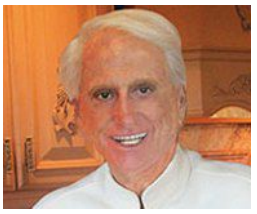

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Beef, grass-fed

Grass feeding is a practice not yet familiar to all consumers. 100% grass-fed beef comes from cows who have grazed in pasture year-round rather than being fed a processed diet for much of their life. Grass feeding improves the quality of beef, and makes the beef richer in omega-3 fats, vitamin E, beta-carotene, and CLA (a beneficial fatty acid named conjugated linoleic acid. (For more detailed information about grass feeding, please click here.) Just how important is grass feeding for beef quality? As you will see in the chart below, we have included grass-feeding as one of our top-level recommendations for anyone who plans to include beef in their meal plan:

Shopping for Beef	
Stick with organic	Organic standards help lower risk of contaminated feed and organic beef usually has higher nutrient quality. However, remember that organic by itself does not guarantee a natural lifestyle for the beef cows.
Ask for 100% grass-fed	Go beyond organic by asking for 100% grass-fed. Don't get sidetracked by the confusing array of labeling terms like natural" or "pasture-raised." Labeling laws allow products to display these terms even if cows spend little or no time outdoors in a pasture setting. Unfortunately, even the term "grass-fed" is not sufficient since grass-fed cows may have spent a relatively small amount of time grass feeding. The standard to look for on the label is "100% grass-fed." Talk to your grocer or the cow farmer and find out how the animals were actually raised. In addition, if you would like more information about the practice of grass-feeding, please click here.
Consider local farms	Organic, 100% grass-fed beef may be available from local farms with small flocks, which provide a natural lifestyle for their cows. Two websites that can help you find small local farms in your area are www.localharvest.org and www.eatwild.com. Both sites are searchable by zip code.

One thing you'll notice about the chart above is an absence of recommendations about specific cuts of beef. In general, we recommend sticking with lower fat cuts of beef if you decide to include this food in your meal plan. Lower fat cuts include top round, bottom round, eye of round, flank, and strip. Health organizations have traditionally recommended avoidance of higher fat cuts like tenderloin, ribeye, or porterhouse because it can be difficult to make room for the amount of total fat, saturated fat, and calories they contain. Since too much total fat, too much saturated fat, and too many calories in a daily meal plan can raise the risk of certain health problems, this approach makes sense to us, particularly in light of the fact that lower fat beef cut can still provide you with the nutritional benefits of 100% grass-fed beef in terms of omega-3s, CLA, beta-carotene, and vitamin E.

What's New and Beneficial About Grass-Fed Beef

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Healthy Eating

- Recent studies have underscored the large difference in carotenoid content between grass-fed and conventionally fed beef. Grass-fed beef may contain more than twice the amount of beta-carotene and lutein that is present in conventionally fed beef. This relationship appears to hold true even if the cows have been fed silage during the winter months and pasture-feed only during the summer. In addition, some researchers have suggested that the yellowish color of fat in grass-fed beef is a good way to determine the extent to which the animals have been pasture-fed.
- The cholesterol content of grass-fed beef has repeated been shown to be lower than the cholesterol content in beef from conventionally fed animals. The decrease in cholesterol that you are most likely to obtain when switching from conventionally fed to grass-fed beef is approximately 22–39%. Since a single 4-ounce serving of conventionally fed beef will typically provide you with 90 milligrams of cholesterol or more, and since the recommended limit from the American Heart Association is 300 milligrams per day (and only 200 milligrams if you are a person who has experienced heart disease or has an LDL cholesterol of 100 mg/dL or more), this 22-39% decrease in cholesterol from grass-fed beef could be very helpful to you in helping you keep your total cholesterol intake under the recommended limit.
- You'll find yourself getting 500-800 milligrams of CLA (conjugated linoleic acid) from a 4-ounce serving of grass-fed beef. This amount is approximately two to three times greater than the amount found in non grass-fed beef. CLA is a fatty acid made from linoleic acid, an omega-6 fatty acid commonly found in food. However, CLA is unique in its chemical structure, and this uniqueness is associated with an increasing list of health benefits, including immune and inflammatory system support, improved bone mass, improved blood sugar regulation, reduced body fat, reduced risk of heart attack, and maintenance of lean body mass. Grass-fed beef also contains greater amounts of vaccenic acid than conventionally fed beef. Various bacteria in our digestive tract are able to convert vaccenic acid into CLA once we've consumed grass-fed beef, and this process can further increase the practical amount of CLA that we receive from grass-fed animals.
- The omega-3 fat content of grass-fed beef varies widely, due to the wide variety of forage crops that can be planted in pastures (or that grow on pastureland in the wild); the age, breed, and health of cows; and seasonal plant cycles in pastureland. Some recent studies show up to 3.5 grams of total omega-3 fats in 4 ounces of grass-fed beef. That level would provide you with 100% of the daily requirement. In other recent studies, total omega-3s in grass-fed beef only reached 1 gram. Still, a single gram of omega-3s could make an important contribution to a person's health. Most of the omega-3 content of grass-fed beef comes in the form of alpha-linolenic acid, or ALA. However, grass-fed beef also typically contains small-to-moderate amounts of other omega-3s, including EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). The range we've seen in recent studies is 20-720 milligrams for EPA, and 10-120 milligrams for DHA. In all cases described above, grass-fed beef contained greater amounts of omega-3s (for ALA, EPA, and DHA) than conventionally fed beef.

Beef, grass-fed, strip steak, cooked
4.00 oz
(113.40 grams)

Calories: 175
GI: very low

Nutrient	DRI/DV
vitamin B12	60%
protein	52%
vitamin B3	48%
omega-3 fats	46%
vitamin B6	44%
selenium	44%
zinc	37%
phosphorus	34%
choline	17%
pantothenic acid	15%

This chart graphically details the %DV that a serving of Beef, grass-fed

provides for each of the nutrients of which it is a good, very good, or excellent source according to our Food Rating System. Additional information about the amount of these nutrients provided by Beef, grass-fed can be found in the Food Rating System Chart. A link that takes you to the In-Depth Nutritional Profile for Beef, grass-fed, featuring information over 80 nutrients, can be found under the Food Rating System Chart.

Health Benefits

Broad-Based Nutrient Support

A recent study of children and teens in the U.S. has shown that individuals in these age groups depend on their intake of beef for the following key nutrients and in the following amounts.

- Vitamin B12: beef provides 14-21% of this B vitamin to U.S. children and teenagers
- Zinc: 13-19% of this mineral is provided by beef to these age groups
- Vitamin B3: U.S. children and teens receive 6-10% of their vitamin B3 from beef
- Vitamin B6: 5-8% of this vitamin is provided by beef to these age groups
- Iron: up to 8% of dietary iron is provided to these age groups by beef

Additionally, beef is an important source of potassium, phosphorus, and protein to these age groups in the U.S. population. Very few U.S. children and teenagers—and equally few U.S. adults—consume grass-fed versus conventionally fed beef. For this reason, we do not have data showing the potential contribution of grass-fed beef to other categories of nutrient consumption. However, we do have research evidence about the average composition of grass-fed versus conventionally fed beef, and this research evidence points to significant differences for the following key nutrients.

- Vitamin E: repeatedly show to be higher in grass-fed beef, sometimes at a level that is three times higher than conventional feeding
- Beta-carotene: shown in several studies to be significantly higher in grass-fed beef, and often at levels twice as high as the amount found in conventionally fed beef. Beta-carotene is not the only carotenoid phytonutrient that increases with grass feeding. The carotenoid lutein increases as well. This relationship between grass feeding and carotenoids appears to hold true even if the cows have been fed silage during the winter months and are pasture-fed only during summer months. The relationship between beta-carotene and grass-feeding in beef is so strong that some researchers have suggested that the yellowish color of fat in grass-fed beef can be used as a good way to determine the extent to which animals have been pasture-fed.
- Omega-3 fatty acids: because many forage plants contain the omega-3 fatty acid alpha-linolenic acid (ALA), cows that forage in a pasture typically get higher levels of ALA in their diet. This ALA gets passed on to us when we eat beef, drink milk, or consume dairy products from cows like cheese or yogurt. The omega-3 fat content of grass-fed beef varies widely due to the wide variety of forage crops that can be planted in pastures (or that grow on pastureland in the wild); the age, breed, and health of cows; and seasonal plant cycles in pastureland. Some recent studies show up to 3.5 grams of total omega-3 fats in 4 ounces of grass-fed beef. That level would provide you with 100% of the daily requirement. In other recent studies, total omega-3s in grass-fed beef only reached 1 gram. Still, a single gram of omega-3s could make an important contribution to a person's health. Since ALA is the most

common omega-3 fatty acid in the plants that cows eat on pastureland, most of the omega-3 content of grass-fed beef comes in the form of ALA. However, just like humans, cows are capable of taking the ALA in their diet and converting some of it into other omega-3 fats, including EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). The range we've seen in recent studies for EPA and DHA in grass-fed beef is 20-720 milligrams for EPA and 10-120 milligrams for DHA. While the lower end of these ranges is relatively small (and far lower, for example, than the amount of EPA and DHA contained in many fish), it is still significant from a health standpoint. Additionally, in all of the research that we have reviewed, grass-fed beef has contained greater amounts of omega-3s than conventionally fed beef.

When combined with the B vitamins and minerals listed above, these additional nutrients specifically associated with grass-feeding of beef—including vitamin E, beta-carotene, and omega-3s—make grass-fed beef unusually diverse in terms of its potential for nutrient support of health. Our food rating system also ranks grass-fed beef as a very good source of the antioxidant mineral selenium and a good source of the B-vitamin choline.

Conjugated Linoleic Acid CLA and Vaccenic Acid

Conjugated linoleic acid (CLA) is a fatty acid made from linoleic acid, an omega-6 fatty acid commonly found in food. However, linoleic acid is not commonly converted into CLA in significant amounts, making CLA much more rare in food. The unique structure of CLA is associated with an increasing list of health benefits, including immune and inflammatory system support, improved bone mass, improved blood sugar regulation, reduced body fat, and maintenance of lean body mass.

You'll find yourself getting 500-800 milligrams of CLA from a 4-ounce serving of grass-fed beef. This amount is approximately two to three times greater than the amount found in non grass-fed beef.

In addition to CLA, you will also find yourself getting a fatty acid called vaccenic acid from grass-fed beef. (Grass-fed beef contains greater amounts of vaccenic acid than conventionally fed beef.) Since various bacteria in our digestive tract can convert vaccenic acid into CLA once grass-fed beef has been consumed, this vaccenic acid supplied by grass-fed beef can further increase the practical amount of CLA that we receive from grass-fed animals.

Immune and Inflammatory Support

We have yet to see large-scale human studies showing decreased risk of chronic immune and inflammatory health problems following routine intake of grass-fed beef. Future results along these lines would not surprise us, since grass-fed beef can provide substantial amounts of the antioxidant vitamins E and beta-carotene, the antioxidant minerals selenium and zinc, and the anti-inflammatory fatty acid CLA. (For the cows themselves, research studies have already shown greater antioxidant capacity in their cells brought about by grass-feeding, as well as stronger performance of antioxidant enzymes like superoxide dismutase. In fact, grass feeding of cows has been shown to do a better job of increasing their antioxidant capacity than supplying them with antioxidant supplements.) Exactly how much these results will extend to humans will most likely depend on the role played by grass-fed beef in the overall diet. While rich in the potential for anti-oxidant and anti-inflammatory support, grass-fed beef also harbors the potential for excessive intake of nutrients like saturated fat and cholesterol when consumed in excessive amounts. It's exactly for this reason that we've recommended avoidance of large portions of grass-fed beef in your everyday meal (along the lines of a 12-ounce steak in the center of your plate that would be providing over half of the calories in your meal). Instead, we recommend an average serving size for grass-fed beef of approximately 4 ounces, whether added to a salad, stir-fry, sauce or other recipe.

Description

Beef is a general term used to describe the flesh derived from animals belonging to the *Bovidae* family of animals, and more specifically, to the

genus called *Bos*. This *Bos* category includes the species *Bos Taurus* and *Bos indicus*. While people commonly use the word "cow" to refer to this group of animals as a whole (a practice that we have also adopted throughout our website), the word "cow" is used in a more much specific way within the beef industry. Within this industry, "cow beef" is just one type of beef. Here are the four basic types of beef found in today's marketplace.

- Cow Beef: beef obtained from a mature female who had already calved at least once
- Heifer Beef: beef obtained from a mature female who had never calved
- Steer Beef: beef obtained from a mature male who had been castrated before the ability to reproduce
- Bull Beef: beef obtained from a mature uncastrated male who was old enough to reproduce

Not typically found in the marketplace is "stag beef" (beef obtained from a mature male who had been castrated after the ability to reproduce).

There are over 800 different breeds of beef cows. Some of the most common are Angus, Aberdeen Angus, Beefmaster, Brahman (Zebu), Hereford, (Whiteface), Jersey, Santa Gertrudis, Shortghorn, and Texas Longhorn.

Among all 97.8 million cows in the U.S., about 9.3 million are dairy cows. The total cow population also includes 30.5 million beef cows (in the strict sense of mature females who have calved), 14 million beef steers (mature males castrated before the ability to reproduce), 15.7 million beef heifers (mature females who have never calved), and 26.5 million calves.

Beef is available in a wide variety of cuts that can fulfill many different recipe needs. The different cuts range in texture and tenderness as well as in fat content. The leanest cuts of beef are taken from the back leg bone, called the round bone. These include eye of round, top round, and bottom round. These cuts are the leanest (most muscular) because the cow uses its back legs as its primary means of movement. The underbelly, including rib, ribeye, spare rib, and brisket, is the site of the fattiest cuts.

The term "grass-fed" was only officially applied to beef by the U.S. Department of Agriculture's (USDA) Agricultural Marketing Service (AMS) in 2007. Producers of grass-fed beef are not required to comply with the USDA standards, unless they want to display the USDA grass-fed shield on their product labeling.

Standards for displaying the USDA's grass-fed shield have been controversial. In order to qualify for the shield, producers of grass-fed beef only need to make continuous access to pasture available during the growing season (the period of time between average final frost and the average subsequent first frost). This guideline allows for potential confinement of grass-fed cows during the rest of the year. Producers of grass-fed beef may also display the shield while allowing their cows to consume corn, wheat, and other grains, but only if those grains are foraged and/or harvested for silage in their vegetative state before they have reached the mature seed stage of growth. Many different types of forage are permitted under the USDA labeling guidelines, including annual grasses, perennial grasses, legumes, *Brassica* vegetables, "browse" (the leaves of woody plants like shrubs) and seeds (except for the seeds of grains).

The American Grassfed Association (AGA) and The American Food Alliance (AFA) are organizations that offer alternative certification for grass-fed beef. AFA and AGA requirements for use of grass-fed labeling are stricter than USDA requirements. In particular, they require a much smaller period of confinement not to exceed 30 days per calendar year. The Food Safety and Inspection Service (FSIS) of the USDA honors both AGA and AFA grass-fed labels and automatically allows beef producers who have qualified for the AGA/AFA labels to display the USDA shield. So when you see the AGA or AFA certifications, you can also be sure that your beef meets the USDA grass-fed standards.

This is what the American Grassfed Association label looks like:

This is what the American Food Alliance label looks like:

As presented as a "BEST CHOICE" recommendation in our chart at the beginning of this food profile, we recommend that you purchase grass-fed beef that displays the USDA shield, the AGA label, the AFA label, or another grass-fed label issued by a certifying agency with similar standards for the grass-feeding of cows. One of our main reasons for this recommendation involves "finishing." We have seen many beef products that use the words "grass-fed" even though the cows involved were only "finished" on pasture. "Finished" is the term used by the beef industry for the feeding of cows during the last 2-3 months prior to slaughter. This period of time has no legal definition and can sometimes vary more widely. Prior to "finishing," a cow may have experienced little or no pasture feeding. When not at pasture, cows are typically confined to feedlots and fed a mixture of concentrates, protein supplements, silages and forages, often combined together in products called total mixed rations (TMRs). "Concentrates" are nutrient-dense composite feeds, often containing corn meal, corn gluten, barley, molasses, citrus pulp, soy protein, urea, and other components.

There is yet another reason why we recommend certified versus non-certified grass-fed beef. From our perspective, grass feeding is not simply a question of what a cow puts into his or her mouth. It's more a question about the lifestyle that is natural for cows, involving exercise and fresh air and plant food that would naturally be available in their environment. Grass-fed certifying organizations have often paid attention to these factors and have established standards that attempt address these factors in varying degrees.

History

Cows may have first been domesticated as early as 7000-8000 BC, beginning in the region of the Eastern Mediterranean around the Tigris and Euphrates Rivers which eventually came to be known as Mesopotamia. Several thousand years later, there is evidence of domestication in China, Korea, and Mongolia, as well as northern Africa. It was not only the meat, milk, and blood of cows that cultures found valuable but also their ability to serve as draft animals which could help with plowing, trampling grain, powering grind wheels, pulling logs, and transporting carts and wagons. Today, the word "oxen" is typically used to refer to castrated male cows that are used for work purposes.

Columbus brought cattle on his second voyage to North America in 1493, and it's clear that when Columbus helped found Spanish colonies in Hispaniola in the Caribbean that expanded over the next decades, cattle herds played a key role in the viability of the colonies. Cows were present in the colony of Jamestown by 1611, and many European colonists came to own cows over the course of the 17th century.

As mentioned previously, the present-day size of the cow population in the U.S. is close to 100 million, including some 60 million cows being raised for beef. Annual per person beef consumption in the U.S. peaked at 184 pounds per person (almost exactly 1/2 pound per day) in 2004 and now averages approximately 166 pounds, or about 10% less over a period of about 10 years.

How to Select and Store

When you are at the grocery store, purchase raw meats last. Since raw meats may contaminate other grocery items, keep fresh meats apart from other items. Put raw meat packages in a plastic bag, so juices won't drip onto

other foods. If it will take you more than an hour to get home, pack raw meats in an ice chest, and keep the ice chest in the passenger area of the car during warm weather. Take meats straight home to the refrigerator or freezer.

There are a few clues you can look for that will help you choose fresher quality beef. Always examine the sell-by date on the label and choose the beef with the latest date. The muscle portion of the meat should be a red or purplish color and not brown, which is a signal that the meat has been excessively exposed to oxygen and is spoiled. Purchase beef that has the least amount of fat. As previously explained, the leanest cuts of beef are taken from the back leg bone, called the round bone. These include eye of round, top round, and bottom round. These cuts are the leanest (most muscular) because the cow uses its back legs as its primary means of movement. The round is your best cut for lean, low-fat beef. Other lean cuts of beef include strip steak and flank steak. While some website include sirloin and T-bone in the lean cut category, these cuts are usually about 30-50% higher in total fat.

If you are purchasing ground beef, you are most likely to find labeling that reads, "Fat not to exceed 15%" or a similar statement with a different percentage, for example "12%" or "10%" or in some rare cases "5%." Percent fat labels are both confusing and misleading, because these percentages do *not* refer to percent of calories but to percent of the product by weight.

Ground beef that is 15% fat by weight is actually 55% fat in terms of calories, and ground beef that is 10% fat by weight gets 44% of its calories from fat. Both types of ground beef exceed the fat content that we recommend. Please note that 5% ground beef brings the percent fat from calories down to approximately 25%, and that's a level makes sense to us.

Unfortunately, however, we almost never see ground beef in groceries that is labeled "Fat not to exceed 5%." For this reason, we recommend taking a lean cut of pre-packaged beef with the amount you wish to purchase from the meat section, bringing it to the in-store butcher, and requesting that it be ground for you. (Remember that lean cuts include top round, bottom round, eye of round, strip, and flank.) Alternatively, you could ask an in-store butcher to grind up whatever amount of lean beef you want from beef that has yet to be packaged and displayed for purchase.

Whenever possible, we recommend that you purchase not only certified grass-fed beef, but also certified organic beef. Certified organic beef is much less likely to expose you to unwanted pesticide, antibiotic, or hormone residues and it is also illegal for certified organic beef to have been genetically modified or irradiated.

Since beef is highly perishable, it should always be kept at cold temperatures, either refrigerated or frozen. Refrigerate the beef in the original store packaging, if it is still intact and secure, as this will reduce the amount of handling involved. Length of storage varies with the cut of beef as larger pieces will have a longer shelf life than pieces with increased surface area. Ground beef will keep for about one to two days, steaks for two to three days, and roasts for three to four days.

If you have more beef than you can use within this period of time, you can freeze it in a cold temperature freezer. Using freezer paper, wrap the beef carefully so that it is as tightly packaged as possible. Ground beef should be able to keep for two to three months, while steaks should keep for about six months.

Tips for Preparing and Cooking

Special safety precautions are important when handling beef. However, the following recommendations should be used as guidelines when handling any animal flesh involved in a meal.

Always wash your hands thoroughly with hot soapy water before preparing foods and after handling raw beef. Don't let raw meat or juices touch ready-to-go foods, either in the refrigerator or during preparation. Don't put cooked foods on the same plate that held raw beef. Always wash utensils that have touched raw meat with hot, soapy water before using them for cooked meats. Wash counters, cutting boards, and other surfaces raw meats have touched.

These surfaces may be sanitized by cleaning with a solution of 1 teaspoon chlorine bleach per quart of water.

Thaw uncooked frozen beef in the refrigerator or in cold water. Never thaw beef at room temperature. Thawing by refrigeration requires planning ahead and most likely allowing a 24-hour thawing period. After defrosting raw beef by this method, it will be safe in the refrigerator for up to five days before cooking.

To thaw beef in cold water, leave the beef in its original wrapping or place it in a watertight plastic bag. Change the water every 30 minutes.

Marinate beef in the refrigerator, not on the counter. Discard the marinade after use because it contains raw juices, which may harbor bacteria. If you want to use the marinade as a dip or sauce, reserve a portion before adding raw food.

Never brown or partially cook beef, then refrigerate and finish cooking later because any bacteria present will not have been destroyed.

Using a thermometer is the only reliable way to ensure safety and to determine the "doneness" of beef and most other foods. To be safe, a product must be cooked to an internal temperature high enough to destroy any harmful bacteria that may have been in the food. Many food handlers believe that visible indicators, such as color changes in the food, can be relied on to determine whether foods have been cooked long enough to ensure bacterial destruction. However, recent research has shown that color and texture indicators are not reliable.

When cooking whole cuts or parts of beef, the thermometer should be inserted into the thickest part of the meat, away from the bone, fat and gristle. The thermometer may be inserted sideways if necessary.

Whole Muscle Meats: The USDA recommends cooking to a minimum internal temperature of 160°F (72°C) for medium-cooked whole cuts of fresh beef and 170°F (77°C) for well-done cuts.

Ground Beef: Ground beef must be cooked thoroughly to kill harmful bacteria. Unlike whole muscle meat, whose interior meat is sterile, the grinding process exposes the interior meat in ground beef to bacteria, which may be on the surface, in the air, on equipment, or on people's hands. To kill these bacteria, food safety experts have one major rule of thumb—cook ground beef to at least 160°F (72°C). This step, while very simple, offers the best protection that consumers can have for serving ground beef products safely.

How to Enjoy

A Few Quick Serving Ideas

- Healthy sauté thin slices of steak with onions, garlic, fresh basil, lemongrass and chili peppers for a southeast Asian inspired meal.
- Add 2-4 ounces of grass-fed ground beef to tomato sauce and serve over pasta.

Individual Concerns

Risk of Contamination

Over the past 15 years, over 250 million pounds of beef have been recalled for contamination reasons by food companies and meat packers across the United States. The largest single recall affected more than 10,000 supermarkets, restaurants, retailers, school districts, and other establishments. Well-known companies like ConAgra have been involved in some of the largest recalls. Several hundred cases of illness and seven deaths were documented over this time period in association with contaminated beef.

By far the most problematic of the beef contaminants has been the bacterium *E. coli 0157:H7*. Seven different strains of *E.coli* have been involved in

contamination problems (including EPEC, ETEC, EIEC, EAEC, VTEC, DAEC, and NTEC). Contamination has been detected in a variety of different settings, including pre-slaughter, processing and packing, distribution, retail handling, retail cooking, and home storage. One recent study has predicted that over 99% of all beef contamination could be prevented by a combination of comprehensive and aggressive sanitation steps during all stages of the beef production process. These sanitation steps would include more effective use of vaccines, antibiotics, and probiotics prior to slaughter; more consistent use of carcass washes, acid spray chill, and steam pasteurization during processing; improved freezing and chilling during packing and distribution; improved consumer handling and storing post-purchase; and better cooking temperature control in homes and restaurants. However, these pre-processing, processing, and post-processing steps do not adequately address contamination problems in the minds of many experts familiar with beef industry practices. In their view, contamination with micro-organisms like *E. coli* is inextricably tied to the unnatural habitat and lifestyle in which beef cattle are required to participate.

Irradiation of Beef

The U.S. Food and Drug Administration (FDA) first approved irradiation of beef in December 1997 following problematic recall of 25 million pounds of beef processed through the Columbus, Nebraska beef packing plant owned by the Hudson Foods Company in Rogers, Arkansas. The beef had become contaminated with *E. coli 0157:H7*. (The Nebraska packing plant had originally been established to supply beef exclusively for Burger King restaurants beginning in 1995.) Irradiation of beef effectively kills micro-organisms (including *E. coli 0157:H7*) that may be present in the beef. Raw beef is typically passed along a conveyor belt and very briefly exposed to gamma irradiation from in the range of 4.5-7.0kGy. While radioactive isotopes of cobalt-60 or cesium-137 have traditionally been used as sources of irradiation, electron beam irradiation and x-ray irradiation are also possible. In practice, few facilities in the U.S. commonly irradiate large amounts of beef, and approximately 5-10% of all U.S. beef is currently irradiated. When prepackaged and sold by retail groceries, irradiated beef is required by the FDA to carry a label that includes this radura symbol.

Like contamination with micro-organisms like *E. coli* , many experts who are knowledgeable about the beef industry question the appropriateness of irradiation from radioactive isotopes, electron beams or x-rays as a solution to problems with beef contamination problems. In their view, potentially contaminated beef should be removed from the marketplace rather than irradiated for future consumption.

Excessive Greenhouse Gases Released During Beef Production

The potential contribution of commercial beef production to global warming is a further concern for many individuals who try to evaluate the appropriateness of beef in their diet. Manure from commercial beef feedlots is a primary contributor to release of methane gas into the atmosphere from the agricultural sector of the U.S. economy, and along with carbon dioxide and nitrous oxide, methane gas is one of the primary problematic greenhouse gases (GHGs) that has been increasing at an unhealthy rate in the earth's atmosphere. Nitrous oxide is a second GHG that has been tracked to commercial beef production due to heavy use of nitrogen-containing fertilizers used in the production of feedstuffs for beef cattle. One of the reasons we recommend grass-fed beef involves the ability of grass feeding to help offset GHG release by reducing atmosphere carbon dioxide. (When pastures are filled with green plants, these plants can take in significant amounts of atmospheric carbon dioxide and help lower the level of this GHG in the environment.)

Nutritional Profile

Beef is an excellent source of vitamin B12 and very good source of protein, niacin, vitamin B6, selenium, zinc and phosphorus. It is also a good source of choline, pantothenic acid, iron, potassium and vitamin B2.

Introduction to Food Rating System Chart

In order to better help you identify foods that feature a high concentration of nutrients for the calories they contain, we created a Food Rating System. This system allows us to highlight the foods that are especially rich in particular nutrients. The following chart shows the nutrients for which this food is either an excellent, very good, or good source (below the chart you will find a table that explains these qualifications). If a nutrient is not listed in the chart, it does not necessarily mean that the food doesn't contain it. It simply means that the nutrient is not provided in a sufficient amount or concentration to meet our rating criteria. (To view this food's in-depth nutritional profile that includes values for dozens of nutrients - not just the ones rated as excellent, very good, or good - please use the link below the chart.) To read this chart accurately, you'll need to glance up in the top left corner where you will find the name of the food and the serving size we used to calculate the food's nutrient composition. This serving size will tell you how much of the food you need to eat to obtain the amount of nutrients found in the chart. Now, returning to the chart itself, you can look next to the nutrient name in order to find the nutrient amount it offers, the percent Daily Value (DV%) that this amount represents, the nutrient density that we calculated for this food and nutrient, and the rating we established in our rating system. For most of our nutrient ratings, we adopted the government standards for food labeling that are found in the U.S. Food and Drug Administration's "Reference Values for Nutrition Labeling." Read more background information and details of our rating system.

Beef, grass-fed, strip steak, cooked
4.00 oz
113.40 grams

Calories: 175
GI: very low

Nutrient	Amount	DRI/DV (%)	Nutrient Density	World's Healthiest Foods Rating
vitamin B12	1.44 mcg	60	6.2	very good
protein	26.16 g	52	5.4	very good
vitamin B3	7.60 mg	48	4.9	very good
omega-3 fats	1.10 g	46	4.7	very good
vitamin B6	0.74 mg	44	4.5	very good
selenium	23.93 mcg	44	4.5	very good
zinc	4.09 mg	37	3.8	very good
phosphorus	240.40 mg	34	3.5	very good
choline	73.82 mg	17	1.8	good
pantothenic acid	0.77 mg	15	1.6	good

World's Healthiest Foods Rating	Rule
excellent	DRI/DV>=75% OR Density>=7.6 AND DRI/DV>=10%
very good	DRI/DV>=50% OR Density>=3.4 AND DRI/DV>=5%
good	DRI/DV>=25% OR Density>=1.5 AND DRI/DV>=2.5%

In-Depth Nutritional Profile

In addition to the nutrients highlighted in our ratings chart, here is an in-depth nutritional profile for Beef, grass-fed. This profile includes information on a full array of nutrients, including carbohydrates, sugar, soluble and insoluble fiber, sodium, vitamins, minerals, fatty acids, amino acids and more.

Beef, grass-fed, strip steak, cooked (Note: "--" indicates data unavailable)		
4.00 oz (113.40 g)	GI: very low	
BASIC MACRONUTRIENTS AND CALORIES		
nutrient	**amount**	**DRI/DV (%)**
Protein	26.16 g	52
Carbohydrates	0.00 g	0
Fat - total	8.10 g	10
Dietary Fiber	0.00 g	0
Calories	175.00	10
MACRONUTRIENT AND CALORIE DETAIL		
nutrient	**amount**	**DRI/DV (%)**
Carbohydrate:		
Starch	0.00 g	
Total Sugars	0.00 g	
Monosaccharides	0.00 g	
Fructose	0.00 g	
Glucose	0.00 g	
Galactose	0.00 g	
Disaccharides	0.00 g	
Lactose	0.00 g	
Maltose	0.00 g	
Sucrose	0.00 g	
Soluble Fiber	0.00 g	
Insoluble Fiber	0.00 g	
Other Carbohydrates	0.00 g	
Fat:		
Monounsaturated Fat	2.80 g	
Polyunsaturated Fat	2.50 g	
Saturated Fat	2.80 g	
Trans Fat	0.13 g	
Calories from Fat	72.90	
Calories from Saturated Fat	25.20	
Calories from Trans Fat	1.15	
Cholesterol	74.00 mg	
Water	83.26 g	
MICRONUTRIENTS		
nutrient	**amount**	**DRI/DV (%)**
Vitamins		
Water-Soluble Vitamins		
B-Complex Vitamins		
Vitamin B1	0.06 mg	5
Vitamin B2	0.14 mg	11
Vitamin B3	7.60 mg	48
Vitamin B3 (Niacin Equivalents)	7.60 mg	
Vitamin B6	0.74 mg	44
Vitamin B12	1.44 mcg	60

Biotin	-- mcg	--
Choline	73.82 mg	17
Folate	14.74 mcg	4
Folate (DFE)	14.74 mcg	
Folate (food)	14.74 mcg	
Pantothenic Acid	0.77 mg	15
Vitamin C	0.00 mg	0
Fat-Soluble Vitamins		
Vitamin A (Retinoids and Carotenoids)		
Vitamin A International Units (IU)	85.00 IU	
Vitamin A mcg Retinol Activity Equivalents (RAE)	4.25 mcg (RAE)	0
Vitamin A mcg Retinol Equivalents (RE)	8.50 mcg (RE)	
Retinol mcg Retinol Equivalents (RE)	0.00 mcg (RE)	
Carotenoid mcg Retinol Equivalents (RE)	8.50 mcg (RE)	
Alpha-Carotene	0.00 mcg	
Beta-Carotene	51.00 mcg	
Beta-Carotene Equivalents	8.50 mcg	
Cryptoxanthin	0.00 mcg	
Lutein and Zeaxanthin	14.70 mcg	
Lycopene	0.00 mcg	
Vitamin D		
Vitamin D International Units (IU)	-- IU	--
Vitamin D mcg	-- mcg	
Vitamin E		
Vitamin E mg Alpha-Tocopherol Equivalents (ATE)	0.25 mg (ATE)	2
Vitamin E International Units (IU)	0.37 IU	
Vitamin E mg	0.25 mg	
Vitamin K	1.02 mcg	1
Minerals		
nutrient	**amount**	**DRI/DV (%)**
Boron	-- mcg	
Calcium	10.21 mg	1
Chloride	-- mg	
Chromium	-- mcg	--
Copper	0.08 mg	9
Fluoride	-- mg	--
Iodine	-- mcg	--
Iron	2.04 mg	11
Magnesium	26.08 mg	6
Manganese	0.01 mg	0
Molybdenum	-- mcg	--
Phosphorus	240.40 mg	34
Potassium	387.82 mg	8
Selenium	23.93 mcg	44
Sodium	62.37 mg	4
Zinc	4.09 mg	37

INDIVIDUAL FATTY ACIDS		
nutrient	**amount**	**DRI/DV (%)**
Omega-3 Fatty Acids	1.10 g	46
Omega-6 Fatty Acids	1.50 g	
Monounsaturated Fats		
14:1 Myristoleic	0.01 g	
15:1 Pentadecenoic	0.00 g	
16:1 Palmitol	0.08 g	
17:1 Heptadecenoic	0.00 g	
18:1 Oleic	1.03 g	
20:1 Eicosenoic	0.00 g	
22:1 Erucic	0.00 g	
24:1 Nervonic	0.00 g	
Polyunsaturated Fatty Acids		
18:2 Linoleic	1.49 g	
18:2 Conjugated Linoleic (CLA)	2.27 g	
18:3 Linolenic	0.02 g	
18:4 Stearidonic	-- g	
20:3 Eicosatrienoic	-- g	
20:4 Arachidonic	0.01 g	
20:5 Eicosapentaenoic (EPA)	0.26 g	
22:5 Docosapentaenoic (DPA)	0.00 g	
22:6 Docosahexaenoic (DHA)	0.04 g	
Saturated Fatty Acids		
4:0 Butyric	0.00 g	
6:0 Caproic	0.00 g	
8:0 Caprylic	0.00 g	
10:0 Capric	0.00 g	
12:0 Lauric	0.00 g	
14:0 Myristic	0.07 g	
15:0 Pentadecanoic	0.01 g	
16:0 Palmitic	0.65 g	
17:0 Margaric	0.03 g	
18:0 Stearic	0.40 g	
20:0 Arachidic	0.00 g	
22:0 Behenate	0.00 g	
24:0 Lignoceric	0.00 g	

INDIVIDUAL AMINO ACIDS		
nutrient	**amount**	**DRI/DV (%)**
Alanine	1.59 g	
Arginine	1.69 g	
Aspartic Acid	2.38 g	
Cysteine	0.33 g	
Glutamic Acid	3.93 g	
Glycine	1.59 g	
Histidine	0.83 g	
Isoleucine	1.18 g	
Leucine	2.08 g	
Lysine	2.21 g	

Methionine	0.68 g	
Phenylalanine	1.03 g	
Proline	1.25 g	
Serine	1.03 g	
Threonine	1.04 g	
Tryptophan	0.17 g	
Tyrosine	0.83 g	
Valine	1.30 g	

OTHER COMPONENTS		
nutrient	**amount**	**DRI/DV (%)**
Ash	1.92 g	
Organic Acids (Total)	0.00 g	
Acetic Acid	0.00 g	
Citric Acid	0.00 g	
Lactic Acid	0.00 g	
Malic Acid	0.00 g	
Taurine	-- g	
Sugar Alcohols (Total)	0.00 g	
Glycerol	0.00 g	
Inositol	0.00 g	
Mannitol	0.00 g	
Sorbitol	0.00 g	
Xylitol	0.00 g	
Artificial Sweeteners (Total)	-- mg	
Aspartame	-- mg	
Saccharin	-- mg	
Alcohol	0.00 g	
Caffeine	0.00 mg	

Note:

The nutrient profiles provided in this website are derived from The Food Processor, Version 10.12.0, ESHA Research, Salem, Oregon, USA. Among the 50,000+ food items in the master database and 163 nutritional components per item, specific nutrient values were frequently missing from any particular food item. We chose the designation "--" to represent those nutrients for which no value was included in this version of the database.

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