

The Beef Controversy

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Introduction

At lunchtime today, you will have the opportunity to devastate the environment, promote world hunger, and wreak havoc on your own health, according to a group of activist organizations. All you have to do is eat a hamburger.

The group making these claims is the Beyond Beef coalition,¹ headed by Jeremy Rifkin, author of the recent book *Beyond Beef: The Rise and Fall of the Cattle Culture*.² The stated goals of Rifkin's group are to "reduce individual beef consumption by at least 50 percent; replace beef in the diet with organically raised grains, legumes, vegetables and fruits; and reform current cattle industry practices and promote humanely and organically raised beef as an alternative for those who include some beef in their diet."

In this special report, the American Council on Science and Health (ACSH) critically examines the charges raised by the Beyond Beef coalition, including both environmental and health issues.

Executive Summary

Beyond Beef alleges that cattle destroy the environment and cause world hunger. The scientific evidence does not support these views.

With good management, cattle production need not ruin land or pollute the environment. Well managed grazing can actually improve the quality of pastureland and rangeland. Manure, when properly handled, is a valuable fertilizer rather than a damaging pollutant. The methane produced by cattle is only a very minor contributor to the so-called greenhouse effect. Cattle graze primarily on poor quality lands that cannot be used for crop production. On a worldwide basis, grazing more than doubles the land area that can be used to produce food for humans.

Reducing beef production would lead to a decrease in the demand for feed grain, but it does not necessarily follow that the grain would become available to the world's hungry people. The more likely outcome is that farmers would not grow the grain because there would be no market demand for it, or it would be diverted to other uses. Grain typically constitutes only 15 to 20 percent of the total feed consumed by beef cattle in the U.S. The remainder consists of grasses and other cellulose-rich materials that humans and non-ruminant animals cannot digest. The raising of ruminant animals is the only way to transform these plant materials into food for human consumption.

Contrary to allegations made by Beyond Beef and others, there is little relationship between fast-food hamburger consumption in the U.S. and the destruction of rainforests in Central and South America. Only about 0.6 percent of the beef consumed in the U.S. comes from Latin American rain-forest areas, and much of that is imported as cooked, canned products rather than as ground beef.

There was a 30 percent decrease in per capita beef consumption in the U.S. between 1976 and 1991. If Beyond Beef's arguments were valid, one would expect that this decline would already have produced demonstrable benefits for the environment and world hunger. Yet Beyond Beef has presented no evidence of any beneficial effects.

Lean beef, in reasonable serving sizes, can be included in a healthful diet that meets current

dietary guidelines. Beef makes positive nutritional contributions to the diet; its iron and zinc content is especially important.

Residues of pesticides, antibiotics and hormones in beef are well within acceptable limits and do not pose a risk to the health of the American public.

As with all raw foods of animal origin, raw beef can be contaminated with bacteria that cause foodborne diseases. Adequate cooking kills these bacteria, making the meat safe to eat. With current technology, it is not possible for producers to guarantee that all meat sold to the public will be free from disease-causing bacteria. Therefore, food service personnel and consumers must do their part to prevent foodborne illness by handling foods in a sanitary manner and cooking them properly.

The U.S. Department of Agriculture intends to require new labels on all packages of meat and poultry which will give instructions for safe handling and cooking. This labeling program is worthwhile, but it should be extended to include eggs, fish and shellfish, as well as meat and poultry. All of these foods require thorough cooking to destroy microorganisms which may be present in the raw products.

The Beef Controversy

The Beyond Beef coalition has raised a wide variety of arguments in support of its goal of drastically reducing beef consumption. Some, including animal rights issues and the desirability of small-versus large-scale agricultural operations, are matters of personal philosophy and are outside the scope of this scientific report. Other arguments, to be described in detail below, focus on the effect of beef production on the environment and the world food supply.

Beef Production and the Environment

Desertification

During most of their lives, beef cattle graze on pastureland and rangeland. Beyond Beef claims that cattle are “hoofed locusts” that destroy millions of acres of grazing land in the U.S. each year.

It is true that uncontrolled grazing can damage grasslands. Properly managed grazing, however, is not destructive.³ In fact, because cattle fertilize land by depositing manure, they can enrich grasslands rather than destroy them.

Most of the 600 million acres of pastureland and rangeland in the U.S. are unsuitable for crop cultivation. Their only possible agricultural use is the grazing of ruminant animals (cattle or sheep). The same is true in other parts of the world; cattle graze primarily on poor quality lands that cannot be used for crop production. On a worldwide basis, grazing more than doubles the land area that can be used to produce food for humans.⁴ If the demand for ruminant animal products ceased, these vast lands would make no contribution to feeding the people of the world.

Do Cattle Steal Food from People?

Perhaps the most disturbing charge raised by Beyond Beef is that cattle production is a major contributor to world hunger. The coalition contends that a billion people go hungry because “pre-

cious grain” is fed to cattle and other livestock. It claims that if everyone stopped eating beef, this grain could be used to feed the world’s hungry people.

Beyond Beef apparently assumes that the problem of world hunger could be solved simply by increasing the amount of food available for consumption. This is an oversimplified, outdated view. The best current evidence indicates that world hunger is not caused by a simple scarcity of food.⁵ Experts believe that hunger is attributable primarily to economic and political factors and problems of distribution, rather than to an insufficient food supply.⁵ Hunger is caused by a lack of access to adequate food, rather than a shortage of food per se.⁶

Even emergency situations of widespread starvation, such as the crisis in Somalia, are generally not due to a simple lack of food. Most of the major famines in this century have been caused by war, political or economic disruption or unwise government policies, rather than by acts of nature such as drought, flood or disease.⁷ Efforts to provide food aid to victims of modern famines have been hampered not by a shortage of food, but by the difficulties of wartime intervention⁷ and by problems of distribution that prevent food from reaching the people who need it most.⁵

If people stopped eating meat, the grain now fed to livestock would not necessarily become available to the world’s hungry people. Those very poor people cannot afford to buy the grain or transport it from the U.S. to their homes. Farmers might donate a small amount of the grain to relief organizations, but they would not be able to stay in business if they gave away a substantial proportion of their crops. The more likely outcome is that farmers would not grow the grain if there were no market demand for it, or it would be diverted to other uses, such as the production of alcohol for fuel.⁵

It is also important to point out that only a small proportion of the feed consumed by beef cattle consists of grain. In the system of beef production currently used in the U.S., cattle consume grain only during the latter part of their lives, when they are housed in feedlots. Grain typically constitutes 15 to 20 percent of the total feed consumed by the animals at all stages of their life cycle.⁵ Less than five pounds of feed grains are used to produce one pound of beef.⁵ The remainder of the animals’ intake consists of grasses and other cellulose-rich materials that humans and non-ruminant animals cannot digest. The raising of ruminant animals is the only way to transform these plant materials into foods for human consumption.

Cattle can be raised entirely on grass, with no grain at all. This is the custom in many developing areas. In the U.S., however, it makes good economic sense to “finish” cattle on grain because it is readily available at a reasonable price. Despite Beyond Beef’s frequent references to “precious grain,” there is a surplus rather than a shortage of grain in the U.S. Many American farmers who could not otherwise make a profit by growing grain are able to stay in business because they can sell their crops to livestock producers.

Cattle as a Source of Pollution

Beyond Beef argues that organic waste from livestock is a massive source of pollution. But as with the destruction of grasslands, this is a matter of management rather than an inevitable consequence of meat production. Manure is indeed a harmful pollutant if it ends up in the wrong places.

In the right places, however, it is a valuable fertilizer.

The manure produced by grazing cattle is recycled naturally into the soil and plants of the grazing lands.⁸ Most of the manure produced in feedlots is removed and applied to soil as a fertilizer.⁸ When used in this way, animal wastes are not a source of pollution; instead, they replenish the organic matter and nutrients in soil and enhance plant growth.⁹ Federal and state laws prohibit the discharge of livestock manure into surface or groundwaters.⁸

Beyond Beef also contends that cattle production is responsible for the release of large quantities of methane, a greenhouse gas which is thought to contribute to global-warming, into the atmosphere. Cattle do produce methane as a byproduct of their ruminant digestion, but the impact of cattle flatulence on global warming is far smaller than Beyond Beef claims. One expert has calculated that driving six miles each way to buy a hamburger would result in 100 times as much greenhouse gas as the production of the hamburger.¹⁰ Another has pointed out that the amount of methane emitted by one cow in a year has the same effect on global warming as the fuel burned to power a single 75-watt light bulb.¹¹ The major sources of methane are wetlands, rice paddies, biomass burning, drilling for oil, landfills and coal mines, not cattle.¹⁰ In fact, the National Academy of Sciences has calculated that all ruminant animals, both wild and domesticated (including sheep, goats, deer, buffalo, giraffes and camels, as well as cattle) account for only five percent of total greenhouse gas production.⁹

Destroying Nature

Beyond Beef argues that cattle are causing “the extinction of plant and animal species” and “the purposeful extermination of millions of predators.” More succinctly, they claim that cattle are destroying nature.

The problem here is not with the facts but with their interpretation. In discussing these issues, Beyond Beef ignores the needs of people and the ways in which people must modify nature if they are to earn a living and feed themselves. The productive use of land inevitably changes the types of plants and animals that live on it. If humans left all of the earth’s land in its natural state, there would be no food for the human population.

In his book, Rifkin claims that, “The elimination of beef will be accompanied by an ecological renaissance, a grand restoration of nature on every continent... Ancient rivers will flow... Streams and springs will come to life... Predator species will thrive... Buffalo will once again roam the West.”² This is a romantic view, not a realistic one.

Rainforest Destruction

The destruction of tropical rainforests is an issue of concern to many Americans. The idea, raised by Beyond Beef and others, that Americans can help to preserve the rainforests by reducing their consumption of beef (particularly fast food hamburgers) has great emotional appeal. In actuality, however, there is little relationship between U.S. beef consumption and the fate of Central and South American rainforests.

The U.S. is not dependent on foreign sources for its beef supply. About 94 percent of the beef

consumed in the U.S. is produced domestically; only six percent is imported.¹² Central America and Brazil account for only about 10 percent of the imports.¹² Thus, about 0.6 percent of all beef consumed in the U.S. comes from rainforest areas. No beef from Brazil ends up in fast food hamburgers, because Brazil exports only cooked or canned beef products (such as canned corned beef) to the U.S. Central American beef may be used in hamburgers, but it constitutes no more than 0.35 percent of all beef consumed in the U.S. Most hamburger imports come from Australia and New Zealand, rather than tropical rainforest areas.

The Missing Evidence

Before moving on to issues of diet and health, it is important to make one final point. Beyond Beef envisions that if American consumers substantially decreased their beef intake, there would be vast improvements in the environment and drastic decreases in world hunger and poverty. There has already been a substantial decrease in per capita beef consumption in the U.S. — from the peak level of almost 90 pounds per person per year in 1976 to about 63 pounds in 1991.¹³ So where is the evidence of benefits? Nowhere in the 353 pages of Rifkin's book or in the extensive literature published by his organization is there any documentation of environmental or world health improvements attributable to this decline in beef intake. Evidence of such improvements would be the best possible argument in favor of the Beyond Beef campaign. Yet the coalition is strangely silent on this subject.

The Role of Beef in the Diet

The American public's greatest concern about beef is the role that fat, saturated fatty acid and cholesterol content may play in increasing the risk of coronary heart disease and other health problems. Surveys conducted for the meat industry show that 55 percent of American consumers say that they have cut down or plan to cut down on meat for health reasons.

Strangely, however, this critical issue has received little attention from the Beyond Beef campaign. Only one of the 40 chapters in Rifkin's book is devoted to the subject. Heart disease often appears last in the coalition's lists of the many adverse effects it attributes to beef consumption.

Perhaps the Beyond Beef coalition assumes that this subject needs little attention because the American public already "knows" that beef is a "bad" food that should be excluded from a healthful diet. National surveys have shown that more than two-thirds of Americans choose foods based on perceptions that they are "good" or "bad." However, like most oversimplified concepts, the good/bad food dichotomy is misleading, and the idea that beef cannot be included in a healthful diet is wrong.

Guidelines for a Healthful Diet

Americans are frequently advised to adopt a diet that contains no more than 30 percent of calories from fat and no more than 10 percent of calories from saturated fatty acids per day. For a person who consumes 2000 calories per day, this translates to no more than 67 grams of total fat and 22 grams of saturated fatty acids daily. It is also recommended that, regardless of total calorie intake,

cholesterol intake should not exceed 300 mg/day.

A standard three-ounce serving of trimmed, lean beef, which provides about 180 calories, easily fits within these guidelines, providing 8.4 g of total fat (13 percent of the daily limit), 3.2 grams of saturated fatty acids (15 percent of the limit) and 73 mg of cholesterol (24 percent of the limit). As the comparisons in Table 1 show, three-ounce servings of other popular animal protein foods also fit within current guidelines.

Table 1: Fat, Saturated Fatty Acids, and Cholesterol in Meat, Poultry, and Seafood²³

Food (3 oz. serving)	Total Fat Acids (grams)	Saturated Fatty Acids (mg)	Cholesterol (mg)
Beef, lean	8.4	3.2	73
Pork, center loin chop	6.9	2.5	70
Veal	5.6	1.6	100
Lamb	8.1	2.9	78
Chicken, skinless	6.3	1.7	76
Turkey, skinless	4.2	1.4	65
Salmon, Sockeye	9.3	1.6	74
Flounder	1.3	0.31	58

Beef as a Source of Minerals

Beef is not only acceptable in terms of fat content; it also makes important positive nutritional contributions to the diet. Most people know that meat* is a good protein source. It is also a major source of five vitamins: thiamin, riboflavin, niacin and vitamins B₆ and B₁₂. Its most critical contribution to the diet, however, is minerals, particularly iron and zinc. Meat is the single richest source of both of these important minerals, and it provides them in highly bioavailable forms. As Table 2 shows, beef is richer in iron and zinc than other meats, poultry or seafood.

Several subgroups of the U.S. population, including infants and young children, adolescents, women of childbearing age and pregnant women, have difficulty obtaining the recommended amounts of iron from their diets. In a 1985 national survey, the mean iron intakes of women aged 19 to 50 years and children aged one to five years were only 61 and 88 percent of their respective Recommended Dietary Allowances (RDA).¹⁴ True iron deficiency is less common, but it is still a significant problem in the U.S. According to data collected from 1976 through 1980, five percent of women age 20-44 years, nine percent of children aged one to two years, and four percent of children aged three to four years were iron-deficient.¹⁵ The U.S. Public Health Service has established the goal of reducing the prevalence of iron deficiency in these high-risk groups to less than three percent by the year 2000.¹⁵

The *Surgeon General's Report on Nutrition and Health* has recommended that "Children, adoles-

cents and women of childbearing age should be sure to consume foods that are good sources of iron, such as lean meats, fish, certain beans and iron-enriched cereals and whole grain products.”¹⁴ Meat is a particularly valuable source of iron because about half of its iron is present in a form called “heme” iron, which the body absorbs more readily than the non-heme iron found in other foods, such as legumes and cereal products.

Some segments of the U.S. population may also have trouble getting the recommended amount of zinc in their diets. The same 1985 survey mentioned above showed that men, women and children consumed an average of 94, 60, and 84 percent of their zinc RDAs, respectively.¹⁴

Meat is a major source of bioavailable zinc; in the U.S., it provides 50 percent of total dietary zinc, and beef is a principal source.¹⁶ Some foods derived from plants, particularly whole grains, also provide zinc, but these foods also contain phytate and dietary fiber, which inhibit the bioavailability of zinc. Meat does not contain these components.

A project recently conducted at Utah State University illustrates the importance of beef and other meats as a source of minerals.¹⁷ The researchers there attempted to devise a week’s menus for a young adult woman which would meet both the RDAs for essential nutrients and the guidelines for dietary modification promulgated by the National Research Council.

Most people would predict that menus of this type would contain less meat than the diets currently consumed by American adults. The researchers found, however, that they had to keep the amount of meat at just about the same level seen in a 1986 national survey. The reason was minerals; meat was needed to provide iron, magnesium, copper and especially zinc. To supply enough of these minerals, it was necessary to include three servings of lean beef and one serving of lean pork in the week’s menus.

Table 2: Iron and Zinc Content of Animal Protein Foods³⁴

Food (3 oz)	Iron Content (mg)	Zinc Content (mg)
Beef, lean ground	2.4	5.8
Beef sirloin	2.4	5.3
Pork	1.1	3.0
Lamb	1.5	3.8
Veal, lean	0.9	3.2
Chicken, dark meat	1.1	2.4
Chicken, white meat	2.0	3.8
Turkey, dark meat	1.2	1.7
Turkey, white meat	0.9	0.5
Cod	0.9	0.5
Shrimp	1.4	1.3
Tuna	1.6	0.3

Lean Beef in Moderate Servings

To take advantage of the positive nutritional contributions of beef without consuming excessive amounts of fat, consumers should choose lean beef, in moderate servings, and prepare it in ways that reduce rather than add fat.

The federal government's Food Guide Pyramid recommends two to three servings (a total of five to seven ounces) of foods from the "meat, poultry, fish, dry beans, eggs & nuts group" per day.¹⁸ To determine how much meat to consume in order to meet this recommendation, it is helpful to remember that a three-ounce portion is about the size and thickness of a deck of cards.

The leanest cuts of beef are those with "loin" or "round" in the name; good selections include round tip, top round, eye of round, top loin, tenderloin and sirloin. If more than one grade of meat is available, choose Select beef instead of Choice; it is generally leaner. To minimize the fat content of beef, follow these preparation tips:

- Trim away all external fat before cooking or eating.
- Broil or roast meat on a rack so that the fat drips off.
- After browning meat, drain off the fat before continuing with the recipe.
- Remove fat from soups, stews and casseroles by chilling them and skimming the hardened fat from the top.
- Avoid cooking methods that require the addition of fat to meat (e.g., frying).

Does Meat Cause Colon Cancer?

High intakes of dietary fat have been associated with increased risks of colon cancer in some human populations.¹⁹ If this association proves to be causal, then all foods that contain fat, including meat, might contribute to increasing the risk of this cancer if consumed in excess. This idea is neither controversial nor startling. What is controversial is the suggestion, by Beyond Beef and others, that meat, specifically, is involved in colon cancer causation.

This claim is based on findings from the Nurses' Health Study, an ongoing investigation of almost 90,000 female registered nurses.²⁰ In this study, researchers found that individuals who ate beef, pork or lamb as a main dish at least once a day were two-and-a-half times more likely to develop colon cancer than those who ate these meats less than once a month. This association was stronger than that for any other food included in the dietary questionnaire filled out by the nurses.

Some observers have interpreted this finding overzealously. One of the study's own authors said, "If you step back and look at the data, the optimum amount of red meat you should eat is zero."²¹

In actuality, however, the data do not justify this extreme statement. Although women who ate meat daily did indeed have an increased risk of colon cancer, those who consumed it up to four times weekly did not have a statistically significant increase in colon cancer risk when compared with those who ate meat less than once a month. When the women were divided into five equal groups, ranging from the lowest to the highest meat intakes, only the group with the highest intake showed an increased risk of colon cancer; the others did not. (The women in the highest one-fifth consumed at least four and a half ounces of meat per day, every day.)

Therefore, as several experts have pointed out,²² the findings of this study are best interpreted as

a call for moderation in meat consumption, rather than elimination of meat from the diet. Dr. Peter Greenwald, director of cancer prevention and control at the National Cancer Institute, summed it up appropriately by saying, "It's a good and important study, but it's going beyond the data to recommend becoming a vegetarian."²³ Similarly, a letter to the journal that published the study stated, "The importance of the paper lies in showing that eating red meat in the quantities recommended by the American Heart Association at this time will allow the American public to obtain adequate amounts of iron and keep rates of colon cancer to a minimum."²²

Iron and Heart Disease

One of the newest charges against beef is that the iron it contains might be harmful to health by increasing the risk of heart attacks. This claim is based on a study conducted in eastern Finland in which men with relatively large amounts of iron stored in their bodies had a higher rate of heart attacks than men with smaller iron stores.²⁴

Does this imply that people should decrease their iron intakes in order to minimize the amount of iron stored in their bodies? ACSH believes that the answer is no, for three important reasons.

First, scientists don't know if the association between iron storage and heart disease that was seen in the Finnish men is also present in other population groups. The eastern Finnish population is unusual in several respects, including its very high rate of heart disease. The relationship between iron and heart disease should also be investigated in a variety of other populations before any recommendations are considered.

Second, it is uncertain whether diet was the factor responsible for the high iron stores in some of the Finnish men. Some of the men may have had hemochromatosis, a hereditary disease that causes excess amounts of iron to accumulate in the body. Unusually high iron storage levels were present in some of the men who had heart attacks, suggesting that they did indeed have this disease.²⁵ If hemochromatosis was the factor responsible for high iron storage levels, then dietary changes would not be beneficial or necessary. Instead, there would be a need for increased efforts to identify and treat patients who have this disorder.

Third, it is important to consider both the risks and benefits of a proposed dietary change before making any recommendations to the public. Iron deficiency is an important health problem; its consequences include decreased ability to perform physical work; impaired behavior, learning and intellectual performance; and low resistance to infection.¹⁴ Several segments of the U.S. population are at risk for iron deficiency; they can reduce that risk by making efforts to include enough iron in their diets. If authorities were to recommend that Americans decrease their iron intakes, they would be increasing a real health risk in the hope of avoiding a hypothetical one. Clearly, this would not be good public health policy.

Chemical Contamination

Beyond Beef contends that beef may be dangerous to eat because it is contaminated with chemicals used in its production including pesticides, antibiotics and hormones. In actuality, however, chemical residues in beef are minimal and do not pose a threat to the health of the American public.

Pesticides

Recent analyses by the Food and Drug Administration, Department of Agriculture, and other agencies show that the levels of pesticide residues in foods sold in the United States, including beef, are well within acceptable limits.²⁶ Many of the samples tested had no detectable residues.

Antibiotics

Antibiotics are generally fed to beef cattle only for short periods of time immediately after the animals arrive in feedlots. These drugs are not commonly used anytime close to slaughter, and government monitoring programs show that the drugs do not cause antibiotic residue problems.²⁶ Contrary to popular opinion, there has never been any conclusive evidence that the feeding of subtherapeutic doses of antibiotics to farm animals is a hazard to human health. The most recent review of this subject by the National Academy of Sciences has concurred with earlier evaluations by concluding that it was not possible to find direct evidence establishing the existence of a human health hazard from the feeding of subtherapeutic doses of antibiotics to livestock.²⁷ This conclusion applies to the relatively extensive use of antibiotics in poultry production as well as the much more limited use in the production of beef cattle.

Hormones

The use of hormones (such as estrogens) to promote growth in cattle is under strict government control. The amount of hormones present in cattle that have been castrated and then treated with replacement hormones is actually lower than that in intact cows or bulls.²⁶ Hormone levels in beef (whether treated or untreated) are lower than in many plant foods. In fact, foods of plant origin contribute more estrogen to typical diets than beef does.²⁶

Microbiological Contamination

Unlike contamination with agricultural chemicals, contamination of foods with microorganisms is a real threat to the health of the American public. It has been estimated that at least 15 million and perhaps as many as 60 million cases of foodborne disease occur in the U.S. each year.²⁷ Most of these illnesses are gastrointestinal, and they are caused by bacteria or bacterial toxins in food. For healthy adults, a bout of “food poisoning” is a memorably unpleasant experience, but it usually ends quickly, with no lasting effects. In vulnerable individuals, however such as infants, young children, the elderly, pregnant women and people with chronic health problems or weakened immune systems, these illnesses can be serious or even fatal.

As with all raw foods of animal origin, raw beef can be contaminated with bacteria that cause foodborne diseases. The bacteria usually come from the animal’s intestinal contents or the slaughter plant environment. They contaminate the surfaces of the meat when the carcass is being skinned and cut apart. Good sanitary practices can minimize this type of contamination, but they cannot completely prevent it.

Meat contaminated with disease-causing bacteria does not have a distinctive odor or appearance.

For this reason, contamination cannot be detected through simple inspection. It is possible to use microbiological techniques to detect the bacteria that cause food poisoning, but these tests take time, and fresh meat is a highly perishable commodity. It is not practical to delay the cutting and shipping of meat until the results of testing become available. Microbiological testing can be helpful in determining the frequency and sources of contamination, but it cannot be used to assure consumers that a particular piece of beef is free from potentially harmful bacteria.

For this reason, the best place to prevent foodborne illness is not the meat-packing plant; it is the kitchen. Adequate cooking destroys harmful microorganisms, and proper food handling practices can prevent cross-contamination and bacterial growth. To ensure that beef is safe to eat, follow these tips:

- Always cook foods adequately. Do not eat or even taste raw meat. Beef roasts or steaks can be served rare. Ground beef, however, should always be cooked to at least medium doneness (160°F or until no pink color remains). Ground meats require thorough cooking because the grinding process distributes contaminants throughout the product. In an intact piece of meat, contaminants are usually found only on the surface, which reaches temperatures high enough to kill bacteria even if the center of the meat is cooked only to the rare or medium-rare stage.
- Keep hot foods hot and cold foods cold. Perishable foods (including meats) should be kept at temperatures above 140°F or below 40°F.
- Avoid cross-contamination. Raw animal foods (meat, poultry, seafood, eggs) and their drippings should not be allowed to come into contact with other foods. Utensils, surfaces and hands that have come into contact with raw animal foods should be thoroughly cleaned before they are used in the preparation of other foods.
- Marinate foods properly. Meat should always be marinated in a covered container in the refrigerator — never at room temperature. If the marinade is to be used as a sauce, it should be boiled after the meat is removed. Alternatively, a separate batch of marinade can be prepared for use as a sauce.
- Do not partially cook food, then finish cooking it the next day. Partial cooking does not kill all microorganisms. They can survive and grow during storage. Subsequent cooking may not be adequate to destroy them.

A Recent Food Poisoning Outbreak

In early 1993, more than 500 people in the western United States, mostly in the state of Washington, developed an uncommon form of food poisoning after eating hamburgers served by a major fast-food restaurant chain.²⁸ There were four deaths.

The illness was caused by *Escherichia coli* O157:H7, an unusual strain of a common intestinal bacterium. This organism can cause intestinal illness, with bloody diarrhea in severe cases. In a small proportion of patients, the diarrhea is followed by a serious, potentially fatal complication called hemolytic uremic syndrome, which is characterized by anemia, kidney failure and central nervous system symptoms.²⁹

E. coli O157:H7 poses the greatest risks to young children and the elderly. Individuals in these age groups are at increased risk of developing diarrhea after exposure to the organism, and they have the highest risk of hemolytic uremic syndrome and death.³⁰

E. coli O157:H7 can be present in the intestines of healthy cattle. In the western states outbreak, the organisms probably contaminated the beef at the time of slaughter. The grinding process distributed the organisms throughout the hamburger patties. Restaurant personnel cooked the hamburgers to a minimum temperature of 140°F, in accordance with company policy and federal regulations.³¹ However, this temperature is not sufficient to kill *E. coli* O157:H7; to destroy this organism, ground beef should be cooked to a minimum temperature of 155°F. Because the hamburgers were undercooked, some disease-causing bacteria survived and reached consumers.

Disease outbreaks of this type can be and should be prevented. If ground beef is cooked to at least 155°F or until no pink color remains, foodborne bacteria such as *E. coli* O157:H7 will be destroyed. Ground meats should always be cooked thoroughly, because contaminants can be present throughout the meat, not just on the surface.

Some people have argued that it would be best to stop *E. coli* O157:H7 outbreaks by preventing contamination at the meat-packing plant. However, it would be extremely difficult — perhaps impossible — to accomplish this. The cattle that carry *E. coli* O157:H7 cannot be identified because the organism does not make them ill. Contamination during slaughter cannot be completely prevented, even with excellent sanitary practices. Contaminated meat cannot be identified easily. The standard test for *E. coli* O157:H7 takes six days.³¹ Fresh meat cannot be held for that length of time before distribution. There is no technique that can be used to detect contaminated carcasses on the production line during inspection.³¹

Improvements in technology may eventually make it possible to produce meat that can be guaranteed free from *E. coli* O157:H7 and other disease-causing microorganisms. However, this is a hope for the future, not a reality for the present. For now, commercial and home food preparers must share in the effort to prevent disease caused by *E. coli* O157:H7, by handling meat carefully and cooking it adequately.

Microorganisms Are the Number One Hazard

The recent *E. coli* O157:H7 food poisoning outbreak has drawn needed attention to the problem of microbiological foodborne illness. Microbiological contamination is the number one cause of illness from food, yet it has never been number one in terms of the effort spent on prevention. Government agencies have devoted far more time and money to the control of chemical hazards in food because the American public and its elected officials perceive that chemical hazards are the most important, even though they are not. The extensive publicity about the *E. coli* O157:H7 outbreak may lead to an overdue change in priorities. It may also lead to greater acceptance of promising technologies that can be used to eliminate contaminants, such as carcass rinses or irradiation.³²

In response to the outbreak, the Food and Drug Administration has issued new regulations calling for the cooking of ground beef to higher temperatures,²⁸ the U.S. Department of Agriculture has started to design a comprehensive microbiological control and prevention program covering all

steps from farm to table,³¹ and an interagency working group has called for more intensive research on this microorganism.

The Department of Agriculture plans to require new labels (which will give instructions for safe handling and cooking) on all packages of meat and poultry. The agency's plan for new labeling regulations was announced shortly after the outbreak occurred. Despite this, the Beyond Beef coalition filed a superfluous lawsuit in federal court seeking injunctions prohibiting government inspectors from putting "inspected and passed" stickers on meats and poultry unless the products also carried warning labels notifying consumers about the possibility of *E. coli* food poisoning. The Department of Agriculture settled this suit by committing itself to requiring the instructional labels it had intended to require anyway.

The new labels will not be "warning" labels informing consumers of an unsafe product. Such labels are best reserved for products that are unsafe when used as intended, such as cigarettes. Meat and poultry are unsafe only when mishandled or incorrectly prepared. Thus, instructions for safe preparation, rather than a warning message, are most appropriate.

Both consumer advocates and the meat industry support the proposed labeling. ACSH agrees, but with one reservation. The new labels will appear only on meat and poultry, simply because these are the only products under the jurisdiction of the Department of Agriculture. The absence of labels on other foods might lead consumers to think that meat and poultry are the only foods that require careful handling and preparation in order to prevent foodborne illness. This misconception could be dangerous. Fish, shellfish and eggs also require thorough cooking to destroy microorganisms which may be present in the raw products. All foods need careful handling to avoid opportunities for microbial growth and cross-contamination. The government agencies that regulate other food products should join with the Department of Agriculture in a coordinated effort to increase public knowledge about all aspects of microbiological food safety.

Conclusion

The Beyond Beef coalition has failed in its effort to justify a drastic reduction in beef consumption in the United States. The scientific evidence does not support the coalition's view that beef production causes environmental devastation and contributes to world hunger. Despite claims to the contrary, beef can be part of a healthful diet that meets guidelines designed to reduce risks of heart disease and cancer. The only real health risk that may be associated with the consumption of moderate amounts of beef or other animal products is that of bacterial food poisoning. This risk can be minimized by proper food handling procedures at all stages from the meat-packing plant to the consumer's table.

The Beyond Beef coalition includes a wide variety of organizations with different goals. Some promote vegetarianism, while others focus on animal rights, rainforest preservation, protection of wildlife, small-scale farming or other issues. None of these groups seems to give top priority to providing accurate, well-balanced scientific information. Jeremy Rifkin, the author of the book *Beyond*

Beef, also seems to have many agendas. He is best known as an opponent of genetic engineering, but he has also campaigned and written about a variety of other issues. It seems possible that both Rifkin and the Beyond Beef coalition have tended to overstate the case against beef because of their strongly held beliefs on related environmental, economic and philosophical issues.

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Suggestions for Further Reading

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Dixie Farley, Vegetarian Diets. The Pluses and the Pitfalls, *FDA Consumer*, May 1992, pp 21-24.

See also the following American Council on Science and Health reports on related issues:

- Coronary Heart Disease: The Facts & Myths
- Diet and Cancer
- Eating Safely: Avoiding Foodborne Illness
- Irradiated Foods
- Pesticides and Food Safety

* Throughout this report, the term “meat” refers to beef, pork, lamb and veal. It does not include poultry.