United States
Department
of Agriculture

Economic
Research
Service

Economic
Information
Bulletin
Number 3

# The 20th Century Transformation of U.S. Agriculture and Farm Policy

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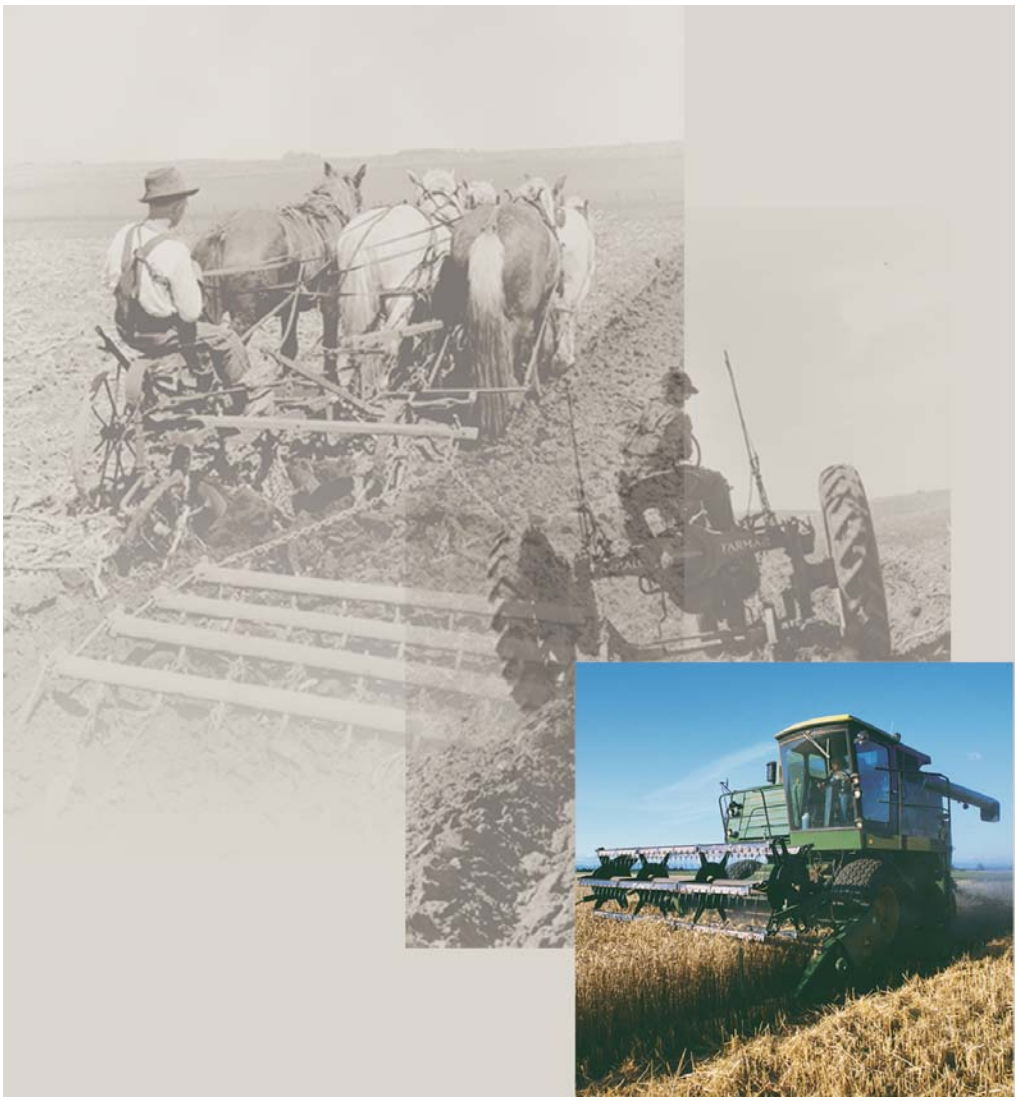
and Neilson Conklin



Electronic
Report

AUTHENTICATED
U.S. GOVERNMENT
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USDA
United States Department of Agriculture

Economic Information Bulletin Number 3

June 2005



Electronic Report from the Economic Research Service

www.ers.usda.gov

# The 20th Century Transformation of U.S. Agriculture and Farm Policy

**Carolyn Dimitri, Anne Effland, and Neilson Conklin**

## Abstract

The structure of farms, farm households, and the rural communities in which they exist has evolved markedly over the last century. Historical data on a range of farm structure variables—including the value of agricultural production, commodity specialization, farming-dependent counties, and off-farm work—offer a perspective on the long-term forces that have helped shape the structure of agriculture and rural life over the past century. These forces include productivity growth, the increasing importance of national and global markets, and the rising influence of consumers on agricultural production. Within this long-term context of structural change, a review of some key developments in farm policy considers the extent to which farm policy design has or has not kept pace with the continuing transformation of American agriculture.

**Keywords:** farm policy, farm structure, policy adjustment, structural adjustment, mechanization, productivity growth, global markets, consumer stakeholders, price and income support, farm policy history

## Acknowledgments

The authors would like to acknowledge the academic and ERS reviewers of the larger manuscript from which this report is excerpted. Their comments on that work were helpful in preparing this shorter version. We also thank Lou King for his valuable editorial assistance and Susan DeGeorge for the cover design, layout, and final charts.

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National Agricultural Library Cataloging Record:

Dimitri, Carolyn
The 20th century transformation of U.S. agriculture and farm policy.
(Economic information bulletin; no. 3)
1. Agriculture—United States—History—20th century.
2. Agriculture and state—United States. I. Effland, Anne B. W.
II. Conklin, Neilson Chase. III. United States. Dept. of Agriculture.
Economic Research Service.
IV. Title.
HD1761

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# Introduction

A common point in the debate over U.S. farm programs has been that current policies were tailored for a time in American agriculture that no longer exists. The structure of farms and farm households—and of the rural communities in which they exist—has changed enough over the last century to raise questions about the efficacy of policies with roots in an agriculturally based economy. How have policies adapted to change in the agricultural economy? How are they similar to Depression-era forms? What are the effects on farmers and the U.S. economy?

To answer these questions, we gathered historical data on a range of farm structure variables and reviewed some key developments in farm policy. The data offer a perspective on the long-term forces that have helped shape the present structure of agriculture and rural life, including productivity growth, the increasing importance of national and global markets, and the rising influence of consumers in agricultural production. This long-term view of structural change provides some insights into the questions now being raised about the efficacy and impacts of current farm policy in the 21st century.

## Changes in Farms, Farm Households, and Rural Communities Across the Century

American agriculture and rural life underwent a tremendous transformation in the 20th century. Early 20th century agriculture was labor intensive, and it took place on a large number of small, diversified farms in rural areas where more than half of the U.S. population lived. These farms employed close to half of the U.S. workforce, along with 22 million work animals, and produced an average of five different commodities. The agricultural sector of the 21st century, on the other hand, is concentrated on a small number of large, specialized farms in rural areas where less than a fourth of the U.S. population lives. These highly productive and mechanized farms employ a tiny share of U.S. workers and use 5 million tractors in place of the horses and mules of earlier days.

As a result of this transformation, U.S. agriculture has become increasingly efficient and has contributed to the overall growth of the U.S. economy. Output from U.S. farms has grown dramatically, allowing consumers to spend an increasingly smaller portion of their income on food and freeing a large share of the population to enter nonfarm occupations that have supported economic growth and development. As a part of the transformation spurred by technological innovation and changing market conditions, production agriculture has become a smaller player in the national and rural economies. While the more broadly defined food and agriculture sector continues to play a strong role in the national economy, farming has progressively contributed a smaller share of gross domestic product (GDP) and employed a smaller share of the labor force over the course of the century (see box, "Farming's changing role in the Nation's economy"). Over the same period, the share of the U.S. population living on farms also declined (fig. 1), as did agriculture's central role in the rural economy; while farming-dependent counties once comprised most of the rural economy, only 20 percent of nonmetro counties were considered farming-dependent in 2000 (fig. 2).

The altered role of farming in the overall economy reflects changes at the farm and farm household level. Since 1900, the number of farms has fallen by 63 percent, while the average farm size has risen 67 percent (fig. 3). Farm operations have become increasingly specialized as well (fig. 4)—from an average of about five commodities per farm in 1900 to about one per farm in 2000—reflecting the production and marketing efficiencies gained by concentration on fewer commodities, as well as the effects of farm price and income policies that have reduced the risk of depending on returns from only one or a few crops. All of this has taken place with almost no variation in the amount of land being farmed.

Farm households have adapted as dramatic increases in productivity have reduced the need for household labor on the farm, and as alternative employment opportunities have developed in nearby rural and metro economies. Although measures of off-farm work and income have varied over the century, making comparisons over time difficult, about a third of farm operators worked off the farm for at least 100 days in 1930 (the earliest such data are available) (see box, "Off-farm income/work"). By

### Farming's changing role in the Nation's economy

**1900**

41 percent of workforce employed in agriculture

**1930**

21.5 percent of workforce employed in agriculture

Agricultural GDP as a share of total GDP, 7.7 percent

**1945**

16 percent of the total labor force employed in agriculture

Agricultural GDP as a share of total GDP, 6.8 percent

**1970**

4 percent of employed labor force worked in agriculture

Agricultural GDP as a share of total GDP, 2.3 percent

**2000/02**

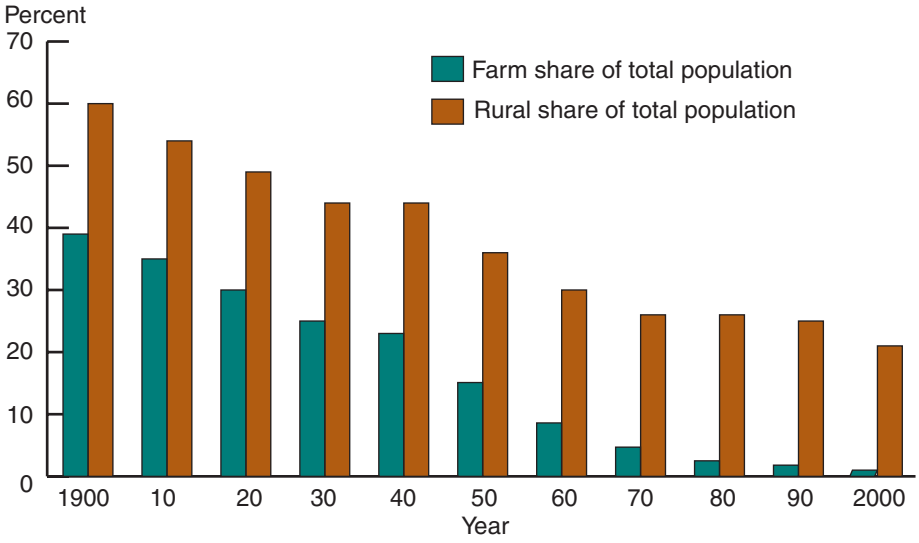
1.9 percent of employed labor force worked in agriculture (2000)

Agricultural GDP as a share of total GDP (2002), 0.7 percent

Source: Compiled by Economic Research Service, USDA. Share of workforce employed in agriculture, for 1900-1970, *Historical Statistics of the United States*; for 2000, calculated using data from *Census of Population*; agricultural GDP as part of total GDP, calculated using data from the Bureau of Economic Analysis.

1970, more than half of farms had off-farm income, and by 2000, 93 percent of farms earned off-farm income. Off-farm work has played a key role in increased farm household income; while farm household income was once below the national average, in 2002 it exceeded the national average by nearly $8,000.

Figure 1
**Both the U.S. farm population and rural population have dwindled as a share of the Nation's overall population**




Sources: Share calculated by Economic Research Service, USDA using data from *Census of Agriculture*, *Census of Population*, and *Census of the United States*.

## Off-farm income/work

**1930**

30 percent of farmers worked off farm for an average of 100 days

**1945**

27 percent of farmers worked off farm

**1970**

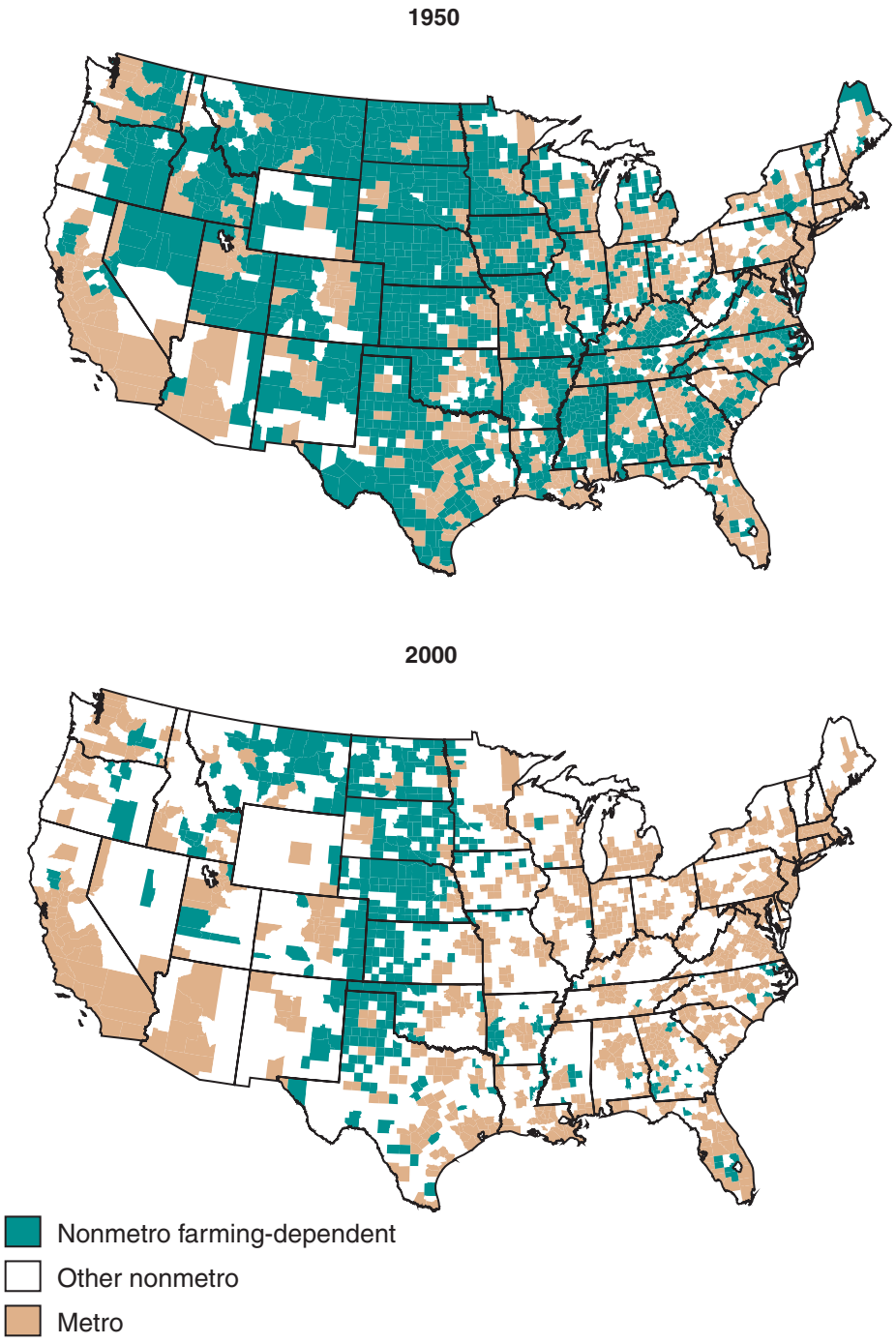
54 percent of households had off-farm income

**2002**

93 percent of households had off-farm income

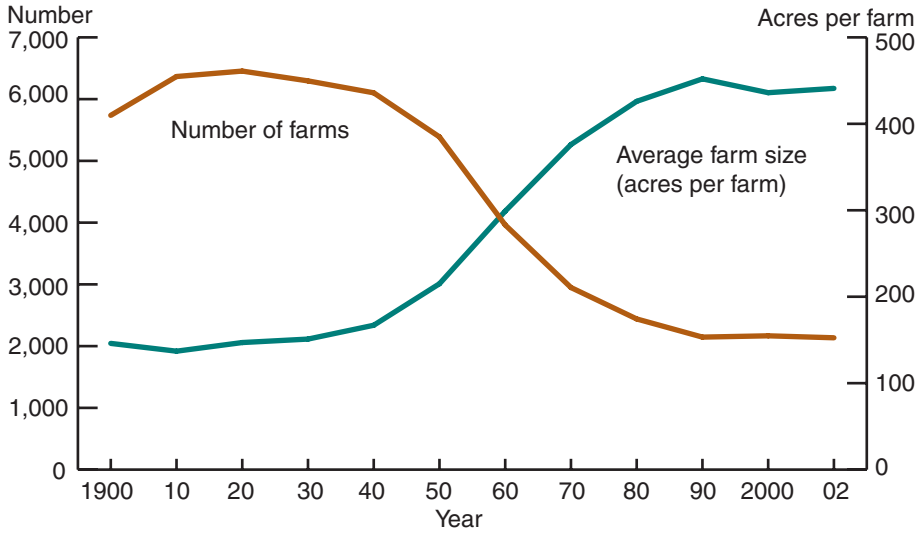
Source: Compiled by Economic Research Service, USDA, using data from *Census of Agriculture* and *Census of the United States*.

Figure 2
**Nonmetro farming-dependent counties, 1950 and 2000**



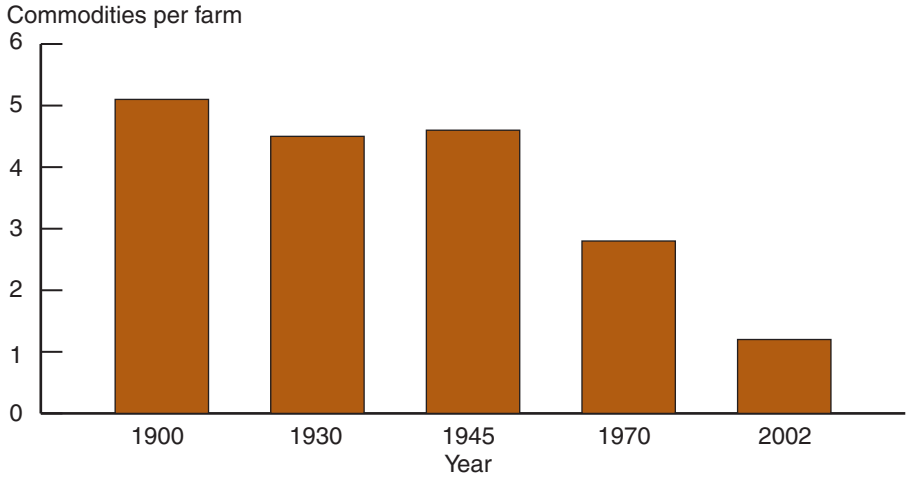

Source: Economic Research Service, USDA. Farming-dependent counties are defined by ERS. For 1950, at least 20 percent of income in the county was derived from agriculture. For 2000, either 15 percent or more of average annual labor and proprietors' earnings were derived from farming during 1998-2000 or 15 percent or more of employed residents worked in farm occupations. Metro/nonmetro status is based on the Office of Management and Budget (OMB) June 2003 classification.

Figure 3
**As the number of farms declined, their average size increased**




Source: Compiled by Economic Research Service, USDA, using data from *Census of Agriculture, Census of Population*, and *Census of the United States.*

Figure 4
**As farms have become more specialized, the number of commodities produced per farm has decreased**



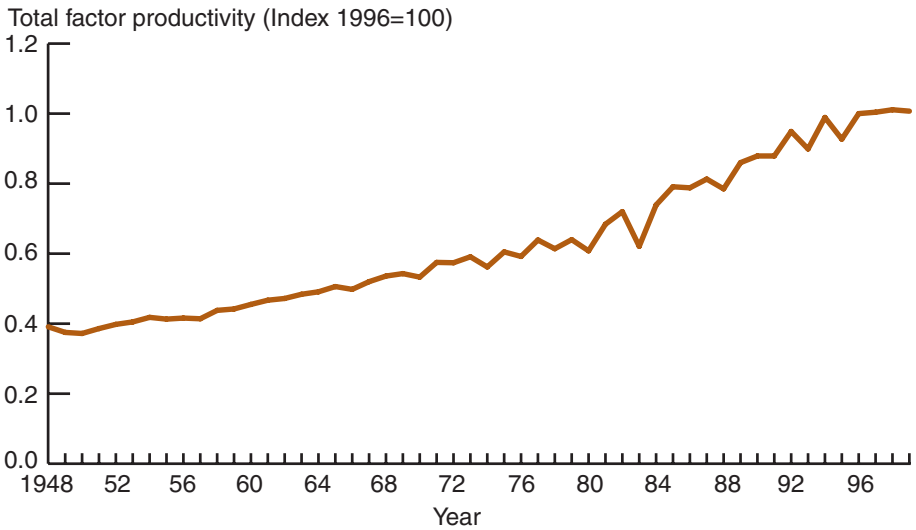

Note: The average number of commodities per farm is a simple average of the number of farms producing different commodities (corn, sorghum, wheat, oats, barley, rice, soybeans, peanuts, alfalfa, cotton, tobacco, sugar beets, potatoes, cattle, pigs, sheep, and chickens) divided by the total number of farms.
Source: Compiled by Economic Research Service, USDA, using data from *Census of Agriculture, Census of the United States,* and Gardner (2002).

## Longrun Forces Behind the Changes

As with the rest of the U.S. economy, the transformation in American agriculture and rural life over the last century has been driven by longrun economic developments, as well as periods of economic crisis. Among the most influential trends: technological development, the rise of consumer influence in agricultural production, and the increasing integration of American farming into national and global markets.

***Technological developments*** in agriculture have been particularly influential in driving change in the farm sector. Following World War II, technological developments occurred at an extraordinarily rapid pace. Advances in mechanization and increasing availability of chemical inputs led to ever-increasing economies of scale that spurred rapid growth in average farm size, accompanied by an equally rapid decline in the number of farms and in the farm and rural populations. From complete reliance on animal power in 1900, farmers rapidly embraced mechanical power (see box, "Mechanization"). Tractors had essentially replaced animal power by 1970, and mechanical harvesting of crops (sugar beets, cotton, and tomatoes, for example) became routine by the late 1960s. Advances in plant and animal breeding throughout the century facilitated mechanization and increased yields and quality, enhanced by the rapid development of inexpensive chemical fertilizers and pesticides since 1945 (fig. 5). As a result of these advances, growth in agricultural productivity averaged 1.9 percent annually between 1948 and 1999. Productivity growth in manufacturing over the same period averaged 1.3 percent annually, although it ranged from 0 to 2.3 percent, depending on the industry (Gullickson).

Figure 5
**Farms are growing more productive**




Note: Productivity captures the increase in production not accounted for by the growth in quantity of inputs used, and is expressed as total factor productivity (the ratio of total outputs to total inputs). When total factor productivity is rising over time, a greater level of production can be obtained from the inputs used. Productivity changes result from changes in efficiency, the scale of production, and technical change.
Source: Economic Research Service, USDA, Agricultural Research and Productivity Briefing Room, http://www.ers.usda.gov/briefing/AgResearch/.

### Mechanization

**1900**

**Number of work animals**
21.6 million

**1930**

**Number of horses, mules**
18.7 million

**Number of tractors**
920,000

**1945**

**Number of tractors**
2.4 million

**Number of mules and horses used for work power on farm**
11.6 million

**1960**

**Number of tractors**
4.7 million

**Number of horses and mules used for work power on farm**
3 million

Note: Data on work animals were no longer collected by the Census after 1960.
Source: Compiled by Economic Research Service, USDA, using data from *Census of Agriculture* and *Census of the United States.*

Since 1900, new technology and development of rural infrastructure have linked farm households ever more tightly to increasingly integrated national markets for labor and capital as well as goods and services. The growing use of purchased inputs for farm production has required cash income, as has the growing demand for consumer goods by farm households. As farm work and household consumption have required more cash and less labor, members of farm households have had both incentive and opportunity to seek off-farm work, which has made rural areas increasingly attractive to nonfarm industries.

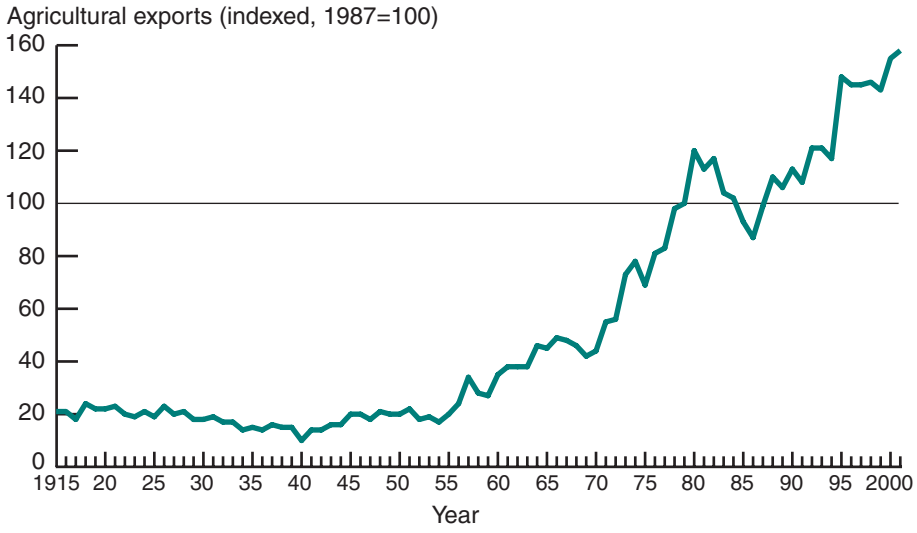
***Consumer influence*** in agricultural production has also grown over the years, as consumers have become more time-pressed and affluent, creating new pressures on the farming sector. Demand has shifted toward products that meet convenience, ethnic, and health-based preferences, while efforts to meet these new demands have led to new relationships between food producers, processors, and retailers. Contracting and vertical integration for supply and quality control, and development of special-use, high-value commodities, have changed the structure of agricultural markets, further increasing the specialization and scale, particularly of livestock and specialty crop operations. (See MacDonald et al.)

Consumers have also recently demanded attention to environmental issues in agriculture. Growing interest in environmentally friendly production practices has expanded markets for organic and other specialized products and has influenced the direction of environmental policy for agriculture. Programs have moved from a focus on soil conservation and fertility, largely aimed at boosting farm productivity, to include measures addressing water and air quality, wildlife and landscape protection, food purity, and animal welfare, phenomena whose effects are felt and manifested away from the farm. (See the ERS web briefing room on Conservation and Environmental Policy.)

While increasingly integrated market structures have developed to meet the quality and safety demands of American consumers, global markets have introduced new consumers and new competitors. ***Global markets*** were increasingly important to U.S. farmers as the first wave of globalization—propelled by steam and the telegraph—was at its peak, and exports helped to fuel rising prices that helped to make 1910-14 the "golden age" of American agriculture. However, as world market prices began to drop in the 1920s, farmers joined manufacturing interests to push for increased tariff protection. These efforts culminated in the passage of the Smoot-Hawley tariffs in 1930. The United States was not alone in escalating tariffs, and world trade plunged. In the 1930s, the volume of U.S. agricultural exports fell by more than 20 percent from the previous decade.

Agricultural exports remained flat until the 1960s but began to rise dramatically by the 1970s (fig. 6), propelled by adjustments in exchange rates as the dollar was freed from the gold standard and by the Soviet Union's growing appetite for imported grains and oilseeds. Global markets have proved volatile at times, however, and disruptions in foreign demand helped to precipitate a farm financial crisis in the 1980s.

Figure 6
**U.S. exports grew dramatically in the last half of the century**




Note: Standard techniques were used to combine four series of data for quantity of goods exported.
Source: Compiled by Economic Research Service, USDA, using data from *Agricultural Statistics*.

By the 1990s, a second wave of globalization was in full swing and American agriculture was becoming part of an increasingly integrated global market, with both agricultural imports and exports rising rapidly. As emerging competitors reformed their policies and adopted technologies already being used in the United States and other developed countries, global competition for international markets grew, pressuring U.S. producers in both export and domestic markets. (See "The U.S. Trade Balance," *Amber Waves*, February 2004, and "Dynamics of Agricultural Competitiveness: Policy Lessons From Abroad," *Amber Waves*, April 2003.)

## U.S. Farm Policy in the Context of Sectoral Change

Since the passage of the first Agricultural Adjustment Act (AAA) in 1933, farm price and income support programs have been the core of agricultural policy in the United States. This policy initially arose as an emergency response to post-World War I economic distress in agriculture that worsened with the onset of the Depression. However, the programs have been adjusted over time as policymakers have responded to the political, social, and economic pressures that agricultural productivity growth, market integration, and structural change have imposed on the farm sector. (See box, "Milestones in U.S. agricultural policy.")

In the 1930s, the economic, social, and political (the AAA played an important role in solidifying rural and southern support for the New Deal) rationale for a new approach to farm policy was clear. Farm household incomes were low even by Depression-era standards and off-farm employment opportunities were few—farming dominated the rural economy. The Federal approach to dealing with these problems—commodity-specific price supports and supply controls—were a product of the farm sector's structure; farms were generally small, diversified operations selling primarily to domestic markets behind high tariff walls. In this environment, the original AAA and subsequent farm legislation into the 1960s relied heavily on price supports and supply controls to increase returns to farmers. (See *History of Agricultural Price-Support and Adjustment Programs, 1933-84* for a detailed history of farm legislation.)

After World War II, rising productivity, driven by the rapid adoption of mechanical and chemical technology, led to growing surpluses even as the number of farms and production agriculture's share of economic activity continued to decline. For over a decade centered in the 1950s, the farm policy debate focused on whether to continue high price supports and supply controls or get the government out of agriculture. A compromise solution was reached in the Food and Agricultural Act of 1965, which retained elements of supply control but relied on a combination of reduced price supports and new income support payments to protect farm income. At the same time, it became obvious that a more market-oriented policy was necessary to help American farmers take advantage of the rising export demands of global markets. The loan rates used to support prices never again rose to the high levels of the 1940s and 1950s. The 1985 Food Security Act and the 1990 Food, Agriculture, Conservation, and Trade Act helped create incentives to encourage marketing commodities (rather than forfeiting them to government-held surpluses), as well as some flexibility in planting decisions. Supply controls ended with the 1996 Federal Agriculture Improvement and Reform Act, and new forms of income support payments not tied directly to farmers' current production decisions— "decoupled" payments—replaced the older income support programs. The evolution of farm policy from one based on supply controls and high price supports to one based primarily on direct Government payments has undoubtedly reduced the economic inefficiencies of resource misallocation and price distortions associated with farm programs.

## Milestones in U.S. agricultural policy

**1933**

Agricultural Adjustment Act: First "farm bill" established the New Deal mix of commodity-specific price and income support programs.

**1936**

Soil Conservation and Domestic Allotment Act: First direct links created between soil conservation and commodity programs.

**1949**

Agricultural Act: Established policy of high, fixed-price supports and acreage allotments as permanent farm policy. Programs revert to the 1949 provisions should a new farm bill fail to pass.

**1954**

Agricultural Act: Introduced flexible price supports to commodity programs.

**1956**

Agricultural Act: Established Soil Bank, which introduced use of conservation reserve in addition to acreage control for supply management. The program ended after only 2 years.

**1965**

Food and Agricultural Act: Introduced new income support payments in combination with reduced price supports and continued supply controls.

**1970**

Agriculture Act: First inclusion of title for Rural Development in a farm bill.

**1973**

Agriculture and Consumer Protection Act: Introduced target prices and deficiency payments to replace price supports, coupled with low commodity loan rates, to increase producer reliance on markets and allow for free movement of commodities at world prices.

**1977**

Food and Agriculture Act: First inclusion of title for Food Stamps and other commodity distribution programs in a farm bill.

**1985**

Food Security Act: Introduced marketing loan provisions to commodity loan programs to reduce forfeitures by allowing repayment of loans at lower rate when market prices fell, with the intention of aiding in reducing Government-held surplus grain. Re-established a conservation reserve.

**1996**

Federal Agriculture Improvement and Reform Act: Replaced price support and supply control program with program of direct payments based on historical production. Introduced nearly complete planting flexibility.

**2002**

Farm Security and Rural Investment Act: Introduced counter-cyclical payments program triggered when current prices fall below a target level, but paid based on historical production. Introduced working-lands conservation payments through the Conservation Security Program. Continued planting flexibility and program of direct payments based on historical production, allowing updating of historical base acres and adding historical soybean acres.

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Source: Compiled by Economic Research Service, USDA. The complete texts of U.S. farm bills from 1933 to 2002 are available on the website of the National Agricultural Law Center (http://www.nationalaglawcenter.org/farmbills/).

Agricultural policies not only moved in a more market-oriented direction, they also broadened beyond commodity programs in the postwar period. Food stamps had roots in the rural relief and commodity distribution policies of the 1930s and 1940s, but became a highly visible national anti-poverty program with the 1964 Food Stamp Act. Beginning with the 1977 Food and Agriculture Act, food stamps and other commodity distribution programs were included in farm bills that governed the more traditional commodity programs as well as related conservation programs. Rural development programs, also with roots in the 1930s, first appeared in a farm bill in the 1970 Agricultural Act, which was followed by the 1972 Rural Development Act, offering a broad range of services, loans, and technical guidance to rural communities adjusting to change.

Although farm policy and related programs have evolved since the 1930s, commodity programs have retained two key features: commodity specificity and a focus on income support. Today, in a farming sector characterized by highly specialized operations, fewer than 25 percent of farms receive payments from programs tied to a limited number of "program crops." Moreover, in an environment in which more than 90 percent of farm household income is derived from off-farm sources, the impact of farm programs on the well-being of farm households continues to decline. These circumstances are very different from those of the 1930s, when farm policies achieved broader coverage of farm households that depended on farming for their livelihoods.

## Conclusion

Overall, farmers found ways to adapt to the changes of the last century. Those who remained in agriculture increased their efficiency by expanding and specializing their operations to take advantage of economies of scale, or by identifying niche markets to maintain profitability. Others moved out of farming and into other enterprises or occupations, or combined farming with off-farm work, with other family members tapping different sources of income. In some cases, farming has become a secondary occupation, providing a preferred lifestyle rather than a primary source of income.

Certainly, not all adjustments have been voluntary or preferred, and regional differences have affected the outcomes. Areas closer to centers of economic growth or to attractive natural amenities have benefited, while areas far from urban development and natural amenities, and areas of persistent poverty—associated with higher concentrations of racial and ethnic minorities—in most cases have not. (See ERS briefing rooms on Rural Population and Migration and on Rural Income, Poverty, and Welfare.)

Farm policies have never fundamentally altered the trajectory of change, but they have in some cases affected its pace. For example, the institutionalization of what began as emergency income support in the 1930s has likely slowed the movement of labor out of the farm sector. In other cases, policies have spurred change—for example, the risk-reduction effects of price supports and the planting rigidities imposed by supply controls encouraged specialization.

As the new century gets underway, technological development and market integration remain forces of change, and their influence, along with that of consumers, appears likely to continue. The structure of farming continues to move toward fewer, larger operations producing the bulk of farm commodities, complemented by a growing number of smaller farms earning most of their income from off-farm sources, all increasingly affected by global events. Although many details of U.S. farm programs have changed over the last 40 years in response to new economic and political circumstances, two key features of commodity programs—commodity specificity and focus on income support—have remained constant. Today, cash receipts for supported commodities (wheat, feed grains, rice cotton, oilseeds, dairy, and sugar) account for only 34 percent of total farm cash receipts. Direct government payments for income support reach only about 500,000 farms (around 25 percent of all farms). The extent to which farm policy meets contemporary objectives for maintaining the well-being of farm households and for sustaining the agricultural economy is a matter for public debate.

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