved by the International Committee for Animal Recording (ICAR). One is the Destron-Fearing Equine Biotherm Lifechip, and the other is the Equine Lifechip. To make and sell the country coded "840" chip, where the first three digits are the code of the nation that the animal originated in, the microchip has to be NAIS approved. If not NAIS approved, the 15-digit chips are coded with the manufacturer's code for the first three digits. In addition, one microchip called the EZID Transponder Implants by AVID/EZiD is currently listed as "Interim Approved." Several other companies produce microchips. For example, Allflex has a 134.2 kHz ISO 11784/11785 compliant microchip that is marketed only for pets and coded with the manufacturer code "982" for the first three digits as opposed to the "840" (nation coded) chip. In addition, Crystal Import Corporation and Datamars (the same company) have 134.2 kHz microchips, but these are not NAIS approved for use in the United States.

Datamars is a Swiss company. These, and possibly some other manufacturer's chips, are currently available in Europe and other nations and may eventually apply for NAIS approval in the United States. Some veterinarians have reported clients getting the microchips from another source, such as Warmblood registration associations in Europe or other locations, and calling the veterinarian simply to implant the chips.

The Destron-Fearing chips are 134.2 kHz ISO-compliant microchips. Several studies have been conducted using these chips, some to study the effectiveness of the biotherm chips in reading an equid's body temperature, others for tracking purposes, and some simply utilized the chips as a form of individual animal identification for research purposes. The studies generally have found the chips to have a read range of two inches for the biothermal chip and four inches for the regular identification chip. In a study at Colorado State University, a 100% read rate was found using 82 biotherm chips in Quarter Horses and Welsh Ponies (Robinson, et al., 2008). The University of Kentucky reports using the microchips for numerous studies, and stated that they had used to have minor migration problems with the Avid microchips, but since switching to the Destron-Fearing chips, they have had no failures or migrations (Ennis, 2008). Texas A&M University did a study on broodmares using the biotherm chips, and had no failures in 20 broodmares (Morgan, et al.). Montana State University conducted a study using microchips and found one chip that failed after one week out of 38 microchips – they suspect the chip had been damaged on insertion, and it was later found to intermittently work. The state of Colorado conducted a study on "Smart Cards," which are credit-card sized cards showing a picture of the horse, ownership information, and having a chip or barcode which can contain information about the horse (Heckendorf, 2008). In a study with 61 rodeo horses using a few different brands of microchips, there were no failures (Heckendorf, 2008). The largest microchip study was conducted in California in racehorses (Evans, 2007). In this study, 2,052 horses (including some from overseas that had been microchipped prior to entering the United States) were implanted with microchips. Of these microchips, seven chips failed immediately and two chips failed later in the study. One horse had a minor skin reaction at the injection site of the microchip, and five chips were difficult to read. Most

of the chips used in past studies were either the Destron-Fearing biotherm chips or regular microchips, though a few of the studies used chips from Allflex or Crystal as well as Destron-Fearing chips. Combining all these studies, we estimate chip failure rate of 0.44%.

The Colorado project testing Smart Cards also assessed horse reactions to being injected with microchips. Of the horses included in the study, 72.6% showed little or no objection to the microchip implant, 17.6% objected slightly, 5.8% jumped away, and 4% required two injections. No horses required any additional physical restraint devices, such as a twitch. This indicates that the majority of horses will have little or no objection to the microchip implant, and problems only exist at approximately the same rate as with common vaccinations in the equine industry. The Colorado State University study indicated that the chips were extremely helpful throughout the course of the project as a quick, reliable method to identify each animal in the study. They did, however, experience problems with the accuracy of the biothermal chip. This and other studies have indicated that the chip is not always accurate, possibly because of the location of implantation. The nuchal ligament is in a location of exposure to the elements and has very little blood flow; therefore the ability to read an implanted chip can be affected by environmental conditions.

A few industry members estimated the cost of the microchips to be between $5 and $20 per chip. The current retail costs of chips were researched by contacting Destron-Fearing distributors. Two distributors of the Destron-Fearing microchips are Dr. Kevin Owen, in Texas, and Milburn Equine/Webster Veterinary. Dr. Owen sells the regular microchips for $10 and the biotherm microchips for $12 to veterinarians and state agencies. Dr. Owen also said that the failure rates on the chips is <1%. Milburn Equine/Webster Veterinary distributes both the manufacturer coded "985" chips and the "840" country coded chips. The normal microchips are around $15/chip, but come in boxes of ten, or $150 per box. The biotherm chips are around $16/chip and also come in boxes of ten, or $160 per box. Both distributors sell almost exclusively to veterinarians or state agencies. A representative of Destron-Fearing stated that the microchips and readers will remain at approximately the

same costs over time, but the technology, such as read range, will improve.

The Jockey Club recently became a microchip distributor of the "840" country-coded chip for Destron-Fearing. The Jockey Club charges $20 per chip to everyone, plus a sales tax in New York and Kentucky, and as of August, 2008 had distributed 120 microchips to mostly Thoroughbred breeding farms. They allow free reporting of the microchip number and microchip lookup features on The Jockey Club website behind a secure login. Sany Thoroughbred foals born in the United States that might race or be breeding stock to produce racehorses must be registered and DNA tested with The Jockey Club. Such foals also must be reported annually in "Mares Bred" and "Live Foals" reports. DNA testing kits are sent out when the foal is born and microchips can be distributed with this testing kit so that the veterinarian can do all the procedures at one time to reduce cost of each individual procedure. The Jockey Club registers over 30,000 foals annually between the United States, Canada, and other territories at a cost of $200 per registration.

Avid Equine markets microchips on the web (http://avidequineid.com/). They market to several different sectors – private owners with 1-4 horses can get kits for $33.50 per kit (which includes one chip and lifetime registration in their database and a few other things). For private owners with five or more horses, they offer a 5-pack kit for $142.50 or $28.50 per kit. For private owners with 25 or more horses, the price is $618.75 for a 25-pack or $24.75 per kit. For large operations, they offer 25-packs of the chips only with no database enrollment for $243.75 or $9.75 per chip. They also offer quick-load cartridges (instead of one chip with one loaded needle) for $173.75 or $6.95 per chip. They have a bulk syringe implanter for $7.50 each for the bulk quick-load kit, and extra needles for $2.00 each. In addition, they offer a HORSEcard that contains horse owner information, a picture of horse, and the horse's microchip number and information, for $12.50.

The safety of implanted microchips is occasionally questioned. Numerous studies have shown them to be safe, highly readable, and highly effective as a form of identification. An ESWG Publication states that microchips have been used in the equine species since the 1980's,

and over time have been shown not to migrate if implanted in the nuchal ligament to the proper specifications, have no adverse health effects on the animal, be durable and a virtually fail-safe method of identification that is extremely difficult to tamper with after insertion, and having a failure rate of less than 0.5%. The ESWG Microchip paper stated that at least 600,000 horses had been microchipped successfully in the United States so far, and that approximately 200,000 of those were from Louisiana since the 1994 EIA testing requirement mandates that an equid must be tested for EIA on an annual basis and at that time must have a permanent, individual form of identification. Louisiana encourages the use of microchips as this form of identification, but currently still allows tattoos and individual brands. In Louisiana, the owner bears all costs of microchipping their animals.

10.4.2 Veterinarian costs for insertion

Industry estimates range from $20-$150 for the cost of inserting microchips into horses, depending on many circumstances such as the number of horses, if competition and better technology lowers the cost of the chips or insertion, if fuel charges are included, etc. Two primary sources were used to obtain costs for veterinarians to insert microchips into horses. One source was a survey conducted by Pennsylvania State University researchers, which gave ranges of the costs of microchip insertion from veterinarians. This survey had some problems with the way the question was stated, veterinarians may or may not have included costs such as travel or sedation, and therefore results could be slightly skewed. Due to this uncertainty, a survey of American Association of Equine Practitioners (AAEP) veterinarians was conducted for our study. The survey was designed to separate the costs of the microchip, the implantation including site preparation for the procedure, travel, and any additional costs that the veterinarian chose to include.

The Penn State study posed the question "What do you charge to microchip?" to the veterinarians in their survey. Over half (53%) of the 138 veterinarians who responded were currently microchipping animals. The responses were categorized into price ranges, with 2.7% of veterinarians charging $20 or less, 32.4% charging $21-$40, 36.5%

charging $41-$60, 10.9% charging $61-$80, 2.7% charging $81-$100, and 4.1% charging $101-$150. Using the median values of each of the price ranges ($10, $30, $50, $70, $90, and $125) and multiplying these by the percentages in each range, we can come up with an approximate average cost of $43.43 for the veterinarians to microchip horses.

Due to the inexact nature of the costs in this study, an informal survey was conducted by phone and e-mail to several AAEP practicing veterinarians nationwide (total of 14 surveys sent). We received full or partial responses from 10 veterinarians (71% response rate), including one not originally on the survey list, who was involved in the California racetrack microchipping study. Veterinarians in this survey did not all use the Destron-Fearing microchips which suggests a need for education among veterinarians to encourage uniform microchipping practices. Veterinarians did not generally seem to know a lot about NAIS or microchips in general, with many using the same microchips to identify horses as they use in dogs and cats at their clinic. From this survey we received the following results:

- The cost of the microchip to the veterinarian averaged about $17 per microchip.
- The charge for implanting the chip to the horse owner averaged about $42 per microchip.
- The average travel charge by the veterinarian to the client was a base of $41.96, plus fuel charges ranging anywhere from $1.50-$4.00 per mile. The practices differed widely on the structure of their "farm call" charges.
- Four of the surveyed veterinarians reported that if an individual brought the horse to their office to be microchipped, the office visit would be from $13-$38 ($13, $15, $15, and $38 were the reported charges).
- Two veterinarians also reported sedation costs, if necessary for the horse. One reported a range of $25-$30 for sedation while the other stated a $50 charge for sedation to implant the microchip, if necessary.

In addition to the questions about cost, some general questions about NAIS, the cost and lifespan of microchip readers, and reasons for microchipping were asked. The veterinarians indicated that most of the horses that were microchipped (and most of the benefits, in some

opinions) were competition horses or horses that traveled a great deal. However, some people who simply want to protect their pleasure/recreational horses are also getting microchips implanted. One veterinarian stated that they obtained the Destron-Fearing biotherm chips through alpaca organizations at a cost of $25/chip and $400 for the scanner, because the alpaca associations in her area used the biotherm chips at shows (see Section 11 of this report for more information on alpaca chip adoption). Several of the veterinarians indicated that they felt biothermal chips would be a huge benefit, if the temperature readings were accurate, but this needs work before being useful in veterinary practice. One veterinarian indicated receiving a discount for buying over 2,000 microchips. Veterinarians in general felt that there were great benefits in recovering lost or stolen horses, in the event of a natural disaster where the horses were pooled together, and for disease control. In reference to the scanners, veterinarians had scanners from various manufacturers that had lasted from two up to 15 years, and were still being used.

One of the major routes to implement NAIS, or to get horses microchipped, that has been suggested is to use Equine Infectious Anemia (EIA) testing to require individual identification, such as the state of Louisiana has already done. On January 10, 2007 USDA-APHIS published a Uniform Methods and Rules for EIA. This was the first step from APHIS to try to unify the EIA testing requirements across states, by recommending specific regulations. These recommendations included:

- Uniform interstate movements of 12-month intervals are recommended.
- Categories of equines that should be tested include: Horses going to show/competitive events; horses being moved interstate; horses changing ownership; equines entering horse auctions or sales markets.
- Recommend individual animal ID being an important part of an EIA testing program.

EIA Requirements currently are decided by each individual state at the state level. Regulations vary from state to state on both intra- and inter-state requirements. The interstate movement requirements are summarized on an annual basis in an American Horse Council publication,

but the intrastate requirements were harder to find. All 50 state veterinarians were contacted and asked what their EIA testing requirements were for instate horses, and for the few state veterinarians who did not respond, the information was researched using state databases and searching state laws and regulations. The following is a brief summary of currently enforced EIA testing regulations in the United States:

- All states require EIA tests within 3, 6 or 12 months of all horses being imported into their state (with the exception that OR and WA do not require tests between states, and Nebraska and North Dakota do not require tests from South Dakota). The only state requiring 3 months is Hawaii. Some states have special requirements of horses going to sales.
- 21 states do not require any testing on instate horses that do not leave the state.
- Of the other 29 states, the level of testing varies from Louisiana, where any horse that has been in the state over 30 days must be tested on an annual basis, to only racehorses and the equids at the state fair being required to have a test.
- Most of the 29 states require testing for comingling groups of equine of any kind, transportation on public highways, prior to or at public auction, or for change of ownership or if the horse is offered for sale.

Standardizing state testing requirements to meet the Uniform Methods and Rules (UMR) in every state would cover nearly every equid in any kind of commerce. Over a period of time, this method could facilitate getting the second step of NAIS accomplished, getting AIN devices into horses, and possibly to start improving the third step of tracking using data that are already recorded on CVI and EIA test forms required for movement of horses.

10.4.3 Universal readers

Veterinarians have indicated various types of scanners last for over a decade, so the longevity of scanners appears robust. Veterinarians likely need a universal reader which can scan both 125 kHz "pet" chips and the 134.2 kHz microchips. The Colorado State University study reported high levels of reliability with their scanners, and they currently are using the same ones they have had for two to three years. The University of

Kentucky has had some scanners fail that have been returned to the manufacturer for repair or replacement, but they indicate that human error (e.g., dropping the reader too many times, leaving it out in the rain) may have caused reader failures. Currently, only the reader manufactured by Destron-Fearing can read the biotherm chip, though other universal readers should be able to read the number on both the biotherm and non-biotherm chips. Some locations, such as major horse import centers and certain show organizations, already have microchip scanners because foreign horses are currently being microchipped due to regulations in their home nations and/or import restrictions. Some industry leaders expressed concerns about the cost of the readers being too high, especially for smaller equine operations or show circuits, especially if the readers end up not being durable. In addition, some operations would need multiple scanners, and the personnel would have to be trained to scan the horses at appropriate times for farm management or for tracking purposes. Destron-Fearing distributor, Dr. Kevin Owen, sells the scanners to veterinarians and state officials for $350 per reader, and Milburn Equine/Webster Veterinary charges approximately $360 per reader. Other universal scanners are available, but costs were not obtained at this time.

10.4.4 Database Costs

Costs to store equine movements are difficult to estimate, as it depends on what level of tracking and which horses are required to be recorded. The ESWG and many other members of the equine community are concerned about the database for a number of reasons. One of the major problems is the locating and tracking of grade horses – horses which are not currently registered with any breed association and in most cases not identified in any form. Some industry members feel that the federal government should keep the database and carry the costs, but are concerned about remaining FOIA exempt if this were to occur. Other suggestions include using a web-service type model where the USDA houses a basic system with only the numbers and where the information is kept, which could then be traced out to already active breed registries such as the AQHA or The Jockey Club for further contact information and tracking records.

InCompass Solutions keeps track of most of The Jockey Club records, and developed and provided the software used in the California race horse tracking study. InCompass provides the database system for all racetracks in the United States, including Arabian, Paint, and Quarter Horse tracks in addition to the Thoroughbred races. They already have a ship in-out module in their software that tracks use, so the infrastructure for tracking horses is already in place. If a racetrack is using their software, which many do, there is no additional charge for using microchip numbers in the ship in-out module. However, InCompass is strictly for racetracks. Another group linked to The Jockey Club, Jockey Club Information Systems, provides farm management software, and they already have the infrastructure in place from a database standpoint for breeding operations to utilize microchip numbers in their management operations. Software design could be a big expense if other segments of the equine industry choose to develop management software around microchip numbers, but it could also be a major benefit in the long run.

Some of the current databases include the Louisiana system, which is tracked by the state veterinary office just like EIA and CVI records are in other states. A student worker is employed to keep track of the database and therefore also keeps track of the equids' individual identifications. PRCA has a system in which all the bucking stock, horses and bulls, are individually identified and can be traced readily. PRCA also estimates that approximately 10% of horses used in timed events at rodeos are currently microchipped, but they do not scan so they do not have a way to confirm this number. AQHA added an alpha-numeric field into their database (to incorporate the older microchips, some of which have letters as well as numbers), but say that less than 1% of their registered horses have reported a microchip number. The Jockey Club estimates that up to 2% of the Thoroughbred population may be microchipped.

One big problem with database management and the current system of registration is grade horses. The United States Equestrian Federation (USEF) has expressed interest in following The Jockey Club's lead and becoming a distributor of the equine microchips as well, as a service to their clients. USEF currently has a registration system called the Performance Horse Registry (PHR) that is open to any grade horse with a

registration application and DNA sample. Creating a grade horse registry has been a concern of the equine industry pertaining to NAIS, and the PHR offers one possible place for owners of grade horses to record their equids in a database. Some other registries in the United States make it possible to register cross-bred or non-pedigreed horses (certain color breeds and pony breeds with color or height restrictions, respectively). Registries like this may provide a way to solve the problem of identifying grade horses by allowing private systems to expand to incorporate these grade animals. Many grade horses are not actually unregistered animals, however. Registered horses are often sold in the United States, and as it is left up to the buyer and seller to transfer ownership on the registration papers, in many cases this transfer never occurs. This means that even if a horse is currently in the registration system, the registered owner may not have owned that horse for many years. One interesting note about grade horses is that even The Jockey Club, one of the largest equine registries in the United States, is only focused on the horse information and does not traditionally record ownership information, so when a horse is done with its racing career it is often sold without papers, and possibly renamed and registered with USEF or some other sport horse organization, or sometimes just left as a grade horse. Finding the current owner of the horse is necessary to knowing where that animal has been and who or what it has been in contact with. One suggestion that was brought up is that the United States could create a law like the Canadian pedigreed livestock law to require the transfer of papers if an animal is pedigreed. This would solve the problem of the wrong owner being listed on papers and create an incentive for transfer of papers, ownership updates, and database information updates to occur.

Overall, most current breed organizations feel that there is little to no additional database cost required for NAIS to simply identify all horses. However, the database cost could play a much larger role if tracking is required at all levels. Whereas cattle may move 4-5 times in a lifetime PRCA estimates that horses may attend as many as 4-5 rodeos in one weekend, let alone an entire year. Industry members estimated that horses could feasibly attend as many as 200 events in a given year, though the low end for any serious competitor in the show or racing world would be one to two events per year. Even at the low end, horses

will move more times in their lifetime than most other livestock species in the NAIS system, and therefore the database cost associated with tracking these animals will be a much higher total.

10.4.5 Labor Costs

Labor costs are another concern of NAIS adoption to the equine industry, due in part to the number of times a horse moves in its lifetime. Horses that move a lot, if tracking is required, would have to be scanned and reported every time they entered or left a premises, which would mean additional time, personnel, and material costs for these venues. There is an ongoing debate as to whether this system would increase or decrease labor requirements, however. Certain aspects of a NAIS system may allow for quicker check-in processes at shows, rodeos, and racetracks, and more efficient CVI and EIA testing procedures.

A major concern to the industry is the level of enforcement of any NAIS system. There are many current regulations on the movement of horses, though the level of enforcement certainly is not 100%. Having check stations available to enforce laws, having trained personnel who know how to enforce laws, and having punishment for breaking the law large enough to make getting the microchips and reporting horse movements are all important considerations in implementing any NAIS within the equine species. If an NAIS tracking system requires additional labor, major show organizations will require additional job positions, increasing their costs. If the check-in process is not smooth, competitors may also decide to quit showing or only show within their state to avoid needing an individual identification device for their horse. Across the industry, there are concerns with horse movement tracking. USEF, PRCA, and The Jockey Club all stated that horses move in and out of show or racing facilities at all hours of the day or night, and for effective check-in to occur this would require a 24-hour a day position with an individual trained to take and report the information at each major show or racing venue during the times when events are held, and at racetracks even during the off season when they are used as training facilities.

Studies have been conducted to experiment with movement tracking in the equine industry, such as the California racehorse study. This study

suggested a need for increased personnel at the tracks to get perfect movement tracking, but suggested there was some value in having even an imperfect tracking system in racehorses. The study also pointed to the fact that the technology for scanners and software needs to be adjusted to make tracking less cumbersome and therefore more useful. Individuals that participated in the study still had to do a great deal of paperwork and data entry; a system with the ability to automatically upload the information would be more ideal. The same issues with a need for additional labor to sort through paperwork are faced in Louisiana with their equine infectious anemia program. Louisiana hires a student worker to keep track of horses when they are Coggins tested and their individual identifications are recorded in the state database.

10.5 Equine Industry Benefits

Benefits of a National Animal Identification System in the equine species are more numerous but much harder to quantify than adoption costs. Generally speaking, most industry members we visited with recognize potential benefits to equine identification, and feel that the industry should be proactive in creating a system. A large segment of the equine industry exists for pleasure and not business creating an array of benefits of animal ID across ownership incentives and animal uses. Major categories of benefits are discussed below.

10.5.1 Premises Registration

The first step of getting equine premises across the nation identified has already proven to be beneficial in some circumstances that have occurred. Wisconsin animal health officials were able to use their premises registration database to send out mailings with West Nile Virus education during the season when outbreaks commonly occur. Currently, animal health officials sometimes go so far as driving door to door to contact individuals in an area about animal disease outbreaks in the equine species; the ability to identify premises allow for better and faster establishment of quarantine regions and find other possibly

infected animals. An article from early 2008 stated that so far, over 430,000 premises have registered voluntarily with NAIS (Cordes, Hammerschmidt, 2008). The Jockey Club requires anyone who wants to purchase microchips from them to first have a premises identification number. However, one problem that the equine industry noted with the premises identification system is that it is currently a point location (such as an address) and not an area, so an individual farm can have multiple premises ID numbers if they chose to sign up every address in their area. It would also be extremely valuable to identify premises by type – which are farms, arenas, racetracks, stables, parks, trail riding areas, or other equine event locations – to help with density estimates and event studies.

10.5.2 An Official, Complete, Ideal Trace-Back System

In equine industry meetings, having an official, complete, ideal trace-back system was the most noted benefit of having an equine identification system. Simply having the ability to identify and trace horses contains many benefits within itself, particularly in disease containment, tracking, and possibly eradication. Currently, there is little to no ability to locate and quarantine horses in a given area surrounding a disease outbreak short of driving door-to-door. The ESWG notes that in being a responsible member of the livestock industry, some sort of identification system would aid the equine industry in working with other livestock groups to quickly trace diseases and prevent outbreaks. Premises identification as well as a trace-back system could make this more feasible. Reductions in commerce could also occur, which is discussed further below.

Disease outbreaks in recent years, in Florida, New Mexico, and numerous other states and locations, have indicated the possible benefits of more quickly being able to identify and trace horses when an outbreak occurs. Some individuals stated the number one priority in disease control in horses would be to track down a-symptomatic carrier horses. Numerous diseases in the horse world, including EHV and EIA, can be carried in and shed from a horse for years, sickening other equids without the host ever showing signs. If all horses in an outbreak could trace back to contact

with a horse showing no signs, at least that horse could be tested to see if it was a carrier animal. See the section "Equine Diseases of Concern" for more information on these cases.

Some members of the equine industry feel that disease tracking is already done to a high degree through CVIs, EIA testing, and other measures of tracking, but feel that the ability to track international horses in shows and races could prevent foreign animal diseases from entering the US. The Jockey Club stated that in any given year, less than five races are cancelled due to disease outbreaks, but race cancellations do occasionally occur. The Penn State study on veterinarians asked some additional questions about the National Animal Identification system, such as if they felt that NAIS would help stop the spread of foreign animal diseases, to which 55% reported yes and 45% responded no. Of the veterinarians in the survey, 76% reported that they had experienced a contagious disease outbreak, indicating that these outbreaks do occur on a regular basis.

Industry members generally feel that equine identification may help minimize the effects of disease outbreaks. Disease eradication could also save the industry a great deal of money – for example, with over 2 million EIA tests performed annually at a cost of over $25/test; EIA testing alone costs over $50 million dollars on an annual basis. If EIA could somehow be eradicated from the US over time, eliminating the need for testing, the industry could save this money.

10.5.3 Maintaining Equine Commerce and Movements

A proper trace-back system that could identify where a sick animal had been and which horses it had or had not been in contact with could assist the equine community in decreasing the level of quarantines and assist equine commerce with less interruptions and shorter durations. Recent outbreaks in the equine community and other livestock communities have prevented state to state or international commerce from occurring due to a lack of confidence in the state or nation's ability to track and contain the diseases. If a national system were in place, it may be possible to quarantine only the affected horses and allow other horses within the state or area to continue to move as needed. In addition, as

noted in the section "State of the Horse Industry," live equine exports constitute an annual value of over $460 million. An animal identification system that was in sync with other systems in the world could expedite the process of getting US horses into and out of other countries and bringing foreign horses into the US. If for any reason the US had a disease outbreak that prevented all equine exports from occurring, this could cost the industry millions of dollars.

10.5.4 Monitoring and Prevention of Loss or Theft

Though horse theft is not as common now as in the past due to better identification systems, horse theft does occur in rare instances. When the horse slaughter market was stronger, some members of the equine industry stated that horse theft seemed more common. Horses also occasionally get loose and get lost by breaking out of pastures or getting away on trail rides, and being able to positively identify these horses when they were found would be beneficial. Individuals that do not travel and compete with their horses regularly have less direct incentive to adopt NAIS. However, NAIS gives individuals the opportunity to positively identify their horses, for the lifetime of the animal, and many industry professionals feel that if the idea was properly presented, even backyard horse owners would be accepting. A lack of education is to blame for much of the anxiety over the NAIS in the equine species. USEF has even stated that they may be willing to provide microchips to their members at a reduced cost or free with the registration of the horse and membership, simply as a service to their members and the industry.

10.5.5 Disaster Relief and Recovery

In recent years, hurricanes Andrew, Katrina, and now Ike have shown the equine industry the value of having an animal identification system, or the problems that are caused by the lack of one in the case of Andrew. Hurricane Andrew was evidence to the horse industry of how bad it can be when horses are not identified. It took many weeks for owners to find their horses, if they ever did. On the other hand, hurricane Katrina was evidence of how beneficial unique identification can be. Due to the 1994 EIA testing law requiring unique identification, horses were almost all

identified and their owners were able to be found and contacted in a timely manner during the relief efforts. Virtually all horses were returned to their rightful owners following Katrina, which was not the case with many other livestock species in this and other disasters. Hurricane Ike in Texas has ongoing rescue efforts. A state park has become the staging area to collect all the misplaced livestock. Having a horse with unique, individual identification will make it much easier for the rescuers to find and contact owners, and for owners to find their horse if they go to the staging area to look for them. In addition to hurricanes, the same situations have occurred in the California and Colorado wildfires, where horses are pooled together in rescue facilities to get them out of the path of the fire, and then owners have to come to those facilities and attempt to pick their horse out of possibly hundreds of horses. In many cases horses look similar making visual identification problematic.

Severe blizzards in Colorado and Wyoming have also at times isolated horse herds miles from home with no access to food, and hay drops have saved the lives of these animals. Having premises with horses identified could aid in knowing where to look for stranded livestock to drop hay for these relief efforts. The Penn State veterinary survey asked questions about disaster planning in veterinarians' offices; 80% of respondents did not have a plan of action for emergency situations. Some respondents stated that in severe weather zones they do try to provide information to their clients and that they do consider disaster planning to be an important issue.

10.5.6 Organization of Production Records

Breeding operations can utilize microchip identification for tracking embryo recipient mares, to keep track of which mare is having which donor's foal. Some organizations require that recipient mares be identified by microchip prior to implanting an embryo. In addition, when mares go to the breeding shed, especially in the thoroughbred industry, proper identification is essential to ensure they are bred to the right stallion. Occasionally, mares are bred by the wrong stallion, resulting in the DNA not matching when the foal is born and registered with The Jockey Club. Many breeding farms currently use halters or collars on all

mares with the name of the horse on it, but these can break, become lost, and occasionally get switched. In addition, some staff on thoroughbred breeding farms cannot speak English, and therefore cannot read the halter tags. Having the ability to scan a number prior to breeding would almost eliminate the potential for mares being switched and allow for easier tracking of production records on the mares and stallions.

10.5.7 Show Check-In & Management

Having individual animal identification at horse shows could aid in the check in process, improving the speed of health checks and verifying that every animal entering the show grounds has an up to date Coggins test and health certificate. Having microchips and possibly electronic CVIs and Coggins tests would allow for faster check in than is currently possible with hard copies of paperwork. At rodeos electronic ID could provide verification that the correct cowboy is riding the correct bucking horses. Though rare, occasionally the wrong animal is brought into the chutes to be ridden. Show organizations could scan horses entering the gate to verify that the correct horse is entering the show ring, because on rare occasions the wrong horse is shown. The value to major show organizations is at the management level for shows: the ability to increase the speed of check-in, verify that the correct individuals are riding the correct horses, track points on the horses and riders during the show season, and assist in speeding up the numerous other small tasks that go into organizing major equine events. It may also help shows to prevent disease at their events and track affected horses if an outbreak were to occur.

10.5.8 "Smart Cards"

The benefits of using Smart Cards are closely related to show management and check in. Smart Cards, or Integrated Circuitry Cards, are credit card sized devices that have the ability to incorporate any desired information on the equine, such as the dates of EIA tests, CVIs, and brand inspections that are commonly required for equids to move interstate or be exhibited at large events. These cards are also capable of

allowing an individual to check in a horse for their classes, stalls, and other management issues at a horse show. They can be connected to private databases for farm management or professional organizations such as breed associations or show offices. Utilization of electronic health papers has to be approved by the states; over half of the states in the US have already approved this system. Using electronic paperwork for health papers could also guarantee that the correct horse has the correct health papers and reduce the amount of physical paperwork for the organizations requiring the documents as well as owners and veterinarians.

10.5.9 Racetrack Management and Racehorse Check In

There are numerous benefits of microchips that are specific to the racehorse world. The current system used to individually identify racehorses is a tattoo inside the lip of the horse with an individual code. When horses are checked in and out of the racetracks (if they keep track of this), checked in for races, or checked in for various other procedures such as veterinary examinations or breeding, quite often the lip tattoo is used to verify horse identity. This requires "flipping" the horse's lip to read the tattoo. Though most thoroughbreds get used to their mouths being handled, some object to this procedure, especially right before a race when the horses are amped up and ready to run. Occasionally, during the pre-race checks, horses even flip over in the paddock and can hurt themselves or their handlers. Each track employs a professional horse identifier that checks horses pre-race, though in some cases the grooms are the ones who actually flip the lips.

Tattoos have the issue of sometimes fading or getting smeared. Microchips would allow for a major simplification of this check-in process. If microchips were implemented on a mandatory basis, this form of identification has the potential to replace lip tattoos in the check-in process, avoiding the potential for spreading disease by touching the lips of multiple horses to check tattoos, avoiding wasting gloves to guard against the spread of disease, speeding up the process with the quick scan of a wand as opposed to physically having to touch the horse, and

avoiding the potential for the horse objecting to its lip being flipped and hurting itself or its handlers in the process.

Microchips would provide definitive verification that the correct animal is being raced, and cannot be smeared or fade like lip tattoos sometimes do. In addition, horses could be identified when coming on and off the track to verify that the correct horses are working out at their scheduled work out times, and horses could be scanned in and out of the gates to verify their identities and aid in tracking, if a tracking system was implemented. Overall, it would be better for the horse handlers and horses alike. Thoroughbred industry owners would likely be sold on the idea if it would simplify their shipping in and out of racetracks and identity verification in the paddock or saddling enclosure. Occasionally, horses are purposely misidentified when leaving or entering the track. Trainers occasionally bring horses onto the track that are not racing on that track for training purposes, when only horses racing there are supposed to be on the track. Also, some high profile racehorses have been hauled off the track for veterinary procedures and been disguised as a "pony" horse or another racehorse to prevent the public from finding out the horse may have a health problem. The use of microchips could aid in increasing and simplifying security in the entire racehorse industry.

10.5.10 Management of Registries and Other Organizations

Numerous equine industry breed organization members mentioned that horse identification system could help their organization keep better track of their horses. There are more than 200 recognized breeds of horses worldwide, and there are at least 125 breed organizations in the United States according to the American Horse Council in 2007, and some horses are registered in multiple organizations. An example of this is that the AQHA is the primary Quarter Horse registry in the world, but there are several different registries for Foundation Quarter Horses, International Quarter Horse registries, and color registries that any breed of horse can be registered in if they are the right color. This, in addition to the mixing of breeds of horses in boarding stables and often at shows, and with the added issues of horses shifting from owner to owner

without registration being transferred or the papers being lost, makes registration papers only partially useful as a tracking device if not directly tied to some physical form of identification on the horse.

The address of the owner is often not where a horse lives. If a horse lives at a boarding stable, the address on registration papers will be the owner's address, not the stable where the horse is located. Microchipping the horse and having some form of movement tracking would aid in all of these struggles faced by breed registrations, by providing a permanent source of information attached to the horse for its lifetime. There are numerous examples of where breed registries have stated NAIS would help when USEF has a problem with horses changing hands and being reregistered under a different name by the new owners, allowing horses that were competing at more advanced levels to come back to lower levels under a new name (and therefore, win at those lower levels). This is not a major problem for the high level horses, but at the lower level shows the problem does occasionally exist. Having a microchip in the horse that is a permanent, tamper proof device identifying the horse, would prevent these issues from happening.

USEF would also like to offer their members the service of looking up a horse's show records via the microchip number in the instance that they are looking to buy the horse to verify that statements the seller makes about the animal are true. They feel that providing microchips to their members, which they have mentioned they are willing to do for free with registrations, may increase registration numbers in their organization. For these reasons, the fact that horses change names, owners, and move around a great deal in their organization, USEF supports NAIS. Having this system could aid the PRCA in verification of ownership and inventory numbers of stock contractors, because they have regulations that require contractors to own a certain number of animals to be recognized by the PRCA.

In the Thoroughbred industry, some breeders already microchip horses when they hit the ground, prior even to pulling a DNA sample for The Jockey Club. This provides permanent identification of the foal from birth, and prevents switching foals or other misidentifications from occurring before paperwork reaches The Jockey Club. Anywhere from 2-

4 foals annually are misidentified or have a DNA discrepancy. Microchips also prevent foals from being switched after the identification has occurred, to avoid issues such as a cheaper foal being switched for a more expensive foal after the expensive foal has died. The Jockey Club would have the ability to identify and manage a horse from the moment it hits the ground throughout its life, including finding out which horses end up at rescue facilities after their race careers.

The English studbook made microchipping mandatory, and numerous other nations are requiring microchips for registration or tracking purposes. Because of this, The Jockey Club felt that selling microchips to their clients would be worthwhile to assist Thoroughbred owners who desire to race or breed internationally. Other groups besides breed organizations feel that microchipping would aid in the management of their organization. Sales organizations feel that it would aid them in numerous ways. For one, it would prevent the need to flip lips at the sales, avoiding the spread of diseases or possible injuries to horses or handlers. Certain veterinary procedures, such as conformation altering procedures, are not allowed to be performed on horses by some sales organizations. Many high end Thoroughbred sales allow prospective buyers to look up veterinary records on the sale horses, and microchips could guarantee that no procedures are hidden from these records. Finally, it would provide permanent and definite identification of the sale horse, so that the right horse was sold in the ring and hauled out by the correct buyer. Additionally, some small show and rodeo circuits could utilize the microchip numbers to keep track of the horses, their owners, and their show records in a quicker electronic form, allowing tracking to be more feasible even at these lower level shows.

10.5.11 Identification for Veterinary Records

One of the veterinarians' biggest time constraints in doing a CVI is taking the time to write out and draw out the markings and color of the horses. Veterinarians do numerous CVIs annually, it is one of the most common calls they receive on horses, and therefore simplifying or speeding up this process in any way could save a great deal of time and money. Using microchips as definite identification and avoiding the time it takes to

write and draw out markings or other information would improve the speed and efficiency of EIA tests, CVIs, pre-purchase examinations, and could create a quicker, more organized system with these documents for disease trace back situations. Another benefit to veterinarians is for their own office organization and to identify the horse on health papers and records such as radiographs. When an individual wants to buy a horse internationally, it is important that the correct documents on the horse are received for the buyer's veterinarian's review, so that mistakes are not made when high dollar international purchases occur. Some veterinarians in the European Union put microchip numbers on horse records for management and sales purposes.

10.5.12 Biothermal Chips

If proven accurate, the biothermal chips could eliminate the need for taking temperatures on horses rectally, which can be a dangerous procedure with some horses. It could also lower the need for cross ties, which some veterinarians consider dangerous to the horse; because one individual would be able to read the horse's temperature in its neck rather than having to have it tied and go to the rear end of the animal. It would allow boarding stables, breeding farms, racehorse training stables, or show agencies to monitor horse health every day if desired. It can possibly allow these operations to catch infections before clinical signs are visually apparent helping to avoid transmission of possible disease outbreaks. In a quarantine situation, these chips could also provide a faster method to check temperatures with a lower risk of spreading infections to horses that are not yet affected.

10.5.13 Assist in Research Efforts on the Horse Industry

Several industry members throughout the research process pointed out the fact that statistics on the equine industry are difficult to obtain and accuracy is questionable at times. Having a complete horse identification and tracking system would allow for more accurate and complete census information to be obtained at a lower cost. One statistician stated that it would take an estimated $7 million dollars just to start a full equine census program (Hill, 2008). Having more accurate information on the

horse industry would allow for more accurate economic, epidemiological, or other types of studies. Horse densities could aid greatly in knowledge of disease spread and quarantine regions. Veterinarians could also do better marketing and better preventative medicine programs with accurate census data. This information has a value of its own, though it is hard to quantify.

10.5.14 Horse Slaughter

Currently, horses have a direct effect on the food chain, as many are exported to Canada and Mexico for slaughter. Identification that is compliant with slaughter regulations could theoretically assist in ensuring that horses which have been treated with drugs not approved for use in horses for human consumption do not enter the food chain.

10.5.15 Help with Unwanted Horse Problem

It is possible that ownership trace-back could prevent irresponsible horse owners from turning their horses loose or dumping them off on other individuals at auction yards or into empty pastures, which has been occurring recently, by providing a method of positive ownership identification. This way, irresponsible horse owners would have to face the consequences of improperly abandoning their animals. Some organizations are looking to microchip horses simply for the reason of dealing with the unwanted horse issue. However, some problems exist with this idea, because it would be the responsibility of the horse owner to get the horse microchipped and reported into a database somewhere, and they may just not report this information or transfers of ownership to avoid these consequences if they are irresponsible in the first place.

10.6 Equine Diseases of Concern

There are numerous diseases in equid species that are of concern to the horse industry and to other livestock industries. In the US Animal Health Report for 2006, eight "animal health events" were reported, five of which involved horses but affected multiple species of animals, while three of those were equine-specific disease outbreaks (USDA 2007k). As

evidenced by this, horses and other equine play an important role in the health status of the livestock sector, and attention to this segment of the industry could help alleviate economic losses and eradicate zoonotic diseases affecting multiple species. These diseases are those that would have a devastating effect on the equine population and in many cases can spread rapidly across species boundaries into the food animal chain, and into humans. The US equine industry has been reasonably safe for many years – in fact, it is difficult to find case studies on major outbreaks of any disease, though they do occur. Some are documented on a state-by-state level, or the show or racing circuits that are affected know about them, but other than that the information is not tracked nor made publicly available, making cost estimates of these outbreaks difficult, if not impossible, to measure. From multiple sources, the following is a list of diseases of concern to the equine species, including both zoonotic and equine-specific diseases. Some are obvious as problems, while others are less known or not currently in the US, but could still have a drastic economic impact if not monitored, or if an outbreak occurred that was not immediately caught and traced:

10.6.1 Anthrax

This disease can affect cattle, sheep, goats, horses, camels, antelopes, other herbivores, and humans. In 2006, Minnesota had an outbreak that killed 91 total animals, including some horses. It is also an OIE-reportable (World Animal Health Organization) equine disease.

10.6.2 Borna Disease (BD)

A neurological disease primarily found in horses and sheep, but also in other warm-blooded animals, including cats, dogs, primates, and cattle. Horses have an 60-95% according to USDA-APHIS (USDA 2002a). Surviving animals may be permanently neurologically impaired.

10.6.3 Brucellosis

Infrequently occurs in horses and humans, more commonly in other livestock species. Horses generally acquire this disease through contact with infected cattle or swine. Many of the wild bison and elk herds in

Yellowstone National Park and other areas are carriers of the bacteria that cause this disease. Brucellosis causes fistulous withers and in some cases abortions or death in horses. Brucellosis is a reportable disease in the US.

10.6.4 Contagious Equine Metritis

Contagious Equine Metritis is a disease that is mentioned in the 2006 US Animal Health Report (USDA, 2007k). Though it is not a zoonotic disease, it can have a devastating impact on a breeding farm or industry, as it is passed through semen by A.I., as well as direct breeding, or contaminated tools, and causes temporary infertility in mares. In most horses, there are no symptoms except for the mare becoming infertile (and therefore, unbreedable, losing a breeding season, which is vital in the equine industry due to the 11 month gestations and small windows for breeding and foaling in some segments, such as racing where older foals are better). Only two horses were reported to have this disease in 2006 – both Lippizzaner stallions imported from Germany into Wisconsin (USDA, 2007k). However, in 1978 and 1979, major outbreaks occurred in Kentucky and Missouri, devastating the breeding industry in those states and prompting efforts to eradicate the disease from the US. This disease is reportable to the OIE (World Animal Health Organization).

10.6.5 Equine Herpes Virus

Equine Herpes Virus (aka Equine Rhinopneumonitis) recently has been under close watch by USDA-APHIS. There have been numerous outbreaks of this disease recorded over the years. It also has some emerging disease concerns: in the 2006 Animal Health Report, Equine Herpesvirus Type 1 (EHV-1) is strongly emphasized due to changes in symptoms, because it is becoming a neurological disease with an increased morbidity/mortality rate and may constitute and emerging disease. This disease is deadly to horses and can cause significant losses to occur. Nearly every horse in the world is exposed to EHV-1 by the time they are two years old, it has long been a cause of respiratory illness and abortion, and in some cases horses that are exposed become latent carriers, never getting sick but never getting rid of the virus and

constantly spreading it to other horses. In 2006, there were 12 outbreaks of the neurological form of this disease in nine different states, and numbers of these cases have been increasing and affecting larger facilities. Even vaccinated horses have contracted the disease, and some have died, apparently due to the mutated strain being too strong and too fast acting for the vaccine to work. Increased horse movement may be to blame for this disease occurring more often in recent years. In late 2006, Florida had an outbreak of EHV-1 which prevented movement of horses on Calder racecourse, including two barns where horses were not allowed to leave at all and the prevention of any horses moving into the track's stables during the quarantine period. At least four horses died in this outbreak. Industry members stated that several racetracks have been shut down or quarantined in recent years due to EHV outbreaks. Maryland also recently experienced an EHV outbreak which affected the horse racing industry. This disease is reportable to the OIE.

10.6.6 Equine Infectious Anemia

Equine Infectious Anemia (EIA) is a disease that is still of concern in many states and easily spreads through biting flies and mosquitoes and is often deadly (or the horse must be quarantined for the rest of its life as a carrier or euthanized, depending on state laws). It certainly would be much less costly from a testing standpoint and a cost of equine lives standpoint if this disease was eradicated. As recently as June 2008, three horses in South-Central Indiana were euthanized after testing positive for EIA. Many state laws require the Coggins test, or another official test, for EIA to be conducted before horses are moved. This may also be an opportunity to implement individual horse ID and tracking by requiring horses to be microchipped at the time of their Coggins test. EIA testing has also increased over the years, with over two million EIA tests performed in 2005, creating a possible route to both track these animals and help eradicate a disease that has plagued the horse industry for a number of years. This is up from 1999 tests of 1.6 million to 2.1 million in 2005.

The Equine 2005 Report contains information about Equine Infectious Anemia knowledge and testing, which has been suggested as a method of

implementation for NAIS in horses. Slightly less than half (45.6%) of operations overall were knowledgeable of this disease, while 9.8% were unaware of EIA. Larger operations (>20 horses) tended to be more knowledgeable, while small operations (5-9 horses) tended have less knowledge. Overall, 37.6% of equids were tested for EIA in the 12 months of this study and 76.9% of the operations had at least one equid tested; with very high percentages being tested in the south (over 50%) while the west (at 14.7%) had the lowest testing numbers. Show/competition horses, race horses, and lessons/school horses were much more likely to be tested than breeding, farm/ranch, or recreational horses. The average cost of an EIA test across all regions was $27.33 per test including all costs associated with conducting the test, such as transportation, drawing the blood, and the laboratory and paperwork, with larger operations having only slightly lower costs. Reasons for EIA testing were primarily for show/event requirements, interstate movement, and personal knowledge. Familiarity with EIA increased from 1998 to 2005, with only 9.8% of operators indicating they were unaware of EIA in 2005 compared to 16.7% in 1998. The cost of a Coggins test (test for EIA) had increased 19.1% over these years, from $22.95 to $27.33. EIA is a OIE-reportable disease.

10.6.7 Equine Influenza

Equine Influenza is an OIE-reportable disease. It is transmitted by aerosol, and causes the horse to be lethargic, have a cough, depressed appetite, and a fever, and can lose a competing horse such as racehorses a great deal of time in their training and ability to race, but is rarely deadly. A recent outbreak in Australia crippled the entire Australian equine industry, especially for racing and breeding, and costs are estimated to be in the billions of dollars. This is an example of the extreme damage that an equine outbreak can do to an economy of the industry and the long term devastating effects it can have if not caught in time. Unfortunately, no scholarly research articles were found on this outbreak, but numerous popular press articles contained information on this and other equine influenza outbreaks, and gave cost estimates to the industry for such events.

The Australian outbreak appears to be due to improper handling at quarantine facilities of horses entering the country, which had been a concern of the Australian horse industry for a number of years prior to this outbreak. Equine influenza had never previously appeared in Australia, and was greatly feared by the racing industry. Previous outbreaks of equine influenza have affected many nations.

In 1986 and 2003, South Africa experienced major outbreaks of equine influenza, and reported in 2004 that they blamed problems with their quarantine stations for the 2003 outbreak. In 1986, races were cancelled for three months in South Africa due to equine influenza. In 2003, racing stopped in nearly all South African racing regions when an estimated 1,000 racehorses were affected by the equine flu, in an outbreak blamed on horses imported from the US. Estimated losses were R120 million in net betting turnover and R10 million in attributable profits. Japan suffered a 2007 outbreak when 29 horses were diagnosed with the equine flu. Three race meets were cancelled, the first Japanese cancellations for 30 years, and several major races and racehorses were affected. The cost was estimated at A$48 million in lost turnover. The United States experienced an outbreak in greyhound racing dogs in Florida, where eight dogs were killed by a respiratory disease later identified as a strain of equine influenza. This event led to an outbreak of the disease in racing and pet dogs, and represents an event where an equine disease has unexpectedly mutated and crossed species boundaries. Great Britain experienced a 2003 outbreak which did not cancel any race meets but was considered the worst outbreak of equine influenza in more than a decade in Newmarket's racing community. Even with all horses vaccinated against equine influenza, Hong Kong suffered an outbreak in 1992 that affected 75% of horses stabled at the Royal Hong Kong Jockey Club, and caused seven race meets over 32 days to be cancelled. Ireland also experienced an outbreak in 2006 from July to December.

The Australian Equine Influenza Outbreak occurred in August of 2007, and the effects were still being felt through the end of October with race cancellations. The outbreak spread from international horses to recreational horses at Sydney's Centennial Park. All racing across the country was cancelled, and a 72-hour ban was placed on movement of all

racehorses. Several major races, including the Sydney Turf Club's A$1 million Golden Rose race and the Melbourne Cup, were delayed or cancelled due to the outbreak. This outbreak affected everyone from breeders and trainers of racehorses to the stock market, due to the effects on bookmaker companies and race track stocks (Wainwright, Moore, 2007).

The horse racing industry in Australia was reported to be an A$8 billion dollar industry with 74,000 jobs in Victoria alone, and it simply came to a halt due to the disease outbreak. No final number on the horses that tested positive for the virus was available, but an August 27th estimate reported 47 horses positive at that time, and another report stated that 200 hacks at a park near the quarantine area were showing signs. Racehorse owners were not allowed to move their horses, in many cases not even allowed to exercise their racehorses. Pony clubs and other shows and events were voluntarily cancelled in many cases. The cost of the delayed breeding season is also extremely important, because the age of racing horses is important in how well they perform on the track, and entire crops of foals could be lost or of reduced quality due to effects on the breeding season. Job losses have occurred, and trainers have lost time with their horses because of their inability to work out and to race. One source estimated the economic loss from a three-month cancellation of events in Victoria would be more than A$57.5 million dollars (Eddy, et al., 2007). This same source stated that the Victorian Government could lose up to A$3 million per week in revenues from betting on horse races. Another source reported that the cost of a three-day halt on wagering in Victoria and New South Wales would be A$70 million, and that all bets for that time period would have to be refunded (Eddy, et al., 2007). In addition, because the equine flu is an emerging disease in Australia, a vaccination program should be started in racehorses, which for the first year at three doses of vaccine per horse would cost A$5.4 million, excluding veterinary administration charges. In 2001, the cost of a response to an outbreak in Victoria was estimated by another organization as A$775,840 with a limited outbreak (using three infected premises as an example) and A$3,740,540 if all race horses in training in the area were vaccinated (Eddy, et al., 2007). Though all of these costs are only estimates, and it is hard to quantify the economic

loss of horses that lost training days or missed a breeding cycle, it is easy to see from this example that a major disease outbreak has a significant cost.

10.6.8 Equine Piroplasmosis

Equine Piroplasmosis (EP) is a disease APHIS is working to eradicate, and was believed to be eradicated in 1988 until a recent 2008 outbreak. It has only been found in the US in one state, Florida, and is a parasitic disease believed to be spread by tropical ticks. It was first noticed in "backyard" horses (not horses that moved around much). It causes anemia, jaundice, fever, and weight loss, and death in up to 20% of affected horses. In a paper written prior to the current outbreak, it is mentioned that eradicating this disease from south Florida in 1988 took 25 years and $12 million dollars. As of September 10, 2008, 20 horses have tested positive (Ryder, 2008b). Five have been "removed" from the area via euthanasia or been moved to a research laboratory, 15 are still in Florida on five different premises. As of September 12, 2008, some of the quarantines were being lifted while leads on horses that had been in contact with the positive horses were still being followed. All imported horses must be tested for this disease. EP is a OIE-reportable disease.

10.6.9 Equine Viral Arteritis

Equine Viral Arteritis (EVA) is listed as an infectious disease of concern in the 2006 Animal Health Report due to a recent outbreak. EVA can be spread both through the respiratory system and breeding practices, and causes both flu-like symptoms and abortions (in some cases, "abortion storms") in pregnant mares. Stallions can carry the disease in glands for many years and are a significant source of infection. The costs to the industry are lost breeding, unhealthy animals and the veterinary costs associated with treatment, and the loss of use of stallions and loss of broodmares for a season or sometimes more. This is a serious disease and one that is costly to the industry.

In 2006, a farm in New Mexico suffered up to 50% losses from mares aborting due to EVA, and two of its stallions were found to test positive from their semen. One of the breeding stallions and any mares that had

visited the property were traced back to 18 states – six states, Kansas, Montana, New Mexico, Oklahoma, Utah, and Alabama, had horses that showed recent EVA infection, and four more states had horses showing suggestions of recent EVA infection, but not definite proof (California, Colorado, Idaho, Texas) (USDA, 2007k).

In New Mexico, a total of 23 premises housing 1,081 horses were either voluntarily or officially quarantined, and the last of these was lifted from quarantine on December 5, 2006. Utah also experienced 21 premises and 591 horses being put under quarantine, with an additional six premises and 350 horses being temporarily quarantined before testing clean, and the last of these quarantines was lifted on November 26 of 2006 (Timoney, et al., 2007). This outbreak showed the need for a national system, or at least common programs among the states, to find and control this economically harmful disease. It also pointed out the fact that embryo transfer and A.I., as well as the common practice of pasturing numerous mares together on breeding farms, allowed the disease to spread readily and rampantly by both respiratory and reproductive routes. EVA is a OIE-reportable disease.

10.6.10 Encephalomyelidities

Encephalomyelidities (West Nile, Eastern Equine Encephalitis, Western Equine Encephalitis) are all are currently in the US. Not spread from horses to humans, but humans and horses can both get these diseases. Horses serve as a kind of watch animal for these diseases – when horses in the area start coming down with them, humans often follow. West Nile recently emerged in the US; the other two have been around for many years. All three can be deadly to the equine species and are OIE (World Animal Health Organization) reportable diseases.

The West Nile Virus outbreak in 2002 affected 15,257 reported horses in 43 states. A study was done on the specific impacts of this outbreak to the North Dakota equine industry (Ndiva Mongoh, et al., 2008). They used estimates of a 15 year useful life of a horse, a $2,000 average value for a horse, maintenance costs of $339 per month, and the monthly cost of purchasing a horse at $13.72 per horse. Disease recovery time varied from one day to three weeks and from three weeks to six months for a

horse to fully recover to its normal usefulness, with an average of four months until total recovery. The cost of West Nile Virus treatment ranged from $190 to $380 per month for horses that stayed on their feet, and $3,000 to $6,000 per month for downer horses. Some isolated cases outside of North Dakota were reported to cost up to $100,000 for treatment.

A study prior to this one estimated the costs of the WNV outbreaks in Nebraska and Colorado at $2.75 million (USDA, 2003), and another study estimated the 2003 economic loss due to fatalities in the state of Texas at $7.46 million (Galvan, et al., 2004). In the case of the North Dakota outbreak, 569 horses were affected with a 22% mortality rate. The total cost to North Dakota was $1.9 million, with $1.5 million dollars incurred by horse owners, and a $400,000 expense to the state of North Dakota for monitoring, control, and surveillance of the disease. The costs incurred by horse owners included $781,203 due to medical costs, with $4,803 for vaccinating 152 horses and $524,400 for the treatment costs of 345 horses, and $802,790 due to the inability to use animals. The cost of the 126 horses that died was estimated to be $252,000. They also stated that these cost estimates are most likely conservative.

10.6.11 Glanders

Glanders affects horses, mules, and donkeys, though it is not currently in the US. It can be spread from horses to humans, and was used in biological warfare in WWI. All imported horses must be tested for this disease. Glanders is an OIE-reportable disease.

10.6.12 Hendra Virus Disease

Hendra Virus Disease is a new emerging disease which is seen in humans and horses. It has only been documented in Australia so far, and has a high mortality rate.

10.6.13 Japanese Encephalitis

Japanese Encephalitis (JE) has been documented in humans, swine (which are amplifiers), and horses. Horses and humans are considered dead-end

hosts, but horse-to-horse transmission is possible. JE is an OIE-reportable disease.

10.6.14 Leptospirosis

Leptospirosis affects humans, many domestic and wildlife species, cattle, pigs, horses, dogs, rodents, wildlife species. It usually spreads from fecal/urine contaminated water. Using a disease tracking database to discover spots of major outbreaks of this disease could prevent some individuals or livestock from getting infected. Leptospirosis is an OIE-reportable disease.

10.6.15 Rabies

Rabies is a well known disease that affects horses, humans, and many other mammals. It may be possible to use an animal tracking database with this disease to indicate regions of major outbreaks and send out recommendations for updating vaccinations in horses for this particular vaccine, which in most states is only available from a veterinarian and not always administered for that reason. Rabies is an OIE-reportable disease.

10.6.16 Screwworm

Screwworm was originally eradicated from the US in 1966, and restrictions exist on horses coming in to the US from countries where it is known to exist. Screwworms can affect humans, horses, and other livestock, and feed on the flesh of these animals usually after hatching from their eggs laid by flies near open wounds. Screwworm is an OIE-reportable disease.

10.6.17 Strangles

Although neither APHIS-VS nor ESWG mentions this disease as a recognized disease of concern, Strangles (aka Equine Distemper, aka Streptococcus equi) is common and can be costly to the horse industry, and has been written up in the American Quarter Horse Magazine recently. Internal or "Bastard" Strangles (where the infection spreads to

lymph nodes other than those in the head and neck) is often deadly, and can occur in a low percentage of cases, though there is no definite estimate on the percentage rate of occurrence. If treated, horses are generally recover, but if left untreated horses can die, mainly from secondary infections such as pneumonia. Even though the mortality rate is low and it is not zoonotic, it can have major economic ramifications due to its highly contagious nature and long recovery periods. It can also occasionally leave permanent scaring, limiting some horses time in the show ring for certain disciplines. Strangles is mentioned in one of the AHC press releases as having recently negatively affected horse owners and the equine industry, and in some cases caused restrictions on the movement of horses (AHC, 2005b). An industry source also mentioned an outbreak on the backside of Churchill Downs a couple years ago which occurred because of a two-year-old that was on the track against regulations (horses stabled on the track are only supposed to be racing there, and the horse was there for training purposes only).

10.6.18 Tetanus

Horses and humans are most susceptible of all animal species to tetanus. It is a bacterial disease which causes toxins affecting the nerves that control muscles. The bacteria are common in the soil and environment, and horses are commonly affected due to the environments they live in and how common injuries to horses are.

10.6.19 Venezuelan Equine Encephalomyelitis

Venezuelan Equine Encephalomyelitis (VEE) is fatal to horses and humans, and horses do play a role in transmission to humans. The last US outbreak was in 1971. South American countries still have this disease, and outbreaks are also occasionally seen in Mexico. Highly infectious, and considered a biosecurity threat. VEE is an OIE-reportable disease.

10.6.20 Vesicular Stomatitis

Vesicular Stomatitis (VS) affects cattle, sheep, swine, horses, humans, and presents similar symptoms as FMD in ruminants. The 2006 US Animal Health Report states that only one state (Wyoming) had a VS outbreak in 2006, affecting 17 horses. The previous year, however, there was an outbreak affecting nine states and 584 horses. The PRCA stated that two rodeos in the last six years have been cancelled due to VS outbreaks. VS is an OIE-reportable disease.

10.6.21 Other Diseases

Other equine diseases listed as OIE-reportable (World Animal Health Organization) in the United States are: African Horse Sickness (Never Occurred), Dourine (hasn't occurred since 1934), and Surra (never occurred). Many of these diseases are transmissible between horses and other livestock species, and in some cases even to humans. For many of the other diseases, horses are a dead-end host. However, for diseases such as JE and WNV, horses often act as sentinels of the disease: when it is seen in horses, human cases often follow, even though horses are not the vector through which they are spread. In some cases, such as with West Nile, prevention methods can be instituted at that time such as mosquito control to prevent further horse and human cases from developing. A few of the other diseases on this list, such as Tetanus and Strangles, are specific to the equine species. The value that a national animal identification system would bring with species-specific diseases is to find out more about prevalence and spread, and learn more about prevention as well. Some equine-specific diseases are extremely costly to the industry, and even if they do not affect the food sector or human health, they do have an economic cost and therefore prevention and tracking would be beneficial.

10.7 Industry Concerns and Recommendations

Several concerns were shared with our research team during interviews with horse industry stakeholders that are important to mention, but that do not fit directly into the benefit and cost analysis of the system. NAIS may or may not have any effect on these industry concerns, but numerous individuals and organizations mentioned these issues as important considerations. The equine industry is a unique, diverse industry that is challenging to define and develop an NAIS benefit-cost analysis for. This section summarizes issues of concern with design and adoption of NAIS in the equine sector that were revealed from the research conducted for this study.

10.7.1 Horses are Already Identified

Numerous organizations question the value an additional form of identification would have for horses that are already registered and tracked using CVIs and EIA tests. They want to know what the specific benefits are for microchipping a horse that they feel is already identified by other methods. Utilizing the existing breed registries will be an important part of NAIS, as they know a lot about where their major show and race horses are and what disease problems exist. AQHA even has a horseback riding program that keeps track to some extent of horses and individuals on private trail rides, where people report the location and trail they rode on and the hours they rode to get rewards for hours in the saddle. In the thoroughbred racing industry, saying they need to both tattoo and microchip would cost extra money to the breeder to perform both procedures to identify the horse, and would not be well accepted. Thoroughbred breeders also have a concern with the confidentiality of microchipping and the database records. They do realize there is a problem with papers not always being sold with horses, but recommend that no one buys a horse without papers. The concerns about costs to breeders for identifying their horses are related to the need to make sure people do not have to register their horse in multiple places; they need to have one registry to send paperwork to and get into the NAIS system. This suggests the involvement of breed associations for record keeping.

Additionally, several industry members suggested that microchipping still needs to be only one part of the permanent identification of a horse. Counterfeit chips exist, and therefore photographs, written descriptions, tattoos, brands, and other forms of identification will still be necessary for positive identification of horses.

10.7.2 Problems with Current Identification and Registration

Numerous documents in the equine industry indicate that many horses are already individually identified, making NAIS implementation easier. However, even though a horse is registered with an association does not mean the horse's information is current, or even that the ownership information is correct. The horse may also be at a different address than listed on the registration, as the papers may state the location of the owner, not the horse if it is boarded or in training. Registration is currently left up to the owners to transfer, and many horses are sold without papers, or the seller charges an additional fee to the buyer to get the papers. Even when a horse is sold with the transfer forms, many buyers do not bother to send in transfer forms because of transfer fees registries charge for this service. Off-the-track thoroughbreds are also a major issue, because they are often sold without papers, and since their papers are not linked to ownership, their location is often lost in the system. Because of the fact that registration papers have no direct physical link with the animal, they are simply a pedigree, drawings of markings, and in some registries a photograph, it is easy for papers to be lost or never transferred and for the identity of a horse to be lost.

Some registries keep DNA information on their horses, but that is a process which takes time and would not be capable of meeting 48 hour trace-back goals. That procedure also must be performed by a lab, and most owners do not send in a DNA sample just to see if it matches some record in a registry. Part of the reason the estimates for horse population numbers range so drastically may be because horses registered with one registry under one name may also be in a different registry under a different name due to papers being lost during the lifetime of the animals. Recreational horses especially are not well

tracked and often get lost in current systems. One suggestion has already been mentioned – to enact a pedigreed livestock law similar to Canada to require papers to be transferred with a change of ownership. Another option could be to require EIA testing at changes of ownership, and have the veterinarian or another official record the microchip number under a different premise ID, so that even if breed registration papers are not immediately transferred, at least local animal health officials can find out where the horse is located. In this way, the horse's microchip number could be linked to the correct premises, and the horse could be tracked even if not registered. However, the options for dealing with these issues would all depend on how the database for the equine industry is organized.

10.7.3 Education Needs and Information Concerns

There are concerns with education and current information available about NAIS in the equine world. There is a lot of misinformation and or misunderstanding regarding the intentions of the system, some of which are raised by concerns about confidentiality of movement tracking. Most major equine organizations recognize many concerns are not founded, but misunderstanding can contribute to resistance in NAIS adoption. Breed registries and other equine organizations are concerned about what the USDA expects from the equine industry in an NAIS system. Costs and difficulty in implementing the system will depend on what the exact parameters of the system end up being.

The Penn State survey of veterinarians assimilated some excellent data on veterinarian's knowledge of NAIS. Many equine owners receive the majority of their healthcare information from veterinarians, so educating veterinarians would be a start to educating all equine owners (Dreschel, et al., 2008). The study found that only 21% of veterinarians felt they were very familiar with NAIS, while 17% stated that they were not at all familiar. Forty-one percent of veterinarians stated they were concerned about finding an improved identification method for equids. Some equine groups recommended that starting an education program with breeders would be the best way to implement NAIS, as if horses were microchipped from birth, eventually the whole population would be

microchipped. The breeders will also be the ones to bear this cost over time; after all older horses are microchipped, they are the ones adding new horses to the population. According to the AHC 2007 Horse Industry Directory, there are 31 educational organizations involved in the equine industry. Youth organizations such as the National 4-H Council and the National FFA Organization would be a great place to start educating groups on microchipping and tracking their horses, and encouraging the youth involved in these programs to have their parents or boarding stables get premise identification numbers.

Numerous survey results have exhibited the need for further education programs on equine healthcare, especially on the smaller premises in the industry. The NAHMS Equine surveys found that 41.7% of operations had not heard of NAIS prior to the survey and only 14.4% considered themselves knowledgeable about the topic. Large operations tended to be more knowledgeable about NAIS than small operations. Operations that were more knowledgeable about NAIS tended to use microchips more often, and operations that at least recognized the term EIA (Equine Infectious Anemia) were 2.8 times more likely to have some level of NAIS knowledge. Vaccination practices are also an area where education could be useful. The use of some level of vaccination on a given premises were approximately the same between 1998 and 2005, with the notable difference being the West Nile Virus vaccine being approved and used in approximately 60% of equine populations. Overall, about 75% of operations vaccinated at some level in both 1998 and 2005. However, 29% of operations that stated they did not vaccinate any equids on their property also transported animals by trailer off of the premises, indicating that unprotected horses are leaving their properties and possibly interacting with other horses or areas where horses have been.

For traveling and interacting with other equids, 60.6% of operations that had horses that left the premises and returned after direct contact with outside animals never isolated or quarantined these animals upon return, and only 10.6% routinely isolated these equids. Operations required a non-resident equine coming on to their premises to have an EIA test 42.1% of the time, and 18.0% required a CVI form. Of the 21.5% of operations that added new horses to their operation in the last 12 months, excluding newborn foals, 58.6% always required an EIA test for

horses being added to their property, and 27.4% required a CVI. Only 63.0% of operations where the horses left the premises sometime within the last five years have ever been asked to present health papers (EIA test results or CVI). Most of these cases were at a show/event or at a sale. Premises in the southern region were asked more often (70.7% of the time) than the north, east, or west. The western region had the lowest percentage of operations being asked to present health papers, at 47.5% of operations that traveled in the last five years, but had the highest numbers for interstate and international movement, suggesting the state laws about papers being checked on livestock traveling between these western states have not been well enforced.

10.7.4 The Issue of Recreational Horses

Some equine stakeholders feel the industry should not be separated in two different priority levels (horses that require CVI/EIA tests and horses that do not) because: 1) the different levels are the same species and diseases can easily be transmitted between them; 2) horses that are not often moved and not highly valued tend to have lower health care standards, be vaccinated less, and are more vulnerable to exposure or to be a non-expressing disease carrier; and 3) horses from the different levels interact regularly. There is not complete separation and segregation between recreational horses and show horses. A lot of premiere show horses are shown in small schooling shows as practice, where recreational horses are also shown by their owners. The different classes of horses also interact at playdays, gymkhanas, trail rides, or boarding stables. Recreational horses may not travel as much as business competition horses, but there is frequent direct and indirect contact. Also, as noted in the case study on EVA, shipped semen and other breeding horses and issues in the breeding industry can and has carried diseases across state lines, whether physical horses are moved or not.

Evidence of the lower healthcare standards on smaller operations is provided by statistics in the NAHMS Equine 2005 studies. On average, 75.9% of operations administered some form of vaccinations in the last 12 months, but large operations (20+ equids) were more likely (87.2%) to administer at least one vaccination to their horses as compared to small

operations(5-9 equids), at 73.6%. Veterinarians were the source of the vaccinations 76.0% of the time, and a higher percentage of small operations used a veterinarian as a source for the vaccinations as opposed to the large operations. This could provide a route for these smaller operations to get microchips inserted by the veterinarian. A higher percentage of large operations also required CVIs, EIA tests, or other health records for new horses coming on to their premises than did small operations, and large operations quarantined new horses more often.

Farm/ranch and personal use horse operations are much less likely to have any kind of written or computerized health records on their animals than boarding/training or breeding farms (USDA, 2006e). Small farms were also less likely than large farms to keep health records of any kind. In regards to quarantining or isolating equids returning to the farm after traveling off-premises and interacting with other equids, large operations quarantined a greater percentage of the time than did small operations. Residences with horses for personal use and farm/ranch operations were less likely than breeding or boarding/training operations to routinely isolate horses upon returning to the operation.

10.7.5 Movement Tracking

Throughout the industry, many stakeholders do not favor complete movement tracking of horses for various reasons. One group stated that where a steer could move 3-4 times in a lifetime, a horse would move 3-4 times in a day. Many horses move frequently to shows, events, other farms, sales, or even trail rides – all of these movements would be difficult and costly to track at a high degree of accuracy. Some members of the industry also comment that due to health care regulations in the equine world such as EIA tests and CVIs, equine diseases are already well traced and horses carrying diseases are found in many cases simply by talking to owners and finding the horses they have been in contact with. "Herd records" in the business plan, requiring the owners to keep accurate records of where the horse has been, and when, is currently the only way to track a specific horse's movements. However, even if owners did this, they have no system to report the information to, and the

current level of record keeping evidenced by the NAHMS report would not indicate that owners are prepared to keep records of their horses' movements (USDA, 2006e; USDA, 2006f). The NAHMS report only discussed health records, but it stated that the use of computerized methods and the veterinarian keeping records have both increased, while 23.5% of operations still have no written or recorded health records. There is also an issue with horses that stay at home being comingled with the horses that are traveling regularly, so it is difficult to limit the horses that need to be traced to only the animals that are moving regularly.

10.7.6 What to do with Positive Horses

Some horse owners have major concerns about what will happen to their horses in the case of a disease outbreak. Several equine diseases, including EHV and EIA, can cause some horses to be carriers and spread disease to other equids while never showing signs themselves. These diseases are difficult to cure and often the horse must be placed in permanent quarantine or euthanized. Many smaller horse owners fear that their horse may be euthanized in the event of a disease outbreak, and would rather hide their horses from a disease tracking system than to risk losing them.

10.7.7 Decreasing Attendance at Events

Two of the major equine organizations expressed concerns that the movement tracking would increase the cost to horse owners, which would in turn increase the cost of their events (especially with movement tracking) and therefore increase entry fees or ticket prices, which may decrease public attendance at events. In addition, with movement tracking, they were concerned that if reporting was too difficult, numerous exhibitors would not participate or only show close to home rather than out of their states or regions. If the NAIS system simplifies the check in process or management at shows or rodeos, these concerns may be eliminated.

10.7.8 European Union and Other Nations Requiring Microchips

The European Union has adapted a program to give every equine a Unique Equine Life Number (UELN) which is a 15 character code, the first three digits representing the country, the second three representing the breed of the horse, and the final nine being random numbers to identify the individual horse. At least 12 European nations, as well as Australia, New Zealand, and many of the South American nations already have microchipping regulations in the equine species. Many of these regulations are specific to the racehorse industry or horse movement, but some nations require all horses to be microchipped, and others require certain breeds to be microchipped to be allowed into registries or studbooks.

In the US, many of the equids in Louisiana are already microchipped due to their EIA testing program requirements. Great Britain microchips race horses at three months when DNA and hair samples are taken by the veterinarian. This is a similar process to what The Jockey Club requires in the United States for Thoroughbred foals. Some equine industry individuals suggested that the tracking of international horses was particularly important, and that all horses going through US quarantine should be chipped, but expressed concerns that placing a requirement on other nations to do something the US does not do would not be well received. In addition, the recent discussion of adding reining as an Olympic equestrian sport could increase the number of Quarter Horse or Stock-Type horses exported from the United States, and cause a greater need for US horses to meet the identification requirements of foreign nations.

10.7.9 Desire to make It Mandatory

Some members of the equine industry suggested that some in the equine industry are just waiting around to see what happens. They suggest that someone needs to make a National Equine ID program mandatory, with a timeline to allow the industry to adjust and learn the best way to go about implementing a system by trying it out. Currently, owners are not sure where to report their microchip numbers to, microchip scanners are

not used regularly at events, and therefore the owners currently chipping their horses are not enjoying many of the potential benefits. They stated that the only way to get an effective level of participation in an equine NAIS would be to make it mandatory. Certain things need to occur to make the system more effective, such as extending the read range on scanners and getting veterinarians to use microchip identification in their practices, and they feel it is likely these things will occur if more horses were microchipped. The equine industry has been talking about and meeting to discuss the idea of NAIS for years, discussing the possible benefits including health records, tracking horses, day-to-day farm operations, and disaster recovery, but what it comes down to is they just feel they need to implement the system and find out where horses are, then the benefits will come with time.

10.7.10 Making sure USDA does not put regulations on the Industry they cannot handle

The equine industry initially felt that horses were an afterthought to be included in the NAIS, and then horses that moved a lot became a high priority in the plan. They are concerned about the USDA making regulations that the horse industry cannot conform to, and want to make sure they are involved in the planning and implementation of any system. That way, the horse industry will be able to develop a system that fits well into the current structure of the industry and hopefully meets the goals set out by the USDA.

10.7.11 Are horses pets or livestock?

The question of horses being a "pet" or a "livestock" animal is one that continuously raises issues in the equine world. Many individuals treat their horses as pets, but they are a part of the livestock industry in some locations. Parts of the equine industry do behave more like the pet industry, and recognizing this fact is important to learning how to implement an identification system in the equine species.

10.7.12 Certainty that the horse and chip are properly matched in the system

Horse registries are concerned about when and how to microchip horses to be certain that the correct microchip number is reported with the horse that receives that microchip. The Thoroughbred industry usually has veterinarians out for a neonatal exam and to do a hair pull for a DNA test, which are two possible times to identify horses. Taking the human error out of reporting microchip numbers will be important in being certain that the system works properly.

10.7.13 Enforcing current laws

Many members of the equine industry pointed out that enforcing current regulations on the equine industry is a major issue, and that any additional system would have to be enforced at a stricter level. The punishment for breaking a regulation and the level of enforcement both must be strict enough to encourage individuals to actually follow the rules. Enforcing the laws we already have was a major concern for members of the industry, though it is possible that a tracking system could assist in the level of enforcement. In addition, to use CVIs and EIA tests for tracking purposes, it is important that veterinarians turn these documents in to the state office on a timely basis, which is not currently the case. Education could help fix this particular issue. Numerous industry members felt that current CVI and EIA testing regulations required for traveling interstate and intrastate are not enforced at a reasonable level. Producer opinion suggests that numerous events and locations that claim to have regulations on EIA tests at events and places where equids comingle do not enforce these regulations. The Business Plan recommends standardizing disease programs, and in the equine species this could mean getting states to standardize and enforce EIA testing regulations. Working on the assumption that we are currently able to track horses using CVI and EIA testing requirements as the state level is good, if these current regulations are enforced. If they are not, this will not be a useful or effective form of disease tracking, because if even one sick horse is missed, the disease could slip through the quarantine region and spread. If a horse needs an EIA test for traveling purposes, a good recommendation on the national level would be to

have a program similar to the state of Louisiana's, requiring a horse to have a permanent form of identification, preferably a microchip, before the test will be performed.

10.7.14 Cost concerns in certain equine industry segments

Industry members commented that the cost of an NAIS system probably will not have much of an effect on the high end of the horse industry. For high dollar race horses and show horses, getting the horse microchipped and scanned at shows would constitute such a small percentage of the horse's value and the annual costs that it would not affect them very much. However, it will affect the smaller racehorse trainers or show horse owners who are either just entering the business or struggling to keep going, and will also affect recreational horse owners who do not normally spend great amounts of money on their horses and just occasionally haul to parks, trail rides, rodeos, or small shows. However, these are also the horses that the USDA is less concerned about identifying initially, so it is possible that by the time they need to microchip their animals the system will be working well and the benefits will outweigh their costs.

10.7.15 Create disease spread models and costs for disease outbreaks

One recommendation is that disease spread models be created and studied to better predict costs associated with potential equine disease outbreaks and benefits identification and movement tracking systems could have in disease eradication and prevention.

10.7.16 Unreliable information

Throughout this project, statements and statistics have been quoted that do not necessarily match industry and producer opinion. The number of equids with no unique form of identification, as listed in the NAHMS studies, may be much higher than indicated by this study because, based on producer opinion, many of the horses left out of the NAHMS study

(horses located on premises with four or less horses) would be in the recreational industry were registration is not always important or necessary. Horse movement numbers, when compared from 1998 to 2005, indicated that horse movement had decreased rather than increased. Industry members are perplexed by this result, when the numbers of events and organizations, including recreational events, are increasing annually. In addition, the 2006 Animal Health Report sites increases in horse movement to possibly explain the spread of equine diseases such as EHV-1.

10.8 Industry Opinion on NAIS

Both the Penn State study and the Colorado Smart Card study asked survey questions on people's attitudes towards an NAIS system in the equine species. The Colorado study found that 85% of participants agreed or strongly agreed with having an animal identification system for the equine species, while 15% were neutral and none disagreed. The majority of participants, 98%, also felt that the project was worthwhile, and 100% wanted to see national acceptance of the equine passport as proof of the EIA test, CVI, and brand inspection. Of the animal healthcare providers in the Penn State study, only 47% were in favor of NAIS, while 4% were opposed and the rest were neutral or unsure. Fifty-six percent of respondents felt that NAIS would be useful in stopping a contagious disease while the rest disagree with this statement. Industry opinion obviously differs greatly on NAIS, and further education could also assist in helping people understand and accept such as system.

10.9 Benefit-Cost Analysis for NAIS for Equine

10.9.1 Costs

The costs of NAIS adoption in equine are quantified for Premises Registration, Animal Identification, and Animal Tracking. Because of lack of data in the equine species, some estimates used here are based on quantities obtained through studies on other species of livestock, and others are producer estimates.

The cost for Premises Registration is shown in table 10.6. The number of premises where equids are housed as quoted in the NAIS Business Plan, is 570,000. In addition to this, the ESWG listed some premises that would not be included in this number as they would not permanently house horses. Estimates for the numbers of these additional facilities, including almost 4,000 State and National Parks (where trail riding areas may exist) and 3,077 counties in the United States (estimate of number of county or state fair/event grounds), constituted adding an additional 9,975 premises (1.75% of the equine premises). So the number of equine premises needed to register is 579,975 if there was 100% adoption of premises registration. Using the net present value of annualized premises registration cost of $4.64 (see Section 4 of this report), this means that the total cost to the industry of 100% premises registration is $2.9 million.

Table 10.6. Cost of Premises Registration in Equine Industry

	Number	$/premises	Industry cost
Equine operations	570,000	$4.64	$2,643,999
Other premises*	9,975	$4.64	$46,270
Total	579,975		$2,690,269

* Includes locations where horses will be comingled and estimated to be 1.75% of equine operations.

Costs for Animal Identification are exhibited in table 10.7. The total costs are based on a total number of equids in the United States being, as listed in the Business Plan, 5.8 million head (USDA, 2008g). This number is then adjusted up by 0.44% to account for the failure rates of microchips obtained in various studies. We assumed that the equine population is staying constant over time and that the average lifespan of a horse is 20 years (the low end of the range of lifespan indicated by the ESWG in their recommendations). The ESWG mentioned in their recommendations that one of the things that make horses unique is that they have the longest life expectancy of any livestock species, and stated a range of 20-35 years.

For replacement horse annual cost of NAIS, the cost of the microchip is an average of five prices obtained for the Destron-Fearing regular and biotherm microchips from distributors to veterinarians ($10, $12, $15, $16, and $20), and this average cost was charged to 100% of replacement horses. A veterinary charge for inserting the chip was based on the veterinary survey results for cost of the microchip and insertion, minus the cost of the chip as this is included separately, and this cost was also charged to 100% of replacement horses. The cost of veterinary travel assumes that 35.6% of the 570,000 premises, or 202,920 locations, where equines are housed would have a foal during the year, as reported in the Equine 2005 survey results.

The estimated annual number of foals, 290,000, was divided by 202,920 premises to get an estimate of 1.4 foals microchipped per veterinarian visit. However, this cost would only apply if the veterinarian was coming out for no other reason than to microchip the foal. The majority of horse owners having foals will have a veterinarian out to check the foal for neonatal exams or first vaccinations within the first year, so we did not charge a travel cost for new foals being microchipped annually. Finally, a cost of $4.15 was charged for the time and materials the owner would spend recording the data on the horse and reporting this data to a government database. Producer estimates indicated that filling out the paperwork on an equine would take an average of 15 minutes, at a cost of $14.60/hour (see Section 4 for wage rate assumptions). In addition, we assumed a $0.50 charge for materials such as postage, printing, or copying as may be necessary for government or equine owner records.

For horses that are currently in the equine population and would initially need to be microchipped, we included an annual interest cost of 7.75%. The NAHMS Equine 2005 survey reported that approximately 1.5% of equids are already microchipped and we assumed they therefore are also recorded in a database. The ESWG Microchip Paper reported an estimate of 600,000 horses already being microchipped, or approximately 10% of the horse population estimate we are using. However, we chose to assume the NAHMS Equine 2005 study was correct for this estimate. Therefore, the percentage of the equine population the microchip, veterinary charge, and recording/reporting data charges are applied to have been reduced to 98.5% with 100% adoption. Based on information included in the NAHMS Equine 2005 survey, such as the percentage of horses vaccinated by veterinarians and the percentage of horses tested for EIA, as well as producer estimates, we also assumed that 30% of horses currently would not see a veterinarian on an annual basis. Therefore, an interest charge on veterinary travel is applied to 30% of the current equine population.

If an equine owner needs a horse microchipped, it is likely that they will add this procedure to another routine veterinary call to mitigate travel costs. We also assume that if a horse is being hauled to the veterinarian to get microchipped, it is probably being hauled in for additional reasons, and therefore we are not charging travel or an office call fee to any percentage of these horses. Once again, the veterinary travel charge assumes that multiple horses are microchipped on each trip, and to obtain an average number of horses microchipped per trip, we assumed that all horses on a given premises would be microchipped in one trip if the veterinarian was coming out for that explicit purpose. Therefore, we took the estimated 5.8 million horses in the United States divided by the estimated 570,000 premises these animals are located on, to come up with an average number of horses per premises of 10.2 head. The veterinary travel charge was then divided by this number of horses.

Using the assumptions and data noted above, we obtain an annual cost of microchipping horses, veterinary charges for insertion, veterinary travel charges, and recording/ reporting data. The sum of all these annual costs comes to a total of $34.5 million for 100% Animal

Identification phase of implementing NAIS in the equine species (table 10.7).

The final phase of the Business Plan for NAIS, Animal Tracking, is by far the hardest to quantify for the equine species. The Business Plan suggests that events, such as shows, races, sales, or other exhibitions, where horses are comingled with equids from different premises, should be a priority in a tracking system (USDA, 2008g). They identify show horses through the USEF Horses Identification Program, and racehorses are identified through The Jockey Club, the United States Trotting Association, and the American Quarter Horse Association. Additional exhibitions or events where horses from across the state or from out of state comingle could include AQHA shows, PRCA and NHSRA rodeos, and numerous other events. The AHC identified 66 Show and Sport Equine Organizations, all or any of which may host their own state, regional or national shows. In addition, some educational organizations such as 4-H host horse shows, as well. The Equine 2005 Event Survey suggested that an average of 151.0 equids would be at an event on a typical day, and that 270.9 equids would attend the event over the entire course of the event. Local lessons, shows, and jackpot roping, where only a small number of local equids are expected to attend, were excluded from this study.

Table 10.7. Estimated Annual Cost of Identifying Horses Individually with Microchips

				Actual Number	Number to Chip**
Replacement horses*				290,000	291,276
Horses in current inventory				5,800,000	5,825,520
	Replacement horse, $/head	Percent applies to	Current inventory horse, $/head	Percent applies to**	Total industry cost
Microchip	$14.60	100.0%	$1.13	98.5%	$10,745,332
Vet charge	$27.40	100.0%	$2.12	98.5%	$20,165,897
Vet travel	$29.36	0.0%	$0.32	30.0%	$558,522
Recording/reporting data	$4.15	100.0%	$0.32	98.5%	$3,054,324
Total	$75.51		$3.90		$34,524,074

*Based on an average horse life of 20.0 years and assuming a constant inventory.

**Assuming that 44% of horses must be re-chipped due to microchip failure.

***The 98.5% accounts for the 1.5% horses that are already chipped, 30.0% is based on an estimate that 70.0% of horses will be chipped by a veterinarian at the same time they are being tested/treated for some other reason.

To illustrate the horse numbers that attend events held by large show organizations, we obtained some event information from equine organizations. From AQHA and USEF, we were able to obtain an approximate number of annual shows and also other equine event numbers from AQHA, which included an average number of horses attending these events. In 2007, AQHA held 2,449 shows with an average of 351 entries per show, and 554 special events with 63 entries per event. USEF estimated they hold 2,500 shows annually with 150 entries per show. Estimates were obtained on the number of PRCA and NHSRA rodeos, of 650 and 1,200 rodeos annually, respectively. In the NAHMS Equine 2005 Event survey, Western Events/Fairs/Rodeos had an average number of equids attending over the entire course of the event of 608.3 head. Unfortunately, this number also has a standard deviation of 262.2, indicating a high level of variability across these types of events.

As it is impossible at this time to quantify the number of equine events per organization and obtain an actual number of equine events, number of equines per event, and movement numbers, we chose to go a different route to quantify the tracking charges. The NAHMS Equine 2005 survey recorded information about the number of operations that transported equids off the premises by vehicle and later returned with them, which was a total of 58.4% of operations. Of these, 94.8% transported the equids within the state (53.1% for 1-9 trips, 37.7% for 10-99 trips, and 4.0% for 100 or more trips). Premises that hauled horses to adjacent states constituted 34.3% of operations (26.8% for 1-9 trips, 7.2% for 10-99 trips, and 0.3% for 100+ trips), 11.9% of operations transported within the US but beyond adjacent states (with 10.9% for 1-9 trips, 0.9% for 10-99 trips, and 0.1% for 100+ trips), and 1.1% transported equids out of the US (1.0% for 1-9 trips and 0.1% for 10-99 trips). These numbers indicate that 332,880 operations (58.4% × 570,000) transported equids off the premises and returned on an annual basis.

If we make the assumption that an individual reporting between one and nine trips is hauling the median amount of times, meaning 5 hauls, and that between 10 and ninety-nine trips is the median number of 54.5 hauls, and that horses hauled more than 100 times would be hauled 125 times, then we can come up with a total number of times horses were hauled by vehicle off premises and returned on an annual basis.

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Therefore, 91.8% of the operations that hauled horses off premises by vehicle hauled 5 times, 45.9% hauled 54.5 times, and 4.4% hauled 125 times. This equates to ((332,880 × 0.918) × 5 = 1,527,919.2 hauls + (332,880 × 0.459) × 54.5 = 8,327,159.64 hauls + (332,880 × 0.044) × 125=1,830,840 hauls = 11,685,919 total hauls. The number of horses hauled on each of these trips would vary, but if we estimate two horses per haul, and estimate that for each haul, the horse would be scanned twice (once at the destination and once upon return to the original location), we can get a total number of scans for the equine industry, not including horses that left the property and did not return because of sale, of 46,743,675 necessary scans.

We can estimate the total horses sold using USDA Census data, and assume that when horses are sold they also move to a new property. Whether they are sold privately or through a public venue such as an auction, we will assume they are scanned twice during this process, once into the auction yard or when leaving their former residence, and once upon arriving at their new residence. The USDA 2002 Census reported a total of 487,808 equids sold. Therefore, if we estimate two scans per sale, we can estimate 975,616 scans due to horses moving because of change of ownership and therefore changing premises. Adding this quantity to the scans necessary for equine movement on and off premises, we get a total number of annual scans of 47.7 million.

The cost of the reader was quantified by taking the prices of Destron-Fearing readers ($350 and $360) which do not have the ability to store data, and an estimated cost of $885 for an Allflex wand reader, which is able to store information, and averaging them. The reasoning behind this is that the readers which have storage capabilities in the other livestock sectors tend to be much higher priced than the Destron-Fearing reader, and some reports, such as the California Racehorse movement study, have reported using Allflex readers with storage capability greatly simplified the movement tracking process. However, horses also tend to be handled in smaller numbers most of the time, so for small farms, breeding operations, veterinarians, anyone using the biothermal chip in horses, or show check in (checking horses one at a time), a reader without storage capability would be perfectly reasonable and less costly. Therefore, we assumed that 50% of the operations requiring readers

would purchase the Destron-Fearing reader, and 50% would purchase the Allflex, or some other more expensive reader with storage capabilities. This average reader cost of $620 was then allocated over an estimated three year lifespan, as was used for the other livestock industries, with interest applied. It is possible that in some segments of the equine industry, where the readers are not shipped around and always are kept in protective cases, that the readers will last much longer than this, as is evidenced by the reports from veterinarians of readers lasting more than 10 years. However, as we have no definite estimate of reader longevity for the specific types of scanners used in the equine industry, the three year estimate of the other livestock species seems to be a reasonable assumption. Based on these parameters, the total annual cost per reader is $239.50.

We estimated that 108,870 readers would be required in the equine industry. Each of the 9,975 estimated additional premises would require at least one reader, and additionally large farms (as defined by the NAHMS Equine 2005 Study as those with 20+ horses) would probably desire a reader to keep track of horses traveling on and off of their premises. Large operations were more likely to have horses travel on and off of their premises, according to the Equine 2005 study, as 77.0% of large operations transported equids off the premises and back by vehicle as opposed to 66.3% of medium operations and 53.1% of small operations. Large operations represented 7.8% of all operations with over five horses on the premises as of July 1, 2005. Since we do not have an estimate for the number of operations with less than 5 horses, we will use this 7.8% to get an approximate number of large premises that may choose to purchase a reader. Therefore, the number of large premises requiring readers would be approximately 0.078 × 570,000 = 44,460. We realize that this may not be the best estimation method for the number of readers required by the equine industry. It is likely that the premises themselves will not purchase the readers, but instead the organizations hosting the shows, races, and events. However, we have no way of quantifying the number of shows and events held annually by each of the breed, show/sport, or educational organizations in the equine world. For future research efforts, focusing on quantifying the number of equine

events held nationwide by all of the equine organizations may provide better estimates for scanning and tracking expenses.

Using the data we currently have, with approximately 9,975 premises where equids comingle, and 44,460 large equine farms where readers may be desirable for management purposes, we estimate a total number of 54,435 premises requiring readers. Using a requirement of two scanners per premises, to allow for the need for multiple scanners at one moment in time, we come up with a total requirement of 108,870 readers in the equine industry. If we take the total number of reads required by the industry, of 47,719,291, divided by this number of readers, we get an average number of reads per scanner of 438 annually. The annual cost per reader was divided by the average number of reads per scanner to get the cost per scan for an individual horse, which was $0.546 (table 10.8).

Table 10.8. Estimated Cost Per Scan in Equine.

Description		
Reader Cost/Scan		$0.55
Annual Reader Cost	$239.50	
Average Reader Cost	$620.00	
Estimated Lifespan (yrs)	3	
Interest Rate	7.75%	
Annual Scans/Reader	438.31	
Database Charge		$0.09
Labor		$0.18
Avg time, seconds	60	
Cost, $/hour	$9.80	
Workmen's comp, %	10.00%	
Annual Cost Per Read/Scan		$0.81

Next, we estimated the amount of time it takes to scan a horse and get a positive identity by checking the information. Based on producer estimates, considering the fact that some horses will be more skittish than others, we will use a number of 60 seconds, or one minute, per scan on a horse. This is applied to a labor cost of $9.80 per hour and a workmen's compensation percentage of 10.0% (for explanation, see Section 4 on labor costs), to get a labor cost per scan of approximately $0.180. This cost was added to the database charge per scan of $0.085 per scan (see Section 4 for explanation of database costs) and the charge for the reader per scan of $0.546 to get a total annual cost per scan of $0.811, which is reported in table 10.8. Based on an estimate of 47.7 million scans required by the industry, the total annual cost to the equine industry for 100% equine movement tracking is estimated at $38.7 million (table 10.9).

Table 10.9. Estimated Horse Movements and Scanning Cost.

Number of operations	570,000
Percent of operations that transported equids off the premises and later return by vehicle	58.4%
Number of operations that transported equids off the premises and later returned by vehicle	332,880

Number of trips per year	Percent of operations	Median trips	Total trips	Total scans*	Industry cost
1-9	91.8%	5	1,527,919	6,111,677	$4,954,237
10-99	45.9%	54.5	8,327,160	33,308,639	$27,000,593
100+	4.4%	12 5	1,830,840	7,323,360	$5,936,450
Total			11,685,919	46,743,675	$37,891,280
Annual equine sales			Head	Total scans**	Industry cost
Total			487,808	975,616	$790,852
TOTAL				47,719,291	$38,682,132

* Total scans is based on 2.0 horses per trip and 2.0 scans per horse per trip.
** Total scans is based on 2.0 scans per horse sold.

Based on the stated assumptions and parameters, our estimated total cost to the equine industry to implement NAIS in the equine species is $75.9 million, as shown in table 10.10. Animal tracking is found to be the greatest expense to the equine industry on an annual basis, however, the cost of the individual animal identification with microchips is only slightly less.

Table 10.10. Total Annual Cost of NAIS Adoption to the Equine Industry.*

Premises Registration	$2,690,269
Animal Identification	$34,524,074
Animal Tracking	$38,682,132
Total	$75,896,475

*Assuming 100% Compliance based on the stated parameters

10.9.2 Benefits

Benefits of NAIS adoption in equine are much more difficult to quantify than costs, but we can view benefits to the equine industry in terms of what the system could save under certain scenarios. Though potential benefits are numerous, they are difficult to quantify. One way to look at it is to take the estimated value of a horse as $2,733, based on the USDA Census for equids sold as described in the introduction of this section, and divide the cost of NAIS in the equine species by this amount. This would constitute the loss of approximately 27,946 equine lives; therefore, if having an NAIS system could save this number of horses from a disease outbreak in a given year, the system would be paid for. This number seems high, but only constitutes 0.48% of the current equine population.

According to the NAHMS report, 1.8% of equids greater than 30 days of age die annually (USDA, 2006e; USDA 2006f). Of this 1.8%, 0.8% die from Strangles, 2.2% from other respiratory issues (which could include infectious diseases), and 3.2% from neurological disorders including WNV and EPM. Unknown causes of death also constituted 6.6% of equine deaths. Taken together, Strangles, other respiratory deaths, and neurological deaths constitute 0.1116% of the entire equine population,

and unknown causes constitute 0.1188% of the equine population. Thus, if animal ID and tracking helped to eradicate some of these diseases, the value in animals saved annually would pay for nearly one-fourth of NAIS adoption costs for horse owners.

Benefits of NAIS associated with animal disease surveillance and control and disaster assistance are also important. Labor costs will certainly be saved in some of these situations, in theory USDA or state animal health officials would no longer have to drive door-to-door in the case of a disease outbreak to check for other equids to test for illness. In disaster recoveries, the cost of labor and feed to take care of horses while searching for owners, could be reduced if horses were simply scanned and owners identified from database records. In addition, veterinarians could save time and hassle by having a microchip identification number for the equine on all of the veterinary records, including health and EIA test certificates, as opposed to drawing out and describing color and markings. Though this saved time may add up to only minutes per exam, over the course of a year with over 2 million EIA tests and likely a similar or greater amount of CVIs performed, it would save a great deal of labor expense. If EIA testing requirements were perfected and every horse tested, the disease could be eradicated from the United States. If this scenario were to happen, pending repeal of the laws requiring EIA testing, US horse owners could save over $50 million per year in from EIA testing expenses. Based on the NAHMS Equine 2005 Survey, the total cost of EIA testing in 2005 was approximately $57,464,741 (2,102,625 tests at an average of $27.33 per test). This value would constitute approximately 75% of the cost of NAIS in the equine species.

Research could also be aided by an equine NAIS. One statistician stated approximate estimates of $7 million dollars simply to start a full equine census. Many in the horse industry feel would be valuable for research and marketing purposes, and others feel full census data could aid in disease tracking, control, and prevention through increased knowledge of equine population densities and disease spread rates. At least partial census data could be obtained by an animal identification system in horses. Additionally, prevention in the loss of equine commerce is of value, though once again precise values cannot be applied at this time. However, if live equine exports constitute approximately $460 million

annually (as estimated in 2005), any effect on the ability to import or export equids could have a great financial impact of the industry. Due to the fact that these horses may still be moved or sold within the United States, we cannot conclude that a total ban on exports would cost the equine industry this full amount, but the cost of NAIS only constitutes approximately 17% of this total value of exports. Therefore, it is easy to see that keeping horse movement open internationally is important, and though state numbers are not available, equine commerce between states is also valuable.

Taking a brief look at overseas disease outbreaks that have occurred, the 2003 influenza outbreak in South Africa cost that nation R130 million, which (using September 2008 exchange rates) equates to approximately $15.8 million US dollars. Japan's 2007 outbreak, costing them $48 million Australian dollars equates to approximately $37.9 million US dollars using September 2008 exchange rates. Australia, which has an $8 billion dollar horse racing industry, approximated its losses during the 2007 equine influenza outbreak as between $57.5 and $70 million Australian dollars, a range of $45.4-$55.3 million US dollars. These estimates all include the loss from betting revenue and direct costs due to losses of breeding, equine movement, cancelled race events, and equine healthcare expenses. Considering that the United State's horse racing industry is worth an estimated $26.1 billion dollars, according to the AHC survey, outbreaks of a disease similar to what has happened in other countries could have a much greater financial impact on the US industry. Equine influenza already exists in the United States, and major outbreaks usually do not occur due to regular vaccinations, but other diseases could have the same far reaching affects.

The only US economic study on equine disease outbreaks discovered in the research for this project was the study on the North Dakota WNV outbreak (Ndiva Mongoh, et al., 2008). The outbreak cost the state of North Dakota approximately $1.9 million in one year, and it was written in the conclusions that this was likely an underestimate of actual economic impacts. In addition, the North Dakota study mentioned other studies which had concluded losses of $2.75 million in Colorado/Nebraska in a given year and losses from equid deaths in the state of Texas as $7.46 million in one year. The expenses for disease

treatments on a monthly basis ranged from $190-$380 if the horse remained on its feet to $3,000-$6,000 for downer horses. In addition, $802,790 was estimated to be the cost for the simple loss of use of the animal for a number of months for the equine to fully recover. The cost of these single-state outbreaks alone being prevented would cover or nearly cover the expense of premises registration for the equine industry. Though hard to quantify, it can be seen that having some sort of prevention and quarantine system for equine disease outbreaks, which would aid in maintaining commerce and preventing further loss of equine use or life, could provide enormous benefits to the equine industry.

One of the industry concerns is enforcement of current laws, and the implementation of NAIS is one way to help enforce laws, including the animal neglect and abandonment regulations, which may assist in preventing irresponsible horse owners from simply dumping or leaving their animals. These owners could be identified through the horse's microchip number. Even if they did not report ownership of the animal, the previous owner could report who the animal was sold to (or the auction it was sold through) and the abandoning owner could be traced and charged.

The specific benefits of premises registration, theft, disaster relief, and the added ability to manage large farms, shows, or exhibitions are difficult to enumerate and these are private benefits that are not a direct part of NAIS adoption. Nonetheless, these benefits are important for adoption as they are what encourage private individuals to adopt. We can assume that there will be some benefit in all these categories. Shows, farms, and exhibitions may save on labor and materials charges if records could be made electronic rather than on paper. However, these are all theoretical costs that are not possible to quantify at this time. The value of solving the problem of "unwanted horses" is also difficult to quantify. Additionally, though no values were assigned, the prevention of injury to racehorses or handlers when being checked in to the racetrack or for designated race or warm-ups constitutes a value for human injury, labor time, and possible loss of use of the animal if it was injured by flipping over in the paddock. Veterinarians and large farms could also save a great deal of time and labor if the biothermal chip was

perfected and other methods of reading temperatures on horses were no longer required.

10.10 Conclusions

THE EQUINE INDUSTRY, which that has an estimated $102 billion dollar impact on the US economy annually with $39 billion of that in direct impacts according to the AHC survey, is a complex industry which is difficult to define and analyze. A precise estimate for the number of horses in the United States or the number of premises they reside on is difficult to obtain, and the information surrounding implementation of a national identification system in the equine industry is constantly growing with changes in technology and ongoing studies. Using the best available current information, this analysis suggests a total cost to the industry of $76.1 million for 100% industry compliance on all levels – premises ID, animal ID, and movement tracking. This amount constitutes a small percentage, 0.075%, of the industry's total economic impacts to the United States and approximately 0.20% of the industries direct economic impacts. The benefits of NAIS adoption are more difficult to enumerate, but given limited disease outbreak information and other data we were able to collect, at least a portion of the cost of NAIS in the equine species would be offset by benefits to the industry. At this time, we cannot definitively conclude from our analysis and available data whether benefits of full NAIS adoption in equine exceed costs of adoption. More research is needed to fully quantify benefits of NAIS adoption that we have omitted in the equine industry. If diseases such as EIA could be eradicated through improved surveillance and testing, or if equine export markets were not able to avoid major lengthy disruption during a possible disease outbreak, such accomplishments would make benefits of NAIS adoption quickly exceed costs.

11. Minor Species

11.1 Bison

11.1.1 Size of Industry

According to the National Bison Association, there are approximately 250,000 bison currently in the United States, including those on public lands. The 2002 Census of Agriculture counted approximately 232,000 bison on about 4,000 farms. Of these bison, 30% are located in South Dakota and North Dakota and 37% are in Montana, Nebraska, Oklahoma, Wyoming, Minnesota, and Colorado.

11.1.2 Diseases of Bison

On public lands bison comingle with each other as well as with deer and elk. Bison are naturally hardy animals and are not susceptible to many of the diseases that plague wild animals and other livestock. For example, deer and elk suffer from Chronic Wasting Disease (CWD) yet there have been no incidents of this disease among bison. However, bison are vulnerable to diseases that have been introduced from Europe. Malignant catarrhal fever or MCF, is one important infectious disease affecting bison. Sheep carry and transmit MCF but do not succumb to it. The disease is spread through nasal secretions and when bison share the same pasture, feed, or water as sheep, they often contract the disease.

Another disease introduced from Europe to which bison are susceptible is brucellosis. The management of brucellosis in Yellowstone National Park has been a controversial topic for decades. While there have been no documented cases of brucellosis being transmitted from bison to cattle, if such a transmission would occur, the impact on the livestock economy of Montana could be substantial. Controversy surrounds park manager techniques to control the number of bison leaving Yellowstone National Park. These techniques include public hunting, hazing bison back into the park, capture, testing for brucellosis exposure, and shipping bison to slaughter (Cheville, McCullough, Paulson, 1989).

11.1.3 Identification Systems Place

Due to the smaller size of the industry in general and processing facilities specifically, the bison industry has the ability to track animals more easily than does the beef industry.

The North American Bison Registry is maintained by National Bison Association (NBA). However, the membership in the registry is small so its usefulness as an identification system is limited. Another identification system used by some bison producers is a source-verified program. The NBA currently offers the National Bison's Source Verification Program as a tool to promote a natural product that can be traced to the ranch of origin. This program is similar to what is required for bison identification under the National Animal Identification System (Carter, 2008). Currently, approximately 23,000 animals are involved in this program, representing close to 10% of the total number of bison in the United States.

11.1.4 Priority of Bison

The bison industry has far less impact on the United States livestock industry as a whole than do other species examined in more detail in this project. In 2002, the number of bison represented 0.2% of total cattle in the United States. Because of the relatively small size of the industry and the nature of bison production, comingling, and thus chance of disease spread, among bison is less than that among cattle. However, near public lands containing bison herds, concerns of disease spread across species remains an important issue. Unlike cattle, bison are wild animals and so they are moved around the country infrequently. In addition, the industry already uses a source-verified program that provides traceability, so the structure for a more wide-spread animal identification system is already in place. Because of the relatively small size of the bison industry, we do not estimate specific benefits and costs of NAIS adoption by the industry in this report. Costs of registering premises in the bison industry would be similar to those of other species. We expect costs of adopting individual animal ID for those who are not already involved in programs similar to the NAIS requirements would be similar

to those for beef cattle (assuming the operation has facilities to work the bison).

11.2 Camelids

11.2.1 The Camelid Industry

The US alpaca industry has been growing rapidly over the past twenty years. The animals were first imported into the United States from South America in 1984 and their numbers in 2006 exceeded 86,000 head. The four top alpaca farming states are Ohio, Washington, Oregon and California (Baird, 2008). The long term goal of the alpaca industry in the US is to develop a domestic textiles industry. However, there are not currently enough alpacas in the US to support an industry, so the majority of those in the alpaca industry are breeders (Anderson, 2008). Live animal shows are an important part of the alpaca industry.

The US Llama population in 2006 exceeded 157,000. Llamas are farmed in similar areas as alpacas. The top llama farming states are Oregon, California, Texas and Washington (Baird, 2008). While some llamas are shown, much of the industry is a companion animal industry. Most of the shows that alpacas and llamas attend are sponsored by the Alpaca Owners and Breeders Association (AOBA) or the Alpaca and Llama Show Association (ALSA).

11.2.2 Diseases of camelids

Camelids are susceptible to certain viruses and parasites, however, the viruses they carry do not cross species lines. Mange and parasites are likely the biggest problems for camelids currently. Mange is species specific while camelids share internal parasites with other ruminants such as cattle, sheep and goats. In general, Brucellosis, Blue Tongue, and Foot and Mouth Disease do not survive well in camelids. The industry monitors for Tuberculosis and Brucellosis, but there has never been a positive test for these in camelids. Likewise, a test exists for Bluetongue, but it is not a clinical entity in camelids. (Anderson, 2008)

11.2.3 Identification Systems in Place

In July 2005, the AOBA began requiring all animals at AOBA-sponsored shows to be microchipped. It is estimated that approximately 85-90% of the US alpaca population is registered through the Alpaca Registry. When an alpaca is registered, it is DNA fingerprinted and microchipped. A smaller percentage of llamas are registered than alpacas because fewer are shown. Approximately 55-65% of llamas are registered (Anderson, 2008).

11.2.4 Priority of Camelids

Both the size and the nature of the camelid industry in the United States make it less of an identification priority than cattle, swine, sheep and poultry. In 2006 there were an estimated 243,000 llamas and alpacas in the United States. This is approximately 4% of the number of sheep in the United States in 2006 and 0.2% of the number of cattle. While the industry is relatively small and highly identified, much breeding movement occurs in the alpaca industry because no AI or embryo transfer is allowed. Therefore alpacas cross state lines frequently, making identification potentially an important issue. The alpaca industry is similar in nature to the equine industry in many ways, just much smaller in overall size. Due to the small size of the camelid industry and the fact that alpacas are predominantly registered, DNA fingerprinted, and have microchips, the industry has already largely adopted NAIS types of animal ID systems. Thus, we do not estimate specific benefits and costs of NAIS adoption by the industry in this report.

11.3 Cervids

11.3.1 The Cervid Industry

Although settlers in the United States farmed elk as early as the 1800's, the practice became popular in the United States in the 1960's. Both elk and white-tailed deer are native to North America. Velvet, a common ingredient in Chinese medicine, is the main product obtained from elk.

Most velvet produced in the United States is sold to China or used by Asian populations residing in the United States. Elk meat is consumed to a limited extent in the United States. Minnesota has a meat cooperative that sells 80,000 pounds of elk meat per year to upscale Orlando markets (Zebarth, 2008). Elk meat is also consumed at mountain resorts. The most common species of cervid raised in North America is white-tailed deer. Most people own these animals to hunt or raise them for breeding stock.

11.3.2 Size of Industry

In 2002 in the United States there were approximately 286,900 captive deer and 97,900 captive elk in a total of about 7,200 facilities (USDA 2002b). A majority of the deer population (52%) was in Texas. Wisconsin and Michigan, the second and third most populated states, each housed 8%. The elk population was more dispersed with the highest percent of animals in any one state being 17% in Minnesota. Wisconsin was the second most populated state with 13% of captive elk and Colorado and Texas follow with 10% and 6%, respectively.

11.3.3 Diseases

Cervids are susceptible to many of the same diseases as cattle. Perhaps the most troubling disease for the captive cervid industry has been CWD, a form of BSE. Cases of CWD have been found in white tail deer, mule deer, elk, and moose. CWD was first discovered in 1978 in Colorado wildlife research animals. It was not discovered in farmed animals until 1996 in Canada and 1997 in South Dakota. The most recent case in the US farmed industry was a whitetail deer in Minnesota. Wyoming has the highest incidences of CWD in the free-ranging population. Population reduction has been tried as a means of disease control, but the tactic has not been very successful (i.e. concentration of the cervid population does not seem to affect percentage of animals infected with CWD).

11.3.4 Identification Systems in Place

Producers need a license and a permit from the state to raise cervids. This is commonly controlled by each state's Department of Agriculture. Farmed cervids are classified as livestock according to APHIS regulation, so producers are subject to livestock regulations with additional fencing requirements. One purpose of cervid identification is to keep the captive population separate from the wild population.

In 2006, APHIS completed a Chronic Wasting Disease Herd Certification Program in coordination with the states and the farmed cervid industry. If states have programs in place that match the requirements for the national program, producers can enroll in the state programs. Otherwise they can enroll directly in the national program. Premises registration is required by the program and every animal is required to have two forms of permanent identification. The regulations of this program meet the requirements of the National Animal Identification System (Zebarth, 2008).

11.3.5 Priority of Cervids

In hopes of controlling CWD, APHIS and the captive cervid industry have been proactive in creating programs and methods to monitor the disease among cervids. The CWD Herd Certification Program is in place and much of the industry complies with its requirements. As such, the industry is highly regulated and far ahead of others in its level of identification and traceability. Thus, we do not explicitly complete a benefit and cost analysis of NAIS adoption for the cervid industry.

11.4 Goats

11.4.1 The Goat Industry

Several factors have contributed to the recent growth of the goat industry in the United States. The meat sector of the goat industry has seen marked growth while the angora and dairy sectors have declined.

The phasing out of the government wool program in 1995 caused a rapid decrease in mohair production. Since goat meat is a staple in many Hispanic and Muslim cultures, as ethnic populations in the US have grown, the demand for goat meat for consumption has increased (Faris, 2008).

The number of goats in the United States in January 2008 was approximately three million head according to NASS. Of these, 42% were located in Texas. The second most populous state was California with 4.4% of the goat population (134,000 goats). The meat goat population was 2.5 million head, approximately 83% of the total US goat population. The geographic distribution of the meat goat population is similar to the total goat distribution. Texas is home to approximately 44% (1 million) of meat goats in the US. Tennessee is a distant second with 4.7% of the meat goat population. (USDA, 2002b).

The number of Angora goats in the US as of January 2008 was 210,000, down 10% from the previous year. A majority of these goats are located in Texas (71%). Arizona comes in a distance second with 8% of the Angora goat population. The US had 305,000 dairy goats as of January 2008, a slight increase from January 2007. About 11% of these are in Wisconsin while California and Texas are home to 10% and 8%, respectively (USDA, 2002b).

While the goat industry is relatively small (sheep inventory as of January 2008 is over twice as large as goat inventory), meat goat numbers in the United States are growing.

11.4.2 Diseases and Identification Systems

As the goat industry grows, the knowledge of diseases that affect goats is also growing. Parasites are more of a health concern for goats than are diseases. Internal parasites can be managed by maintaining a low stocking density in pastures. As more animals graze on the same pasture, parasite problems increase because animals are grazing closer to the ground and the amount of fecal matter on the pasture increases. Diseases that affect the goat industry include caprine arthritis-

encephalitis (CAE), footrot, caseous lymphadenitis (CL), soremouth, and scrapie. Of these diseases, CAE is the most serious.

Although scrapie rarely affects goats, many goat producers are enrolled in the National Scrapie Eradication Program (NSEP). According to APHIS, as of December 2007, 52% of the goat herds are registered in the program (USDA, 2007e). The NSEP has been successful in tracking animal across the United States.

11.4.3 Priority of Goats

APHIS assigned goats a medium priority designation in their Business Plan to Advance Animal Disease Traceability. Several characteristics of goats and the goat industry make the species less of a priority for this research project. First, the small size of the industry, relative to the major species industries, lessens its importance with regard to the livestock industry as a whole. The number of goats in the US as of January 2008 was less than half the number of sheep. Next, the industry's participation in the NSEP coupled with the low incidences of the disease found in goats provide a relatively high level of traceability for the risk of disease spread associated with the species. Finally, the geographical concentration of the industry allows a possible disease outbreak to be more easily managed. However, as previously mentioned, the industry appears to be becoming less geographically concentrated than in the past. Costs of adopting NAIS for goat producers would likely be similar to those of the sheep industry.

12. Other Benefits Of NAIS Adoption

PREMISES REGISTRATION, ANIMAL IDENTIFICATION, and animal movement tracking offer a number of benefits to industry stakeholders, government health professionals, food safety regulators, and consumers. The types of benefits that accrue range from enhanced animal health surveillance to improving consumer demand because of food product credence attributes associated with food and animal traceability. The economic impact of several of the benefits discussed here are estimated directly or indirectly and presented in previous sections of this report. The benefits estimated in our report are those that are directly affected by NAIS adoption. However, the economic values of numerous benefits noted here are not estimated in this study because they are benefits that NAIS adoption would enable or make more efficient, but are *not* directly a part of the confidential NAIS premises registration or animal ID system. As a result, we know that our current benefit-cost analysis understates potential benefits of NAIS adoption. In addition to the summary that follows, see Smith et al. (2005) for an excellent discussion of several benefits of traceability.

12.1. Enhancing Animal Health Surveillance and Disease Eradication

ONE OF THE MOST IMPORTANT DIRECT BENEFITS of premises registration, animal ID, and animal movement tracking is the impact on animal health. To conduct appropriate, statistically sound, animal health surveillance requires knowing where animals are located, their densities, and animal movements. Developing sampling procedures of animals to determine statistically valid measures of the extent of diseases in populations require knowing where animals are located.

A number of state and national animal identification programs have been used in the United States in attempts to eradicate a variety of animal diseases. Examples include the national brucellosis eradication program,

with roots back to 1934 (Bradt, 1959), in which vaccinated heifers are identified with an official tattoo in the ear. Ironically, this program has been so successful at eradicating the disease that vaccinations have greatly declined over time going from 45% of heifers being vaccinated in 1995 to only 20% by 2003 (Wiemers, 2003). The result is far fewer cattle having a brucellosis animal ID for any type of traceability in the event of a health crisis. The swine pseudorabies (PRV) eradication plan was successful in getting all states designated as free from the disease. However, large populations of feral swine in certain regions of the country raise concerns regarding PRV reintroduction. Thus, the new targeted surveillance program integrates with swine premises registration data to develop "a robust database to allow targeted sampling based on associated risks" (Korslund, 2008, p. 2). The National Scrapie Eradication Program started in 2001 identifies animals using an ear tag that are over 18 months of age entering the sheep breeding herd indentifying each animal by flock of origin and each having a unique herd management number.

Animal disease management and eradication programs provide an immediate benefit from integration with NAIS. Standardization of premises identification systems; uniformity in a nationally recognized animal, lot, or flock identification numbering system; and standardized methods and devices for livestock ID utilization (Wiemers, 2003) all speak to the ability on a national level to rapidly identify premises, trace animals, and respond with appropriate actions in the event of an animal disease outbreak. Preparedness before an outbreak is essential in reducing the economic impact.

12.2 Reducing Economic Impact of Disease Outbreaks

THE TYPE OF ANIMAL IDENTIFICATION and traceability system in place in an industry can significantly impact the duration, spread, and economic consequences of a foreign animal disease (Saatkamp et al., 1995 and 1997). Disney et al. (2001) analyzed the economic impacts of improved animal identification systems for cattle and swine using a

hypothetical foot-and-mouth disease (FMD) outbreak in the United States. Improved animal identification systems in cattle could provide economic benefits with average benefit-cost ratios for cattle ranging from 1.24 to 3.15 depending upon the time planning horizon and the traceability situation. However, economic benefits (in terms of reduced economic consequences of an FMD outbreak) were not justified in swine with improved animal identification systems and most benefit-cost ratios were less than one. Zhao, Wahl, and Marsh (2006) investigated the economic consequences of an FMD outbreak in the US with increased levels of animal traceability and surveillance. They concluded that total consumer and producer combined surplus losses from an FMD outbreak would decline from $266.3 billion to $50.3 billion with a depopulation rate that went from 30% to 60% of latent infectious herds, which the authors attributed to increased animal traceability.

12.3. Regionalization and Compartmentalization to Re-establish Market Access

In management of any animal disease outbreak one critical issue regarding the economic impact of the outbreak is the ability to contain the disease and restore market access for at least part of the industry as soon as possible. This brings to the forefront the concept of regionalization (or zoning) in which a subpopulation, based on geographic region, can be demonstrated as an isolated area free of disease incidence enabling the region to have international market access. Paarlberg et al. (2007) examine the economic impact of regionalization in the United States of a highly pathogenic avian influenza outbreak. They concluded that such an outbreak in the United States would have substantial economic impacts with about a $718 million reduction in returns to capital and management in the poultry meat production sector with no regionalization over a 4-year time horizon. With regionalization, poultry meat producer losses would reduce to around $500 million because regionalization dampens export market losses.

Compartmentalization is further refined relative to zoning and involves isolating one or more establishments with common biosecurity

management measures "that provide distinct disease risk separation from animals or birds at higher risk for the disease(s) in question" (Scott et al., 2006, p. 875). The World Organization for Animal Health (Office international des epizooties – OIE) officially recognizes regionalization and compartmentalization animal disease management procedures as conditions that may enable resumed international market access in unaffected areas following a disease discovery. Animal ID, movement tracking, inflow, and outflow documentation are essential in demonstrating such an auditable biosecurity management system is present.

12.4. Reducing Producer Costs Associated with Animal Disease Testing

Animal disease testing is part of on-going animal disease surveillance and eradication programs. Having individual animal identification can significantly reduce the costs to both the producer and the state veterinarians of testing a herd for a particular animal disease. In Michigan for example between January 1, 2000 and June 1, 2006 over 18,000 herds and 1,191,063 animals (average tested herd size of approximately 66 head) have been tested for bovine tuberculosis (Michigan Department of Agriculture, 2006). Michigan, currently the only state with a mandatory individual animal identification program in operation, provides a specific example of the producer cost savings that may be realized by having individual animal identification and associated electronic technologies available to increase testing efficiency. Discussions with Dr. Tom Flynn and Dr. Dan Robb (both experienced veterinarians in Michigan) suggest that use of MIM (a software technology that leverages electronic animal identification in animal disease testing) leads to quicker TB testing of cow herds. In particular, Robb suggests that creation of herd testing for 25, 50, and 100 head herds may be conducted 0, 1, and 2.5 hours quicker, respectively, by utilizing MIM software on animals with RFID animal identification. These reduced times of testing herds of more than 25 head correspond to

reduced periods of on-farm production interruption and hence reduced lost value of production for participating farmers.

12.5. Enhancing Animal Welfare in Response to Natural Disasters

During natural disasters there are times when having premises registration and/or animal identification can greatly assist officials in identifying and assisting animals in distress or finding owners for displaced animals. A recent example of premises registration improving animal health surveillance occurred in southeast Colorado during the December 2006 blizzards. Colorado Department of Agriculture used premises registration information to check on the welfare of ranchers and their livestock which substantially accelerated the rate and expanded the scope, of issue assessment and assistance needs (Colorado Department of Agriculture, 2007). Following hurricane Katrina in New Orleans, 163 horses and mules were returned to their owners, mostly identified with microchips or lip tattoos in 2005 (New Orleans City Business, 2005).

12.6 Facilitating Meeting Country-of-Origin Labeling Requirements

With country-of-origin labeling of meat being enacted in September 2008, retailers are required to label fresh beef, pork, lamb, chicken, and goat, as well as other products, according to its country of origin. All retailers and suppliers are required to maintain origin information for one year for covered products that they sell. Under this law, producers must maintain records that can link animals sold to production records documenting animal origin. If animals are comingled from multiple sources of origin, for example, cattle stockers and feedlots, they will need to be able to link the animals in a pen to their origins. If animal sorting and co-mingling from multiple sources occurs, the burden of maintaining origin records could be reduced with individual animal ID.

In particular, animals having NAIS compliant forms of ID (e.g., "840" tags) can use this to verify origin. Thus, NAIS compliant individual animal identification eliminates the need for maintaining multiple affidavits for lots of animals comingled from a variety of sources.

12.7 Reducing Information Asymmetry by Increasing Transparency in Supply Chain

AN IMPORTANT IMPLICATION OF ANIMAL TRACEABILITY is that it can reduce information asymmetry leading to greater transparency in the vertical supply chain. Animal identification is a direct link to where an animal originated and with movement tracking provides an efficient way to identify sources of and quickly solve animal production problems that affect overall value of animals throughout production and processing. For example, Resende-Filho and Buhr (2008) demonstrate that even with low levels of animal traceability (39%), a beef packer can induce a cattle feeder to adopt quality control practices to reduce incidence of injection-site lesions in fed cattle. Animal tracing would provide similar incentives to reduce information asymmetry related to up to date vaccination programs, feeding regimens that might lead to meat residues, or tracking other animal treatments such as growth promoting implant programs.

12.8 Reducing Risk of Unfounded Responsibility in Liability Claims

TRACEABILITY SYSTEMS CREATE INCENTIVES for firms to do things that increase food safety because such systems increase the possibility of legal action upon responsible parties. As such, traceability enables parties in the vertical supply chain to more easily document that they are not responsible for harm associated with a food safety event (Pouliot and Sumner, 2008).

12.9 Improving Efficiency of Value Added and Certified Programs

The USDA Agricultural Marketing Service (AMS) has several voluntary marketing programs such as USDA Process Verified, Quality Systems Assessment, and Non-Hormone Treated Cattle that require animal identification and traceability. The AMS has integrated their auditing of these certification programs to enable NAIS to meet the animal identification requirements.

NAIS can also be used to help verify requirements for USDA Export Verification programs to be eligible for products to be exported to specific countries such as Japan or EU. Global certification programs, such as International Standardization Organization (ISO) guidelines, are another growing source of food safety and hygiene systems entailing traceability (Meuwissen et al., 2003).

Some industry stakeholders told us they were concerned that NAIS adoption could reduce premiums associated with source and age verification programs. This is possible, if NAIS animal ID makes such voluntary AMS programs easier and cheaper to comply with. However, if industry adoption of NAIS animal ID and tracing increases domestic and/or export demand in ways described in Section 9, then the industry would still garner significant net benefits from adoption. However, some individuals could be made worse off, or certainly benefit less, from NAIS adoption than the average firm.

12.10 Social Benefits of Animal Tracing

Social value of traceability in general is very well presented by Golan et al. (2004b, pages 37-38):

Social benefits may also include the avoided costs to firms that produce safe products but lose sales because of safety problems in the industry. A firm's traceability system not only helps minimize potential damages for the individual firm, it also helps minimize damages to the whole industry

and to upstream and downstream industries as well. For example, a series of widespread ground meat recalls has the potential to hurt the reputation and sales of the entire meat industry, including downstream industries such as fast food restaurants and upstream suppliers such as ranchers. The benefits to the industry of a traceability system pinpointing the source of the bad meat and minimizing recall (and bad publicity) could therefore be much larger than the benefits to the individual firm.

Though their example refers specifically to a meat traceability issue, similar arguments certainly apply to animal traceability.

12.11. Enhancing Global Competitiveness

In case studies of poultry, beef, pork, lamb, and fish firms employing traceability located in France, Holland, Germany, Norway, and Scotland, Buhr (2003) states, "When case participants were asked why they adopted traceability, the first response in every case was, "Consumers demanded to know where their food came from and how it was produced" (p. 14). Following the BSE events in the United States in December 2003, the vast majority of the beef export market was completely closed. Five years later, only about 75% of beef export market volume movement prior to the BSE event has been regained. Murphy et al. (2008) in review of animal identification systems in North America argue that animal identification systems are becoming "prerequisites to international trade" (p. 284).

Liddell and Bailey (2001) argue that the United States pork industry lags behind major world producers of United Kingdom, Denmark, Japan, and Australia in animal traceability. Meisinger et al. (2008) also demonstrate how much more advanced the EU, UK, Denmark, New Zealand, and Australia are relative to US in swine and pork traceability. Bass et al. (2008) discuss how major lamb producing countries of Australia and EU have advanced mandatory sheep traceability systems beyond the voluntary system present in the United States. Tonsor and Schroeder (2006) present similar arguments comparing the United States and Australian beef tracing systems. Souza-Monteiro and Caswell (2004)

present evidence that EU, Japan, Australia, Brazil, Argentina, and Canada lead the United States in beef traceability systems. Table 12.1, taken from Bowling et al. (2008), illustrates how many of the major cattle producing countries have animal ID and traceability systems that are mandatory. Bailey (2007) demonstrates the US has a weaker beef traceability system than Uruguay, Argentina, EU, and Australia. He concludes that consumer concerns about credence attributes provided through animal ID and traceability could become more important threatening the ability of the United States industry to compete effectively. Meat and Livestock Australia (2008) consider cattle ID in their country as an insurance policy in the event of a trade disruption.

Table 12.1. Comparison of Cattle Population and Identification and Traceability Systems.

Country	Cattle Population (1,000 hd)[1]	Premises ID[2]	Individual Cattle ID[2]	Group / Lot Cattle ID[2]	Electronic Cattle ID[2]	Record Animal Movement[2]	Retire Animal Number[2]
Australia	28,560	M	M	V	M	M	M
Botswana	3,100	V	M	NA	M	M	V
Brazil	207,157	M	V	M	V	M	V
Canada	14,830	V	M	NA	M	V	M
European Union	90,355	M	M	V	V	M	M
Japan	4,391	M	M	V	V	M	M
Mexico	28,648	V	V	V	V	V	V
Namibia	2,384	M	M	V	V	M	M
New Zealand*	9,652	V	V	V	V	V	V
South Korea*	2,484	M	M	V	V	M	M
Uruguay	11,956	M	M	V	M	M	M
United States*	96,702	V	V	V	V	V	V
World	1,383,157						

[1]All numbers are for cattle populations in 2006 as reported by the Food and Agriculture Organization of the United Nations (FAOSTAT, 2008).

[2] M = Mandatory, V = Voluntary, NA = Not Allowed

* Indicates a voluntary program. The requirements listed are for those who choose to participate

Source: Bowling et al. (2008). Reproduced with permission from Editor-in-Chief, *Professional Animal Scientist*.

13. Information Gleaned from Industry Meetings and Lessons Learned

During the course of our discussions with industry stakeholders, in addition to information and data that were used directly in our benefit-cost analysis, several related sentiments were revealed. Here we summarize some of these sentiments. This particular section of our report, unlike most of the rest of our analysis, is not meant to represent a scientific survey response and does not therefore have associated robust statistical properties in terms of whose opinions it does or does not represent. However, our discussions were broad in terms of industry organizations and representatives that we visited and thus represent views expressed by a significant segment of industry (see appendix A3 for list of organizations we visited). The information we share here is a synthesis of comments and does not represent any single entity or person.

13.1 Cost of animal ID is just a cost of doing business

In our industry discussions we often heard sentiments reflecting that animal ID and tracing are part of a well-functioning and efficient vertical food production and marketing chain. This sentiment was reflected in reference to numerous aspects of what animal ID and movement tracing brings to animal health management, crisis management, adding credence attributes to food labels, enhancing trade, and various other potential benefits. Making NAIS practices a part of business reflects the idea that many in industry perceive a need and are moving forward with evaluating how to adopt systems most efficiently.

13.2 Mandate, tell us the rules, and we'll adjust

The sentiment relating to mandating animal ID was especially voiced by market participants who recognize economies of scale associated with fixed investment in ID scanning and recording equipment. A voluntary ID system, with moderate or low levels of adoption, is costly for firms that must make facility modifications and procure information technology equipment in order to offer animal ID and recording services. If mandated, the investment must be made by all firms and will be fully utilized in each establishment. If left voluntary, establishments must figure out whether to make investments necessary to adopt NAIS practices in the presence of uncertainty about their ability to fully utilize the equipment. This makes adoption of such equipment a strategic decision that can either make a firm more or less competitive with other firms in the industry. The "tell us the rules" segment of this statement was a reflection of developing guidelines over time in NAIS including what some perceived as a change in direction from what some believed appeared to be a system that was headed toward being made mandatory to a voluntary system.

13.3 Not mandating will result in low animal movement tracking

A concern that was similar to the sentiment of "mandate and we will adjust," was that without mandating, producers will be slower to adopt and fewer will adopt ID and tracing technology. Again, the concern was that slow and small adoption rates, makes it difficult, especially for smaller firms in industry, to know what direction to head in terms of adding or not adding animal ID and recording services.

13.4 Stakeholders do not largely support a NAIS national data bank

Numerous organizations told us that an NAIS national data bank was not preferred. Instead industry organizations often times told us their preference was for the individual industry to maintain their own data bank(s) while allowing USDA access on an as needed basis. This sentiment was at times motivated by a group that might be capturing more information than that specified by NAIS and using it for other purposes making dumping parts of the data to another data bank simply an added cost without perceived additional value or because the industry preferred to keep the data internal. This preference was revealed across numerous species and industry sectors.

13.5 But, not having a coordinated national data base is problematic

Despite preferences for maintaining animal ID and movement records internal within an industry, many that we visited with admitted that having multiple individual data banks, may make coordination and communication across data banks problematic. The feeling was that the lack of a centralized data base will either slow or curtail successful tracing. Centralized data banks in Australia and Canada, where animal ID systems are mandatory and more mature, were often noted examples of how such systems have been designed.

13.6 Do not know animal density or location making surveillance hard

Benefits of animal ID resulting from improved animal surveillance were presented in Section 12. Our research team heard from several in a variety of settings that not knowing the locations,

densities, or movements of animals makes disease surveillance much more difficult.

13.7 Larger firms need common technology

Having ID and animal movement recording occur at the speed of commerce is a very important dimension of acceptability and adoption of ID systems. Furthermore, larger firms that have large numbers of animals flow through their operations, indicate common technology that will operate effectively at the speed of commerce is essential for efficient ID and movement tracking. This suggests that if a technology neutral position remains for NAIS adoption, the resulting adoption will be more expensive and have a lower rate of adoption than if specific technology specifications were defined at points in time. In contrast, smaller operations often have preference for a variety of animal ID and recording systems that may not be compatible with recording large numbers of animal movements rapidly. Thus, we heard conflicting opinions as to the value of "technology neutral" systems such as are currently being suggested in the NAIS plans.

13.8 Do not add redundancies to current practices

We heard several times from several organizations across species that an animal ID and movement tracking system, whether group/lot or individual animal, needs to complement, not add redundancy and added layers of work to current industry practices. The reality of whether and how this can be accomplished is well beyond the scope of our project, but it was revealed often enough to merit noting.

13.9 NAIS enables us to regionalize and perhaps compartmentalize issues

Another frequently mentioned comment by stakeholders was the opportunity for NAIS to regionalize and compartmentalize animal health issues to more quickly and more fully re-establish market access in the wake of an animal disease or food safety event. Again, this was discussed more fully in Section 12, but it is well recognized by stakeholders as something NAIS should be designed to enhance.

13.10 Breeding herds are biggest challenge and need for NAIS

Several stakeholders revealed the greatest need and the greatest challenge for NAIS adoption is in the animal breeding herd. Focusing effort on this segment of each species appears well justified.

13.11 Negative externality on non-adopters, social value exceeds private

While we often heard sentiments about supporting mandated NAIS by many stakeholders we also often heard concerns that related to non-adopters gaining at the expense of adopters of the technology. From an animal health management perspective someone who does not adopt the technology gains from those who do by the overall animal herd health being improved. Thus, individual producers that believe others will adopt have less incentive themselves to adopt. In economics this is referred to as a 'free rider' problem meaning that adopters essentially subsidize non-adopters. Industry ID management systems such as compartmentalization (discussed in Section 12) can negate much of the 'free rider' problem. There is some sentiment that there might a significant public value of animal ID that justify public support for such

programs as adoption rates might be lower than desired without such support.

13.12 First breach of confidentiality will be disaster

The issue of confidentiality of data and information collected in NAIS has long been a concern voiced by some industry participants (Bailey and Slade, 2004). Stakeholders told us that a breach of such confidentiality would be a disaster for development of NAIS. This concern was not unexpected, but speaks volumes to industry demand for confidentiality of NAIS data.

13.13 Technology needs to be error free

Operating at the speed of commerce and error free are commonly stated characteristics of an NAIS system that industry participants indicate will greatly affect adoption rates. Tonsor and Schroeder (2006) discussed how components of the Australian animal ID system required troubleshooting and solving problems as they occur. This is true of NAIS as well. However, the United States livestock industries operate with considerably more animal movement than many other countries resulting in lower tolerance for technology problems and reading errors by US industry participants. Bottom line, the technology needs to be as error free as possible. Related to this, many participants reiterated the need for one system, at least within a species, such that they did not have to work with and/or support multiple technologies.

13.14 Packers will benefit but do not pay the costs

Several industry participants voiced concern that with full animal ID and tracing adoption growers incur the major costs, but packers gain the major benefits. Our results indicate that indeed growers

incur the largest share of NAIS adoption costs, especially in the beef sector (Section 4). However, as our economic analysis shows (Section 9), growers as well as packers gain if modest domestic beef demand and/or export demand enhancements occur from NAIS full animal ID and tracing adoption.

13.15 NAIS IS A GOOD THING FOR GLOBAL INDUSTRY

THE FEELING THAT NAIS IS NEEDED to ensure consumer confidence in our products was a widely, though not unanimously, held sentiment among stakeholders of all species and sectors.

14. LIMITATIONS

AS WITH ANY SUCH BENEFIT-COST ANALYSIS of this scale and scope, the limitations of this study are too large in number to fully illuminate. However, several limitations of this project deserve elaboration.

14.1 LACK OF DATA NECESSARY FOR PRECISE ESTIMATION

ESTIMATING BENEFITS AND COSTS OF ADOPTION OF NAIS is much like doing so for any new technology; many of the benefits and costs have to be estimated based on projections and assumptions made having less than ideal data. For example, our study relies on surveys of industry adoption rates of numerous management practices such as computer use and animal ID and other management practices that are often dated, subject to weaknesses of the survey methods used to collect primary data, and may not be representative of the entire industry. Furthermore, often data from different sources do not match up well and often data in the form needed simply do not exist. We tried to address this chronic shortcoming by using the most current and reliable published data available, supplementing public data with industry expert opinion, and where feasible and important to outcomes, performing sensitivity analyses.

Our study team's way of dealing with data uncertainty or unavailability in direct cost estimation was to generally err on the upper end of cost estimate range. As such, the NAIS adoption cost estimates in this study are more likely biased upward than being understated. As a result of data challenges present, it is difficult to assign precise statistical confidence levels to our overall estimates. Instead, our estimates represent a culmination of the best information we could collect given a large number of constraints using the most appropriate methods available to complete the analysis.

14.2 Benefit-cost estimates are based on current technology and prices

The analysis of benefits and costs of adoption of NAIS hinges heavily on current technology available to ID animals and record their movements. Over time the technology is improving and will continue to become cheaper as it is more fully adopted around the world and as additional refinements are made. Furthermore, the full benefits of NAIS have not been fully discovered as is typical of such new technology developments. There are likely benefits from such adoption that industry has not yet realized. For example, an improved animal identification and information system might enhance a beef cow/calf producer's ability to manage his cowherd (e.g., culling and genetic selection decisions) and thus lower costs of production. While benefits such as this will undoubtedly exist, they tend to be operation specific and are hard to predict and thus they have not been included in our analysis. As such, our benefit-cost analysis, even though completed with appropriate discounting and net present value analysis and annualizing methods, uses current values for benefit and cost parameterization. Likely these understate future benefits and overstate future costs.

14.3 Costs are *probable* and benefits are *potential*

One issue apparent from the start of this project was that quantifying direct costs of adopting animal ID systems was markedly different from determining benefits. Quantifying direct costs of adopting NAIS, though very involved and requiring many assumptions, judgments, and estimates is an exercise in evaluating highly probable outcomes. That is, costs of adoption reflect well-defined actions and investments that need to be made by industry participants if they elect to adopt NAIS practices.

In sharp contrast, most of the benefits of NAIS adoption are potential benefits that have some largely unknown probability of occurrence and/or are conditional on how industry participants elect to utilize NAIS

ID and tracing technology. Typically the probability of events that provide apparent benefits of having a widely adopted NAIS, is not known with any reasonable degree of certainty. For example, no one has a reliable estimate of any particular highly contagious foreign animal disease outbreak in the United States where having NAIS might greatly reduce costs of disease management and eradication. Even if we had an estimate of the probability of a disease outbreak, the epidemiology of disease spread is uncertain and can at best be simulated numerous times to obtain a distribution of possible outcomes. Furthermore, potential diseases and their probability of occurrence are dynamic. There are no reliable estimates of the type or frequency of natural disasters that might occur where having NAIS would substantially reduce adverse impacts. How market access will be affected by having a traceability system present and having regionalization and compartmentalization in the event of an industry crisis is subject to global trade policies and political relationships that often times, at best, lag scientific knowledge. In other words, while few would question the benefits of having NAIS in the event of a major disease outbreak, what is often debated is the probability of a major disease outbreak occurring.

Because of the challenge with estimating direct benefits, our study relied heavily upon scenario analyses that are not predictions, but reflect *what if* assessments using our best judgment to design relevant scenarios to help provide useful information for decision making. Anytime scenarios are relied upon, there are always going to be preferences for more and different scenarios to be presented. We selected what we felt were the most useful scenarios for making sound industry and public policy decisions. Certainly, more scenarios can be considered than what we present.

We also included a section in the report on other potential benefits (Section 12) specifically to highlight that many benefits of NAIS adoption are not explicitly estimated in our study. For example, our overall benefit-cost estimation ignores most private firm direct benefits NAIS adoption may provide including improved supply chain coordination, enhancing value-added opportunities, and enabling more intensive production management. As a result, overall benefit estimates

associated with NAIS adoption quantified in our analysis are undoubtedly underestimated.

14.4 Synergism and substitution of NAIS adoption is largely ignored

NAIS adoption by one species affects benefits and costs of adoption in other species. For example, having individual animal ID and animal traceability in cattle, has a direct positive impact on the swine industry in the event of a contagious disease outbreak that crosses species. Such cross-species affects can have substantial economic impact when it comes to things such as market access. One way we address part of this species cross-over is through our equilibrium displacement model where beef, pork, poultry, and lamb markets are directly linked to, and affect, each other. However, our study does not fully address cross-species impacts with respect to disease management and eradication that could increase or reduce the net benefit of NAIS adoption in one species or another.

14.5 Lack pet and hobby data

Throughout our benefit-cost analysis the focus was on NAIS adoption in commercial agriculture with much less emphasis on individuals who have animals as pets or raise them for hobbies. We relied upon USDA NASS and Census data for the number of livestock operations by species when estimating costs and thus we do not account for livestock owners that do not meet the official classification of an operation. For example, we do not have specific data on club calves, sheep, or pigs; animals raised by youth for competition or show events; backyard poultry flocks; and many other small non-farm livestock or poultry caretakers. Though we do not have detailed data, the number of animals included in these segments is a very small proportion of the total industry, so excluding these animals is not a major omission in animal numbers. Some pet or hobby animals have very little cross-premises

movement during their lifetimes, so premises registration might be sufficient to have information about animal locations for these operations. Thus, the omission of operations and animals of this type likely is not a critical issue impacting the benefit-cost analysis. However, animals that are involved in county and state fairs and other livestock shows, could have considerable animal movement and co-mingling. Largely omitting such animals (except in equine where we attempted to capture more of these) and individuals from our analysis is a weakness of our study. If reliable data existed on such individuals, we expect our overall industry costs of NAIS adoption would increase very little by their inclusion (because the animal numbers are very small relative to the population). However, benefits of having animal movement tracking for these animals might be a bit larger and a more important omission because of the amount of movement and co-mingling involved with some of these animals.

14.6 We assume the rest of the world is static

Our benefit-cost analysis is specific to the United States. Our equilibrium displacement modeling exercise includes import and export equations, however, the model assumes nothing else in the rest of the world changes as we change NAIS adoption rates and run various scenarios. This is not realistic, but on the other hand, neither are any other assumptions of what specific global adjustments might occur outside of our model under various scenarios. This is simply the reality of any economic model. When we make an exogenous supply and/or demand shock and evaluate the outcome, we assume *ceteris paribus* (all else constant). Indeed, all else is never constant.

15. REFERENCES

Abbott, D. M. 2008. Equine-Webster Veterinary. Personal Communication. August 8.

Allflex – Companion Animal ID 2008. Available at: http://www.allflex.co.nz/8.html. Accessed July, 2008.

American Horse Council. 2004. "American Horse Council Hosts Forum on Equine Identification." American Horse Council Press Release, May, 2004. Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

American Horse Council. 2005. "National Animal Identification System." American Horse Council Press Release, July 2005. Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

American Horse Council. 2005. "National Animal Identification System: Premises Registration." American Horse Council Press Release, July, 2005. Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

American Horse Council. 2007. *2007 Horse Industry Directory*. Washington, D.C.: American Horse Council, Inc.

American Horse Council Foundation. 2005a. *The Economic Impact of the Horse Industry on the United States*. Deloitte Consulting LLP, edt.

American Horse Council Foundation. 2005b. *The Economic Impact of the Horse Industry on the United States: Technical Appendix*. Deloitte Consulting LLP, edt.

American Quarter Horse Association. 2008. *2007 AQHA Annual Report*. Amarillo, TX. 2008.

American Veterinary Medical Association. "Brucellosis Backgrounder." February, 2007. Available at: http://www.avma.org/reference/backgrounders/brucellosis_bgnd.pdf. Accessed July, 2008.

Anderson, D. 2008. DVM, Kansas State University. Personal Communication. August 22.

AVID Equine ID. 2008. Available at: http://avidequineid.com/. Accessed July, 2008.

Baca, R. (2007). *NAIS Disease Program System Integration*. Presentation slides available at: http://www.animalagriculture.org/proceedings/IDINFOEXPO2007/2%20Wednesday/2%20General%20Session%20IV/1%20Rich%20Baca.pdf.

Bailey, D. (2007). "Political Economy of the U.S. Cattle and Beef Industry: Innovation Adoption and Implications for the Future." *Journal of Agricultural and Resource Economics* 32(3):403-416.

Bailey, D. and J. Slade. (2004). "Factors Influencing Support for a National Animal Identification System for Cattle in the United States." Selected paper presented at the American Agricultural Economics Association Annual Meetings, Denver, CO, August 1-4.

Baird, T.N. and J. Jarvinen. 2008. "National Animal Identification System (NAIS)." Available online at http://www.camelidid.org/nais_generic.pdf. Accessed May, 2008.

Barnes, K., Smith, S., Lalman, D. Managing Shrink and Weighting Conditions in Beef Cattle. Oklahoma Cooperative Extension Service. F-3257. Accessed September 2008, Available at http://osuextra.okstate.edu/pdfs/F-3257web.pdf.

Bass, P.D., K.E., Belk, M.B. Bowling, T.G. Field, S.H. Geleta, S.B. LeValley, J.M. Meisinger, R.G.L. Murphy, D.L. Pendell, J.A. Scanga, G.C. Smith, J.N. Sofos, J.D. Tatum, and W.R. Wailes. 2007. *"Assessing The Impact Of The National Animal Identification System (NAIS) With Regard To Beef, Pork And Lamb Harvesting And Rendering Facilities In The US."* Final Report submitted to USDA APHIS on September 25, 2007.

Bass, P.D., D.L. Pendell, D.L. Morris, J.A. Scanga, K.E. Belk, T.G. Field, J.N. Sofos, J.D. Tatum, and G.C. Smith. 2008. "Review: Sheep Traceability Systems in Selected Countries Outside of North America." *Professional Animal Scientist* 24(4, August):302-307.

Beeman, M. DVM, Littleton Equine Clinic. Personal Communication. 2/18/2008.

Bennett, L., L.J. Butler, J.W. Oltjen, J. Evans, K. Flynn, V. Velez, and F. Haque. (2008). Benefits and Costs of Implementing a National Animal Identification and Traceability System in California for a State Agency. July 12, 2008.

Berezowski, J. 2008. "Diseases of Bison." Available online at http://www.usask.ca/wcvm/herdmed/speciastock/bison/disease/bisondis.html. Accessed February, 2008.

Bolte, K. 2007. *Electronic Animal Identification Systems at Livestock Auction Markets: Perceptions, Costs, and Benefits.* M.S. Thesis, Department of Agricultural Economics, Kansas State University.

Bolte, K., K. Dhuyvetter, and T. Schroeder. 2008. *Electronic Animal Identification Systems at Livestock Auction Markets: Adoption Rates, Costs, Opportunities, and Perceptions.* Kansas State Univ. Coop. Ext. Serv. Bull. MF-2813. February 2008.

Bowling, M.B, D.L. Pendell, D.L. Morris, Y. Yoon, K. Katoh, K.E. Belk, and G.C. Smith. 2008. "Review: Identification and Traceability of Cattle in Selected Countries Outside of North America." *Professional Animal Scientist* 24(4, August):287-294.

Boyles, S., D. Frobose, and B. Roe. 2002. *Ownership Options for Feeding Cattle.* The Ohio State University Animal Science AS-15-02.

Bradt, C.G. 1959. "Our Industry Today: Brucellosis Eradication Moves Ahead at Accelerated Pace." *Journal of Dairy Science* 42 (November):1888-1891.

Brester, G.W. 1996. "Estimation of the U.S. Import Demand Elasticity for Beef: The Importance of Disaggregation." *Review of Agricultural Economics* 18(January):31-42.

Brester, G.W., J.M. Marsh, and J.A. Atwood. 2004. "Distributional Impacts of Country-of-Origin Labeling in the U.S. Meat Industry." *Journal of Agricultural and Resource Economics* 29:206-227.

Brester, G.W., and T.C. Schroeder. 1995. "The impacts of brand and generic advertising on meat demand." *American Journal of Agricultural Economics* 77:969-979.

Brester, G.W., and M.K. Wohlgenant. 1997. "Impacts of the GATT/Urugay Round Trade Negotiations on U.S. Beef and Cattle Prices." *Journal of Agricultural and Resource Economics* 22:145-156.

Brown, M. 2008. "Dozens more Yellowstone bison face slaughter." *San Diego Union Tribune.* February 13,.

Buhr, B.L. 2003. "Traceability, Trade and COOL: Lessons form the EU Meat and Poultry Industry." International Agricultural Trade Research Consortium, Working Paper #03-5, Department of Applied Economics, University of Minnesota. April.

Buhr, B.L. (2003a). "Traceability and Information Technology in the Meat Supply Chain: Implications for Firm Organization and Market Structure." *Journal of Food Distribution Research* 34(3):13-26.

Canadian Cattle Animal Identification Agency. (2008). Personal meeting with Julie Stitt, Executive Director, Denver, CO, January 15.

Carter, D. 2008. U.S. bison industry. Personal communication. February 2, 2008.

cattlenetwork. 2006. *Cattle on Feed Terms and Definitions.* Accessed June 2008, available at http://www.cattlenetwork.com/Cattle_Feeding_Content.asp?ContentID=25726.

Cheville, N.F., D.R. McCullough, L.R. Paulson. 1989 *Brucellosis in the Greater Yellowstone Area. National Academy of Sciences.* Washington, D.C. Pp 42-45.

Clanahan, H. 2007. "Strangling Strangles." *America's Horse*, American Quarter Horse Association, Amarillo, TX. September. 10(1):14-18.

CNA Corporation. 2004. *Reconstruction of Response Operations to Eradicate Exotic Newcastle Disease in 2002-2003.* Report 11057. July 2004. Obtained from Dr. David Morris on July 25, 2008.

Coffey, L., M. Hale, and A. Wells. *Goats: Sustainable Production Overview.* National Center for Appropriate Technology. August 2004.

College of Agricultural Sciences, Agricultural Research and Cooperative Extension. *Agricultural Alternatives: Meat Goat Production.* The Pennsylvania State University. 2000.

Colorado Department of Agriculture. 2007. "National Animal Identification System Proves to be a Valuable Tool During Blizzard Recovery Operations." Media Press Release, www.ag.state.co.us, Lakewood, CO, January, 4.

Colorado Department of Agriculture. 2008. *Pilot Program Focuses on Early Detection.* Inside Ag. January.

Cordes, T. 2000. "Equine Identification: The State of the Art." AAEP Proceedings, 2000. 46:300-301.

Cordes, T. and N. Hammerschmidt. 2008. "You, Your Vet, and the NAIS." *The Horse*, March, p. 98.

Cuthbertson, B., and N. Marks. 2007. "Beyond Credence: Emerging Consumer Trends in International Markets." Published by the Victorian Government Department of Primary Industries Melbourne, May. Also published on www.dpi.vic.gov.au/agribusiness

Darnell, D. 2008. *Actual MIMS vs. Manual TB Testing Cost Analysis.* Obtained via email from Diana Darnell on August 15, 2008.

Datamars – Transponders for Animal Identification. Available at: http://www.datamars.com/index.cfm?menuitemid=264. Accessed May, 2008.

Davis, G.C., and M.C. Espinoza. 1998. "A Unified Approach to Sensitivity Analysis Equilibrium Displacement Models." *American Journal of Agricultural Economics* 80:868-879.

Dhuyvetter, K.C., M.D. Tokach, and S.S. Dritz. 2007. "Farrow-to-Weaned Pig Cost-Return Budget." Kansas State Univ. Coop. Ext. Serv. Bull. MF-2153.

Dickinson, D.L., and D. Bailey. 2005. "Experimental Evidence on Willingness to Pay for Red Meat Traceability in the United States, Canada, United Kingdom, and Japan." *Journal of Agricultural and Applied Economics* 37(3):537-548.

Dickinson, D.L., and D. Bailey. 2002. "Meat Traceability: Are U.S. Consumer Willing to Pay for It?" *Journal of Agricultural and Resource Economics* 27(2):348-364.

Disney W.T., J.W. Green, K.W. Forsythe, J.F. Wiemers, and S. Weber. (2001). "Benefit-Cost Analysis of Animal Identification for Disease Prevention and Control." *Scientific and Technical Review* 20(2):385-405.

Dreschel, N., K. Vanderman, A. Swinker, E. Jedrzejewski, and J. Werner. 2008. "Equine Veterinarians and Health Care Professionals Survey Resistance to the Implementation of National Equine Identification." The Pennsylvania State University, University Park, Pennsylvania.

Drovers. 2006. *Directory of Service Providers.* Accessed June 2008, available at http://www.drovers.com/directories.asp?pgID=712.

Eddy, A., J. Elder, C. Egan, J. Schell, P. Bartley, J. Hannaford, and R. Wells. 2007 "All bets are off as $8 billion horse racing industry goes to the dogs; The flu that stopped a nation- The Equine Influenza Outbreak." *Sunday Age*, Melbourne, Australia, August 26, p. 4.

Ennis, L. 2008. DVM, University of Kentucky. Personal Communication. July 24.

Equine Species Working Group. "Equine Diseases of Concern." Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

Equine Species Working Group. "Radio Frequency Identification Devices (microchips) for Equines." Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

Equine Species Working Group. 2005. "ESWG Equine Identification Update PowerPoint." November, 2005. Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

Equine Species Working Group. 2006. "Equine Species Working Group NAIS Recommendations to USDA." August 1, 2006. Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

Equine Species Working Group. 2007. "NAIS and Horses: The Facts Surrounding the National Animal Identification System and the Horse Industry in the U.S." Equine Species Working Group, Second Edition, March 2007. Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

Evans, J. "California Equine Identification Project." 2007. Powerpoint Presentation presented at NIAA meetings, Kansas City, MO. August 2007.

Evans, J., J. Davy, and T. Ward. 2005. *An Introduction to Electronic Animal Identification Systems and Comparison of Technologies.* Cooperative Extension. University of California. Accessed September 2008, available at http://cemendocino.ucdavis.edu/files/24481.pdf.

Faris, B., 2008. Professor, Kansas State University. Personal Communication. May 29.

Fick, D., M. Beeman, and A. Mann. 2004. "ESWG comments submitted to USDA in response to the July 2004 Advance Notice of Proposed Rule." Available at: http://www.equinespeciesworkinggroup.com/info.html. Accessed January, 2008.

Florida Department of Agriculture. 2008 "Equine Piroplasmosis (EP) Update." September 24, 2008. Available at: http://www.doacs.state.fl.us/ai/pdf/Equine_Piroplasmosis_Situation_Web_Update.pdf. Accessed September, 2008.

Flynn, T. 2008. DVM, USDA-APHIS, personal conversation.

Foster, G. 2007. "Aussie flu could hit Sportingbet; Market Report." *Daily Mail*, London, England, August 29, p. 68.

Freeman, D.W. 2007 "Oklahoma Horse Industry Trends." Oklahoma Cooperative Extension Service, June, 2007. Available at: http://osufacts.okstate.edu/docushare/dsweb/Get/Document-2087/CR-3987web.pdf. Accessed July, 2008.

Galvan R., A. Rene, S. Bae, and K.P. Singh. 2004. An Analytical Study of the Perceptions, Prevention Strategies, Treatment and Economic Impact of Equine West Nile Virus. Available at http://www.nass.usda.gove/mexsai/Papers/westnile.pdf. Accessed September, 2008.

Garin, D., G. Caja, and C. Conill. 2005. *Performance and Effects of Small Ruminal Boluses for the Electronic Identification of Fattening Lambs.* Livestock Production Science 92(1):47-58.

Gegner, L.E. 2001. *Bison Production.* Appropriate Technology Transfer for Rural Areas. December. Available online at http://www.attra.ncat.org/attra-pub/bison.html.

Ghiradi, J, G. Caja, D. Garin, M. Hernandez-Jover, o. Ribo, and J. Casellas. 2006. *Retention of Different Sizes of Electronic Identification Boluses in the Forestomachs of sheep.* Journal of Animal Science 84:2865-2872.

Gill, D., K. Barnes, K. Lusby, and D.S. Peel. *Ranchers Guide to Custom Cattle Feeding.* Beef Cattle Handbook. BCH-8040. Accessed September 2008, Available at http://www.iowabeefcenter.org/pdfs/bch/08040.pdf.

Goat Working Group. 2006. National Animal Identification System: Goat Species Working Group Report. September 2006.

Golan, E., B. Krissoff, and F. Kuchler. 2004a. "Food Traceability: One Ingredient in a Safe and Efficient Food Supply." *Amber Waves* 2(2,April):16-21.

Golan, E., B. Krissoff, F. Kuchler, L. Calvin, K. Nelson, and G. Price. 2004b. *Traceability in the U.S. Food Supply: Economic Theory and Industry Studies.* United States Department of Agriculture, Economic Research Service, Agricultural Economic Report Number 830, Washington, DC, March.

Gracia, A., and G. Zeballos. 2005. "Attitudes of Retailers and Consumers toward the EU Traceability and Labeling System for Beef." *Journal of Food Distribution Research* 36(3):45-56.

Grain Inspection, Packers and Stockyards Administration (GIPSA) 2007. Livestock and Meat Marketing Study. 2007. *Volume 3: Fed Cattle and Beef Industries.* January. Available at: http://archive.gipsa.usda.gov/psp/issues/livemarketstudy/LMMS_Vol_3.pdf.

Grain Inspection, Packers and Stockyards Administration (GIPSA) Livestock and Meat Marketing Study. 2007. *Volume 5: Lamb and Lamb Meat Industries.* January. Available at: http://archive.gipsa.usda.gov/psp/issues/livemarketstudy/LMMS_Vol_5.pdf.

Grain Inspection, Packers and Stockyards Administration (GIPSA) 2007.*Packers and Stockyards Statistical Report 2005 Reporting Year.* February; SR-07-1.

Halpern, N.E. 2008. *Memo: Equine Infectious Anemia.* New Jersey Department of Agriculture. June.

Hansen, R. 2007. *Bison Profile.* Agricultural Marketing Resource Center. April.

Harvey N., Reeves A., Schoenbaum M.A., Zagmutt-Vergara F.J., Dube C., Hill A.E., Corso B.A., McNab B., Cartwright C.I., & Salman M.D. 2007. The North American Animal Disease Spread Model: A simulation model to assist decision making in evaluating animal disease incursions. Prev. Vet. Med., 82, 176-197.

Heckendorf, C. 2008. DVM, Colorado State Veterinarian's Office. Personal Communication. January 30.

Heckendorf, C.C. 2007. "Jefferson County Horse Council: Equine ID." Presented to Jefferson County Horse Council, Colorado, October 1.

Hill, A. and A. Reeves. 2006. "*User's Guide for the North American Animal Disease Spread Model 3.0.*" Animal Population Health Institute, Colorado State University, August.

Hill, G. 2008. USDA-APHIS-NAHMS. Personal communication. March.

Hobbs, J.E. 1996. "A Transaction Cost Analysis of Quality, Traceability and Animal Welfare Issues in UK Beef Retailing." *British Food Journal* 98 (6): 16-26.

Hobbs, J.E., D. Bailey, D.L. Dickinson, and M. Haghiri. 2005. "Traceability in the Canadian Red Meat Sector: Do consumers care?" *Canadian Journal of Agricultural Economics* 53, 47-65.

Huntrods, D. 2007. *Elk Profile.* Agricultural Marketing Resource Center. Iowa State University. November.

International Lama Registry. 2004. *Overview of the USAIP/NAIS. ILRe-port. Pp8.* June.

Ishmael, W. 2002. *Time is Weight.* Beef Magazine. Accessed October, 2007, available at http://beefmagazine.com/mag/beef_time_weight/.

Jacob, J., and B. Mather. 2003. *The Home Broiler Chicken Flock.* University of Florida Cooperative Extension Service, Institute of Food and Ag. Sciences No. PS42, June. Accessed May 2008, available at http://edis.ifas.ufl.edu/pdffiles/PS/PS03500.pdf.

javmaNews. 2005. *USDA takes steps to battle CWD: Chronic wasting disease survey and certification program in the works.* Accessed June, 2005. Available online at http://www.avma.org/onlnews/javma/jun05/050615d.asp.

Johnson, J., ed. 2002. "Equine Health Report." National Institute for Animal Agriculture, Spring.

Johnson, C. and G. Knowles. 2007 "Compensation looms as horse flu crisis spreads." *The West Australian*, Perth, Australia, August 27.

Kirk, K. 2007. Charges for tagging in Michigan auction markets. Personal communication, October 22.

Korlsund, J. 2008. "PRV Surveillance Plan Moves Toward Implementation." Nationa Animal Health Surveillance System *Outlook*, Quarter Two, July. Available at: http://www.aphis.usda.gov/vs/ceah/ncahs/nsu/outlook/issue18_jul08/outlook_jul_2008_prv_surveillance_implementation.pdf

Krieg, K. 2007. *Shrink*. Alaska Livestock Series. Feb. LPM-00744. Accessed September 2008, Available at http://www.uaf.edu/ces/publications/freepubs/LPM-00744.pdf.

Lawrence, J.D., D. Strohbehn, D. Loy, and R. Clause. 2003. "Lessons Learned from the Canadian Cattle Industry: National Animal Identification and The Mad Cow." Midwest Agribusiness Trade Research and Information Center, Research Paper 03-MPR 7, Ames, IA, October.

Lemieux, C.M., and M.K. Wohlgenant. 1989. ""Ex Ante" Evaluation of the Economic Impact of Agricultural Biotechnology: The Case of Porcine Somatotropin." *American Journal of Agricultural Economics* 71:903-914.

Liddell, S. and D. Bailey. 2001. "Market Opportunities and Threats to the U.S. Pork Industry Posed by Traceability Systems." *International Food and Agribusiness Management Review* 4:287-302.

Littlefield, M. DVM, MS. 2008. Louisiana Department of Agriculture & Forestry, Animal Health Services – Veterinary Health Division. Personal Communication. January 28.

Livestock Marketing Association. 2008. Livestock Markets in the U.S. Personal communication with Kristen Hendricks, March.

Livestock Marketing Information Center (LMIC). Lakewood, Colorado. Available at http://www.lmic.info/.

Loureiro, M.L., and W.J. Umberger. 2003. "Estimating Consumer Willingness to Pay for Country-of-Origin Labeling." *Journal of Agricultural and Resource Economics* 8(2):287-301.

Loureiro, M.L., and W.J. Umberger. 2004. "A Choice Experiment Model for Beef Attributes: What Consumer Preferences Tell Us." Selected paper presented at the American Agricultural Economics Association Annual Meetings, Denver, CO, August.

Marsh, J.M. 1994. "Estimating Intertemporal Supply Response in the Fed Beef Market." American Journal of Agricultural Economics 76:444-453.

Marsh, J.M. 2003. "Impacts of Declining U.S. Retail beef Demand on Farm-Level Beef Prices and Production." American Journal of Agriculture Economics 85:902-913.

Massachusetts Department of Agricultural Resources. 2008. "Equine Herpes Virus." Available at: http://www.docstoc.com/docs/732155/THE-COMMONWEALTH-OF-MASSACHUSETTS-EXECUTIVE-OFFICE-OF-ENERGY---Equine-Herpes-Virus-Alert. Accessed July.

Maugeri, M. 2007 "Flu to slow racing stocks." *Herald Sun*, Australia, August 27.

McBride, W.D., N. Key, and K.H. Mathews, Jr. 2008. *Subtherapeutic Antibiotics and Productivity in U.S. Hog Production*. Review of Agricultural Economics, 30(2,2008):270-288.

McGraw, Paul. 2008. "Livestock Premises Registration Benefits Briefing Paper." Obtained via email from Paul McGraw on June 16.

Meat and Livestock Australia. 2008. Personal meeting with David Palmer, Managing Director; Don Heatley, Chairman; and Michelle Gorman, Regional Manager – North America, Denver, CO, January 16.

Meisinger, J.L., D.L. Pendell, D.L. Morris, K.E. Belk, and G.C. Smith. 2008. "Review: Swine Traceability Systems in Selected Countries Outside of North America." *Professional Animal Scientist* 24(4, August):295-301.

Mennecke, B., A.M. Townsend, D.J. Hayes, and S.M. Lonegran. 2007. "A Study of the Factors that Influence Consumer Attitudes Toward Beef Products using the Conjoint Market Analysis Tool." *Journal of Animal Science* 85, 10:2639-2659.

Meunier, R., and M. Latour. Unknown year. *Commercial Egg Productin and Processing*. Working papers, Dept. of Animal Science, Purdue University. Accessed May 2008, available at http://ag.ansc.purdue.edu/poultry/publication/commegg/.

Meuwissen, M.P.M, A.G.J. Velthuis, H. Hogevenn, and R.B.M. Huirne. (2003). "Traceability and Certification in Meat Supply Chains." *Journal of Agribusiness* 21,2(Fall):167-181.

Michigan Department of Agriculture. (MDA, 2007). *Michigan Bovine Tuberculosis Eradication Project 2007 Activities Report*. Available at: http://www.michigan.gov/documents/emergingdiseases/btbactivities2007a_244926_7.pdf

Michigan Department of Agriculture. (MDA, 2006). *Michigan Bovine Tuberculosis Eradication Project 2006 Activities Report*. Available at: http://www.michigan.gov/documents/emergingdiseases/BTB_2006_Activities_Report_189581_7.pdf.

Microsoft. *Office Professional 2008*. Accessed May 2008, available at http://office.microsoft.com/en-us/products/FX101211561033.aspx.

Montana State University. 2006. "Summary of the Equine Injectable Microchip Study."

Morgan, S., M. Vogelsang, M. Bowman, B. Scott, E. Eller, P. Gibbs, and K. Hinrichs. Forthcoming. "Investigation of the relationship of body temperature, serum estradiol, and serum progesterone to the onset of parturition in the mare." Texas A&M University, College Station, TX.

Moreau, H. DVM, Louisiana Department of Agriculture & Forestry, Animal Health Services – Veterinary Health Division. Personal Communication. 01/30/2008.

Munger, R. 2008a. *Mobile Devices Assist 2007 NM TB Incident*. Quarter Two 2008. Available at: http://www.aphis.usda.gov/vs/ceah/ncahs/nsu/outlook/issue18_jul08/outlook_jul_2008_mobile_devices_2007_nm_tb.pdf.

Munger, R. 2008b. Phone interview on August 4.

Murphy, R.G.L, D.L. Pendell, D.L. Morris, J.A. Scanga, K.E. Belk, and G.C. Smith. 2008. "Review: Animal Identification Systems in North America." *Professional Animal Scientist* 24(4, August):277-286.

National Bison Association web site. Accessed February 2, 2008. Available at http://www.bisoncentral.org.

National Chicken Council. 2008. *The Chicken Industry: Growing Chickens Under Contract*. Accessed May 2008, available at http://www.nationalchickencouncil.com/aboutIndustry/detail.cfm?id=14.

Ndiva Mongoh, M., R. Hearne, N.W. Dyer, M.L. Khaitsa. 2008. "The economic impact of West Nile virus infection in horses in the North Dakota equine industry in 2002." *Tropical Animal Health and Production*, 2008, 40:69-76.

Nevens, A.L. DVM, MS, 2008. CHRB Veterinarian. Personal Communication. July 23.

New Orleans CityBusiness. 2005. "More than 300 Horses Saved from Hurricane Katrina." September, 26. Available at: http://findarticles.com/p/articles/mi_qn4200/is_20050926/ai_n15641018

Nigel, K. and W. McBride. 2007. *The Changing Economics of U.S. Hog Production*, ERR-52. U.S. Dept. of Agr., Econ. Res. Serv. Dec. 2007.

North Dakota Outdoors. 2005. *Farmed Deer and Elk in North Dakota*. February. Pp 18-20.

Owen, K. DVM. 2008. Electronic ID, Inc. Personal Communication. August 8.

Paarlberg, P.L., A.H. Seitzinger, J.G. Lee, and K.H. Mathews, Jr. 2008. *Economic Impacts of Foreign Animal Disease*. ERR-57. U.S. Dept. of Agriculture, Econ. Res. Serv. May 2008.

Paarlberg, P.L., A.H. Seitzinger, and J.G. Lee. 2007. "Economic Impacts of Regionalization of a Highly Pathogenic Avian Influenza Outbreak in the United States." *Journal of Agricultural and Applied Economics* 39(2, August):325-333.

Pendell, D.L. 2006. "Value of Animal Traceability Systems in Managing a Foot-and-Mouth Disease Outbreak in Southwest Kansas." Ph.D. dissertation, Dept. of Agr. Econ., Kansas State University.

Pendell, D.L., J. Leatherman, T.C. Schroeder, and G.S. Alward. 2007. "The Economic Impacts of a Foot-and-Mouth Disease Outbreak: A Regional Analysis." Journal of Agricultural & Applied Economics, 39: 19-33.

Pouliot, S. and D.A. Sumner. 2008. "Traceability, Liability, and Incentives for Food Safety and Quality." *American Journal of Agricultural Economics* 90(1, February):15-27.

Preston, B. 2006. *Captive Deer and Elk Industry Awareness Information*. National Wildlife Federation. February.

Radintz, T. 2008. Phone interview on August 11.

Reinholz, A., D. Vaselaar, G. Owen, D. Freeman, J. Glower, K. Ringwall, M. Riesinger, and G. McCarthy. 2006. *Learning from Animal Identification with UHF RFID Technology*. Center for Nanoscale Science and Engineering (CNSE), North Dakota State University.

Resende-Filho, M.A. and B.L. Buhr. 2008. "A Principal-Agent Model for Evaluating the Economic Value of a Traceability System: A Case Study with Injection-Site Lesion Control in Fed Cattle." *American Journal of Agricultural Economics* in press.

Reeves, A., A.D. Gil, F. Zagmutt-Vergara, A.E. Hill, B.A. Corso, M.D. Salman. 2006. Validation of the North American Animal Disease Spread Model using data from the 2001 outbreak of Foot-and-Mouth Disease in Uruguay. In: Ellis, R.P. (Ed.), Proceedings of the 87th Annual Meeting of the Conference of Research Workers in Animal Diseases. Blackwell Publishing, Ames, IA.

RFID IC Reader – Rfidtagstcc.com. Available at: http://www.rfidtagstcc.com/page/729410. Accessed August, 2008.

Richardson, C. 2005. *Reducing Cattle Shrink*. Ministry of Agriculture, Food and Rural Affairs. September, 2005; AGDEX 425/20. Accessed September 2008, Available at http://www.omafra.gov.on.ca/english/livestock/animalcare/facts/05-063.htm.

Richey, B.D., G.N. Slack, and M. Vice-Brown. 2005. "Animal Agriculture and Identification: Historical Significance." Prepared by National Institute for Animal Agriculture for U.S. Veterinarian. http://animalagriculture.org//id/AnimalAgricultureand IDHistoricalSignificance.htm

Ringwall, K. 2005a. *BeefTalk: Overhead Costs Loom Big in Working Cattle on Range*. North Dakota State University Agr. Exp. Sta., January. Accessed September 2008, Available at http://www.ext.nodak.edu/extnews/newsrelease/2005/011305/02beefta.htm.

Ringwall, K. 2005b. *BeefTalk: Tagging Cattle Challenges Time Management Concept.* North Dakota State University Agr. Exp. Sta., January. Accessed September 2008, Available at http://www.ext.nodak.edu/extnews/newsrelease/2005/010605/02beefta.htm.

Robb, D. 2008. DMV, Michigan Department of Agriculture. Personal conversation.

Robinson, T.R., S.B. Hussey, A.E. Hill, C.C. Heckendorf, J.B. Stricklin, and J.L. Traub-Dargatz. 2008 "Comparison of temperature readings from a percutaneous thermal sensing microchip with temperature readings from a digital rectal thermometer in equids." Journal of the American Veterinary Medical Association 233(4):613-617.

Ryder, E. 2008a. "Hurricane Update: Horses in Coastal Texas Receive Care, Hay." TheHorse.com, September 17, 2008. Available at: http://www.thehorse.com/ViewArticle.aspx?ID=12714. Accessed September, 2008.

Ryder, E. 2008b. "Piroplasmosis Update: 20 Positive, Tracing Exposed Horse." TheHorse.com, September 10, 2008. Available at: http://www.thehorse.com/ViewArticle.aspx?ID=12668. Accessed September, 2008.

Saa, C., M. Milan, G. Caja, and J. Ghirardi. 2005. *"Cost evaluation of the use of conventional and electronic identification and registration systems for the national sheep and goat populations in Spain."* *Journal of Animal Science* 83:1215-1225.

Saatkamp, H.W., A.A. Dijkhuizen , R. Geers, R.B.M. Huime, J.P.T.M. Noordhuizen, and V. Goedseels. 1997. "Economic Evaluation of National Identification and Recording Systems for Pigs in Belgium." *Preventive Veterinary Medicine* 30:121- 135.

Saatkamp, H.W., R. Geersa, J.P.T.M. Noordhuizenb, A.A. Dijkhuizenc, R.B.M. Huirne, and V. Goedseels. (1995). "National Identification and Recording Systems for Contagious Animal Disease Control." *Livestock Production Science* 43:253-264

Scheierl, R. 2008. Phone interview on August 11.

Schmitz T., C. Moss, and A. Schmitz. 2003. *Marketing Channels Compete for U.S. Stocker Cattle. Journal of Agribusiness.* 21(2):131-148.

Schroeder, T., G. Tonsor, J. Mintert, and J.M.E. Pennings. 2006. *Consumer Risk Perceptions and Attitudes about Beef Food Safety: Implications for Improving Supply Chain Management.* Kansas State University Agricultural Experiment Station and Cooperative Extension Service, November.

Scott. A., C. Zepeda, L. Garber, J. Smith, D. Swayne, A. Rhorer, J. Kellar, A. Shimshony, H. Batho, V. Caporale, and A. Giovannini. (2006). "The Concept of Compartmentalisation." *Scientific and Technical Review* 25(3):873-879.

Seitzinger, A.H., N. GrandMaison, and R. Holley. 2008. NAADSM Cost Budgets. Personal Communication. August.

Self, H.L. and N. Gay. 1972. *Shrink During Shipment of Feeder Cattle. Journal of Animal Science.* 35:489-494.

Sellnow, L. 2007 "Equine Viral Arteritis Disease Outbreak is a Real Concern to Horse Industry: Horse owners are warned that EVA can quickly spread within an equine population." *Quarter Horse News*, January 1, pp. 124-126.

Sexton, R.J. and T.L. Saitone. 2007. *"Alpaca Lies? Speculative Bubbles in Agriculture: Why They Happen and How to Recognize Them."* Review of Agricultural Economics 29(2):286-305.

Smith, G.C., J.D. Tatum, K.E. Belk, J.A. Scanga, T. Grandin, and J.N. Sofos. (2005). "Traceability from a US Perspective." *Meat Science* 71:174-193.

Solaiman, S. G. 2006 "Outlook for a Smal Farm Meat Goat Industry for California." University of California Small Farm Center Research Report SFCRR2005-01. February.

Souza-Monteiro, D.M. and Caswell, J.A. 2004. "The Economics of Implementing Traceability in Beef Supply Chains: Trends in Major Producing and Trading Countries." University of Massachusetts Amherst Working Paper No. 2004-6. June.

Sheep Working Group. 2006. The National Animal Identification System: Sheep Working Group Report. Accessed April 2008, available at http://www.sheepusa.org/index.phtml?page=site/text&nav_id=e605aa16e0f261dac9a9408d2a053c77.

Shelton, S. InCompass Solutions and The Jockey Club.2008. Personal Communication. July 30.

Statistics Canada. 2008. *Table 1-1, Hogs on farms, Canada.* Accessed September 2008, Available at http://www.statcan.ca/english/freepub/23-010-XIE/2008002/tablesectionlist.htm.

Stein, F.J., S.C. Geller, and J.C. Carter. (2003). "Evaluation of microchip migration in horses, donkeys, and mules." Journal of the American Veterinary Medical Association 233(9):1316-1319.

Sutton, D. National Scrapie Program Coordinator, National Center for Animal Health Programs, USDA, APHIS, VS. Personal communication 11/25/08.

Tessaro, S.V. 1989. "Review of the diseases, parasites and miscellaneous pathological conditions of North American bison." Canadian Veterinary Journal 30: 416-422. May.

Timoney, P.J. 2005 "Equine Viral Arteritis: Is the Disease a Cause for Industry Concern?" *Impulsion*, Spring & Summer, pp 4-7, 9-10.

Timoney, P.J., L. Creekmore, B. Meade, D. Fly, E. Rogers, and B. King. (2007). "2006 Multi-State Occurrence of EVA." Available at: http://www.aphis.usda.gov/vs/nahss/equine/eva/EVA_2006_Multistate_USAHA.pdf. Accessed July, 2008.

Tomek, W.G., and K.L. Robinson. 1990. *Agricultural Product Prices*. 3rd ed. Ithaca, New York: Cornell University Press.

Tonsor, G.T. and A.M. Featherstone. 2008. Heterogeneous Production Efficiency of Specialized Swine Producers. Working paper under peer-review, September 2008.

Tonsor, G.T. and T. C. Schroeder. 2006. "Livestock Identification: Lessons for the U. S. Beef Industry from the Australian System." *Journal of International Food and Agribusiness Marketing* 18(3/4):103-118

Tonsor, G., T.C. Schroeder, J.A. Fox, and A. Biere. 2005. "European Preferences for Beef Steak Attributes." *Journal of Agricultural and Resource Economics* (30):367-380.

Umberger, W.J., D.M. Feuz, C.R. Calkins, and B.M. Stitz. 2003. "Country-of-Origin Labeling of Beef Products: U.S. Consumers' Perceptions." *Journal of Food Distribution Research* 34(3):103-116.

University of Maine Cooperative Extension. 2001. "Equine Facts: Facts on Strangles (Streptococcus equi) Infections in Horses." January. Bulletin #1009.

U.S. Department of Agriculture. 1978. *Sheep and Goats*. USDA:NASS. Washington D.C.

U.S. Department of Agriculture. 1988. *Sheep and Goats*. USDA:NASS. Washington D.C.

U.S. Department of Agriculture. 1997a. *Part I: Reference of 1997 Beef Cow-Calf Management Practices*. USDA:APHIS:VS, CEAH, National Animal Health Monitoring System. Fort Collins, CO.

U.S. Department of Agriculture 1997b. "NAHMS Equine '98: Needs Assessment Survey Results." USDA:APHIS:VS. May, 1997. Info Sheet. Available at: http://nahms.aphis.usda.gov/equine/equine98/eq98na.pdf.

U.S. Department of Agriculture. 1998. *Sheep and Goats*. USDA:NASS. Washington D.C.

U.S. Department of Agriculture 1999a. Equine. USDA-NASS. Available at: http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1466. Accessed Febuary, 2008.

U.S. Department of Agriculture.1999b. *Part I: Reference of 1999 Table Egg Layer Management in the U.S.* USDA-APHIS-VS, CEAH. Fort Collins, CO #N319.1099

U.S. Department of Agriculture. 2000. *Part I: Baseline Reference of Feedlot Management Practices, 1999*. USDA:APHIS:VS, CEAH, National Animal Health Monitoring System. Fort Collins, CO. #N327.0500.

U.S. Department of Agriculture 2001. "Infectious Upper Respiratory Disease in U.S. Horses: Disease Frequency." USDA:APHIS:VS. October, 2001. Info Sheet. Available at: http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/equine/equine98/eq98iurd_freq.pdf.

U.S. Department of Agriculture 2002a. Borna Disease, September, 2002, USDA:APHIS:VS. Riverdale, MD Info Sheet.

U.S. Department of Agriculture. 2002b. *The Census of Agriculture*. USDA-NASS. Washington D.C. Accessed February 2008, available at http://www.agcensus.usda.gov/Publications/2002/index.asp.

U.S. Department of Agriculture 2002c. Equine Piroplasmosis, July, 2008, USDA:APHIS:VS. Riverdale, MD Factsheet.

U.S. Department of Agriculture. 2002d. *Part I: Reference of Sheep Management in the United States, 2001*. USDA-APHIS-VS, CEAH. Fort Collins, CO #N256.0702. Accessed September 2008, available at http://nahms.aphis.usda.gov/sheep/sheep01/Sheep01Pt1.pdf.

U.S. Department of Agriculture. 2003. *Economic Impact of West Nile Virus on the Colorado and Nebraska Equine Industries: 2002*. USDA-APHIS-VS, Fort Collins, CO.

U.S. Department of Agriculture. 2004. Summary Report Epidemiology Investigation of Washington State BSE Case. March 2004. Obtained June 25, 2008 from Dr. David Morris.

U.S. Department of Agriculture. 2006a. *Administration of Official Identification Devices with the Animal Identification Number*. USDA-APHIS. Washington D.C.

U.S. Department of Agriculture. 2006b. Alabama BSE Investigation: Final Epidemiology Report. May 2, 2006. Obtained June 25, 2008 from Dr. David Morris.

U.S. Department of Agriculture 2006c. Baseline Reference of Equine Health Management Strategies at Equine Events in Six States, 2005, USDA-APHIS-VS, CEAH, National Animal Health Monitoring System, Fort Collins, CO #N456.0607.

U.S. Department of Agriculture. 2006d. *Cattle Death Loss*. USDA-NASS. Washington D.C. Accessed September 2008, available at http://www.peer.org/docs/doj/06_9_5_nass_report.pdf.

U.S. Department of Agriculture 2006e. Equine 2005, Part I: Baseline Reference of Equine Health and Management, 2005, USDA:APHIS:VS, CEAH. Fort Collins, CO #N451-1006.

U.S. Department of Agriculture 2006f. Equine 2005, Part II: Changes in the U.S. Equine Industry, 1998-2005, USDA-APHIS-VS, CEAH. Fort Collins, CO #N452-0307.

U.S. Department of Agriculture 2006g. *Equine Infectious Anemia: Uniform Methods and Rules*. January, 2007, USDA-APHIS. Washington, D.C. APHIS #91-55-064.

U.S. Department of Agriculture. 2007a. *Dairy 2007, Part I: Reference of Dairy Cattle Health and Management Practices in the United States, 2007*. USDA-APHIS-VS, CEAH. Fort Collins, CO #N480.1007

U.S. Department of Agriculture 2007b. Equine Herpes Virus Myeloencephalopathy: A Potentially Emerging Disease, January, 2007, USDA:APHIS:VS, CEAH. Fort Collins, CO Info Sheet.

U.S. Department of Agriculture. 2007c. *Farm Labor*, USDA-NASS. Washington D.C. Accessed October 2007, available at http://usda.mannlib.cornell.edu/usda/current/FarmLabo/FarmLabo-08-17-2007.pdf.

U.S. Department of Agriculture. 2007d. *Livestock Slaughter*. USDA-NASS. Washington D.C. Accessed February 2008, available at http://usda.mannlib.cornell.edu/usda/nass/LiveSlau//2000s/2008/LiveSlau-01-25-2008.pdf.

U.S. Department of Agriculture. 2007e. *National Animal Identification System (NAIS) – A User Guide and Additional Information Resources*. Version 2.0 December 2007. Available at: http://animalid.aphis.usda.gov/nais/naislibrary/documents/guidelines/NAIS-UserGuide.pdf.

U.S. Department of Agriculture. 2007f. *A Business Plan to Advance Animal Disease Traceability*. December 12, 2007. Available at: http://animalid.aphis.usda.gov/nais/naislibrary/documents/plans_reports/NAIS_Business_Plan.pdf.

U.S. Department of Agriculture. 2007g. *Packers and Stockyards Statistical Report, 2005 Reporting Year*. USDA-GIPSA, SR-07-1. Washington D.C. Accessed September 2008, available at http://archive.gipsa.usda.gov/pubs/2005_stat_report.pdf.

U.S. Department of Agriculture. 2007h. *Sheep and Lamb Predator Death Loss in the United States, 2004*. USDA-APHIS. Washington D.C. Accessed September 2008, available at http://nahms.aphis.usda.gov/sheep/sheep_pred_deathloss_2004.pdf.

U.S. Department of Agriculture. 2007i. *The Facts About Traceability: National Animal ID System*. December 2007. Available at: http://animalid.aphis.usda.gov/nais/naislibrary/documents/factsheets_brochures/TraceabilityFactsheet.pdf.

U.S. Department of Agriculture. 2007j. Status Report – Fiscal Year 2007 Cooperative State-Federal Brucellosis Eradication Program. Available at: http://www.aphis.usda.gov/animal_health/animal_diseases/brucellosis/downloads/yearly_rpt.pdf.

U.S. Department of Agriculture. 2007k. United States Animal Health Report, 2006, USDA:APHIS:VS, CEAH. Fort Collins, CO Agriculture Information Bulletin #801.

U.S. Department of Agriculture. 2008a. Approved Devices. USDA-APHIS-NAIS. Available at: https://nais.aphis.usda.gov/ainmngt/AllProductSelect.do. Accessed: September, 2008.

U.S. Department of Agriculture. 2008b. Equine Piroplasmosis and the 2010 World Equestrian Games. May, 2008, USDA:APHIS:VS. Available at: http://www.aphis.usda.gov/animal_health/animal_diseases/piroplasmosis/downloads/ep_2010_weg_wp.pdf. Accessed August, 2008.

U.S. Department of Agriculture. 2008c. *National Animal Identification System Participating Animal Tracking Databases (ATDs) Status Report.* USDA-APHIS. Washington D.C. Accessed June 2008, available at http://animalid.aphis.usda.gov/nais/nais/naislibrary/documents/guidelines/NAIS_ATDs_for_web.pdf.

U.S. Department of Agriculture. 2008d. *Premises Registration Statistics, September 29, 2008.* USDA-APHIS. Washington D.C. Accessed September 2008, available at http://animalid.aphis.usda.gov/nais/naislibrary/documents/plans_reports/NAIS_Prem_Stat_Report.pdf.

U.S. Department of Agriculture. 2008e. *Quick Stats.* USDA-NASS. Washington D.C. Accessed February 2008, available at http://www.nass.usda.gov/QuickStats/Create_Federal_All.jsp.

U.S. Department of Agriculture. 2008f. *Swine 2006, Part III: Reference of Swine Health, Productivity, and General Management in the United States.* USDA-APHIS:VS, CEAH. Fort Collins, CO #N478.0308.

U.S. Department of Agriculture. 2008g. *A Business Plan to Advance Animal Disease Traceability.* Version 1.0, June. Obtained via email from Dr. Neil Hammerschmidt on July 25, 2008.

U.S. Department of Agriculture. 2008h. *Farms, Land in Farms, and Livestock Operations: 2007 Summary.* USDA-NASS. Washington D.C. Accessed March 2008, available at http://usda.mannlib.cornell.edu/usda/current/FarmLandIn/FarmLandIn-02-01-2008_revision.pdf.

U.S. Department of Agriculture. 2008i. *Minnesota Ag News: Sheep and Goats.* USDA-NASS. St. Paul, MN. Accessed March. Available at http://www.nass.usda.gov/Statistics_by_State/Minnesota/Publications/Livestock_Press_Releases/shp0108.pdf.

U.S. Department of Agriculture. 2008j. National Tuberculosis Reports Summary. PowerPoint slides obtained from Dr. David Morris via email on August 29.

U.S. Department of Agriculture. 2008k. Texas BSE Investigation: Final Epidemiology Report. August 2005. Obtained June 25, 2008 from Dr. David Morris.

U.S. Department of Agriculture. 2008l. *Sheep and Goats.* USDA:NASS. Washington D.C.

U.S. Department of Agriculture. 2008m. *Meat Preparation: Focus on Bison* Fact Sheets. USDA, FSIS. Available online at http://www.fsis.usda.gov/Fact_Sheets/Bison_from_Farm_to_Table/index.asp. Accessed January 8, 2008.

U.S. Department of Agriculture. 2008n *Battling Bisons' Mysterious MCF Disease.* USDA, ARS. Available online at http://www.ars.usda.gov/is/AR/archive/jun02/bison0602.htm. Accessed January 22.

U.S. Department of Agriculture. 2008o *Brucellosis and Yellowstone Bison.* USDA, APHIS. Available online at http://www.attra.ncat.org/attra-pub/bison.html. Accessed February 2008.

U.S. Department of Agriculture. 2008p *Animal Health: Chronic Wasting Disease Information.* USDA, APHIS. Available online at http://www.aphis.usda.gov/animal_health/animal_diseases/cwd. Accessed February, 2008.

U.S. Department of Agriculture. 2008q *Part I: Reference of Beef Cow-Calf Management Practices in the United States, 2007-08.* USDA:APHIS:VS, CEAH, National Animal Health Monitoring System. Fort Collins, CO.

U.S. Department of Agriculture. 2007. *National Animal Identification System (NAIS)—A User Guide and Additional Information Resources.* Version 2.0. USDA-APHIS. Accessed on January 7, 2009. http://animalid.aphis.usda.gov/nais/naislibrary/documents/guidelines/NAIS-UserGuide.pdf

U.S. Department of the Interior, National Park Service (NPS). 2008m *Yellowstone Bison.* Available online at http://www.nps.gov/yell/naturescience/bison.htm. Accessed February 15.

U.S. Department of Labor, Bureau of Labor Statistics (BLS). 2007. *May 2007 National Occupational Employment and Wage Estimates: United States.* Washington D.C. Accessed November 2007, Available at http://www.bls.gov/oes/current/oes_nat.htm#b43-0000.

U.S. General Services Administration (GSA). 2007 *Privately Owned Vehicle (POV) Mileage Reimbursement Rates.* Accessed December. Available at http://www.gsa.gov/Portal/gsa/ep/contentView.do?contentId=9646&contentType=GSA_BASIC.

U.S. Government Accountability Office (GAO). *National Animal Identification System.* GAO-07-592. July 2007. Full report available at: http://www.gao.gov/new.items/d07592.pdf.

Verbeke, W., and R.W. Ward. 2006. "Consumer Interest in Information Cues Denoting Quality, Traceability and Origin: An Application of Ordered Probit Models to Beef Labels." *Food Quality and Preference* 17:453-467.

VerCauteren, K.C., M. Lavelle, D. L. Nolte, S. E. Hygnstrom, J. Gilsdorf. "Cervid Disease Research at the National Wildlife Research Center." Wildlife Damage Management, Internet Center for USDA National Wildlife Research Center. University of Nebraska, Lincoln. 2004.

Wainwright, R. and M. Moore. 2007 "The cough that stopped a nation." *Sydney Morning Herald* Australia, November.

Walker, J. 2006. *Radio Frequency Identification for Beef Cattle.* Extension Extra. ExEx2051, South Dakota State University. Accessed September 2008, available at http://agbiopubs.sdstate.edu/articles/ExEx2051.pdf.

Ward, R., D. Bailey, and R. Jensen. 2005. "An American BSE Crisis: Has it affected the Value of Traceability and Country-of-Origin Certifications for US and Canadian Beef?" *International Food and Agribusiness Management Review* 8(2):92-114.

Watson, K. 2002. *Jumping into EID.* Quality Beef Connection, June. Accessed October 2007, available at http://ucce.ucdavis.edu/files/filelibrary/1524/24481.pdf.

Webb, P. 2008. Costs for tagging cull breeding hogs. Personal communication, May 9, 2008.

Wiemers, J.F. (2003). "Animal Identification and Traceability: Protecting the National Herd." Presented at *Agricultural Outlook Forum 2003*, Washington, DC, February 21.

Williams, S. 2006. Extension Assists Producers with Preparations for National Animal Identification. Impact. University of Idaho Extension. Accessed September 2008, available at http://www.uidaho.edu/extension/impacts/Pdf_06/2-06swilliams-identification.pdf.

Wisconsin Department of Natural Resources. 2008. *Keeping Wisconsin Deer Healthy.* Available online at http://www.dnr.state.wi.us/org/land/wildlife/whealth/issues/deerhealth.htm, Accessed February, 2008.

Wisconsin Livestock Identification Consortium. (WLIC, 2006). A Consortium Approach to Instituting the National Animal Identification System in Wisconsin. March 2006.

Wisconsin Pork Association (WPA). 2006. *Wisconsin Pork Association Final Report Animal ID Project—Phase II.* Accessed February 2008, available at http://www.wiid.org/resource/1179496787_WPA_Final_Report_Phase_II.pdf.

Wohlgenant, M.K. 1989. "Demand for Farm Output in a Complete System of Demand Functions." *American Journal of Agricultural Economics* 71:241-252.

Wohlgenant, M.K. 1993. "Distribution of Gains from Research and Promotion in Multi-Stage Production Systems: The Case of the U.S. Beef and Pork Industries." *American Journal of Agricultural Economics* 75:642-651.

Wohlgenant, M.K. 2005. "Market Modeling of the Effects of Adoption of New Swine Waste Management Technologies in North Carolina." Unpublished, North Carolina State University.

Zhao, Z., T.I. Wahl, and T.L. Marsh. (2006). "Invasive Species Management: Foot-and-Mouth Disease in the U.S. Beef Industry." *Agricultural and Resource Economics Review* 35(1, April):98-115.

Zebarth, G. 2008. U.S farmed deer and elk industry. Personal Communication. March 18.

16. APPENDICES

APPENDIX A3:
INDUSTRY ASSOCIATION REPRESENTATIVE MEETINGS

1. American Association of Meat Processors
2. National Renderers Association
3. Darling International
4. Seaboard Farms
5. Superior Lamb
6. Southwest Meat Association
7. Smithfield Beef
8. National Milk Producers Federation
9. National Livestock Producers Association
10. Livestock Marketing Association
11. Michigan Department of Agriculture
12. United Producers Inc. (Auction Network in Michigan)
13. Michigan cow/calf, feedlot, and dairy producers
14. National Meat Association
15. American Sheep Industry Association
16. American Meat Institute
17. National Cattlemen's Beef Association
18. United States Meat Export Federation
19. Meat and Livestock Australia
20. Canadian Cattle Identification Agency
21. APHIS Risk Analysis Team members
22. Pro Rodeo Cowboys Association
23. Meat and Livestock Australia
24. National Pork Board
25. National Pork Producers Association
26. Colorado State University Veterinary Hospital
27. American Horse Council
28. Destron Fearing
29. R-CALF U.S.A.
30. American Quarter Horse Association
31. National Bison Association

32. American Boer Goat Association
33. North American Elk Breeders Association
34. The Jockey Club
35. United States Equestrian Federation
36. Thoroughbred Owners and Breeders Association
37. Kentucky Department of Agriculture
38. American Association of Equine Practitioners
39. Penn State University – Animal & Dairy Science Department
40. National Horseman's Benevolent and Protective Association
41. Kentucky Thoroughbred Association
42. Broseco Ranch
43. Agri Beef Company
44. APHIS
    a. Center for Emerging Issues
    b. National Surveillance Unit
    c. National Animal Health Monitoring System
45. Office of the Chief Information Officer
46. Policy and Program Development
47. National Center for Animal Health Programs
48. National Chicken Council
49. American Boer Goat Association
50. Kansas State University—Animal Sciences & Industry Department
51. Kansas State University—Clinical Sciences Department
52. California Department of Food and Agriculture
53. University of California-Davis, NAIS cost and benefit research team
54. Center for Animal Disease Modeling and Surveillance (CADMS), Univ. of California-Davis

APPENDIX A4: BOVINE COST APPENDICES

APPENDIX A4.1: BEEF COW/CALF OPERATIONS

Table A4.1.1 Number of Beef Cow/Calf Operations and Inventory and Production Levels by Size of Operation.

	Size of Operation, number of head						
	1-49	50-99	100-499	500-999	1000-1999	2000-4999	5,000+
Number of operations	585,050	94,490	72,855	4,180	980	290	55
Percent of operations currently tagging	35.1%	54.3%	61.0%	61.4%	61.4%	61.4%	61.4%
Average herd size, head	15.7	65.2	175.9	633.9	1,182.90	2,512.60	7,828.50
Bulls in herd, head (500+ lbs)	0.6	2.6	7	25.1	46.8	99.3	309.4
Calving rate, %	95.6%	95.6%	95.6%	95.6%	95.6%	95.6%	95.6%
Calving rate adjusted for twinning, %	94.3%	94.3%	94.3%	94.3%	94.3%	94.3%	94.3%
Calf death loss before 24 hours, %	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Calf death loss after 24 hours, %	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%
Replacements retained, %	15.1%	15.1%	15.1%	15.1%	15.1%	15.1%	15.1%
Replacement animals, head	2.4	9.8	26.6	95.7	178.6	379.3	1,181.80
Cow death (disappearance) loss, %	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%
Cull rate, %	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%
Cows culled, head	1.7	7.2	19.4	69.7	130.1	276.4	861.1
Bulls culled, head	0.2	0.6	1.7	6.3	11.7	24.8	77.4
Total animals sold, head	13.4	55.9	150.7	543.1	1,013.50	2,152.70	6,707.30
Calves born and alive at 24 hours, head	14.6	60.6	163.5	589.2	1,099.50	2,335.40	7,276.50
Calves dead after 24 hours, head	0.7	2.7	7.3	26.4	49.2	104.6	325.9
Total calves available for sale, head	13.9	57.9	156.2	562.8	1,050.2	2,230.8	6,950.5

Table A4.1.2 Tags and Tag Applicators per Cow/calf Operation by Size of Operation that Currently Tags Cattle.

	Size of Operation, number of head						
	1-49	50-99	100-499	500-999	1000-1999	2000-4999	5,000+
Number of calves to retag, head	0.3	1.4	3.9	14.1	26.3	55.8	173.8
Total cows and bulls tagged, head	0.4	1.7	4.6	16.5	30.7	65.3	203.4
Total tags purchased	15.3	63.7	172	619.7	1,156.50	2,456.50	7,653.70
Tag loss rate, %	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
RFID button tag cost, $/tag	$2.50	$2.30	$2.20	$2.00	$2.00	$2.00	$2.00
Total RFID tag cost, $/operation	$41	$155	$400	$1,312	$2,447	$5,199	$16,197
RFID tag applicator cost, $/unit	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83
Number of tag applicators	1	1	2	4	5	6	7
Years of RFID tag applicator	4	4	4	4	4	4	4
Annual cost of tag applicator, $/operation	$4	$4	$7	$14	$18	$21	$25

Table A4.1.3 Tags and Tag Applicators Required per Cow/calf Operation by Size of Operation Currently Not Tagging Cattle.

	Size of Operation, number of head						
	1-49	100-499	500-999	1000-1999	2000-4999	5,000+	5,000+
Number of calves to retag, head	0	0	0	0	0	0	0
Total cows and bulls tagged, head	0	0	0	0	0	0	0
Total tags purchased	13.4	55.9	150.7	543.1	1,013.50	2,152.70	6,707.30
Tag loss rate, %	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
RFID button tag cost, $/tag	$2.50	$2.30	$2.20	$2.00	$2.00	$2.00	$2.00
Total RFID tag cost, $/operation	$36	$136	$351	$1,149	$2,145	$4,556	$14,194
RFID tag applicator cost, $/unit	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83
Number of tag applicators	0	0	0	0	0	0	0
Years of RFID tag applicator	4	4	4	4	4	4	4
Annual cost of tag applicator, $/operation	$0	$0	$0	$0	$0	$0	$0

Table A4.1.4 Tagging-Related (Working) Costs per Cow/Calf Operation by Size of Operation that Currently Tags Cattle.

	Size of Operation, number of head						
	1-49	50-99	100-499	500-999	1000-1999	2000-4999	5,000+
RFID Tag Labor Cost							
Labor rate, $/hour	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80
Time to tag 2X / animal, seconds	30	30	30	30	30	30	30
Cost of tagging animal 2X, $/head	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08
Cost of tagging, $/operation	$1	$5	$14	$51	$95	$202	$629
Labor and Chute Costs							
Setup time for retag, hours	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Hours required to re-tag / sort	0.26	0.31	0.41	0.81	1.29	2.47	7.17
Number of employees	1	3	4	5	6	6	6
Labor cost to retag, $/operation	$3	$10	$17	$42	$81	$154	$446
Chute charge, $/head	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00
Total chute cost, $/operation	$1	$3	$9	$32	$60	$128	$399
Cattle Shrink Costs							
Average calf weight, lbs/head	524	524	524	524	524	524	524
Shrink, lbs/head	2	2	2	2	2	2	2
Average calf price, $/lb	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Average cow weight, lbs/head	1,274	1,274	1,274	1,274	1,274	1,274	1,274
Shrink, lbs/head	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Average cow price, $/lb	$0.48	$0.48	$0.48	$0.48	$0.48	$0.48	$0.48
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Total shrink costs, $/operation	$1	$6	$15	$54	$100	$213	$663
Miscellaneous Costs							
Human injury, $/operation	$0	$1	$2	$6	$12	$23	$70
Animal injury, $/operation	$0	$1	$1	$5	$9	$19	$60
Total Working Costs, $/operation	$7	$25	$58	$190	$357	$739	$2,268

Table A4.1.5 Tagging-Related (Working) Costs per Cow/Calf Operation by Size of Operation Currently Not Tagging Cattle.

	Size of Operation, number of head						
	1-49	100-499	500-999	1000-1999	2000-4999	5,000+	5,000+
RFID Tag Labor Cost							
Labor rate, $/hour	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80
Time to tag 2X / animal, seconds	0	0	0	0	0	0	0
Cost of tagging animal 2X, $/head	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Cost of tagging, $/operation	$0	$0	$0	$0	$0	$0	$0
Labor and Chute Costs							
Setup time for retag, hours	0	0	0	0	0	0	0
Hours required to re-tag / sort	0	0	0	0	0	0	0
Number of employees	0	0	0	0	0	0	0
Labor cost to retag, $/operation	$0	$0	$0	$0	$0	$0	$0
Chute charge, $/head	$2.54	$2.54	$2.54	$2.54	$2.54	$2.54	$2.54
Total chute cost, $/operation	$34	$142	$384	$1,382	$2,578	$5,477	$17,065
Cattle Shrink Costs							
Average calf weight, lbs/head	524	524	524	524	524	524	524
Shrink, lbs/head	2.62	2.62	2.62	2.62	2.62	2.62	2.62
Average calf price, $/lb	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Average cow weight, lbs/head	1,274	1,274	1,274	1,274	1,274	1,274	1,274
Shrink, lbs/head	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Average cow price, $/lb	$0.48	$0.48	$0.48	$0.48	$0.48	$0.48	$0.48
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Total shrink costs, $/operation	$10	$41	$109	$394	$735	$1,561	$4,863
Miscellaneous Costs							
Human injury, $/operation	$0	$0	$0	$0	$0	$0	$0
Animal injury, $/operation	$2	$9	$24	$86	$161	$343	$1,068
Total Working Costs, $/operation	$46	$192	$517	$1,862	$3,475	$7,381	$22,996

Table A4.1.6 Costs Associated with Reading Tags per Cow/Calf Operation by Size of Operation.

	Size of Operation, number of head						
	1-49	50-99	100-499	500-999	1000-1999	2000-4999	5,000+
Animals Bought and Number of Reads							
Average cattle bought	6	18	44	135	135	135	135
Animals sold through auction, %	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%
Non-auction cattle bought, head	1.8	5.5	13.3	41.2	41.2	41.2	41.2
Misread percentage	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%
Total reads of electronic tags	1.8	5.7	13.6	42.3	42.3	42.3	42.3
RFID System is:	Outsourced	Outsourced	Outsourced	Outsourced	Outsourced	Outsourced	Outsourced
RFID capital cost per read	$4.35	$1.96	$1.62	$1.14	$1.14	$1.14	$1.14
Labor/chute costs per read	$1.38	$0.47	$0.22	$0.17	$0.17	$0.17	$0.17
Shrink/injury cost per read	$0.22	$0.08	$0.04	$0.02	$0.02	$0.02	$0.02
Total RFID cost, $/read	$5.95	$2.51	$1.88	$1.33	$1.33	$1.33	$1.33
Total RFID cost, $/operation	$11	$14	$26	$56	$56	$56	$56

APPENDIX A4.2: DAIRY OPERATIONS

Table A4.2.1 Number of Dairy Operations and Inventory and Production Levels by Size of Operation.

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
Number of operations	33,435	20,980	9,325	4,555	1,700	920	595
Percent of operations currently tagging	86.50%	86.50%	86.50%	86.50%	86.50%	86.50%	86.50%
Average herd size, head	20.3	67.2	131.6	299.6	673.4	1,323.90	3,555.50
Bulls in herd, 500+ 17, Dairy 9	0.2	0.7	1.4	3.2	7.3	14.3	38.3
Calves per cow, %	92.50%	92.50%	90.10%	90.10%	86.30%	86.30%	86.30%
Calving rate adjusted for twinning, %	89.50%	89.50%	87.20%	87.20%	83.50%	83.50%	83.50%
Calf death loss before 48 hours, %	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Calf death loss after 48 hours, %	8.30%	8.30%	9.20%	9.20%	6.50%	6.50%	6.50%
Replacements retained, %	44.80%	44.80%	44.80%	44.80%	44.80%	44.80%	44.80%
Replacement animals, head	9.1	30.1	59	134.3	301.8	593.4	1,593.70
Cow death (disappearance) loss, %	4.80%	4.80%	5.80%	5.80%	6.10%	6.10%	6.10%
Cull rate, %	24.10%	24.10%	23.70%	23.70%	23.40%	23.40%	23.40%
Cows culled, head	4.9	16.2	31.2	71	157.6	309.8	832
Bulls culled, head	0.1	0.2	0.4	0.8	1.8	3.6	9.6
Total animals sold, head	11.8	39.2	72.5	165.1	363.1	714	1,917.40
Calves born and at 48 hours, head	18.1	60.2	114.8	261.2	562.3	1,105.50	2,968.80
Calves dead after 48 hours, head	1.6	5.3	11.3	25.7	39.1	76.9	206.4
Total calves available for sale, head	16	53	100	227.6	505.6	994	2,669.50

Table A4.2.2 Tags and Tag Applicators per Dairy Operation by Size of Operation that Currently Tags Cattle.

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
Number of calves to retag, head	0.4	1.3	2.5	5.7	12.6	24.9	66.7
Number of cows and bulls to retag, head	0.5	1.7	3.3	7.6	17	33.5	89.8
Total tags purchased	19.1	63.2	120.6	274.5	591.9	1,163.80	3,125.40
Tag loss rate, %	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
RFID button tag cost, $/tag	$2.50	$2.30	$2.20	$2.10	$2.00	$2.00	$2.00
Total RFID tag cost, $/operation	$51	$157	$286	$621	$1,276	$2,508	$6,735
RFID tag applicator cost, $/unit	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83
Number of tag applicators	1	1	2	3	4	5	6
Years of RFID tag applicator	4	4	4	4	4	4	4
Annual cost of tag applicator, $/operation	$4	$4	$7	$11	$14	$18	$21

Table A4.2.3 Tags and Tag Applicators Required per Dairy Operation by Size of Operation Currently Not Tagging Cattle.

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
Number of calves to retag, head	0	0	0	0	0	0	0
Number of cows and bulls to retag, head	0	0	0	0	0	0	0
Total tags purchased	11.8	39.2	72.5	165.1	363.1	714	1,917.40
Tag loss rate, %	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
RFID button tag cost, $/tag	$2.50	$2.40	$2.30	$2.20	$2.10	$2.00	$2.00
Total RFID tag cost, $/operation	$32	$101	$180	$391	$822	$1,539	$4,132
RFID tag applicator cost, $/unit	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83
Number of tag applicators	0	0	0	0	0	0	0
Years of RFID tag applicator	4	4	4	4	4	4	4
Annual cost of tag applicator, $/operation	$0	$0	$0	$0	$0	$0	$0

Table A4.2.4 Tagging-Related (Working) Costs per Dairy Operation by Size of Operation that Currently Tags Cattle.

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
RFID Tag Labor Cost							
Labor rate, $/hour	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80
Time to tag 2X / animal, seconds	30	30	30	30	30	30	30
Cost of tagging animal 2X, $/head	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08
Cost of tagging, $/operation	$2	$5	$10	$23	$49	$97	$261
Labor and Chute Costs							
Setup time for retag, hours	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Hours required to re-tag / sort	0.27	0.31	0.36	0.49	0.79	1.32	3.12
Number of employees	1	1	1	1	1	1	1
Labor cost to retag, $/operation	$3	$3	$4	$5	$8	$14	$33
Chute charge, $/head	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00
Total chute cost, $/operation	$1	$3	$6	$13	$30	$58	$157
Cattle Shrink Costs							
Average calf weight, lbs/head	524	524	524	524	524	524	524
Shrink, lbs/head	0	0	0	0	0	0	0
Average calf price, $/lb	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Average cow weight, lbs/head	1,274	1,274	1,274	1,274	1,274	1,274	1,274
Shrink, lbs/head	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Average cow price, $/lb	$0.45	$0.45	$0.45	$0.45	$0.45	$0.45	$0.45
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Total shrink costs, $/operation	$0	$0	$1	$2	$5	$9	$25
Miscellaneous Costs							
Human injury, $/operation	$0	$1	$1	$2	$4	$7	$19
Animal injury, $/operation	$0	$0	$1	$2	$5	$9	$25
Total Working Costs, $/operation	$6	$13	$22	$48	$101	$195	$520

Table A4.2.5 Tagging-Related (Working) Costs per Dairy Operation by Size of Operation Currently Not Tagging Cattle.

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
RFID Tag Labor Cost							
Labor rate, $/hour	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80
Time to tag 2X / animal, seconds	0	0	0	0	0	0	0
Cost of tagging animal 2X, $/head	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Cost of tagging, $/operation	$0	$0	$0	$0	$0	$0	$0
Labor and Chute Costs							
Setup time for retag, hours	0	0	0	0	0	0	0
Hours required to re-tag / sort	0	0	0	0	0	0	0
Number of employees	0	0	0	0	0	0	0
Labor cost to retag, $/operation	$0	$0	$0	$0	$0	$0	$0
Chute charge, $/head	$2.54	$2.54	$2.54	$2.54	$2.54	$2.54	$2.54
Total chute cost, $/operation	$30	$100	$185	$420	$924	$1,817	$4,878
Cattle Shrink Costs							
Average calf weight, lbs/head	524	524	524	524	524	524	524
Shrink, lbs/head	0	0	0	0	0	0	0
Average calf price, $/lb	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Average cow weight, lbs/head	1,274	1,274	1,274	1,274	1,274	1,274	1,274
Shrink, lbs/head	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Average cow price, $/lb	$0.45	$0.45	$0.45	$0.45	$0.45	$0.45	$0.45
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Total shrink costs, $/operation	$2	$5	$10	$22	$49	$97	$260
Miscellaneous Costs							
Human injury, $/operation	$0	$0	$0	$0	$0	$0	$0
Animal injury, $/operation	$2	$6	$12	$26	$58	$114	$305
Total Working Costs, $/operation	$34	$111	$206	$469	$1,031	$2,027	$5,444

Table A4.2.6 Costs Associated with Reading Tags per Dairy Operation by Size of Operation.

	Size of Operation, number of head						
	1-49	50-99	100-199	200-499	500-999	1,000-1,999	2000+
Animals Bought and Number of Reads							
Average cattle bought	3	10	19	44	134	264	710
Animals sold through auction, %	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%
Non-auction cattle bought, head	0.9	2.9	5.9	13.4	40.9	80.3	215.7
Misread percentage	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%
Total reads of electronic tags	23.8	78.9	154.7	352.2	802.9	1,578.60	4,239.50
RFID System is:	Outsourced	Outsourced	Outsourced	Outsourced	Owned	Owned	Owned
RFID capital cost per read	$1.26	$0.96	$0.90	$0.88	$0.64	$0.33	$0.13
Labor/chute costs per read	$0.26	$0.20	$0.14	$0.13	$0.12	$0.12	$0.12
Shrink/injury cost per read	$0.04	$0.03	$0.02	$0.02	$0.02	$0.02	$0.02
Total RFID cost, $/read	$1.57	$1.18	$1.05	$1.03	$0.78	$0.46	$0.26
Total RFID cost, $/operation	$37	$93	$163	$362	$622	$732	$1,106

APPENDIX A4.3: BACKGROUNDING OPERATIONS

Table A4.3.1 Number of Backgrounding Operations and Inventory and Production Levels by Size of Operation.

	Operation Size Category						
	1	2	3	4	5	6	7
Number of operations	21,438	11,334	6,333	4,333	3,329	2,316	1,787
Average animals purchased, head	30.5	103.7	345.3	496.4	722	1,452.60	2,963.30
Death loss, %	1.30%	1.30%	1.30 %	1.30 %	1.30 %	1.30%	1.30%
Total calves available for sale, head	30.2	102.3	340.8	490	712.6	1,433.70	2,924.80

Table A4.3.2 Tags and Tag Applicators Required per Backgrounding Operation by Size of Operation

	Operation Size Category						
	1	2	3	4	5	6	7
Average animals purchased, head	30.5	103.7	345.3	496.4	722	1,452.60	2,963.30
Tag loss rate, %	2.50%	2.50%	2.50 %	2.50 %	2.50 %	2.50%	2.50%
Number of calves to retag, head	0.8	2.6	8.5	12.2	17.8	35.8	73.1
Total tags purchased	0.8	2.6	8.5	12.2	17.8	35.8	73.1
RFID button tag cost, $/tag	$2.50	$2.50	$2.50	$2.50	$2.50	$2.40	$2.30
Total RFID tag cost, $/operation	$5	$13	$28	$38	$55	$98	$184
RFID tag applicator cost, $/unit	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83
Number of tag applicators	1	2	2	2	3	3	3
Years of RFID tag applicator	4	4	4	4	4	4	4
Annual cost of tag applicator, $/operation	$3	$6	$6	$6	$9	$9	$9

Table A4.3.3 Tagging-Related (Working) Costs per Backgrounding Operation by Size of Operation.

	Operation Size Category						
	1	2	3	4	5	6	7
RFID Tag Labor Cost							
Labor rate, $/hour	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80
Labor and Chute Costs							
Setup time for retag, hours	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Hours required to re-tag / sort	0.26	0.3	0.41	0.47	0.58	0.91	1.59
Number of employees	2	2	2	3	3	3	4
Labor cost to retag, $/operation	$5	$6	$8	$14	$17	$27	$62
Chute charge, $/head	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00
Total chute cost, $/operation	$1	$3	$9	$12	$18	$36	$73
Cattle Shrink Costs							
Average calf weight, lbs/head	700	700	700	700	700	700	700
Shrink, lbs/head	2.75	2.75	2.75	2.75	2.75	2.75	2.75
Average calf price, $/lb	$1.09	$1.09	$1.09	$1.09	$1.09	$1.09	$1.09
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%
Total shrink costs, $/operation	$1	$2	$6	$9	$13	$27	$55
Miscellaneous Costs							
Human injury, $/operation	$0	$0	$1	$1	$1	$2	$4
Animal injury, $/operation	$0	$0	$1	$2	$3	$6	$12
Total Working Costs, $/operation	$7	$11	$25	$38	$52	$97	$206

Table A4.2.4 Costs Associated with Reading Tags per Backgrounding Operation by Size of Operation.

	Operation Size Category						
	1	2	3	4	5	6	7
Animals Bought and Number of Reads							
Average cattle bought	30.5	103.7	345.3	496.4	722	1,452.60	2,963.30
Animals sold through auction, %	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%
Non-auction cattle bought, head	9.3	31.5	105	150.9	219.5	441.6	900.8
Misread percentage	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%
Total reads of electronic tags	10.7	36.4	121.4	174.5	253.8	510.6	1,041.50
RFID System is:	Outsourced	Outsourced	Outsourced	Outsourced	Outsourced	Outsourced	Owned
RFID capital cost per read	$1.61	$1.13	$0.99	$0.97	$0.95	$0.93	$0.84
Labor/chute costs per read	$0.22	$0.23	$0.25	$0.24	$0.29	$0.28	$0.29
Shrink/injury cost per read	$0.24	$0.23	$0.22	$0.22	$0.22	$0.22	$0.22
Total RFID cost, $/read	$2.07	$1.59	$1.47	$1.43	$1.46	$1.44	$1.35
Total RFID cost, $/operation	$22	$58	$178	$249	$371	$736	$1,407

Table A4.3.1 Number of Feedlot Operations and Inventory and Production Levels by Size of Operation.

	Size of Operation, feedlot capacity (head)								
	1-999	1000-1999	2000-3999	4000-7999	8000-15999	16000-23999	24000-31999	32000-49999	50000+
Number of operations	85,000	809	564	343	182	78	55	71	58
Fed cattle marketings, head	43.5	964.2	2,473.40	5,755.10	13,928.60	27,769.20	42,345.50	61,633.80	118,982.80
Disappearance, %	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Estimated placements, head	44.9	994	2,549.90	5,933.10	14,359.40	28,628.10	43,655.10	63,540.00	122,662.60
Death loss, %	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%	1.30%
Total fed cattle marketed, head	44.3	981.1	2,516.80	5,856.00	14,172.70	28,255.90	43,087.60	62,714.00	121,068.00

Table A4.3.2 Tags and Tag Applicators Required per Feedlot Operation by Size of Operation.

	Size of Operation, feedlot capacity (head)								
	1-999	1000-1999	2000-3999	4000-7999	8000-15999	16000-23999	24000-31999	32000-49999	50000+
Estimated placements, head	44.9	994	2,549.90	5,933.10	14,359.40	28,628.10	43,655.10	63,540.00	122,662.60
Tag loss rate, %	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
Number of calves to retag, head	1.1	24.5	62.9	146.4	354.3	706.4	1,077.20	1,567.80	3,026.70
Total tags purchased	1.1	24.5	62.9	146.4	354.3	706.4	1,077.20	1,567.80	3,026.70
RFID button tag cost, $/tag	$2.50	$2.50	$2.30	$2.20	$2.10	$2.00	$2.00	$2.00	$2.00
Total RFID tag cost, $/operation	$6	$73	$165	$349	$788	$1,482	$2,253	$3,272	$6,303
RFID tag applicator cost, $/unit	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83	$11.83
Number of tag applicators	1	3	5	5	5	5	5	5	5
Years of RFID tag applicator	4	4	4	4	4	4	4	4	4
Annual cost of tag applicator, $/operation	$3	$9	$15	$15	$15	$15	$15	$15	$15

Table A4.3.3 Tagging-Related (Working) Costs per Feedlot Operation by Size of Operation.

	Size of Operation, feedlot capacity (head)								
	1-999	1000-1999	2000-3999	4000-7999	8000-15999	16000-23999	24000-31999	32000-49999	50000+
RFID Tag Labor Cost									
Labor rate, $/hour	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80	$9.80
Labor and Chute Costs									
Setup time for retag, hours	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Hours required to re-tag / sort	0.27	0.7	1.4	2.93	6.75	13.2	20	28.99	55.74
Number of employees	3	3	4	5	6	6	6	6	6
Labor cost to retag, $/operation	$8	$21	$55	$144	$397	$776	$1,176	$1,705	$3,277
Chute charge, $/head	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00	$1.00
Total chute cost, $/operation	$1	$25	$63	$146	$354	$706	$1,077	$1,568	$3,027
Cattle Shrink Costs									
Average calf weight, lbs/head	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Shrink, lbs/head	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Average calf price, $/lb	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95	$0.95
Percent of price to assign to shrink	25%	25%	25%	25%	25%	25%	25%	25%	25%
Total shrink costs, $/operation	$1	$19	$49	$113	$275	$547	$835	$1,215	$2,345
Miscellaneous Costs									
Human injury, $/operation	$1	$1	$4	$10	$26	$52	$78	$113	$218
Animal injury, $/operation	$0	$4	$10	$23	$56	$112	$172	$250	$482
Total Working Costs, $/operation	$11	$69	$180	$436	$1,108	$2,194	$3,338	$4,851	$9,349

Table A4.3.4 Costs Associated with Reading Tags per Feedlot Operation by Size of Operation.

	Size of Operation, feedlot capacity (head)								
	1-999	1000-1999	2000-3999	4000-7999	8000-15999	16000-23999	24000-31999	32000-49999	50000+
Animals Bought and Number of Reads									
Average cattle bought	44.9	994	2,549.9	5,933.1	14,359.4	28,628.1	43,655.1	63,540.0	122,662.6
Animals sold through auction, %	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%	69.60%
Non-auction cattle bought, head	13.6	302.2	775.2	1,803.7	4,365.2	8,702.9	13,271.2	19,316.2	37,289.4
Misread percentage	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%	2.80%
Total reads of electronic tags	15.8	349.4	896.2	2,085.3	4,678.0	9,326.5	14,222.0	20,700.1	39,961.1
RFID System is:	Outsourced	Outsourced	Outsourced	Owned	Owned	Owned	Owned	Owned	Owned
RFID capital cost per read	$1.44	$0.95	$0.93	$0.46	$0.45	$0.27	$0.20	$0.17	$0.12
Labor/chute costs per read	$0.31	$0.35	$0.34	$0.34	$0.31	$0.31	$0.31	$0.30	$0.30
Shrink/injury cost per read	$0.26	$0.24	$0.24	$0.24	$0.15	$0.15	$0.15	$0.15	$0.15
Total RFID cost, $/read	$2.00	$1.53	$1.51	$1.04	$0.91	$0.73	$0.66	$0.62	$0.58
Total RFID cost, $/operation	$32	$534	$1,352	$2,163	$4,264	$6,764	$9,396	$12,880	$23,237

APPENDICES A8: GOVERNMENT COSTS

APPENDIX A8.1: LIST OF INDIVIDUALS CONTACTED/INTERVIEWED

List of Individuals Contacted/Interviewed:

Federal Government Personnel:

- Diana Darnell – USDA-APHIS (based in Milo, MI)
- Dr. Tom Flynn – DVM, USDA-APHIS
- Dr. Neil Hammerschmidt – USDA-APHIS
- Dr. Tom Kasari – USDA-APHIS
- Dr. David Morris – USDA-APHIS
- Randy Munger – DVM, USDA-APHIS (based in Fort Collins, CO)
- Dr. John Wiemers – USDA-APHIS

Individual State Contacts:

- Dr. Paul Anderson – Minnesota Board of Animal Health
- Matthew Ankney – Interagency Bovine TB Eradication Coordinator, Michigan Department of Agriculture
- Roberta Bailey – Accountant, Michigan Department of Agriculture
- Delores Clausen – Animal ID Coordinator, Iowa Department of Agriculture and Land Stewardship Animal Industry
- Linda Cope – Animal ID Integration Analyst, Idaho State Department of Agriculture
- Kenny Edgar – Animal ID Coordinator, Texas Animal Health Commission
- Dr. Charlie Hatcher – Animal ID Coordinator, Tennessee Department of Agriculture
- Dr. Dave Fly – New Mexico State Veterinarian, New Mexico Livestock Board
- Charles Gann – Animal ID Coordinator, Arkansas Livestock & Poultry Commission
- John Heller – Former Animal ID Coordinator, Colorado Department of Agriculture
- Kevin Kirk – Special Assistant to the Division Director, Michigan Department of Agriculture
- Brad Klaassen – Animal ID Coordinator, Oklahoma Department of Agriculture, Food, and Forestry
- Paul McGraw – DVM, Assistant State Veterinarian, Wisconsin Department of Agriculture, Trade, and Consumer Protection
- Doug Metcalf – Chief of Staff, Indiana Board of Animal Health

- Penny Page – Animal ID Coordinator, North Carolina Department of Agriculture
- Ted Radintz – Animal Health Response Outreach Coordinator, Minnesota Department of Agriculture
- Brian Rickard – Animal ID Coordinator, Kansas Animal Health Department
- Dr. Dan Robb – DVM, Michigan Department of Agriculture
- Ray Scheierl – State of Minnesota
- Victor Velez – California Department of Food and Agriculture

Appendix A8.2: Survey of Select Animal ID Coordinators

The following email message was sent on August 29th to animal ID coordinators/leaders in fourteen states (included in Appendix 8.1).

I have one more request for your IMMEDIATE attention to kindly make of you as I wrap up the national NAIS benefit/cost assessment.

Attached is a short, 8 question survey that I would like you to complete. I am using this as a follow-up to diverse discussions I have had over the past few months. This will help me get answers to some standardized questions and hence improve our analysis.

As in our phone discussions, I will not report individual results, or provide direct citations on comments; rather I will present summary statistics of the entire set of responses I receive. Please also provide any comments/background that you feel might be useful in interpreting your responses. Moreover, if you have specific values for each multiple-choice question, please provide them as well.

While I don't typically do this, I would like for you to respond to this by next Tuesday (September 2nd) if at all possible as I am required to submit my report by next Thursday. Accordingly, please complete it and return to me electronically I don't believe the survey will take much of your time.

Thanks again for your assistance and enjoy your weekend, Glynn

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Glynn T. Tonsor
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Phone: 517-353-9848
Fax: 517-432-1800

The survey document contained the following set of questions:

PREMISES REGISTRATION QUESTIONS:

1. *How many new applications for NAIS premises registration can your office typically process in one hour?*

a. *Please choose one of the following ranges that best encompasses your professional assessment:*

i. *0-20*
ii. *21-40*
iii. *41-60*
iv. *61-80*
v. *81-100*
vi. *101-120*
vii. *Over 120*

2. *What is the frequency of premises registration applications that contain some sort of error or omission requiring follow-up investigations?*

For hard-copy applications

i. *0%-5% frequency*
ii. *6%-10% frequency*
iii. *11-15% frequency*
iv. *16-20% frequency*
v. *Over 20 %*

For internet-based applications

i. *0%-5% frequency*
ii. *6%-10% frequency*
iii. *11-15% frequency*
iv. *16-20% frequency*
v. *Over 20 %*

3. *What do you believe is the cost (including all costs of efforts related to soliciting new applications, processing applications, addressing application errors/omissions, etc.) of currently establishing new premises in your state?*

a. *Please choose one of the following ranges:*

i. *$0/premise - $15/premise*
ii. *$16/premise - $30/premise*

iii. $31/premise - $45/premise
iv. $46/premise - $60/premise
v. $61/premise - $75/premise
vi. $76/premise - $90/premise
vii. Over $90/premise

4. Assume tomorrow you were provided the necessary funds, with the intent of enhancing premises registration rates in your state, to conduct an extensive mass mailing effort to all known individuals within your state that have not yet registered their premises (but are suspected to have premises that ideally would be registered with NAIS). What do you believe would be overall response?
a. 0-10% of those contacted would register their premises
b. 11-20% of those contacted would register their premises
c. 21-30% of those contacted would register their premises
d. 31-40% of those contacted would register their premises
e. Over 40% of those contacted would register their premises

BUDGET QUESTIONS:

5. Approximately what portion of the funds received in the USDA cooperative agreements your state has received to date were used primarily for registration activities?
a. Please choose one of the following ranges:
i. 0-20%
ii. 21%-40%
iii. 41%-60%
iv. 61%-80%
v. 81%-100%

6. Looking forward over the next three years, what portion of your state's NAIS related activities do you expect to be focused on premises registration?
a. Please choose one of the following ranges:
i. 0-20%
ii. 21%-40%
iii. 41%-60%
iv. 61%-80%
v. 81%-100%

USE OF NAIS INFORMATION:

7. *If tomorrow a livestock disease was identified in your state, to what extent would you use information available to you through your state's current participation in the national NAIS system?*

a. *Please choose the most appropriate response:*
i. *Not at all, I would not use NAIS information*
ii. *I would use NAIS information, but less than other in-state resources*
iii. *I would use NAIS information more than other in-state resources*
iv. *I would rely almost exclusively on NAIS information*

8. *Continuing with the prior question, if a livestock disease was identified in your state, how long do you believe it would currently take to notify all livestock producers operating within the following distances of the outbreak?*

a. *WITHIN 15 miles:*
i. *less than 1 hour*
ii. *1-5 hours*
iii. *6-12 hours*
iv. *13-24 hours*
v. *25-48 hours*
vi. *49-96 hours*
vii. *5-7 days*
viii. *Over 1 week*

b. *WITHIN 30 miles:*
i. *less than 1 hour*
ii. *1-5 hours*
iii. *6-12 hours*
iv. *13-24 hours*
v. *25-48 hours*
vi. *49-96 hours*
vii. *5-7 days*
viii. *Over 1 week*

Thanks again for your assistance in making this project more complete,
Glynn Tonsor

Appendices A9: Modeling Market Effects of Animal Identification

Appendix A9.1: Stochastic Equilibrium displacement models

Elasticity-based computable equilibria (equilibrium displacement models) or partial equilibria models are commonly used when assessing the effects and/or the costs of potential changes in economic policy or structure. Elasticity-based computable equilibria models are attractive in that they are obtained by simple manipulation or row operations of differential approximations to economic models and are accurate to the degree that the underlying system can be linearly approximated (Davis and Espinoza, 1998; Brester, Marsh, and Atwood, 2004).

In economic modeling, the system's actual parameters are usually unknown and must be estimated or assumed. Most studies use some combination of assumed, previously published, and/or statistically estimated shares and elasticities. In all cases, it should be recognized that uncertainty exists with respect to the model's actual parameters and, as a result, with respect to the policy effects derived using estimated parameters. Davis and Espinoza (1998) illustrate the importance of examining the sensitivity of changes in prices and quantities (as well as producer and consumer surplus) relative to variations in selected elasticity estimates. Also, as a practical matter, the amount of uncertainty with respect to model parameters may vary across parameters. For example, if a number of researchers and statistical methodologies have obtained similar estimates for a given elasticity, the degree of uncertainty with respect to the given elasticity will be less than for a parameter for which published estimates have varied widely across researchers and methodologies.

An additional complication in policy models is that subsets of the model's economic parameters are likely to be correlated, non-normally distributed, and possibly intractable. For example, elasticities of supply in a vertically structured model might be positively correlated and restricted to be positive, while own-demand elasticities might be positively

correlated and restricted to be negative (Davis and Espinoza, 1998). Brester, Marsh, and Atwood (2004) use Monte Carlo simulations of an equilibrium displacement model in which elasticities among vertical demand and supply sectors are correlated.

As indicated below, if independent marginal distributions of a model's parameters can be approximated, Monte Carlo simulation techniques can be used to introduce correlation between marginal pseudo-samples from possibly widely divergent statistical families of distributions. However, in such cases, the common methods for generating correlated multivariate normal random variates are inappropriate if applied directly to the marginal pseudo-samples themselves.

We use a variant of the Iman-Conover (1982) process for generating correlated random variables. The Iman-Conover process is attractive in that marginal distributions can be simulated independently from most continuous distributions. Each of the independently generated marginal samples is then merely reordered to obtain a rank correlation similar to the desired correlation structure. The Iman-Conover process is straightforward and easy to implement in most common spreadsheets and statistical packages. The following examples were developed in "R"—a free public source statistical modeling software package.

We first demonstrate why traditional procedures for generating correlated multivariate normal random variates are inappropriate for a general set of marginal distributions. We then demonstrate the use of Iman-Conover procedures for introducing correlation while preserving all marginal pseudo-samples.

A9.1.1 Generating Multivariate Normal Pseudo-Samples

The most commonly used procedures for generating correlated multivariate normal samples exploit the fact that linear combinations of normal random variates are themselves normally distributed. Assume that an n by k multivariate normal "sample" Z_C with covariance matrix Σ is desired. A common procedure to generate such a sample matrix is to initially populate an n by k matrix Z_I with randomly and independently generated normal (0,1) random variates. If the random variates in Z_I are independently generated, the expected covariance matrix of Z_I is a k by k

identity matrix I_1. However, for finite samples the realized sample covariance matrix is computable as

$$\hat{\Sigma}_{Z_1} = Z_1' \left[\frac{1}{n-1} \left(I_n - \frac{1}{n} \underline{1}_n \underline{1}_n' \right) \right] Z_1 \hat{C} Z_1 \qquad \text{(A9.1)}$$

and may not equal I_k. In the above expression, $\underline{1}_n$ is an n by 1 vector with each element equal to 1, and $\hat{C}$ is the sample covariance operator. Procedures similar to those presented in Greene (2003) can be used to easily demonstrate that $Y' \hat{C} Y$ is the sample covariance matrix of any corresponding sample matrix Y.

Before proceeding, we apply an Iman-Conover "whitening" process by factoring $\hat{\Sigma}_{Z_1} = U'U$ using a Cholesky or similar factorization algorithm. If Z_1 was generated randomly, the matrix U will be nonsingular and a "whitened" sample matrix Z_W can be constructed as $Z_W = Z_1 U^{-1}$. Because the columns of Z_W are linear combinations of the columns of Z_1, the n by k sample Z_W will be multivariate normal with sample covariance matrix:

$$\hat{\Sigma}_{Z_W} = Z_W' \hat{C} Z_W = \left(U^{-1}\right)' Z_1' \hat{C} Z_1 U^{-1} = \left(U^{-1}\right)' \hat{\Sigma}_{Z_1} U^{-1} = \left(U'\right)^{-1} U' U U^{-1} = I_k. \qquad \text{(A9.2)}$$

Obtaining a multivariate normal sample Z_C with sample covariance matrix Σ is accomplished by factoring $\Sigma = V'V$ and generating $Z_C = Z_W V$, which has sample covariance matrix:

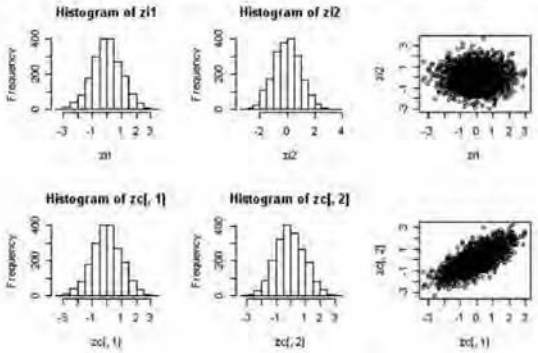
$$\hat{\Sigma}_{Z_C} = Z_C' \hat{C} Z_C = V' Z_W' \hat{C} Z_W V = V' \hat{\Sigma}_{Z_W} V = V'V = \Sigma. \qquad \text{(A9.3)}$$

Because each column of Z_C is generated as linear combinations of the columns of Z_W, the columns in Z_C are distributed multivariate normal while having a sample covariance equal to the desired covariance matrix Σ. The panels in figure A9.1 plot the results of applying the above process with 2,000 observations on two normal variates with a target correlation of 0.7. The top three panels are histograms and a joint scatter plot of the two independently generated normal (0,1) variates. The bottom three panels in Figure A9.1 present histograms and a joint scatter plot of the two marginals after the above transformations were applied. The resulting correlation between the two marginals is 0.7.

In the following discussion we return to the multivariate normal matrix Z_C because it is integral to the variant of the Iman-Conover procedure that

we use. In the next section, we demonstrate why the above process for generating correlated random variables (taking linear combinations of independently generated marginals) is not appropriate when working with nonadditively regenerative marginal distributions.

Figure A9.1. Plots of Normally Random Variates Before and After Transformation



A.9.1.2 Linear Combinations of Nonregenerative Distributions

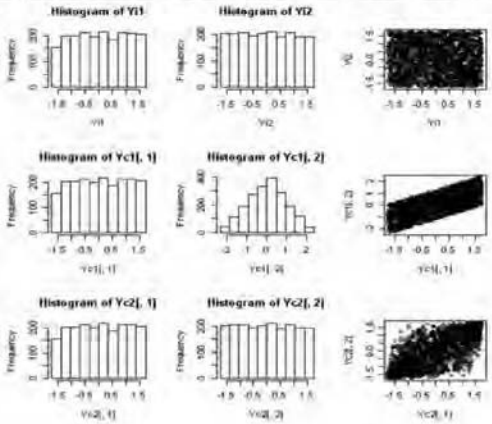
The top three panels in Figure A9.2 present histograms and a joint scatter plot from a 2,000 by 2 bivariate pseudo-sample Y_1 generated as two independent *uniform* $-\sqrt{3}, \sqrt{3}$ distributions with mean 0 and variance 1. The histograms and scatter plot of the marginal distributions indicate that the pseudo-samples appear to be uniformly and independently distributed over the $-\sqrt{3}, \sqrt{3}$ interval.

Assume that a correlated bivariate uniform distribution is desired with correlation 0.7. Because the uniform distribution is not additively regenerative, generating correlated variates using the Cholesky decomposition weighted-average procedure destroys the original marginal distributions. The middle three panels in Figure A9.2 demonstrate this result. With a bivariate distribution, the Cholesky decomposition transformation leaves the first marginal unchanged. However, the second variate is reconstructed as a linear combination of

both the original marginal samples. The second histogram in the middle set of panels clearly shows that the resulting variate is not uniformly distributed although the correlation between the two transformed random variates is 0.7. The scatter plot of the joint observations is presented in the third panel of Figure A9.2.

The results of applying the Iman-Conover process to the uniform marginal samples are presented in the third panel of plots in Figure A9.2.[17]

Figure A-2. Results of Generating Correlated Uniform Random Variates



[17] As we indicate above, the Iman-Conover process can easily be implemented in Excel or other programming environments. Following is R code that can be used to compute the reordered correlated pseudo-sample. The user calls the function with the Y_I and SIGMA matrices. The function returns the correlated Y_C sample matrix.

```
ImanConover=function(yi,sigma) {
yc=yi
ydim=dim(yi)          # record the dimension of the Yi matrix
zi=matrix(rnorm(ydim[1]*ydim[2]),ydim[1],ydim[2])  # populate the normal(0,1) Zi matrix
zc=(zi %*% (solve(chol(cov(zi))))) %*% (chol(sigma))  # create the correlated Zc matrix
for (j in 1:ncols) {
 ys=sort(yi[,j])
 yc[,j]=ys[rank(zc[,j])]          # create the correlated Yc matrix
 }
yc
   }
```

Because the Iman-Conover process merely involves reordering the original marginal pseudo-sample, the process has clearly not affected the histograms of the marginal distributions. The Pearson correlation of the transformed variates for this example is about 0.695. The third plot in panel three is a scatter plot of the joint distribution after the reordering process.

The Iman-Conover process can easily be used to generate correlated random variables over a wide range of possible functional forms for the marginal distributions in an economic policy simulation model.

Appendix A9.2: Consumer/Producer surplus changes under various levels of Animal ID system adoption and demand Changes

Table A9.2.1. Producer and Consumer Surplus Changes from 30% Adoption of a Full Animal Identification/Tracing Program.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-9.91	-0.12	-134.03	-112.66	-0.038%
Wholesale Beef	-35.51	-0.62	-210.97	-178.39	-0.107%
Slaughter Cattle	-139.42	-1.73	-489.86	-423.79	-0.214%
Feeder Cattle	-143.55	-3.39	-478.26	-417.24	-0.264%
Total Beef Producer Surplus	-332.15	-5.84	-1,304.29	-1,115.00	-0.243%
Retail Pork	14.59	-0.05	36.65	33.06	0.028%
Wholesale Pork	3.28	-0.23	6.26	5.98	0.010%
Slaughter Hog	1.52	-0.47	-1.51	-0.47	-0.001%
Total Pork Producer Surplus	19.49	-0.75	41.00	38.63	0.016%
Retail Domestic Lamb	1.19	-0.01	1.18	1.25	0.032%
Wholesale Lamb	0.17	-0.01	-0.80	-0.56	-0.034%
Slaughter Lamb	-0.42	-0.06	-3.00	-2.40	-0.153%
Feeder Lamb	-2.67	-0.08	-9.80	-8.49	-0.485%
Total Lamb Producer Surplus	-1.73	-0.16	-12.25	-10.12	-0.112%
Retail Poultry	41.95	0.01	92.28	83.63	0.045%
Wholesale Poultry	30.18	-0.01	71.04	64.47	0.037%
Total Poultry Producer Surplus	72.05	0.00	161.94	146.66	0.041%
Total Meat Producer Surplus	-243.94	-6.80	-1,109.90	-947.86	-0.119%
Consumer Surplus					
Retail Beef	-136.70	-0.55	-409.41	-360.75	-0.112%
Retail Pork	3.33	-0.23	9.90	8.87	0.004%
Retail Domestic Lamb	-2.86	-0.02	-9.27	-8.13	-0.175%
Retail Imported Lamb	3.80	0.02	10.83	9.61	0.107%
Retail Poultry	-0.46	0.04	18.61	15.49	0.004%
Total Meat Consumer Surplus	-129.46	-0.76	-378.70	-336.18	-0.027%

Table A9.2.2. Producer and Consumer Surplus Changes from 50% Adoption of a Full Animal Identification/Tracing Program.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-19.00	-0.21	-242.15	-205.58	-0.069%
Wholesale Beef	-64.02	-1.09	-383.90	-326.55	-0.196%
Slaughter Cattle	-245.81	-3.04	-858.36	-745.70	-0.376%
Feeder Cattle	-253.96	-5.97	-843.38	-736.59	-0.466%
Total Beef Producer Surplus	-588.54	-10.28	-2,303.37	-1,967.53	-0.428%
Retail Pork	25.44	-0.08	63.81	57.33	0.048%
Wholesale Pork	5.71	-0.39	11.10	10.54	0.017%
Slaughter Hog	2.69	-0.80	-2.31	-0.53	-0.001%
Total Pork Producer Surplus	33.92	-1.27	72.10	67.63	0.028%
Retail Domestic Lamb	1.98	-0.01	2.01	2.10	0.053%
Wholesale Lamb	0.29	-0.02	-1.34	-0.93	-0.057%
Slaughter Lamb	-0.70	-0.09	-5.00	-4.01	-0.256%
Feeder Lamb	-4.45	-0.14	-16.31	-14.05	-0.809%
Total Lamb Producer Surplus	-2.85	-0.26	-20.40	-16.84	-0.187%
Retail Poultry	73.02	0.01	159.98	145.24	0.079%
Wholesale Poultry	52.30	-0.02	123.58	112.07	0.064%
Total Poultry Producer Surplus	125.39	-0.01	282.19	256.42	0.071%
Total Meat Producer Surplus	-434.81	-11.92	-1,968.97	-1,677.80	-0.212%
Consumer Surplus					
Retail Beef	-240.60	-0.97	-717.43	-636.20	-0.197%
Retail Pork	5.89	-0.39	17.47	15.79	0.008%
Retail Domestic Lamb	-4.76	-0.03	-15.42	-13.55	-0.292%
Retail Imported Lamb	6.36	0.03	18.12	16.13	0.180%
Retail Poultry	-1.10	0.07	31.55	26.15	0.006%
Total Meat Consumer Surplus	-227.89	-1.33	-658.96	-586.86	-0.048%

Table A9.2.3. Producer and Consumer Surplus Changes from 70% Adoption of a Full Animal Identification/Tracing Program.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-35.39	-0.34	-408.54	-346.87	-0.117%
Wholesale Beef	-105.18	-1.71	-630.50	-534.45	-0.326%
Slaughter Cattle	-396.21	-4.77	-1,373.30	-1,181.33	-0.603%
Feeder Cattle	-398.55	-9.70	-1,308.38	-1,159.81	-0.733%
Total Beef Producer Surplus	-940.97	-16.47	-3,702.95	-3,149.67	-0.691%
Retail Pork	39.44	-0.12	99.31	89.22	0.075%
Wholesale Pork	9.01	-0.56	18.33	17.21	0.028%
Slaughter Hog	4.34	-1.16	-1.87	0.57	0.001%
Total Pork Producer Surplus	53.18	-1.84	115.28	107.89	0.044%
Retail Domestic Lamb	2.83	-0.01	2.93	3.09	0.077%
Wholesale Lamb	0.41	-0.03	-1.86	-1.30	-0.080%
Slaughter Lamb	-0.97	-0.13	-7.00	-5.62	-0.357%
Feeder Lamb	-6.22	-0.20	-22.84	-19.68	-1.136%
Total Lamb Producer Surplus	-3.96	-0.37	-28.50	-23.41	-0.261%
Retail Poultry	112.90	0.02	245.51	223.17	0.121%
Wholesale Poultry	80.87	-0.03	190.52	174.04	0.098%
Total Poultry Producer Surplus	194.69	-0.01	438.73	398.11	0.110%
Total Meat Producer Surplus	-706.45	-18.81	-3,157.19	-2,704.56	-0.342%
Consumer Surplus					
Retail Beef	-384.34	-1.52	-1,146.63	-1,015.54	-0.313%
Retail Pork	9.72	-0.56	28.88	26.24	0.013%
Retail Domestic Lamb	-6.67	-0.05	-21.56	-18.96	-0.411%
Retail Imported Lamb	8.98	0.04	25.73	22.80	0.255%
Retail Poultry	-1.62	0.10	48.67	41.06	0.010%
Total Meat Consumer Surplus	-365.15	-2.04	-1,056.77	-936.05	-0.076%

Table A9.2.4. Producer and Consumer Surplus Changes from 50% Adoption of a Premises Registration Program.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	2.22	0.01	6.28	5.61	0.002%
Wholesale Beef	0.29	0.00	1.12	0.97	0.001%
Slaughter Cattle	-0.40	0.00	-0.28	-0.24	0.000%
Feeder Cattle	-0.40	-0.03	-0.40	-0.34	0.000%
Total Beef Producer Surplus	1.58	-0.03	6.17	5.39	0.001%
Retail Pork	0.71	0.00	1.61	1.47	0.001%
Wholesale Pork	0.15	-0.02	0.17	0.18	0.000%
Slaughter Hog	0.05	-0.03	-0.28	-0.19	0.000%
Total Pork Producer Surplus	0.92	-0.05	1.45	1.41	0.001%
Retail Domestic Lamb	0.18	0.00	0.14	0.16	0.004%
Wholesale Lamb	0.03	0.00	-0.17	-0.12	-0.007%
Slaughter Lamb	-0.10	-0.01	-0.61	-0.50	-0.032%
Feeder Lamb	-0.46	-0.01	-1.72	-1.49	-0.085%
Total Lamb Producer Surplus	-0.34	-0.03	-2.35	-1.93	-0.021%
Retail Poultry	2.10	0.00	4.49	4.06	0.002%
Wholesale Poultry	1.55	0.00	3.38	3.08	0.002%
Total Poultry Producer Surplus	3.70	0.00	7.90	7.19	0.002%
Total Meat Producer Surplus	5.55	-0.11	12.97	11.91	0.001%
Consumer Surplus					
Retail Beef	-1.34	0.01	-1.91	-1.82	-0.001%
Retail Pork	0.10	-0.02	0.19	0.18	0.000%
Retail Domestic Lamb	-0.51	-0.01	-1.71	-1.50	-0.032%
Retail Imported Lamb	0.62	0.00	1.86	1.64	0.018%
Retail Poultry	-0.08	0.00	0.68	0.56	0.000%
Total Meat Consumer Surplus	-1.15	0.00	-0.83	-0.87	0.000%

Table A9.2.5. Producer and Consumer Surplus Changes from 50% Adoption of a Bookend Animal Identification Program.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-19.99	-0.18	-205.37	-172.81	-0.058%
Wholesale Beef	-52.22	-0.84	-301.62	-252.85	-0.152%
Slaughter Cattle	-195.84	-2.24	-678.74	-590.99	-0.297%
Feeder Cattle	-186.17	-5.00	-622.94	-545.99	-0.345%
Total Beef Producer Surplus	-458.30	-8.24	-1,785.11	-1,525.54	-0.334%
Retail Pork	19.86	-0.01	51.79	46.35	0.039%
Wholesale Pork	4.97	-0.09	13.32	12.04	0.019%
Slaughter Hog	3.16	-0.18	6.58	6.21	0.010%
Total Pork Producer Surplus	27.78	-0.28	72.07	65.44	0.027%
Retail Domestic Lamb	1.21	-0.01	1.31	1.37	0.034%
Wholesale Lamb	0.18	-0.01	-0.75	-0.54	-0.033%
Slaughter Lamb	-0.41	-0.05	-2.90	-2.34	-0.149%
Feeder Lamb	-2.56	-0.08	-9.44	-8.11	-0.465%
Total Lamb Producer Surplus	-1.59	-0.15	-11.66	-9.63	-0.107%
Retail Poultry	64.22	0.01	126.70	115.24	0.063%
Wholesale Poultry	35.84	0.01	86.62	78.42	0.044%
Total Poultry Producer Surplus	100.56	0.02	213.67	193.17	0.054%
Total Meat Producer Surplus	-335.18	-8.67	-1,512.80	-1,286.46	-0.164%
Consumer Surplus					
Retail Beef	-190.12	-0.76	-563.57	-499.46	-0.154%
Retail Pork	7.01	-0.07	23.46	20.52	0.010%
Retail Domestic Lamb	-2.76	-0.02	-8.97	-7.90	-0.169%
Retail Imported Lamb	3.81	0.02	10.81	9.56	0.107%
Retail Poultry	2.68	0.06	32.94	27.77	0.007%
Total Meat Consumer Surplus	-174.73	-0.77	-500.73	-443.70	-0.036%

Table A9.2.6. Producer and Consumer Surplus Changes from 50% Adoption of a Full Animal Identification/Tracing Program.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-19.00	-0.21	-242.15	-205.58	-0.069%
Wholesale Beef	-64.02	-1.09	-383.90	-326.55	-0.196%
Slaughter Cattle	-245.81	-3.04	-858.36	-745.70	-0.376%
Feeder Cattle	-253.96	-5.97	-843.38	-736.59	-0.466%
Total Beef Producer Surplus	-588.54	-10.28	-2,303.37	-1,967.53	-0.428%
Retail Pork	25.44	-0.08	63.81	57.33	0.048%
Wholesale Pork	5.71	-0.39	11.10	10.54	0.017%
Slaughter Hog	2.69	-0.80	-2.31	-0.53	-0.001%
Total Pork Producer Surplus	33.92	-1.27	72.10	67.63	0.028%
Retail Domestic Lamb	1.98	-0.01	2.01	2.10	0.053%
Wholesale Lamb	0.29	-0.02	-1.34	-0.93	-0.057%
Slaughter Lamb	-0.70	-0.09	-5.00	-4.01	-0.256%
Feeder Lamb	-4.45	-0.14	-16.31	-14.05	-0.809%
Total Lamb Producer Surplus	-2.85	-0.26	-20.40	-16.84	-0.187%
Retail Poultry	73.02	0.01	159.98	145.24	0.079%
Wholesale Poultry	52.30	-0.02	123.58	112.07	0.064%
Total Poultry Producer Surplus	125.39	-0.01	282.19	256.42	0.071%
Total Meat Producer Surplus	-434.81	-11.92	-1,968.97	-1,677.80	-0.212%
Consumer Surplus					
Retail Beef	-240.60	-0.97	-717.43	-636.20	-0.197%
Retail Pork	5.89	-0.39	17.47	15.79	0.008%
Retail Domestic Lamb	-4.76	-0.03	-15.42	-13.55	-0.292%
Retail Imported Lamb	6.36	0.03	18.12	16.13	0.180%
Retail Poultry	-1.10	0.07	31.55	26.15	0.006%
Total Meat Consumer Surplus	-227.89	-1.33	-658.96	-586.86	-0.048%

Table A9.2.7. Producer and Consumer Surplus Changes from 30% Adoption of a Full Animal Identification/Tracing Program with a 7.92% Export Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-30.20	2.93	-1.52	-17.31	-0.006%
Wholesale Beef	-68.74	12.24	30.92	0.03	0.000%
Slaughter Cattle	5.06	63.78	1,351.71	1,036.81	0.521%
Feeder Cattle	-45.69	39.45	734.71	549.05	0.348%
Total Beef Producer Surplus	-138.21	118.54	2,086.42	1,549.37	0.334%
Retail Pork	23.34	-0.34	34.11	32.91	0.027%
Wholesale Pork	5.80	-0.41	3.06	4.23	0.007%
Slaughter Hog	3.24	-0.58	-3.32	-1.45	-0.002%
Total Pork Producer Surplus	32.65	-1.34	34.33	35.80	0.015%
Retail Domestic Lamb	1.29	-0.01	1.20	1.26	0.032%
Wholesale Lamb	0.19	-0.01	-0.77	-0.54	-0.033%
Slaughter Lamb	-0.41	-0.06	-3.02	-2.43	-0.155%
Feeder Lamb	-2.67	-0.09	-9.87	-8.49	-0.486%
Total Lamb Producer Surplus	-1.62	-0.16	-12.29	-10.05	-0.112%
Retail Poultry	63.97	-0.09	99.25	92.60	0.051%
Wholesale Poultry	46.19	-0.12	74.36	69.73	0.040%
Total Poultry Producer Surplus	109.26	-0.21	175.31	164.63	0.046%
Total Meat Producer Surplus	3.81	116.86	2,324.13	1,759.07	0.220%
Consumer Surplus					
Retail Beef	-235.72	11.45	-287.45	-295.96	-0.089%
Retail Pork	6.99	-0.78	0.91	2.81	0.001%
Retail Domestic Lamb	-2.88	-0.02	-9.29	-8.15	-0.176%
Retail Imported Lamb	4.02	0.01	10.86	9.69	0.109%
Retail Poultry	0.73	-0.61	2.60	3.80	0.001%
Total Meat Consumer Surplus	-225.47	10.01	-274.69	-285.83	-0.023%

Table A9.2.8. Producer and Consumer Surplus Changes from 50% Adoption of a Full Animal Identification/Tracing Program with a 14.14% Export Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-56.41	5.23	-10.36	-38.50	-0.012%
Wholesale Beef	-123.58	21.88	54.32	0.12	0.001%
Slaughter Cattle	11.83	114.15	2,433.58	1,859.36	0.931%
Feeder Cattle	-79.52	70.62	1,325.44	990.92	0.626%
Total Beef Producer Surplus	-245.90	212.12	3,762.88	2,811.65	0.598%
Retail Pork	41.02	-0.60	59.08	57.48	0.047%
Wholesale Pork	10.24	-0.71	5.36	7.50	0.012%
Slaughter Hog	5.79	-1.00	-5.54	-2.32	-0.004%
Total Pork Producer Surplus	57.41	-2.33	60.85	62.75	0.025%
Retail Domestic Lamb	2.17	-0.01	2.02	2.13	0.053%
Wholesale Lamb	0.31	-0.02	-1.29	-0.92	-0.056%
Slaughter Lamb	-0.69	-0.09	-5.04	-4.07	-0.259%
Feeder Lamb	-4.45	-0.14	-16.43	-14.17	-0.811%
Total Lamb Producer Surplus	-2.68	-0.27	-20.47	-16.74	-0.186%
Retail Poultry	112.46	-0.17	173.48	161.91	0.088%
Wholesale Poultry	80.92	-0.21	129.64	122.19	0.070%
Total Poultry Producer Surplus	192.30	-0.39	307.75	287.38	0.081%
Total Meat Producer Surplus	4.87	209.20	4,185.69	3,151.34	0.395%
Consumer Surplus					
Retail Beef	-417.47	20.45	-503.34	-518.74	-0.157%
Retail Pork	12.45	-1.38	1.78	5.17	0.002%
Retail Domestic Lamb	-4.80	-0.04	-15.49	-13.59	-0.294%
Retail Imported Lamb	6.77	0.01	18.29	16.22	0.182%
Retail Poultry	1.04	-1.09	3.07	5.67	0.001%
Total Meat Consumer Surplus	-399.53	17.90	-483.51	-502.26	-0.040%

Table A9.2.9. Producer and Consumer Surplus Changes from 70% Adoption of a Full Animal Identification/Tracing Program with a 22.95% Export Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-97.64	8.49	-38.12	-77.89	-0.025%
Wholesale Beef	-203.37	35.60	85.73	0.00	0.003%
Slaughter Cattle	20.52	185.95	3,981.41	3,050.59	1.516%
Feeder Cattle	-118.11	114.85	2,199.96	1,653.58	1.035%
Total Beef Producer Surplus	-391.73	345.35	6,157.61	4,605.85	0.974%
Retail Pork	64.97	-0.96	93.07	90.04	0.074%
Wholesale Pork	16.35	-1.08	8.91	12.33	0.019%
Slaughter Hog	9.32	-1.49	-6.98	-2.37	-0.004%
Total Pork Producer Surplus	91.06	-3.53	97.66	100.29	0.041%
Retail Domestic Lamb	3.12	-0.02	2.93	3.07	0.077%
Wholesale Lamb	0.44	-0.03	-1.81	-1.29	-0.078%
Slaughter Lamb	-0.97	-0.13	-7.06	-5.71	-0.362%
Feeder Lamb	-6.22	-0.20	-22.97	-19.84	-1.140%
Total Lamb Producer Surplus	-3.66	-0.38	-28.47	-23.32	-0.260%
Retail Poultry	176.85	-0.27	269.25	253.43	0.138%
Wholesale Poultry	127.59	-0.34	201.14	190.73	0.108%
Total Poultry Producer Surplus	303.22	-0.63	474.72	450.05	0.125%
Total Meat Producer Surplus	0.13	340.96	6,839.39	5,137.32	0.645%
Consumer Surplus					
Retail Beef	-672.63	33.23	-797.74	-828.12	-0.251%
Retail Pork	20.49	-2.16	4.10	9.36	0.005%
Retail Domestic Lamb	-6.75	-0.06	-21.77	-19.06	-0.413%
Retail Imported Lamb	9.71	0.02	26.04	23.21	0.258%
Retail Poultry	1.74	-1.78	2.59	7.03	0.002%
Total Meat Consumer Surplus	-640.86	29.16	-769.58	-800.44	-0.063%

Table A9.2.10. Producer and Consumer Surplus Changes from 90% Adoption of a Full Animal Identification/Tracing Program with a 34.13% Export Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	-152.99	12.64	-63.64	-119.91	-0.040%
Wholesale Beef	-304.27	53.05	137.92	0.10	0.005%
Slaughter Cattle	52.38	277.81	6,008.17	4,620.69	2.267%
Feeder Cattle	-156.02	171.75	3,343.75	2,548.64	1.576%
Total Beef Producer Surplus	-550.50	515.97	9,356.81	6,972.44	1.491%
Retail Pork	93.73	-1.41	132.20	129.03	0.105%
Wholesale Pork	23.79	-1.52	13.07	18.23	0.029%
Slaughter Hog	13.78	-2.03	-8.09	-2.03	-0.003%
Total Pork Producer Surplus	132.09	-4.96	140.17	146.62	0.059%
Retail Domestic Lamb	4.28	-0.02	4.01	4.19	0.105%
Wholesale Lamb	0.59	-0.04	-2.45	-1.73	-0.106%
Slaughter Lamb	-1.30	-0.18	-9.54	-7.70	-0.489%
Feeder Lamb	-8.38	-0.27	-30.98	-26.75	-1.542%
Total Lamb Producer Surplus	-4.86	-0.51	-38.35	-31.43	-0.350%
Retail Poultry	254.64	-0.41	384.13	362.24	0.197%
Wholesale Poultry	183.07	-0.50	286.19	270.96	0.154%
Total Poultry Producer Surplus	437.48	-0.93	671.78	644.10	0.178%
Total Meat Producer Surplus	16.98	509.76	10,371.26	7,771.57	0.973%
Consumer Surplus					
Retail Beef	-978.47	49.47	-1,115.11	-1,179.58	-0.359%
Retail Pork	30.41	-3.11	7.55	14.68	0.007%
Retail Domestic Lamb	-9.12	-0.08	-29.34	-25.72	-0.558%
Retail Imported Lamb	13.22	0.02	35.39	31.56	0.350%
Retail Poultry	2.70	-2.66	1.23	7.55	0.002%
Total Meat Consumer Surplus	-931.59	43.51	-1,081.19	-1,110.45	-0.089%

Table A9.2.11. Producer and Consumer Surplus Changes from 30% Adoption of a Full Animal Identification/Tracing Program with a 0.24% Domestic Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	159.83	42.03	1,087.40	879.42	0.296%
Wholesale Beef	6.44	32.41	429.18	321.71	0.194%
Slaughter Cattle	-88.76	35.17	279.12	173.08	0.087%
Feeder Cattle	-110.18	20.40	43.21	0.25	0.000%
Total Beef Producer Surplus	-26.33	130.56	1,826.45	1,351.20	0.290%
Retail Pork	26.11	0.02	64.67	58.29	0.049%
Wholesale Pork	6.57	-0.18	14.46	13.44	0.021%
Slaughter Hog	3.76	-0.44	3.90	4.45	0.007%
Total Pork Producer Surplus	36.81	-0.61	84.14	76.84	0.031%
Retail Domestic Lamb	1.31	-0.01	1.44	1.46	0.037%
Wholesale Lamb	0.19	-0.01	-0.74	-0.52	-0.032%
Slaughter Lamb	-0.42	-0.06	-2.97	-2.40	-0.153%
Feeder Lamb	-2.67	-0.08	-9.79	-8.48	-0.484%
Total Lamb Producer Surplus	-1.60	-0.16	-11.98	-9.84	-0.110%
Retail Poultry	70.77	0.03	148.47	135.65	0.074%
Wholesale Poultry	51.17	0.02	115.56	105.71	0.060%
Total Poultry Producer Surplus	122.46	0.05	265.21	241.69	0.067%
Total Meat Producer Surplus	130.96	130.02	2,171.18	1,665.84	0.208%
Consumer Surplus					
Retail Beef	-18.30	165.56	1,226.25	889.04	0.275%
Retail Pork	8.25	-0.10	23.05	21.01	0.010%
Retail Domestic Lamb	-2.88	-0.02	-9.23	-8.13	-0.175%
Retail Imported Lamb	4.04	0.02	11.24	10.02	0.113%
Retail Poultry	1.17	0.21	35.25	29.46	0.007%
Total Meat Consumer Surplus	-5.66	165.65	1,305.55	945.88	0.078%

Table A9.2.12. Producer and Consumer Surplus Changes from 50% Adoption of a Full Animal Identification/Tracing Program with a 0.43% Domestic Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	279.48	74.19	1,911.99	1,541.71	0.519%
Wholesale Beef	10.54	57.22	753.83	563.08	0.340%
Slaughter Cattle	-156.52	62.09	495.30	305.53	0.153%
Feeder Cattle	-194.86	36.00	82.52	0.28	0.000%
Total Beef Producer Surplus	-49.65	230.48	3,214.25	2,380.94	0.509%
Retail Pork	45.77	0.05	113.69	102.36	0.085%
Wholesale Pork	11.48	-0.31	25.50	23.71	0.038%
Slaughter Hog	6.63	-0.75	7.18	8.07	0.013%
Total Pork Producer Surplus	64.71	-1.03	148.21	135.51	0.055%
Retail Domestic Lamb	2.21	-0.01	2.45	2.48	0.062%
Wholesale Lamb	0.31	-0.02	-1.24	-0.88	-0.053%
Slaughter Lamb	-0.69	-0.09	-4.97	-4.01	-0.255%
Feeder Lamb	-4.44	-0.14	-16.30	-14.12	-0.808%
Total Lamb Producer Surplus	-2.64	-0.26	-19.88	-16.36	-0.182%
Retail Poultry	123.63	0.06	259.81	237.56	0.129%
Wholesale Poultry	89.45	0.03	202.34	184.93	0.106%
Total Poultry Producer Surplus	214.64	0.09	464.69	422.48	0.118%
Total Meat Producer Surplus	227.14	229.58	3,823.71	2,931.10	0.366%
Consumer Surplus					
Retail Beef	-32.68	292.21	2,165.64	1,567.45	0.484%
Retail Pork	14.53	-0.16	41.07	37.15	0.018%
Retail Domestic Lamb	-4.81	-0.03	-15.40	-13.56	-0.292%
Retail Imported Lamb	6.78	0.03	18.96	16.88	0.189%
Retail Poultry	1.79	0.37	60.76	50.75	0.012%
Total Meat Consumer Surplus	-11.36	292.37	2,300.85	1,667.26	0.137%

Table A9.2.13. Producer and Consumer Surplus Changes from 70% Adoption of a Full Animal Identification/Tracing Program with a 0.67% Domestic Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	435.74	117.62	3,002.55	2,425.91	0.813%
Wholesale Beef	12.95	90.76	1,174.01	869.84	0.525%
Slaughter Cattle	-254.26	98.50	774.75	467.24	0.239%
Feeder Cattle	-306.89	56.79	139.24	2.93	0.002%
Total Beef Producer Surplus	-95.12	365.27	5,079.13	3,722.43	0.797%
Retail Pork	72.03	0.09	178.92	161.23	0.134%
Wholesale Pork	18.12	-0.44	41.22	38.24	0.061%
Slaughter Hog	10.54	-1.09	13.13	14.33	0.023%
Total Pork Producer Surplus	102.34	-1.46	237.68	216.00	0.087%
Retail Domestic Lamb	3.16	-0.01	3.62	3.63	0.091%
Wholesale Lamb	0.44	-0.03	-1.74	-1.21	-0.073%
Slaughter Lamb	-0.96	-0.13	-6.94	-5.61	-0.357%
Feeder Lamb	-6.21	-0.20	-22.89	-19.73	-1.136%
Total Lamb Producer Surplus	-3.60	-0.37	-27.59	-22.75	-0.253%
Retail Poultry	193.79	0.09	407.94	371.49	0.202%
Wholesale Poultry	139.65	0.05	317.04	288.96	0.165%
Total Poultry Producer Surplus	335.59	0.14	729.25	660.50	0.183%
Total Meat Producer Surplus	339.25	364.07	6,015.21	4,590.61	0.574%
Consumer Surplus					
Retail Beef	-58.00	463.28	3,412.97	2,466.01	0.758%
Retail Pork	23.35	-0.20	66.80	60.30	0.029%
Retail Domestic Lamb	-6.75	-0.05	-21.58	-19.01	-0.411%
Retail Imported Lamb	9.72	0.04	27.26	24.20	0.269%
Retail Poultry	2.81	0.57	95.13	79.52	0.019%
Total Meat Consumer Surplus	-26.98	463.55	3,628.72	2,618.28	0.216%

Table A9.2.14. Producer and Consumer Surplus Changes from 90% Adoption of a Full Animal Identification/Tracing Program with a 0.96% Domestic Beef Demand Increase.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	616.55	167.83	4,250.25	3,429.40	1.148%
Wholesale Beef	15.95	129.52	1,661.31	1,235.50	0.746%
Slaughter Cattle	-369.21	140.54	1,102.82	667.72	0.335%
Feeder Cattle	-440.14	80.88	197.89	0.06	0.000%
Total Beef Producer Surplus	-150.22	521.09	7,226.74	5,284.86	1.126%
Retail Pork	102.79	0.15	255.37	229.25	0.191%
Wholesale Pork	25.92	-0.57	60.01	55.54	0.088%
Slaughter Hog	15.14	-1.44	20.56	21.72	0.035%
Total Pork Producer Surplus	146.34	-1.90	343.24	312.25	0.125%
Retail Domestic Lamb	4.32	-0.02	4.99	4.98	0.125%
Wholesale Lamb	0.59	-0.04	-2.38	-1.64	-0.100%
Slaughter Lamb	-1.30	-0.18	-9.37	-7.56	-0.482%
Feeder Lamb	-8.37	-0.27	-30.83	-26.58	-1.537%
Total Lamb Producer Surplus	-4.80	-0.50	-37.10	-30.46	-0.340%
Retail Poultry	275.25	0.13	577.44	526.37	0.287%
Wholesale Poultry	197.59	0.07	450.60	410.42	0.234%
Total Poultry Producer Surplus	475.87	0.20	1,034.46	938.56	0.259%
Total Meat Producer Surplus	469.28	519.52	8,564.25	6,516.81	0.811%
Consumer Surplus					
Retail Beef	-86.04	661.04	4,863.54	3,504.80	1.074%
Retail Pork	33.96	-0.22	97.99	88.16	0.042%
Retail Domestic Lamb	-9.12	-0.06	-29.12	-25.61	-0.556%
Retail Imported Lamb	13.25	0.05	37.00	32.88	0.365%
Retail Poultry	4.08	0.81	135.43	113.67	0.027%
Total Meat Consumer Surplus	-40.43	661.44	5,160.86	3,732.09	0.308%

Table A9.2.15. Producer and Consumer Surplus Changes in the Absence of an Animal Identification/Tracing Program and a 10% Permanent Loss of Beef Export Markets.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	81.15	5.65	149.22	127.93	0.044%
Wholesale Beef	137.13	17.23	206.45	178.55	0.109%
Slaughter Cattle	-224.97	-49.52	-2,143.71	-1,741.23	-0.886%
Feeder Cattle	-107.97	-53.86	-1,517.87	-1,191.51	-0.757%
Total Beef Producer Surplus	-110.71	-80.59	-3,222.91	-2,561.19	-0.560%
Retail Pork	-8.96	0.20	-4.57	-5.96	-0.005%
Wholesale Pork	-3.06	0.13	-0.41	-1.13	-0.002%
Slaughter Hog	-1.91	0.13	0.52	-0.14	0.000%
Total Pork Producer Surplus	-14.25	0.47	-4.76	-7.40	-0.003%
Retail Domestic Lamb	-0.13	0.00	-0.10	-0.11	-0.003%
Wholesale Lamb	-0.01	0.00	0.00	-0.01	0.000%
Slaughter Lamb	-0.01	0.00	0.01	0.00	0.000%
Feeder Lamb	0.00	0.00	0.02	0.01	0.001%
Total Lamb Producer Surplus	-0.16	0.00	-0.08	-0.10	-0.001%
Retail Poultry	-33.70	0.08	-34.14	-33.36	-0.018%
Wholesale Poultry	-18.85	0.13	-13.56	-15.10	-0.008%
Total Poultry Producer Surplus	-52.98	0.22	-49.66	-49.82	-0.014%
Total Meat Producer Surplus	-182.00	-79.93	-3,290.08	-2,645.07	-0.336%
Consumer Surplus					
Retail Beef	127.74	-15.13	-95.66	-31.46	-0.010%
Retail Pork	-4.16	0.68	5.79	3.07	0.001%
Retail Domestic Lamb	0.03	0.00	0.09	0.07	0.002%
Retail Imported Lamb	-0.24	0.01	-0.13	-0.16	-0.002%
Retail Poultry	-1.31	0.82	16.69	11.54	0.003%
Total Meat Consumer Surplus	644.49	1,406.45	13,798.58	10,410.01	0.839%

Table A9.2.16. Producer and Consumer Surplus Changes in the Absence of an Animal Identification/Tracing Program and a 25% Permanent Loss of Beef Export Markets.

Surplus Measure	Short Run	Long Run	Cumulative	Cumulative Present Value	Cumulative Percent Of Total
	million dollars				
Producer Surplus					
Retail Beef	202.60	14.12	361.48	312.37	0.107%
Wholesale Beef	342.05	42.93	496.71	435.20	0.269%
Slaughter Cattle	-562.08	-123.66	-5,350.27	-4,344.00	-2.239%
Feeder Cattle	-269.85	-134.15	-3,710.58	-2,954.39	-1.895%
Total Beef Producer Surplus	-277.28	-200.91	-8,045.22	-6,391.45	-1.407%
Retail Pork	-22.41	0.49	-11.42	-14.89	-0.013%
Wholesale Pork	-7.65	0.31	-1.03	-2.83	-0.004%
Slaughter Hog	-4.77	0.33	1.29	-0.36	-0.001%
Total Pork Producer Surplus	-35.63	1.17	-11.88	-18.37	-0.008%
Retail Domestic Lamb	-0.33	0.00	-0.25	-0.27	-0.007%
Wholesale Lamb	-0.04	0.00	-0.01	-0.02	-0.001%
Slaughter Lamb	-0.01	0.00	0.02	0.01	0.001%
Feeder Lamb	-0.01	0.00	0.04	0.02	0.001%
Total Lamb Producer Surplus	-0.40	0.01	-0.20	-0.25	-0.003%
Retail Poultry	-84.24	0.19	-85.26	-83.36	-0.046%
Wholesale Poultry	-47.13	0.34	-33.90	-37.74	-0.021%
Total Poultry Producer Surplus	-132.45	0.55	-124.14	-124.43	-0.035%
Total Meat Producer Surplus	-455.09	-199.20	-8,212.58	-6,601.83	-0.843%
Consumer Surplus					
Retail Beef	319.68	-37.82	-229.16	-74.61	-0.023%
Retail Pork	-10.40	1.70	14.46	7.68	0.004%
Retail Domestic Lamb	0.08	0.01	0.22	0.18	0.004%
Retail Imported Lamb	-0.61	0.02	-0.32	-0.40	-0.004%
Retail Poultry	-3.29	2.05	41.73	28.84	0.007%
Total Meat Consumer Surplus	302.99	-34.02	-172.92	-44.58	-0.004%

Questions

Response from John Clifford, D.V.M., Deputy Administrator for Veterinary Services and Chief Veterinarian, Animal and Plant Health Inspection Service, U.S. Department of Agriculture

Questions Submitted by Hon. Walt Minnick a Representative in Congress from Idaho

Question 1. Dr. Clifford, you testified that there are challenges associated with protecting producers' privacy in the development and implementation of a national identification system. What authority does the Department of Agriculture have to protect this sensitive information and how can we safeguard this information from being subject to the Freedom of Information Act if the program is mandated?

Answer. USDA takes National Animal Identification System (NAIS) privacy issues very seriously. In developing NAIS standards, we intentionally limited the type and quantity of information collected and maintained by the Federal government. This is the most effective step we can take in order to help protect producer privacy.

USDA generally treats producer information as confidential. The Freedom of Information Act (FOIA) does, however, compel us to release information that is not subject to a FOIA exemption. To date, USDA has applied FOIA exemptions to withhold NAIS producer information when requested, and will continue to apply appropriate exemptions to protect personal information and confidential business information provided by NAIS participants, consistent with law and the Administration's recently announced policies regarding FOIA.

Question 2. If the NAIS were made mandatory, would backyard poultry flocks and every single animal be required to participate?

Answer. To be successful, NAIS must include animals moving in commerce because of their potential to spread disease. If NAIS were made mandatory, we would not require—but certainly encourage—producers keeping backyard poultry flocks and other animals not moving in commerce to participate. At a minimum, we would strongly encourage these producers to register their premises, since animal disease does not discriminate on the basis of herd or flock operation size or whether a producer sells animals commercially or raises them for personal use. With premises registration information, we can proactively contact these producers early on in a disease situation, so that they can take steps to protect their animals.

The three bovine spongiform encephalopathy (BSE) tracebacks in the United States are important examples of why we need a high participation rate of animals in commerce. In tracing back these three cows, we ran into a number of dead ends and in multiple cases, we just could not trace back an animal to its herd of origin, which is key in properly investigating BSE cases. Having these premises and animals identified would have benefitted the government and producers tremendously, allowing a more swift and targeted response and use of resources.

Question 3. With respect to premises registration, beef cattle premises have shown to be the most difficult to register, while the dairy cattle, poultry, swine, sheep, and goat markets have had a much greater participation in the registration effort. What do you think accounts for this disparity?

Answer. Various groups within the beef cattle industry have voiced a number of concerns with NAIS that we believe contribute to their low participation rate, currently estimated at 25%. One of the greatest concerns we have heard is with the costs associated with a mandatory NAIS. Over 90 percent of the industry costs for such a system would be associated with the cattle sector. This is largely due to the individual animal identification required, whereas swine, sheep, goats, and poultry can often be sufficiently traced using premises and group lot identification. Additionally, cattle typically move more times during their lifespan than other livestock species.

Concerns have also been raised about the use of producer information. Some have concerns that their information will be released and used to their detriment, such as for liability purposes related to food safety tracebacks, as we move forward with this critical program.

We believe strongly that we must work collaboratively with industry to address their concerns and move forward with an effective NAIS—whether it be a mandatory or voluntary system. In fact, on April 15, 2009, the Secretary held a roundtable with stakeholders representing the full spectrum of views on NAIS. This meeting kicked off a larger listening tour to gather feedback on concerns and, more importantly, to identify potential solutions to help USDA and the U.S. livestock sector move forward with the program.

Question 4. What studies have been done demonstrating that NAIS will reduce the occurrence or scope of animal disease outbreaks?

Answer. I would first like to clarify that the purpose of NAIS is not to reduce the occurrence of an animal disease outbreak, but rather, to reduce the scope of disease

spread by increasing traceability and thereby allowing for a swifter and more precise response. Several studies have looked at foreign animal disease outbreaks and their resulting effects, and have found that a quicker response equates to a significant decrease in negative effects from an outbreak. I will briefly discuss a few of these studies.

In a study that examined the impacts of a hypothetical foot-and-mouth disease outbreak in California, researchers found that a shorter traceback time is key to reducing the scope of a disease, as indicated by the study's finding that in its simulation, "a one-week delay in starting depopulation could increase the proportion of infected premises from 18% to more than 90%."[1] An additional study cited "prompt identification and elimination of affected herds" as a major factor influencing eradication of an outbreak of foot-and-mouth disease.[2] A more recent study that examined the value of traceability in a hypothetical foot-and-mouth disease outbreak in Kansas found that "as the level of surveillance and ability to trace cattle increases, the number of animals that have to be destroyed and related costs decrease."[3]

These studies highlight the need for enhanced traceability, which can be achieved through increased participation in NAIS. The more quickly we can identify what animals and operations may be affected, the faster we will be able to find exposed animals and take the necessary steps to contain the disease. Conversely, the longer the process takes, the more a contagious disease can spread, potentially increasing the number of herds and animals involved. And, in the case of diseases like BSE that are not contagious, the longer it takes to provide definitive information about the extent of the disease, the longer we will see decreased consumer confidence and negative trade impacts. This would lead to more cost for producers, longer commerce interruptions with added cost to consumers, and more disruptions to communities and industries connected to livestock production.

We also see significant opportunities to reduce the scope of domestic disease within our animal health programs. For example, of the 199 positive cases of bovine tuberculosis identified in the United States between late 2003 and early 2008, over 84 percent of the animals did not have official USDA individual identification. As a result, USDA and state investigative teams spent substantially more time and money conducting tracebacks, including an expanded scope of an investigation to identify suspect and exposed animals. Additionally, the average time spent conducting a traceback involving 27 recent bovine tuberculosis investigations was 199 days. This is simply not acceptable.

We can see the potential value added by enhancing traceability when we compare recent tuberculosis tracebacks of U.S. versus Canadian cows. Since 2006, we have completed 44 investigations of bovine tuberculosis positive animals. The average length of time to complete these investigations was 186 days. However, the average investigation time for two cattle that originated in Canada, which has a mandatory animal identification system, was only 19.5 days. Canada's unique numbering standard, tied to a unique premises identification, is consistent with our proposed standards for advancing traceability in the United States. Incorporation of these standards into livestock commerce will provide USDA with the readily-accessible, accurate information required to expedite disease control efforts.

Question 5. What analysis has been conducted of current tracking capabilities? For example, what is the average tracking time for individual animals? For cases that have taken longer than average, what reason(s) have been identified for the slower response?

Answer. USDA examines animal disease surveillance data, animal health program data, and actual animal disease investigations to analyze our current traceback capabilities. Current traceability in the poultry, swine, and sheep industries is high. However, we have consistently found that in the beef cattle industry, tracebacks take longer, cannot always be completed, and result in longer delays and greater costs to producers because of the industry's low traceability level. Traceback time varies depending on each unique situation, and is greatly affected by the availability of records, which can vary widely. Additionally, as disease risk lessens, fewer people participate in USDA's existing eradication programs. This means that fewer animals

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[1] Ekboir, J.M., L.S. Jarvis and J.E. Bervejillo. 2003. Potential Impact of FMD Outbreak in California, in Sumner, D. (ed.), Exotic Pests and Diseases: Economics, Science and Policy, Iowa State University Press.

[2] Ekboir, Javier. (1999). *The Potential Impact of Foot and Mouth Disease in California: The Role and Contribution of Animal Health Surveillance and Monitoring Services.* Davis, Calif.: Agricultural Issues Center.

[3] Pendell, D.L. and Schroeder, T.C. (2007). Value of Animal Traceability Systems in Managing a Foot-And-Mouth Disease Outbreak in Southwest Kansas. Kansas State University Agricultural Experiment Station and Cooperative Extension Service.

are identified and can be traced if there is a disease event. Below are some examples:

Bovine Spongiform Encephalopathy (BSE) 09

Surveillance data from July 2007 through January 2009 indicated that of 72,869 primarily adult cattle, only 39% (28,558) were identified with an official USDA metal ear tag. Official USDA animal identification tags are individually unique nationally and provide the opportunity to also associate a point of first tagging, allowing for a faster traceback.

Bovine Brucellosis 09

USDA official brucellosis calfhood vaccination requires the attachment of a USDA official animal identification tag, which provides a primary means of identifying cattle for traceability purposes. Program data for calendar year 2008 indicates that slightly more than 3.7 million heifer calves were vaccinated, out of over 20 million heifers that were eligible (based on USDA National Agricultural Statistics Service data). Therefore, only 18.5% of eligible heifers for brucellosis vaccination were identified with nationally unique, USDA official animal identification.

Question 6. What analysis has been done to determine the specific data that would be important during a disease outbreak, and the potential for error or delay due to excessively large databases?

Answer. USDA determined what data is needed during a disease outbreak based on widely agreed upon veterinary epidemiological principles, the agency's experience responding to animal diseases, and stakeholder input. It is generally understood within veterinary epidemiology that it is vital to have data that would identify an animal's origin and movements. [4] Examination of USDA's previous experience in responding to animal disease events, including review of epidemiological investigation reports, supports that assertion. Our analysis defined what is needed to identify, contain, and eradicate livestock disease. This includes (1) the animal's identity, (2) where it originated, (3) what other farms it was on, (4) what other animals it had contact with, (5) what other farms are in the vicinity of the affected farms, and (6) the timeframe in which those contacts took place.

The NAIS Information Technology (IT) systems were built specifically to provide this vital information to animal health officials quickly and easily when a disease event arises. They were also designed to be able to function effectively in the event of a major outbreak. The systems have a full back-up site, are tested regularly to ensure performance level, and are updated as enhancements become available.

The problem USDA faced at the outset of development of NAIS was not that of an excessively large database, but rather that there were multiple disparate systems, coupled with traceback data that was contained on paper records stored in file cabinets at numerous locations across the country. USDA has effectively used a number of large databases for a variety of its programs and thus has experience in developing and maintaining them successfully. USDA is confident that the IT system built to support NAIS, while encompassing large databases, is being carefully managed to provide available and secure traceability information when needed.

Question 7. What analysis has been done of the unintended consequences of NAIS? For example, what plans have been developed to address non-compliance and the risks posed by animals that are being kept illegally?

Answer. NAIS is currently a voluntary program; therefore, non-compliance is not an issue. However, in order for the program to be successful, participation must exceed the critical mass level of participation estimated by USDA to be 70 percent of the animals in a specific species/sector identified and traceable to their premises of origin. If we did not exceed this threshold, we would not be able to significantly improve traceability.

In a mandatory system, USDA would likely develop a gradual enforcement scheme and detect non-compliance as animals moved in commerce. In each instance, we would assess the risk of that movement involving animals that were not officially identified, work to communicate the importance of complying with the regulations to those responsible for the movement, and, when necessary, assess penalties commensurate with the risk.

Questions Submitted by Hon. K. Michael Conaway a Representative in Congress from Texas

Question 1. What is the basis for the design of NAIS? Specifically, why does USDA repeatedly state that 48-hour traceback is "optimal" and that the program needs to include every animal? Both claims run contrary to sound epidemiology and

[4] Toma, et al., (1999). "Dictionary of Veterinary Epidemiology," Iowa State University Press.

risk analysis. Diseases have incubation times from a few hours to a few years—one approach does not fit all. And risk analysis would dictate that we focus our resources on high risk facilities (which typically mean high density).

Answer. A working group of epidemiologists, producers, market operators, harvest facility operators and other stakeholders determined that a 48-hour time frame would satisfy all sectors of the livestock production chain. Yes, incubation time and infectivity vary among diseases; however, we must have a system capable of handling the worst case scenario. This worst case scenario is a foot-and-mouth disease outbreak, which has an incubation time of 24–36 hours. To develop the 48-hour goal, we coupled this with the likelihood that 100% of the needed data would not be available electronically and would require some manual tracing.

It is important to remember that 48 hours is the goal, developed by experts in this field, to obtain all traceback information—but not to complete all disease tracebacks. For example, it takes 72 hours just to complete a screening test for bovine tuberculosis. But, it is essential to locate potentially exposed animals to help keep the disease from spreading should confirmatory results come back positive.

From my perspective, I agree that high density, intensively managed livestock populations pose a greater risk for disease amplification; however, animal disease can strike operations of all sizes and we must be prepared for that risk. USDA does not believe that every animal should be included in NAIS—the key is that NAIS must include all animals *moving in commerce* because of their potential to spread disease. And beyond that, additional premises registration and identification of lower priority operations and animals only serve to make the system stronger.

Question 2. What are the costs of NAIS? In the cost-benefit analysis for COOL, USDA included the following: labor, training, modification of existing record-keeping, software programming, computer hardware, impacts on operations' efficiency, and more. Yet, when asked about NAIS, USDA makes it sound like it's nothing more than the cost of the tag.

Answer. NAIS costs include program management by veterinarians, information specialists, statisticians and others; outreach; animal identification (identification devices and labor, applicators, etc.); data collection (market readers, slaughter readers, field readers, data collection labor); and the development and maintenance of the information system itself. Once NAIS is implemented, there will still be ongoing costs. The system is comprised of components that will have to be rebuilt, replaced, or updated over time (e.g., as the livestock population turns over, new ID tags will need to be purchased; as new technologies become available, computers, applicators, and readers will need to be replaced; etc.). Data from the Kansas State University benefit-cost analysis released by USDA on April 29, 2009, show that annual estimated costs for implementing NAIS today throughout the livestock (food animal) industries could range from roughly $143 million for a bookend approach with 90 percent participation, to $228 million for full pre-harvest traceability with 100 percent participation, with other options falling in between.

Because over 90 percent of the industry costs for a fully implemented system would be associated with the cattle industry, I would like to briefly discuss their costs. As the program currently stands, for most U. S. cattle operations, the cost to identify animals with NAIS-compliant tags/devices is a choice of alternatives and price comparisons with tags that are already being used, and most often, not the imposed implementation of a totally new system of tagging. Data show that in the U. S. cattle industry, 79.1 percent of all beef cows and 97.4 percent of all dairy cows are identified individually with some form of animal identification[5]. NAIS-compliant, USDA official animal identification tags are available as traditional visual tags as well as RFID tags/devices. They are very similar to the existing tags being used by the producers, where often only the numbering system is different. Actual costs depend upon the producer's choice of which tag works best for their operation. Overall, the costs for NAIS roughly translate into less than one-half percent of the retail value of U.S. beef products.

Question 3. There are serious ethical concerns in how NAIS has been developed. The USDA's working groups were initially drawn from the working groups established by the National Institute for Animal Agriculture (NIAA). The NIAA is an industry trade organization, and the members of the working groups included many companies who stood to profit directly from the implementation of NAIS, such as tag manufacturers and database management companies. Even some of the nonprofit organizations—such as Farm Bureau and Jockey Club—have subsidiaries or

[5] based upon USDA APHIS National Animal Health Monitoring System (NAHMS) data (Beef 2007–08 and Dairy 2007 studies).

ties to companies that manage databases. These conflicts of interest have never been addressed.

Answer. I do not believe that we took ethical missteps in the development and implementation of the NAIS. The National Animal Identification Development Team was initiated by USDA at the request of the United States Animal Health Association, an organization of state and federal animal health officials, producers, and livestock industry organizations. The steering Committee and working groups were selected under the direction of USDA, not NIAA. The participants are experts on these issues, and it was essential that we develop the program using their expertise.

Nearly 400 individuals representing over 200 stakeholder organizations helped develop the initial plan, which was called the United States Animal Identification Plan (USAIP). There was a concerted effort to include large and small producers, livestock markets, harvest facilities, renderers, academia, producer organizations, breed organizations, state and Federal animal health agencies, tribal organizations, technology providers (tags, readers, integrators), data service providers, transportation (trucking industry), and grower alliances, cooperatives, and other organizations not necessarily affiliated with a national organization.

Inclusion of companies and organizations directly involved in the animal identification or data collection business was not seen to be a conflict of interest. Their expertise was valuable, but certainly not the only source of information.

The USAIP was only one set of recommendations that the agency considered in developing the National Animal Identification System (NAIS). Public input from listening sessions across the country was also considered. The numerous comments received from email and website postings were as well. And Secretary Vilsack has emphasized his desire to seek additional input as we continue with NAIS implementation.

Question Submitted by Hon. David Scott a Representative in Congress from Georgia

Question 1. The GAO reported in July 2007 that the Department had major areas that would hinder USDA's ability to implement NAIS effectively, what has the USDA done to cover these issues:

A. USDA has not prioritized the implementation of NAIS by species or other criteria. Instead, the agency is implementing NAIS for numerous species simultaneously, causing federal, state, industry resources to be allocated widely, rather than being focused on the species of greatest concern.

B. USDA has not developed a plan to integrate NAIS with preexisting USDA and state animal ID requirements. As a result, producers are generally discouraged from investing in new ID devices for NAIS.

C. USDA has not clearly defined a time frame for rapid trace back possibly slowing response and causing greater economic losses.

D. USDA does not require potentially critical information to be recorded, such as species or age in the NAIS databases.

Answer. USDA appreciates the review conducted by GAO and has addressed all recommendations. I will outline progress on each of the four issues you specifically mentioned below.

A. APHIS has prioritized the implementation of NAIS by species and other criteria. USDA's *A Business Plan to Advance Animal Disease Traceability* specifically addresses prioritization of NAIS implementation by species. NAIS should be implemented in a way that addresses the unique attributes of different species/industry sector and the way animals are raised and processed. In addition, we need to consider that animal diseases are not always species-specific. For example, foot-and-mouth disease (FMD) was first diagnosed in swine in the United Kingdom outbreak in 2001 but soon affected cattle and sheep. Therefore, APHIS recognizes that NAIS must be inclusive for all livestock and poultry while prioritizing efforts that will address the species with the greatest void in traceability.

Species were grouped into two tiers, and within each tier, ranked as low, medium, or high priority. The level of priority reflects the emphasis each species and each sector will be given in implementing the strategies and actions of the business plan. The specific prioritization of species can be found on pages 14–25 of the business plan, which is available at: *http://animalid.aphis.usda.gov/nais/naislibrary/documents/plans__reports/TraceabilityBusinessPlan%20Ver%201.0%20Sept%202008.pdf.*

B. USDA has taken a number of steps to integrate NAIS with preexisting USDA and State animal identification requirements and encourage the use of new identification devices through ongoing actions defined in the business plan on pages 26–27. For example, the National Poultry Improvement Plan (NPIP) supplements NAIS with locations of poultry breeder flocks, resulting in traceability estimated at more than 95 percent. Additionally, an estimated 95 percent of sheep flocks can be traced

back to the flock of origin due to the identification provided by USDA's scrapie eradication surveillance program.

APHIS issued regulations to establish the premises identification number (PIN) as a standard for identifying locations that manage and/or hold livestock, with a final rule on July 18, 2007 (72 FR 39301–39307). The regulations also established the animal identification number (AIN) as an official numbering system for all disease program activities (bovine tuberculosis, brucellosis, scrapie, etc.) to uniquely identify locations across all disease programs. Additionally, APHIS published an interim rule on September 18, 2008, which reserves the 840 number for U.S.-born animals (73 FR 54059–54063).

A. On December 22, 2008, we issued Veterinary Services (VS) Memorandum No. 575.19 to explain our policy for the use of the PIN in the administration of animal disease program activities. Specifically, the use of the PIN format is being established as the standard for all disease programs to ensure the locations are uniquely identified across all disease programs.

On January 13, 2009, we published a proposed rule (74 FR 1634–1643) to make the 840 number the only version of the AIN, establish the NAIS seven-character PIN as the sole standard, and have a standardized PIN for all premises that use USDA official animal identification.

USDA and states are incorporating electronic data capture and reporting into existing animal health programs and information systems. This effort in mobile information management for field collection of animal identification data, whether chuteside with producers or at surveillance points such as harvest facilities or livestock markets, is expanding. Examples include the electronic bovine tuberculosis testing system, electronic brucellosis system for vaccination and testing, and the electronic scrapie tracing system.

C. The September 2008 traceability business plan provides timelines with performance measure objectives to advance tracing capabilities for each species. Tables outlining these timelines are found on pages 59–60 of the business plan.

D. With regard to requiring potentially critical information to be recorded, such as species or age, in the NAIS databases, APHIS has discussed this issue extensively with stakeholders through the species working groups and in collaboration with industry. Participants identified the minimum data elements that must be obtained to conduct a traceback investigation. APHIS incorporated these data elements into NAIS through the requirements of the animal tracking databases.

Other data elements, such as species, date of birth, and gender, are often contained in information systems maintained by service providers in animal agriculture and may be provided when necessary. Requiring additional information for an animal record to be considered a "qualifying" record, however, must be closely evaluated so as not to exclude otherwise valuable information.

Through development of animal tracking databases, APHIS has established a process to ensure that any consideration of expanding data elements is done in collaboration with the species working groups and through the recommendation of the NAIS Subcommittee. Experience with the animal tracking databases as they come on line with the Animal Trace Processing System will allow APHIS to document the availability of necessary information.

APHIS is studying the information available through the animal tracking databases to determine if additional required fields are necessary or if the data maintained in the systems are adequate without requiring additional data elements. Additionally, such findings and potential recommendations will be discussed with the species working groups. If changes are warranted, APHIS will revise the NAIS program standards and repost them in July 2009.

Question Submitted by Hon. Frank Kratovil, Jr. a Representative in Congress from Maryland

Question 1. Is it fair to say that you bring to the table substantial insight into the cost and benefit of this system? If so, can it be an effective system if it is not mandatory?

Answer Yes, I do believe that I have substantial insight due to decades of experience in protecting animal health and think it is important to examine the costs of our animal health programs and compare those to the potential benefits. The NAIS system can only be effective with strong participation that exceeds the critical mass level estimated by USDA to be 70 percent of the animals in a specific species/sector identified and traceable to their premises of origin. If we do not exceed this threshold, we will not be able to significantly improve traceability. In other words, this important system simply won't work. It is essential that we have an effective NAIS—whether it is voluntary or mandatory—in order to more quickly and precisely respond to animal disease outbreaks.

To examine the costs and benefits of various forms of a National Animal Identification System, we sought the help of outside experts. A team from Kansas State University, Montana State University, Colorado State University, and Michigan State University carried out this analysis. The analysis studies the benefits and costs of all components of NAIS across all industry/species sectors. The analysis sought to determine the overall distribution of the system's benefits and costs among producers of various-sized herds, marketing firms, processors, consumers, and state and federal government agencies. USDA provided the analysis to the Committee on April 29, 2009.

I recognize that cost is a significant concern for everyone with an interest in the NAIS. We know accountability is essential to assure the American public that the Federal government is making the best and most efficient choices when it comes to their tax dollars. We understand that NAIS implementation is not cheap; data from the Kansas State University cost-benefit analysis show that annual estimated costs for implementing NAIS today throughout the livestock (food animal) industries could range from roughly $143 million for a bookend approach with 90 percent participation, to $228 million for full pre-harvest traceability with 100 percent participation, with other options falling in between. But we must compare this with the estimated billions of dollars in losses we would suffer from an FMD outbreak. And, although significant, the costs for implementing NAIS in the cattle sector roughly translate into less than one-half percent of the retail value of U.S. beef products.

We are committed to being transparent and providing information about the benefits and costs of NAIS. On April 15, 2009, the Secretary held a roundtable with stakeholders representing the full spectrum of views on NAIS. This meeting kicked off a larger listening tour to gather feedback on concerns—including producer costs—and, more importantly, to identify potential solutions to help USDA and the U.S. livestock sector move forward with the program. We look forward to a productive discussion on these issues.

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