



United States Department of Agriculture
Food Safety and Inspection Service

Food Safety Information



Beef from Farm to Table

Since 1910, the first year that statistics were compiled, Americans have been eating an average of 56 pounds of beef yearly. About 40 million cattle are inspected yearly by USDA's Food Safety and Inspection Service. In 2009, this translated into more than 61 pounds of beef per person. In calls to the USDA Meat and Poultry Hotline, beef is the second food category (behind turkey) callers most ask about. The following information answers many of their questions about the safe handling, preparation, cooking and storage of beef.

What is beef?

The domestication of cattle for food dates to about 6500 B.C. in the Middle East. Cattle were not native to America, but brought to the New World on ships by European colonists. Americans weren't big eaters of fresh beef until about 1870, due to the enormous growth of the cattle industry in the West. The introduction of cattle cars and refrigerated cars on the railroad facilitated distribution of the beef.

"Beef" is meat from full-grown cattle about 2 years old. A live steer weighs about 1,000 pounds and yields about 450 pounds of edible meat. There are at least 50 breeds of beef cattle, but fewer than 10 make up most cattle produced. Some major breeds are Angus, Hereford, Charolais, and Brahman.

"Baby beef" and "calf" are 2 interchangeable terms used to describe young cattle weighing about 700 pounds that have been raised mainly on milk and grass. The meat cuts from baby beef are smaller; the meat is light red and contains less fat than beef. The fat may have a yellow tint due to the vitamin A in grass.

"Veal" is meat from a calf which weighs about 150 pounds. Those that are mainly milk-fed usually are less than 3 months old. The difference between "veal" and "calf" is based on the color of their meat, which is determined almost entirely by diet. Veal is pale pink and contains more cholesterol than beef.

NOTE: This information is about whole muscle beef and variety beef. See "Focus on Ground Beef" for information about hamburger and ground beef

How are cattle raised?

All cattle start out eating grass; three-fourths of them are "finished" (grown to maturity) in feedlots where they are fed specially formulated feed based on corn or other grains.

Can hormones & antibiotics be used in cattle raising?

Antibiotics may be given to prevent or treat disease in cattle. A "withdrawal" period is required from the time antibiotics are administered until it is legal to slaughter the animal. This is so residues can exit the animal's system. FSIS randomly samples cattle at slaughter and tests for residues. Data from this Monitoring Plan have shown a very low percentage of residue violations. Not all antibiotics are approved for use in all classes of cattle. However, if there is a demonstrated therapeutic need, a veterinarian may prescribe an antibiotic that is approved in other classes for an animal in a non-approved class. In this case, no detectable residues of this drug may be present in the edible tissues of the animal at slaughter.

The Food Safety and Inspection Service (FSIS) is the public health agency in the U.S. Department of Agriculture responsible for ensuring that the nation's commercial supply of meat, poultry, and egg products is safe, wholesome, and correctly labeled and packaged.

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Hormones may be used to promote efficient growth. Estradiol, progesterone, and testosterone (three natural hormones), and zeranol and trenbolone acetate (two synthetic hormones) may be used as an implant on the animal's ear. The hormone is time released, and is effective for 90 to 120 days. In addition, melengesterol acetate, which can be used to suppress estrus, or improve weight gain and feed efficiency, is approved for use as a feed additive. Not all combinations of hormones are approved for use in all classes of cattle. Hormones are approved for specific classes of animals only, and cannot be used in non-approved classes.

How is beef inspected?

Inspection is mandatory; grading is voluntary, and a plant pays to have its meat graded. USDA-graded beef sold at the retail level is Prime, Choice, and Select. Lower grades (Standard, Commercial, Utility, Cutter, and Canner) are mainly ground or used in processed meat products. Retail stores may use other terms which must be different from USDA grades.

USDA Prime beef (about two percent of graded beef) has more fat marbling, so it is the most tender and flavorful. However, it is higher in fat content. Most of the graded beef sold in supermarkets is USDA Choice or USDA Select. The protein, vitamin, and mineral content of beef are similar regardless of the grade.

How is ungraded beef different?

All beef is inspected for wholesomeness. The overall quality of ungraded beef may be higher or lower than most government grades found in retail markets.

What is marbling?

Marbling is white flecks of fat within the meat muscle. The greater amount of marbling in beef, the higher the grade because marbling makes beef more tender, flavorful, and juicy.

Retail Cuts of Fresh Beef

There are four basic major (primal) cuts into which beef is separated: chuck, loin, rib, and round. It is recommended that packages of fresh beef purchased in the supermarket be labeled with the primal cut as well as the product, such as "chuck roast" or "round steak." This helps consumers know what type of heat is best for cooking the product. Generally, chuck and round are less tender and require moist heat such as braising; loin and rib can be cooked by dry heat methods such as broiling or grilling.

Unfortunately, names for various cuts can vary regionally in stores, causing confusion over the choice of cooking method. For example, a boneless top loin steak is variously called: strip steak, Kansas City Steak, N.Y. strip steak, hotel cut strip steak, ambassador steak, or club sirloin steak.

How much beef is consumed?

Figures from the USDA's Economic Research Service show average annual per capita beef consumption for the following selected periods:

Year	Weight	Year	Weight
1910	48 pounds	1960	59 pounds
1920	40 pounds	1970	80 pounds
1930	34 pounds	1980	72 pounds
1940	38 pounds	1990	64 pounds
1950	45 pounds	2009	61 pounds

Nutrition Labeling

Nutrition claims such as “lean” and “extra lean” are sometimes seen on beef products. Here are their definitions:

“Lean” - 100 grams of beef with less than 10 grams of fat, 4.5 grams or less of saturated fat, and less than 95 milligrams of cholesterol.

“Extra Lean” - 100 grams of beef with less than 5 grams of fat, less than 2 grams of saturated fat, and less than 95 milligrams of cholesterol.

What does “natural” mean?

All fresh meat qualifies as “natural.” Products labeled “natural” cannot contain any artificial flavor or flavoring, coloring ingredient, chemical preservative, or any other artificial or synthetic ingredient; and the product and its ingredients are not more than minimally processed (ground, for example). All products claiming to be natural should be accompanied by a brief statement which explains what is meant by the term “natural.”

Some companies promote their beef as “natural” because they claim their cattle weren’t exposed to antibiotics or hormones and were totally raised on a range instead of being “finished” in a feedlot.

How & why is some beef aged?

Beef is aged to develop additional tenderness and flavor. It is done commercially under controlled temperatures and humidity. Since aging can take from 10 days to 6 weeks, USDA does not recommend aging beef in a home refrigerator.

Why is beef called a “red” meat?

Oxygen is delivered to muscles by the red cells in the blood. One of the proteins in meat, myoglobin, holds the oxygen in the muscle. The amount of myoglobin in animal muscles determines the color of meat. Beef is called a “red” meat because it contains more myoglobin than chicken or fish. Other “red” meats are veal, lamb, and pork.

Color of Beef

Beef muscle meat not exposed to oxygen (in vacuum packaging, for example) is a burgundy or purplish color. After exposure to the air for 15 minutes or so, the myoglobin receives oxygen and the meat turns bright, cherry red.

After beef has been refrigerated about 5 days, it may turn brown due to chemical changes in the myoglobin. Beef that has turned brown during extended storage may be spoiled, have an off-odor, and be tacky to the touch.

Iridescent Color of Roast Beef

Sliced cooked beef or lunch meat can have an iridescent color. Meat contains iron, fat, and many other compounds. When light hits a slice of meat, it splits into colors like a rainbow. There are also various pigments in meat compounds which can give it an iridescent or greenish cast when exposed to heat and processing. Iridescent beef isn’t spoiled necessarily. Spoiled cooked beef would probably also be slimy or sticky and have an off-odor.

Additives

Additives are not allowed on fresh beef. If beef is processed, additives such as MSG, salt, or sodium erythorbate must be listed on the label.

Dating of Beef Products

Product dating is not required by Federal regulations. However, many stores and processors may voluntarily date packages of raw beef or processed beef products. If a calendar date is shown, there must be a phrase explaining the meaning of the date.

Use or freeze products with a “Sell-By” date within 3 to 5 days of purchase.

If the manufacturer has determined a “Use-By” date, observe it. This is a quality assurance date after which peak quality begins to lessen but the product may still be used. It’s always best to buy a product before its date expires. It’s not important if a date expires after freezing beef because all foods stay safe while properly frozen.

What foodborne organisms are associated with beef?

Escherichia coli can colonize in the intestines of animals, which could contaminate muscle meat at slaughter. *E. coli* O157:H7 is a rare strain that produces large quantities of a potent toxin that forms in and causes severe damage to the lining of the intestine. The disease produced by it is called Hemorrhagic Colitis and is characterized by bloody diarrhea. *E. coli* O157:H7 is easily destroyed by thorough cooking.

Salmonella may be found in the intestinal tracts of livestock, poultry, dogs, cats, and other warm-blooded animals. There are about 2,000 *Salmonella* bacterial species. Freezing doesn't kill this microorganism, but it is destroyed by thorough cooking. *Salmonella* must be eaten to cause illness. They cannot enter the body through a skin cut. Cross-contamination can occur if raw meat or its juices contact cooked food or foods that will be eaten raw, such as salad.

Staphylococcus aureus can be carried on human hands, nasal passages, or throats. Most foodborne illness outbreaks are a result of contamination from food handlers and production of a heat-stable toxin in the food. Sanitary food handling and proper cooking and refrigerating should prevent staphylococcal foodborne illness.

Listeria monocytogenes is destroyed by cooking, but a cooked product can be recontaminated by poor handling practices and poor sanitation. FSIS has a zero tolerance for *Listeria monocytogenes* in cooked and ready-to-eat products such as beef franks or lunchmeat. Observe handling information such as "Keep Refrigerated" and "Use-By" dates on labels.

Rinsing Beef

It isn't necessary to wash raw beef before cooking it. Any bacteria which might be present on the surface would be destroyed by cooking.

How to Handle Beef Safely

- **Raw Beef:** Select beef just before checking out at the register. Put packages of raw beef in disposable plastic bags, if available, to contain any leakage which could cross-contaminate cooked foods or produce. Beef, a perishable product, is kept cold during store distribution to retard the growth of bacteria.

Take beef home immediately and refrigerate it at 40 °F; use within 3 to 5 days (1 or 2 days for ground beef and variety meats such as liver, kidneys, tripe, sweetbreads, or tongue) or freeze (0 °F). If kept frozen continuously, it will be safe indefinitely.

It is safe to freeze beef in its original packaging or repackage it. However, for long-term freezing, overwrap the porous store plastic with aluminum foil, freezer paper, or freezer-weight plastic wrap or bags to prevent "freezer burn," which appears as grayish-brown leathery spots and is caused by air reaching the surface of food. Cut freezer-burned portions away either before or after cooking the beef. Heavily freezer-burned products may have to be discarded for quality reasons. For best quality, use steaks and roasts within 9 to 12 months.

- **Ready-Prepared Beef:** For fully-cooked, take-out beef dishes such as Chinese food, barbecued ribs, or fast food hamburgers, be sure they are hot at pickup. Use cooked beef within 2 hours (1 hour if the air temperature is above 90 °F) or refrigerate it at 40 °F in shallow, covered containers. Eat within 3 to 4 days, either cold or reheated to 165 °F (hot and steaming). It is safe to freeze ready-prepared beef dishes. For best quality, use within 4 months.

Safe Defrosting

There are three safe ways to defrost beef: in the refrigerator, in cold water, and in the microwave. Never defrost on the counter or in other locations.

- **Refrigerator:** It's best to plan ahead for slow, safe thawing in the refrigerator. Ground beef, stew meat, and steaks may defrost within a day. Bone-in parts and whole roasts may take 2 days or longer. Once the raw beef defrosts, it will be safe in the refrigerator for 3 to 5 days before cooking. During this time, if you decide not to use the beef, you can safely refreeze it without cooking it first.
- **Cold Water:** To defrost beef in cold water, do not remove packaging. Be sure the package is airtight or put it into a leakproof bag. Submerge the beef in cold water, changing the water every 30 minutes so that it continues to thaw. Small packages of beef may defrost in an hour or less; a 3- to 4-pound roast may take 2 to 3 hours.
- **Microwave:** When microwave defrosting beef, plan to cook it immediately after thawing because some areas of the food may become warm and begin to cook during microwaving. Holding partially-cooked food is not recommended because any bacteria present wouldn't have been destroyed.

Foods defrosted in the microwave or by the cold water method should be cooked before refreezing because they may have been held at temperatures above 40 °F.

It is safe to cook frozen beef in the oven, on the stove, or grill without defrosting it first; the cooking time may be about 50% longer. Do not cook frozen beef in a slow cooker.

Marinating

Marinate beef in the refrigerator up to 5 days. Boil used marinade before brushing on cooked beef. Discard any uncooked leftover marinade.

Partial Cooking

Never brown or partially cook beef to refrigerate and finish cooking later because any bacteria present wouldn't have been destroyed. It is safe to partially pre-cook or microwave beef immediately before transferring it to the hot grill to finish cooking.

Liquid in Package

Many people think the red liquid in packaged fresh beef is blood. However, blood is removed from beef during slaughter and only a small amount remains within the muscle tissue. Since beef is about 3/4 water, this natural moisture combined with protein is the source of the liquid in the package.

Safe Cooking

For safety, the USDA recommends cooking hamburgers and ground beef mixtures such as meat loaf to 160 °F as measured with a food thermometer. Cook all organ and variety meats (such as heart, kidney, liver and tongue) to 160 °F. Cook all raw beef steaks and roasts to a minimum internal temperature of 145°F as measured with a food thermometer before removing meat from the heat source. For safety and quality, allow meat to rest for at least three minutes before carving or consuming. For reasons of personal preference, consumers may choose to cook meat to higher temperatures. For approximate cooking times for use in meal planning, see the following chart compiled from various resources. Times are based on beef at refrigerator temperature (40 °F). Remember that appliances and outdoor grills can vary in heat. Use a food thermometer to check for safe cooking and doneness of beef.

APPROXIMATE BEEF COOKING TIMES

For approximate cooking times for use in meal planning, see the following chart compiled from various resources. Times are based on beef at refrigerator temperature (40 °F). Remember that appliances and outdoor grills can vary in heat. Use a food thermometer to check for safe cooking and doneness of beef.

Type of Beef	Size	Cooking Method	Cooking Time	Internal
Rib Roast, bone in	4 to 6 lbs.	Roast 325 °F	23-25 min./lb.	145 °F and allow to rest for at least 3 minutes
Rib Roast, boneless rolled	4 to 6 lbs.	Roast 325 °F	Add 5-8 min./lb. to times above	
Chuck Roast, Brisket	3 to 4 lbs.	*Braise 325 °F	*Braise 325°	
Round or Rump Roast	2 1/2 to 4 lbs.	Roast 325 °F	30-35 min./lb.	
Tenderloin, whole	4 to 6 lbs.	Roast 425 °F	45-60 min. total	
Steaks	3/4" thick	Broil/Grill	4-5 min. per side	
Stew or Shank Cross Cuts	1 to 1 1/2" thick	Cover with liquid; simmer	2 to 3 hours	
Short Ribs	4" long and 2" thick	*Braise 325 °F	1 1/2 to 2 1/2 hours	
Hamburger patties, fresh	4 ounces	Grill, broil or fry	3 to 5 minutes per side	160 °F

*Braising is roasting or simmering less-tender meats with a small amount of liquid in a tightly covered pan.

Microwave Directions:

- When microwaving unequal size pieces of beef, arrange in dish or on rack so thick parts are toward the outside of dish and thin parts are in the center; cook on medium-high or medium power.
- Place a roast in an oven cooking bag or in a covered pot.
- Refer to the manufacturer's directions that accompany the microwave oven for suggested cooking times.
- Use a meat thermometer to test for doneness in several places to be sure temperatures listed above have been reached.

Storage Times

Since product dates aren't a guide for safe use of a product, how long can the consumer store the food and still use it at top quality? Follow these tips:

- Purchase the product before the date expires.
- Follow handling recommendations on product.
- Keep beef in its package until using.
- It is safe to freeze beef in its original packaging. If freezing longer than 2 months, overwrap these packages with airtight heavy-duty foil, plastic wrap, or freezer paper or place the package inside a plastic bag.
- For storage times, consult the following chart.

Home Storage of Beef Products

If product has a "Use-By" Date, follow that date. If product has a "Sell-By" Date or no date, cook or freeze the product by the times on the following chart.

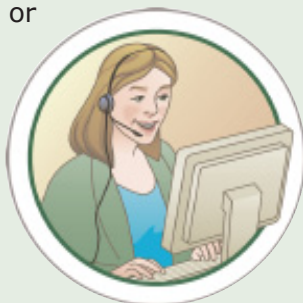
STORAGE TIMES FOR BEEF PRODUCTS

PRODUCT	REFRIGERATOR 40 °F	FREEZER 0 °F
Fresh beef roast, steaks, chops, or ribs	3 to 5 days	6 to 12 months
Fresh beef liver or variety meats	1 or 2 days	3 to 4 months
Home cooked beef, soups, stews or casseroles	3 to 4 days	2 to 3 months
Store-cooked convenience meals	1 to 2 days	2 to 3 months
Cooked beef gravy or beef broth	1 or 2 days	2 to 3 months
Beef hot dogs or lunch meats, sealed in package	2 weeks (or 1 week after a "Use-By" date)	1 to 2 months
Beef hot dogs, opened package	7 days	1 to 2 months
Lunch meats, opened package	3 to 5 days	1 to 2 months
TV dinners, frozen casseroles	Keep Frozen	3 to 4 months
Canned beef products in pantry	2 to 5 years in pantry; 3 to 4 days after opening	After opening, 2 to 3 months
Jerky, commercially vacuum packaged	1 year in pantry Refrigerate 2 to 3 months	Do not freeze

Food Safety Questions?

Call the USDA Meat & Poultry Hotline

If you have a question about meat, poultry, or egg products, call the USDA Meat and Poultry Hotline toll free at **1-888-MPHotline (1-888-674-6854)**. The hotline is open year-round



Monday through Friday from 10 a.m. to 4 p.m. ET (English or Spanish). Recorded food safety messages are available 24 hours a day. Check out the FSIS Web site at

www.fsis.usda.gov.

Send E-mail questions to **MPHotline.fsis@usda.gov**.

AskKaren.gov

FSIS' automated response system can provide food safety information 24/7 and a live chat during Hotline hours.



Mobile phone users can access **m.askkaren.gov**

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