



Masters of Beef Advocacy 2.0

Teacher's Guide

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Introduction

Welcome to the Masters of Beef Advocacy 2.0. By completing these courses your students will join a nationwide network of farmers, ranchers, chefs, dietitians, physicians, school teachers, foodservice operators, retail grocers and others in the community of people who raise safe, wholesome and nutritious beef for consumers around the world whose goal is to engage consumers in a conversation about beef.

The MBA program consists of a series of five lessons:

- The Beef Community
- Raising Cattle on Grass
- Life in the Feedyard
- From Cattle to Beef
- Beef, It's What's For dinner

As each student completes these lesson they will learn how to answers questions consumers have about how beef gets from the pasture to their plate. Today's consumers have a lot of questions about their food, especially beef, such as:

- Is beef safe to feed to my family?
- Are cattle treated properly?
- Are cows causing global warming?
- Does eating red meat cause heart disease or cancer?
- Does beef come from "factory farms"?
- Why are antibiotics and hormones used to produce beef?
- Is "natural" beef safer?
- Is grass-finished beef more nutritious?

Each lesson includes a self-directed tutorial and 10 question multiple choice quiz and should take less than one hour to complete. We recommend completing each lesson in one class period, if possible. To complete each lesson, play the tutorial for your class then have each student complete the quiz individually. Once your students have completed all five lessons and passed the five quizzes, fill out the excel spreadsheet and e-mail it to MBA@beef.org. Your students will be added to the national database of MBA graduates and receive an invitation to join the MBA Alumni Facebook page. They will also begin receiving the monthly *MBA Advocacy in Action* e-mail newsletter.

If at any time you experience technical difficulties, please send an e-mail to MBA@beef.org, and we will respond as soon as possible.



MASTERS OF BEEF ADVOCACY 2.0

Lesson 1: The Beef Community

Welcome to the Masters of Beef Advocacy. By enrolling in these courses you have joined thousands of farmers, ranchers, chefs, dietitians, physicians, school teachers, foodservice operators, retail grocers and others in the community of people who raise safe, wholesome and nutritious beef for consumers around the world.

The MBA program consists of a series of five courses:

- The Beef Community
- Raising Cattle on Grass
- Life In the Feedyard
- From Cattle to Beef
- Beef it's what's for dinner

Each course includes a self-directed tutorial and quiz and should take less than one hour to complete. We recommend completing each course in one sitting, if possible. During the tutorial you can go backwards and forwards through the slides, or stop and restart where you left off, but once you begin the quiz you must complete the quiz or restart the quiz from the beginning when you return to the course.

If at any time you experience technical difficulties, such as a course showing up as “incomplete” after you completed it, please send an e-mail to mba@beef.org, and we will respond as soon as possible. Be sure to review the computer system requirements provided in your acceptance letter and follow all directions in the tutorial closely to reduce the likelihood you will experience technical problems.

This is a self-paced program. You can complete all five programs in one sitting or spread them out over a number of days or weeks. We recommend completing at least one course per week for a total of five weeks. Of course, we understand some times are busier than others and you may need to skip a week or two. However, if you do not complete the program within eight weeks we will contact you to determine if you want to continue or withdraw from the program.

As you complete these courses you will learn how to answer questions consumers have about how beef gets from the pasture to their plate. Today's consumers have a lot of questions about their food, especially beef:

- Is beef safe to feed to my family?
- Are cattle treated properly?
- Are cows causing global warming?
- Does eating red meat cause heart disease or cancer?
- Does beef come from “factory farms”?
- Why are antibiotics and hormones used to produce beef?
- Is “natural” beef safer?
- Is grass-finished beef more nutritious?

More than 98 percent of the American population has little or no direct connection to production agriculture. This creates a huge knowledge gap between those who produce food and the majority who consume it. When it comes to beef, consumers see cattle grazing in the fields and fresh beef in the meat case, but have little exposure to what happens in between. They have heard about “factory farms” and have seen movies like “Food, Inc.” that portray today’s agriculture in a negative light.

Efforts like Meatless Mondays try to convince consumers to reduce meat consumption by cutting out burgers and steaks at least one day a week. Their goal is to “reduce meat consumption 15 percent in order to improve personal health and the health of the planet.” Many of these anti-meat campaigns want consumers to believe modern beef production is harmful to the environment, cruel to animals and produces unsafe and unhealthy food.

You know that’s not true, but what can you do about it? You can engage in the conversation with consumers about how food is produced. You can help answer their questions and correct misinformation. You can be the voice and face of today’s beef community.

When engaging consumers in a conversation about beef, it is important to first listen to their questions and concerns. As you listen, find common ground to build on and then share information to answer their questions. Don’t worry, though. You don’t have to have all the answers. The most important thing you can do is acknowledge their concerns and share your commitment to continuously improving to meet their expectations. As the saying goes, “people don’t care how much you know until they know how much you care.”

Let the “Two Cs” guide your conversation on any subject:

- We care (about the same issues you do)
- We’re capable (of meeting your expectations)

For example, when talking about beef safety, remind people that you care about the safety of the food you eat, too. The beef community, from pasture to plate, works hard to ensure the beef we raise for our family and theirs is safe.

We also care about animals and know that animal care is an obligation, not an option. Through programs like beef quality assurance (BQA), we provide education and training for those responsible for caring for cattle throughout their life cycle.

As stewards of the land for many generations, we understand the importance of the limited resources we have to produce food and we take action every day to sustain the land for future generations.

We also care about our health and the health of our families and we eat beef knowing it provides 10 essential nutrients and vitamins our bodies need to grow and stay healthy and strong as we age.

This course will provide a look at who the beef community is that help bring beef from pasture to plate, as well as the contributions of the beef community to local communities and the economy. We will review the beef lifecycle and conclude the course by discussing the variety of beef choices available today and how to answer common consumer questions about beef.

Exciting, romantic, challenging and pioneering — that is how many popular books and movies have portrayed the lives of U.S. cattle farmers and ranchers. These portrayals only scratch the surface of what it really means to be a cattleman, and yet, they hint at something very real: cattlemen's deeply rooted values and influence on our communities, the economy, public health and the environment. With that influence comes responsibility; today's cattle farmers and ranchers take the responsibility of raising healthy cattle for high-quality, nutritious beef very seriously.

We are extremely proud of our role in feeding people. This is evident in the way we have invested in beef safety improvements, responded to consumers' preferences and focused on creating the best beef-eating experiences. We also are proud of our roles as small business owners, community leaders, animal caretakers, nutritionists and environmentalists. The beef community's mission is to provide the safest, highest-quality, most consumer-friendly beef in an environmentally and economically sustainable manner.

So what do we mean by the beef community?

Family farmers and ranchers still make up the foundation of the beef community. Today, there are approximately one million U.S. cattle farmers and ranchers making daily decisions on how to raise beef. Ninety-seven percent of beef farms or ranches are family-owned. In addition, 54 percent of these farms and ranches have been in the same family for three generations or more, and 64 percent of cattle farmers and ranchers say that they hope to continue the tradition by passing down their farm or ranch to their children. By keeping farms and ranches within the family for many generations, cattlemen also have been able to keep all-American family values alive and well.

But these values are not just held by farmers and ranchers –

The beef community includes the people who work at every step in the journey of bringing beef from pasture to plate. This includes the men and women who work in feedyards, including veterinarians, nutritionists and professional cowboys who provide good care and nutrition for cattle every day. The community includes researchers who discover new ways to care for animals, reduce the environmental impact and improve the safety of beef. It includes teachers and students across the country studying better ways to raise beef. And the beef community includes the employees of large and small businesses and who provide equipment, feed, seed and services to farmers and ranchers as well as the people who work in processing plants, restaurants and grocery stores to bring beef to the consumer.

While the beef community is broad and diverse, many members of the community grew up on family farms and ranches and share the same hopes, dreams and concerns about the future of our planet and our ability to feed a growing world population. And the one thing we all have in common is we all eat and want the food we serve our families to be safe, wholesome and nutritious. We — the people who help bring beef from pasture to plate — are the beef community, and consumers are our no. 1 priority.

The beef community represents the largest single segment of American agriculture. In fact, the U.S. Department of agriculture (USDA) says more farms are classified as beef cattle operations (35%) than any other type. Farmers and ranchers nationwide are responsible for approximately 90 million head of cattle, though most cattle operations are smaller than most people might think. According to USDA, the typical herd averages just 50 head of cattle.

Perhaps the most basic contribution farmers and ranchers make to their local communities is managing a business that relies on local goods or services and often creates job opportunities. On average, one beef operation provides jobs for more than two family members and two non-family members. Cattlemen also support other farmers in many cases by buying crops for cattle feed from other farms near their operation. When viewed from a broader national economy, the beef community directly and indirectly accounts for more than 1.4 million full-time jobs and contributes more than \$188 billion in output to the national economy.

The beef community encompasses a wide variety of beef production models as diverse as the approximately 620,000 beef cattle operations in the U.S. Working together as a community allows each of these independent small family business owners to make the best use of the natural resources they have in their area of the country, whether it is native grasslands or abundant grain supplies. Working together, the beef community maximizes the value of these precious resources. From beef sold at a local farmers' market to beef at your favorite restaurant or local grocery store, we provide consumers with lots of ways to enjoy beef at a price they can afford.

One of the basic questions consumers have is “where does beef come from?” You can help answer this question by explaining the beef “lifecycle” – the journey from pasture to plate.

(1) The beef lifecycle begins on cow-calf farms and ranches where cows are bred and give birth to a calf each year. These are family farms and ranches like those you may see along highways and country roads.

(2) For the first few months of life, calves drink their mother's milk and spend time grazing on grass pastures.

(3) Calves are weaned from their mother's milk when they are about eight months old and weigh approximately 500 pounds. Calves then move onto pastures where they eat grass and forages that provide protein and energy they need to grow.

(4) Many calves are purchased at livestock auction markets by farmers and ranchers called stockers and backgrounders. Some of the calves, including about one-in-three female calves, are kept on the farm or ranch as breeding animals.

(5) Stockers and backgrounders graze cattle on many different kinds of pasture all across the United States. Like cow-calf operations, these are mostly family-owned ranches and farms where cattle graze on pasture or start receiving grain to supplement their diets. These cattle gain weight as they convert forage and grain into muscle and fat.

(6) The majority of cattle in the United States are then sold or moved to feedyards where they receive carefully balanced, nutritious diet and individual attention for an average of 120 to 180 days prior to slaughter. Feedyards look different than cow-calf and backgrounding operations because cattle do not graze on pasture. Rather, they typically are separated into herds of 100 animals and live in pens that allow about 125 to 250 square feet of room per animal, plenty of room to move around, groom themselves, and socialize with other cattle.

Cattle in a feedyard have constant access to water and are free to graze at feedbunks which contain plant material called forage which includes grasses similar to what they would have eaten while grazing on pasture, whole corn plant silage and hay (grass, legumes or other herbaceous plants that have been cut, dried, and stored for use as animal feed), as well as

grains like corn and wheat. The addition of grain to their diet provides additional energy they need to thrive and grow.

Some cattle remain on pasture for their entire lives prior to slaughter. The meat from these cattle is referred to as “grass-fed” or “grass-finished” beef. Though technically speaking, all beef is “grass-fed,” since all cattle spend the majority of their lives on pasture; grass-fed is a voluntary marketing claim that livestock producers may request USDA to verify in order to distinguish their beef products in the marketplace. We will discuss this topic further in the beef choices section to come.

(7) Both grass-finished and grain-finished beef cattle are harvested in modern processing facilities or packing plants where skilled workers break down beef carcasses into popular beef cuts. When cattle arrive at packing plants, they are moved inside in a quiet and orderly manner. There is little excess movement or unnecessary noise, so cattle are not unduly stressed. Packing plant technicians then use a mechanical stunning device to quickly and effectively render animals unconscious prior to slaughter.

The harvest process has evolved over the years based on scientific research to ensure both humane animal treatment and the production of safe food. The humane slaughter act (passed in 1958 and updated in 1978 and 2002) dictates strict animal handling and slaughtering standards for packing plants. Federally-inspected facilities are under continuous observation by USDA's food safety and inspection service (FSIS) personnel to ensure compliance with all regulations.

(8) When beef leaves the packing plant, it is in the form of large sections – either primals, like the chuck, round rib and loin; or subprimals, which are smaller cuts of meat such as the bottom round, top round, eye round and round tip. Some plants sell subprimals to meat processing facilities where workers skillfully break them down further into individual steaks and roasts that are sent to supermarkets and restaurants worldwide. Approximately 90 percent of the beef raised in the United States (by weight) is consumed in the United States. The remaining 10 percent of beef is exported.

(9) All beef – whether grass-finished or grain-finished – provides 10 essential nutrients like zinc, iron, protein and b vitamins to diets in the United States and around the globe. There are nutritional differences in the fat profile of grass-finished and grain-finished beef, but that's the subject for another day... and another course: beef. It's what's for dinner.

Ultimately, consumers dictate the actions of the beef supply chain, from pasture to plate, by determining what kinds of beef they will buy and at what price. For instance, beef cattle are now much leaner than just a decade ago as a result of the consumer demand for products with less fat. Consequently, there now are 29 cuts of beef that meet government guidelines for lean, such as the tenderloin, sirloin and 95% lean ground beef.

To complete the modern beef production story, let's take a look at the choices of beef available to consumers today.

Consumers' lifestyles and budgets have changed over time, and the beef community has evolved to meet those needs. We provide consumers with grain-finished, grass-finished, certified organic and natural beef products. While each kind of beef offers something different to the consumer, all beef shares the common denominators that continues to spark demand: a safe, wholesome and nutritious meal.

The range of options in beef products results from the different ways cattle are fed and raised, but all types of beef have the same safety and nutritional benefits. When it comes to these critical factors, there is little or no difference between today's beef choices. All beef goes through a rigorous inspection process and is subject to strict government guidelines to ensure the highest level of safety, and all beef choices are a good or excellent source of 10 essential nutrients and vitamins like protein, zinc, iron, and B vitamins.

Regardless of your personal preferences, you should be able to explain to consumers what the key differences are between the different choices of beef. More importantly, you can emphasize that no matter what type of beef consumers choose, they can be confident all beef choices are safe, wholesome and nutritious.

Due to the variety of beef choices available today, there may be combinations or variations of these terms or marketing claims — for example, beef may be grain-finished and organic or grass-finished and organic. The label should clearly state the production model with which the beef was raised. Following are brief explanations of the key differences between the choices of beef most commonly available to consumers in their favorite restaurant or grocery store.

Grain-finished, also known as conventional or grain-fed, is the most widely produced beef in the United States and makes up the majority of beef in the meat case at the supermarket or on the menu at your favorite restaurant.

Consumers typically don't know that most beef cattle spend the majority of their lives in range or pasture conditions feeding on grass, *including grain-finished cattle*. At 12 to 18 months of age, on average, grain-finished cattle are moved to a feedyard where they receive a balanced diet of grasses, grains and other forages. Grain-finishing helps farmers and ranchers provide the consistent quality, great-tasting and affordable beef most consumers prefer while also utilizing locally grown renewable feeds. For example, after corn is distilled to produce alcohol or ethanol, the remaining solids are called distillers grains. These cereal products, which would otherwise go to waste, provide a high fiber, highly digestible protein that supplies the animal with energy to thrive and grow.

Based on the geographic region of the country where the cattle are raised, the feed may also include locally grown products that otherwise would be sent to landfills or burned and go to waste. For example, in California, cattle might consume almond hulls as part of their ration, while cattle in Idaho might have potato starch remaining from making hash browns or fries mixed into their ration. There is great diversity in what is locally available and cattlemen take advantage of the existing natural resources in their geographic regions and transform these resources into great-tasting, nutritious beef consumers love.

Grain-finishing has many benefits in today's beef production. Transferring cattle to a feedyard around one year of age allows the cow/calf farm or ranch to raise a new crop of calves every year and prevent overgrazing of pastures. Adding grain to their diet at this age provides much-needed energy for muscle growth, resulting in more meat per animal. Raising more meat per animal reduces the amount of land, water, feed and other resources needed to provide affordable beef for a rapidly growing population.

As discussed previously, most beef cattle spend the majority of their lives in range or pasture conditions feeding on grass, including grain-finished cattle. However, in order to meet USDA's agricultural marketing service voluntary certification for grass-fed cattle (also known as grass-finished) cattle may eat only a grass and forage-based diet throughout their whole lifespan (with

the exception of milk consumed prior to weaning). Grass-finished beef cattle cannot be fed grain or grain byproducts and must have continuous access to pasture during the growing season.

Producing grass-finished beef in large volumes is difficult in North America due to limited growing seasons. For example, in northern states, grass can be covered in snow for many months of the year, requiring farmers and ranchers to store or purchase hay to feed cattle during the winter. Grass-finished beef also takes longer to raise—on average of 226 days longer than grain-finished beef — therefore requiring more resources like land, water and feed. For this reason, grass-finished beef typically is more expensive to produce and costs more at the supermarket than grain-finished beef. Grass-finished beef is often described as having a distinct taste and may require different preparation methods, including marinades and shorter cooking times.

A common question from consumers is whether antibiotics or hormones can be administered to grass-finished cattle. The answer is yes, according to USDA, beef that is grass-finished may judiciously be given FDA-approved antibiotics or growth promotants as well as vitamin and mineral supplements.

The definition of “natural” and “naturally raised” also is a source of confusion for many consumers. According to USDA, natural means that a product is minimally processed and contains no additives. By this definition, most beef in the meat case is natural. However, many consumers may confuse “natural” with “naturally raised beef,” which is from cattle raised without added hormones to promote growth or the use of antibiotics to prevent disease. This voluntary standard establishes the minimum requirements for those producers who choose to operate a USDA-verified program involving a naturally raised claim.

According to USDA, the “naturally raised” marketing claim standard means the cattle were raised *entirely without* growth promotants, antibiotics (except for ionophores used as coccidiostats for parasite control), and never fed animal by-products.

Common “naturally raised” production claims include “raised without hormones,” “raised without antibiotics,” “free range” and “vegetarian fed.” Since the definition of “natural” and “naturally raised” differ, it is important for consumers to read labels carefully to understand what a particular label means.

If a consumer prefers beef from animals raised without added hormones to promote growth or the use of antibiotics to prevent disease, they should look for specific language on the label such as “naturally raised,” “raised without hormones,” “raised without antibiotics” or “organic.”

Certified organic beef must meet USDA's national organic program standards. Organically raised cattle must be fed 100-percent organic feed, and they may not be given hormones to promote growth or antibiotics for any reason. While some consumers may confuse “organic” with grass-finished beef, certified organic beef can be either grass-finished or grain-finished, as long as the grass or grain was grown without synthetic pesticides or fertilizers.

According to research, organically produced food does not differ in safety or nutrition from conventionally produced foods. The U.S. Department of agriculture, which certifies organic food, “makes no claims that organically produced food is safer or more nutritious than conventionally produced food. Organic food differs from conventionally produced food in the way it is grown, handled and processed.”

Like many organic products, organic beef is more expensive to produce, which results in higher prices than other beef choices in the meat case.

You probably already know that the use of antibiotics and growth promotants is one of the most emotional issues surrounding modern beef production. Consumers are concerned about their health and the well-being of their families and rightly have questions about why and how we use these products to raise beef. You can help answer their questions with information on the various choices available to consumers, as well as the following facts about the use of hormones and antibiotics. But perhaps the most important thing you can do is share your personal experience with either using antibiotics or growth promotants to raise cattle or eating beef that came from cattle raised with these products.

Though the cattleman's primary goal is to prevent illness in the herd, it is natural for some cattle to become sick. Antibiotics, also known as antimicrobials, are medications that fight bacterial infections. Antibiotics made specifically for cattle are used to help an animal regain or maintain superior health.

Farmers and ranchers work with veterinarians to promptly diagnose illnesses in cattle and make every effort to return sick or injured animals to good health because it is the right and humane thing to do. When antibiotics are necessary to maintain cattle health or treat sick cattle, cattlemen believe in using the smallest and most effective dose of antibiotics made specifically for cattle. As often is the case, preventing illness may result in less antibiotic use than if cattle get sick and require antibiotics to treat the illness.

The health of U.S. cattle herds, as well as the continuous supply of safe beef, relies on the long-term effectiveness of antibiotics. Therefore, cattlemen follow *the producers guide for judicious use of antibiotics*. These guidelines, which have been in place since 1987, were adapted from the American veterinary medical association, American association of bovine practitioners and the academy of veterinary consultants' appropriate antibiotic use guidelines. They specifically call for:

- Avoiding the use of antibiotics that are important in human medicine;
- Using a narrow spectrum of antimicrobials whenever possible;
- Treating the fewest number of animals possible;
- Limiting antibiotic use to disease prevention or control; and
- Not using antibiotics if the principle intent is to improve performance.

Before an antibiotic may be used in beef cattle production, it must go through a comprehensive, multi-step review by the U.S. Food and drug administration (FDA) to ensure animal health and human food safety. Approved products must also be continually proven safe to stay on the market. When an antibiotic is approved, FDA establishes a withdrawal period and safe residue levels based on rigorous scientific testing. By law, no meat sold in the United States is allowed to contain antibiotic residues that violate FDA standards. The USDA food safety and inspection service (FSIS) conducts tests to ensure beef products entering the food supply do not contain antibiotic levels that violate FDA standards.

America's cattle producers have safely used growth promotants for more than 60 years to produce the lean beef consumers demand while using fewer resources, like land, water and feed. We will discuss natural resource usage in more detail in the environmental stewardship

course. For now, let's talk about how and why growth promotants are used and what is done to ensure they are safe.

Growth promotants, sometimes referred to as growth hormones or steroids, help cattle efficiently convert feed into more lean muscle. Most growth promotants are used to supplement existing hormones or compensate for missing hormones in an animal's body. The hormones in growth promotants are metabolized, or used up, by the animal's body before it goes to harvest. Although these products vary in active ingredients and dose, they generally work by discouraging protein depletion and encouraging protein synthesis in cattle so they can gain more lean muscle from less feed. According to research, the judicious and safe use of growth promotants improves the average daily gain of cattle by approximately 15 to 25 percent.

Growth promotants typically are administered through a small pellet, called an implant, which is placed under the skin on the back of an animal's ear. They also can be administered through an animal's feed. Either way, growth promotants are metabolized by the animal prior to harvest.

The safety of growth promoting products used in cattle production is ensured through several layers of requirements, which are enforced by multiple government agencies. First, growth promotants are required to go through a comprehensive, multi-step review process conducted by scientists to ensure animal health and food safety. If approved, these products then are re-evaluated by FDA annually and only remain in the marketplace if they are continually proven safe. In addition, USDA FSIS tests beef for growth promotant residues at harvest to ensure compliance with FDA-established safe levels.

Today, the U.S. beef community is a leader in the global beef marketplace. Thanks to hard work, effective use of natural resources and science-based improvements in breeding, animal nutrition and growth enhancement technologies, U.S. cattle farmers and ranchers raise 20 percent of the world's beef with 7 percent of the world's cattle in order to help sustainably feed a growing world population.

As we discussed earlier, consumers have a lot of questions about how beef gets from the pasture to their plate:

- Is beef safe to feed to my family?
- Are cattle treated humanely?
- Are cows causing global warming?
- Does eating red meat cause heart disease or cancer?
- Does beef come from factory farms?
- Why are antibiotics and hormones used to produce beef?
- Is "natural" beef safer?
- Is grass-finished beef more nutritious?

We will discuss beef safety, animal care, environmental stewardship and beef nutrition in more detail in the courses to follow. For now, let's quickly review what we've learned about factory farms, the use of antibiotics and hormones and the variety of beef choices available to today's consumers.

Family farmers and ranchers still make up the foundation of the beef community. In fact, 97 percent of beef cattle farms and ranches are family-owned and operated. The people who work in feedyards, packing plants and other steps along beef's journey from pasture to plate often

grew up on family farms and ranches. We all share the same hopes, dreams and concerns about the future of our planet and our ability to feed a growing world population. And, we all eat and want the food we serve our families to be safe, wholesome and nutritious.

Farmers and ranchers work with veterinarians to promptly diagnose illnesses in cattle and make every effort to return sick or injured animals to good health because it is the right and humane thing to do. When antibiotics are necessary to maintain cattle health or treat sick cattle, cattlemen believe in using the smallest and most effective dose of antibiotics made specifically for cattle. As often is the case, preventing illness may result in less antibiotic use than if cattle get sick and require antibiotics to treat the illness.

Raising healthy animals is a critical step in providing wholesome beef. We understand the importance of maintaining the effectiveness of these medicines for both human and animal health and are committed to using them responsibly. FDA has developed an approval process that stringently manages antibiotic use and specifically monitors for potential resistance. This system helps protect human health while giving veterinarians and beef producers the tools needed to keep animals healthy.

America's cattle producers have safely used growth promotants for more than 60 years to produce the lean beef consumers demand while using fewer resources, like land, water and feed. While this is very important, we would never use any product we did not believe was safe in raising beef for our dinner table, and yours.

The safety of growth promoting products used in cattle production is ensured through several layers of requirements, which are enforced by multiple government agencies. First, growth promotants are required to go through a comprehensive, multi-step review process conducted by scientists to ensure animal health and food safety. If approved, these products are then re-evaluated by FDA annually and only remain in the marketplace if they are continually proven safe.

The range of options in beef products results from the different ways cattle are fed and raised. The great news for consumers is that all beef, regardless of how it was raised, shares the same popular characteristics that put it at the center of the dinner plate: taste, nutrition and safety. When it comes to safety, there is no difference between today's beef choices. All beef goes through a rigorous inspection process and is subject to strict government guidelines to ensure the highest level of safety. When it comes to nutrition, all beef choices are a good or excellent source of 10 essential nutrients and vitamins like protein, zinc, iron and b vitamins. While there are some differences between grain-finished and grass-finished beef, as long as you choose beef, you are making a nutritious and wholesome choice for you and your family!

In a conversation about beef, it is important to first listen to their questions and concerns. As you listen, find common ground to build on and then share information to answer their questions. Don't worry, though. You don't have to have all the answers. The most important thing you can do is acknowledge their concerns and share your commitment to continuously improving to meet their expectations. As the saying goes, "people don't care how much you know until they know how much you care."

Let the "Two Cs" guide your conversation on any subject:

- We care (about the same issues you do)
- We're capable (of meeting your expectations)

We care about the same issues every consumer does: the safety of our food, making sure animals receive proper care, preserving the environment for future generations and living healthful lives. We are working hard every day to meet consumer expectations in these areas. Members of the beef community at every stage of the production process take seriously their responsibility to provide safe and wholesome food for America's dinner tables.



Masters of Beef Advocacy 2.0

Lesson 2: Raising Cattle on Grass

INTRO

Many consumers today have very little understanding of how beef gets from the pasture to their plate. Some even think cattle are born and raised in feedyards for their entire lives before being marched next door to the slaughterhouse. Perhaps this misperception is why many consumers believe beef comes from “factory farms.” So rather than get defensive when someone asks if beef is raised on factory farms, you may want to ask what their image of a factory farm is. It also may be helpful to take a few minutes to explain the “how” and “why” behind the various stages in the beef lifecycle. This course will cover the first stage: raising cattle on grass.

One of the common questions consumers ask about beef is whether it is grass-fed or grain-fed. What they probably mean is whether it was raised on grass or in a feedyard. While some cattle are strictly grass-fed, the reality is most cattle are raised on a combination of both grass and grain in the U.S. In fact, for as long as cattle have been raised for beef in this country farmers and ranchers have supplemented cattle diets with grain. But why?

The entire U.S. is located in the northern hemisphere. Most of the U.S. is above the 39th parallel, where daylight falls under 10 hours a day starting on November 18 and returns to over ten hours a day beginning January 24. Plant growth, including crops and grass, is considerably slowed during this period of reduced sunlight. And during the winter months in the northern tier of states like Montana and the Dakotas, grass is covered in snow. When grass is not growing, or covered in snow, it is not suitable for grazing. Cattle need access to green, growing grass to provide the nutrients they need to thrive and survive. So during the winter months, cattlemen will supplement cattle feed with grain, hay, silage and other available feedstuffs.

We will discuss “what cattle eat” in more detail in the next course, Life in the Feedyard. But when consumers ask if beef is grass-fed or grain-fed, the answer is almost always “yes!” Nearly all cattle spend the majority of their lives grazing on native grasslands, whether it is in the Flint Hills of Kansas, the Sandhills of Nebraska, or the foothills of the Rocky Mountains. There are vast benefits to raising cattle on grass. Open space and pastures, managed by farmers and ranchers, provides habitats for 75 percent of America’s wildlife. Furthermore, because 85 percent of U.S. grazing lands are unsuitable for growing crops, raising cattle on grasslands allows farmers and ranchers to more than double the amount of land that can be used to raise food and allows us to raise cattle in all 50 United States, from Alaska to Hawaii, California to Florida, and Texas to Montana.

Grass is the root of all being in the beef industry. Many cattlemen would say they are actually grass farmers. The cattle themselves are the ones who turn the grass into beef! The unique digestive system of cattle allows them to process grass and other plant sources of protein our human digestive systems cannot process, and turn it into a high quality source protein we can enjoy.

Farmers and ranchers have been raising cattle on grass in the U.S. for more than 200 years. In the mid-1800s ranchers would herd cattle thousands of miles on cattle drives from southern states such as Texas and New Mexico to railheads in Kansas to be shipped by train to stockyards in Chicago. An estimated 20 million cattle made this journey from 1866 to 1886, about one million per year.¹ During these drives, cattle would travel 15 to as much 25 miles a day for up to two months. If moved too fast they would lose so much weight they'd be hard to sell at the end of the journey. Along the way they were given times to rest and graze on native grasslands which once nourished large herds of bison. These native grasslands still exist in many areas where cattle are raised today and serve the same purpose as they did so many years ago.

Of course, things have changed a lot since the 1800s. After President Lincoln signed the Homestead Act of 1862, settlers began pushing west and once open range became private land. Between 1862 and 1934, the federal government granted 1.6 million homesteads and distributed 270,000,000 acres—or 420,000 square miles—of federal land for private ownership. This was a total of 10 percent of all land in the United States.² The privatization of land and expansion of railways across the country signaled the end to long cattle drives. Eventually, packing plants were built closer to the major ranching areas and, in the 1950s and 60s, improvements in grain yields led to the advent of modern feedyards, significantly changing the way beef travels from pasture to plate.

But the fact remains that nearly all cattle are still born and raised on grass, an important point to share with consumers who may think cattle are either exclusively grass-fed or grain-fed.

SECTION 1 – WHERE IT ALL BEGINS

The beef production lifecycle starts on cow-calf farms and ranches where calves are born and raised on their mother's milk and grazing on grass. According to the U.S. Department of Agriculture, there are approximately 619,000 beef cattle farming and ranching operations in the United States. Ninety-seven percent of these cattle farms and ranches are family owned and operated. These are the farms and ranches people may see when they are taking a drive in the country and see cattle standing out in a field and say, "Hey kids, look at all the cows!" Of course, as you know, they're not all "cows." In fact, when talking about what happens on a cow-calf farm or ranch, you may want to start by explaining the difference between bulls (intact males), cows (females

¹ http://en.wikipedia.org/wiki/Cattle_drives_in_the_United_States

² http://en.wikipedia.org/wiki/Homestead_Acts

who have given birth), heifers (young females) and steers (castrated males). This is a non-threatening way to ease into the conversation!

The busiest time of year for every cow-calf operation is calving season, the time of the year when baby calves are born. Bovines have a nine-month gestation period similar to humans. If all goes right, a cow will give birth to a calf every year, help raise the calf, get pregnant three months later and have another calf the following year. Cattle farmers and ranchers typically time this process so all of the cows in their herd give birth within several weeks of each other. This is calving season. Calving season varies depending on many factors: farm size, location, marketing considerations, off farm responsibilities; all of these factors contribute to when a producer may choose to time calving.

Many cattle farmers and ranchers choose to set up their calving season for early winter or spring, during the months of January – April. These producers may follow this schedule because they are planting corn or harvesting winter wheat in late spring. This does present challenges in the form of snow and other harsh winter weather; however, farm and ranch families often have to juggle multiple chores during each season so offsetting calving time during slower farming (or crop-growing) phases can be beneficial.

On the other hand, some producers prefer to calve in the fall, when the weather may be milder and therefore easier on the cow and calf. Of course there are risks associated with fall calving as well. Heat stress can cause cows to calve prematurely in late summer and early winter storms can wreak havoc on cows that are still in summer pastures.

Regardless of when calving season occurs, all farmers and ranchers go above and beyond to ensure proper care for cows and their calves. Calving requires putting in several hours per day checking heifers, or females that have not yet given birth, and cows, females that have offspring, and caring for newborn calves. Once a calf is born, the rancher needs to check its health, assign it an identification number and ensure that it can stand and suckle its mother's milk. Calves need colostrum, which is chock full of invaluable antibodies and nutrients, within the first 24 hours to boost their immunity and prepare them for a healthy life.

Sometimes calving season occurs during snow and other inclement weather. When this happens, farmers and ranchers will often sort cows that are expected to calve soon into a barn that is closer to the main homestead or into a pen and shelter that is set up in the pasture. This allows them to keep newborn calves out of snow and wind that can jeopardize their health in the early stages of life.

After entering the world and receiving individual care to get started on the right hoof, baby calves spend the next several months of their lives drinking milk and transitioning to grazing on grass alongside their mothers and other calves until they are weaned.

Weaning is the natural removal of a suckling calf from its mother. As with other facets of beef production, weaning can be performed in a variety of ways. Some of the more popular methods are fence line weaning and complete separation.

Fence line weaning consists of moving cows to the opposite side of a strong fence, while leaving calves in the original pasture. During the first few days after weaning, calves and cows will have some nose-to-nose contact and may bawl to communicate with each other. However, after the first five days, fence line visits will gradually decrease, as will bawling.

Similarly, complete weaning consists of moving the cows to a new location out of sight and sound from the calves. The calves will stay in their original surrounding and will bawl for several days. However, eventually they will cease their vocalization and adjust to their new way of life.

Producers will wean calves off their mothers anywhere between 4 and 8 months of age, however, it is preferential to wean at an older age to provide the calf with the full benefit of its mother's care. However, some situations could require weaning at an earlier age. For example, during a drought, farmers and ranchers may choose to wean their calves earlier in order to preserve forage reserves. Calves may also be weaned off their mother at an earlier age if the cow is not able to stand up to the demands of milking to an older weaning age.

Since calves are processed and treated prior to weaning, the remainder of their days on the cow calf farm or ranch is spent grazing in pastures. Approximately 45 days after weaning, calves are gathered and transported to a stocker or backgrounder larger pastures to spend more time grazing on grass and growing before being sent to the feedyard.

SECTION 2 – ANIMAL CARE ON THE FARM

An overwhelming majority of consumers—95 percent—say they support raising animals to produce meat IF they can be assured every animal will be well-cared for. However, when they see videos of animal mistreatment posted online they may question whether farmers and ranchers truly do care about their animals. It is important to not dismiss this concern, but acknowledge that while these incidents are rare examples, we share their expectation that every animal be treated properly and work hard to ensure that happens through programs like Beef Quality Assurance (BQA).

Good animal care begins on the farm or ranch where the calf is born. During a calf's time on the farm, cattle farmers and ranchers will implement common animal health practices that were developed by veterinarians and other animal science experts for proper cattle herd and health management. One of the first animal health procedures done on cow-calf farms and ranches is castrating the male, or bull, calves. Many consumers may wonder why this is necessary. There are two primary reasons for castration: to control behavior and improve the tenderness of meat.

Intact bull calves can be very aggressive and may hurt other animals or people working with them. Castration reduces the production of testosterone thereby limiting their aggressive behavior. Testosterone also produces stronger muscle tissues, resulting in tougher meat. Castrated bull calves, also called steers, produce more tender beef. For these reasons, all male bull calves are castrated unless they are going to be kept in the herd for breeding purposes.

There are multiple methods of castration, including surgical removal of the testes and banding of the scrotum with rubber bands, cutting off the blood flow. While castration may be temporarily painful or stressful to the calf, producers are able to mitigate the pain or stress by castrating at an earlier age. Animal care experts believe the earlier the age of castration, the less pain and stress a calf experiences.

According to Beef Quality Assurance guidelines, where practical, cattle should be castrated before the age of three months, or at the first available handling opportunity beyond this age. The use of method(s) that promote the well-being and comfort of cattle should be encouraged. It is recommended that all animals not used for breeding purposes be castrated and allowed to heal before ever leaving their farm of origin. Cattle farmers and ranchers may seek guidance from a veterinarian on the availability and advisability of analgesia or anesthesia of beef cattle, particularly in older animals. Many cattle farmers and ranchers will also brand and dehorn their calves at the same time they perform castration. Unlike castration, both male and female calves may be branded and dehorned. Yes, that's right, both male and female calves can grow horns (many people unfamiliar with cattle think only bulls have horns). However, the majority of beef cattle raised in the United States today are "polled," which means that the cattle are genetically bred to be born without horns. For example, the Angus cattle breed, which is very popular in the United States, has the gene that causes them naturally to be born without horns.

There are some breeds of cattle in the United States born with horns. Dehorning typically is conducted within the first few weeks of a calf's life and is recommended no later than at 120 days of age, or before the animal weighs 500 pounds. For a cow with slightly more "developed" horns, cattlemen work with veterinarians and follow Beef Quality Assurance practices that work to ensure the comfort and safety of an animal through local anesthesia and analgesia.

Branding can be done in one of two ways—freeze branding and hot iron branding. Branding is another important component of herd management. Branding not only allows ranchers and farmers to differentiate their animals from their neighbors, it can also identify each individual animal for record-keeping purposes. Unique brands for each farm or ranch allow for Mr. Smith to find his cattle on Mr. Jones' property and help protect both Mr. Smith and Mr. Jones from cattle thieves.

Dehorning at a young age involves removing the horn "buds" – or small amount of horn growth – with a tool that looks like a melon scoop. Removing the horns is another way of preventing the animals from hurting each other or the people around them.

Branding, castration and dehorning have been accepted and effective herd management practices for more than 200 years. Branding time is generally a community affair—neighbors will assist each other with the process which can

sometimes take several days, especially if there are hundreds of calves to brand and treat. Calves will be separated from the cows and laid on their side by one or two cowhands, while another will place the branding iron on the hide; usually the hip. Yet another may be simultaneously removing the horns and testicles. In a matter of seconds the procedure is over and the calf returns to its mother and exhibits normal behavior in a matter of minutes.

The cow-calf stage in the lifecycle is also an important time to prevent or treat diseases and respiratory illnesses, which are major contributors to cattle death on farms and ranches. Just like in humans, the mother's milk provides much needed colostrum to build immunity in their calf. Cattle farmers and ranchers also work with their veterinarian to establish an optimal herd health program which typically includes vaccinations to calves to protect them from common diseases. Just like vaccination in human medicine, cattle are given vaccinations to boost their immunity against debilitating disease and illness. One shot as a calf can help an animal live a healthy life.

When vaccinations are administered, careful attention must be paid to how and where the injection is given. The Beef Quality Assurance program provides guidance for injection procedures based off of the type of vaccination and the mode of action. For example, injections should never be given in the hip or thigh, regardless of the age of the animal – injecting into these areas could damage the sirloin or round cuts of meat. The Beef Quality Assurance program also provides guidance for administering antibiotics if an animal becomes sick.

If an animal gets sick, the farmer or rancher will work with their veterinarian to diagnose and treat the illness with the judicious use of antibiotics. Some of the most common uses of antibiotics in beef production are for respiratory issues such as bovine respiratory disease, which is also called shipping fever or bronchial pneumonia.

Anti-animal agriculture activists commonly distort antibiotic use figures to sway consumers against the use of antibiotics in the safe production of beef, claiming that 70 percent of all antibiotic use in the U.S. is in livestock. However, the Animal Health Institute points out “35 percent of the use attributed to animals are compounds not used in human medicine, thus having no potential for reducing the effectiveness of antibiotics used to treat human disease.” Furthermore, comparing animal antibiotic use to human antibiotic use is a misleading comparison. While the number may seem large it may help to point out that it takes a larger dose of antibiotics to treat a 1,200 pound animal than a 120 pound person, the same way an adult needs a higher dose than a child. The key is to put animal health antibiotic use in context and talk about how and why we use antibiotics responsibly as part of a total animal health regimen. We believe treating a sick animal with antibiotics is the right thing to do and, in some cases, treatment may help prevent illnesses before they occur may help reduce overall antibiotic use.

The animal agriculture community is also working with the Food and Drug Administration (FDA) to voluntarily phase out certain uses of antibiotics including antibiotics that are most important to human health. For example, the most commonly

used antibiotic class in human medicine, penicillin, is the fourth most used in animal agriculture, and at a significantly smaller occurrence of use/level of use. Conversely, the most commonly used class of antibiotics in animal agriculture, tetracyclines, is the least used antibiotic in human medicine. Building upon that, the second most commonly used class of antibiotics in animal agriculture, ionophores, are not used in human medicine at all.

When antibiotics that are medically important to humans must be used, cattle farmers and ranchers work closely with their veterinarians to determine when to use them. It's important for consumers to know that these antibiotics are used only under extremely important circumstances and are used very judiciously to ensure these valuable tools remain effective for both human and animal health.

Another critical component of responsible antibiotic use and administration are withdrawal times. While you may understand and appreciate that a beef animal cannot be sent to slaughter before the withdrawal time from an antibiotic has expired, many consumers are unaware of this safeguard to prevent antibiotic residues in meat. In addition, the Food and Drug Administration routinely tests for antibiotic residues and has zero tolerance for residue violations.

By sharing this valuable information with consumers, the beef community can build trust and assure beef buyers that farmers and ranchers are taking extreme precaution while maintaining herd health for the betterment of the cattle and the end product. The bottom-line is that raising healthy animals is the first step in producing safe, wholesome and nutritious beef.

SECTION 3 – BEEF NUTRITION

Americans love beef but they also may have heard that beef is high in saturated fat so they should limit the amount of beef they eat. In addition, the *Dietary Guidelines for Americans*, 2010, and MyPlate encourage people to “go lean with protein” – further promoting the role of lean meat in a healthful diet.^{3,4} Did you know that today's beef is leaner than the beef we raised 30-40 years ago?

Today's leaner beef offers consumers the flavor they crave and the wholesome, nutritious food they seek all in one delicious package. Supplying consumers with leaner beef that simultaneously delivers on nutrition, flavor, safety and convenience is the result of a successful collaboration spanning at least four decades. This “gate-to-plate” effort involves the entire beef supply chain, beginning with America's cattle farmers and ranchers raising leaner animals.

Beef nutrition begins on the farm with genetic selection in order to produce leaner beef for consumers. As members of the beef community, you probably know that some breed genetics contribute to more tender steak while other breeds of cattle are known for qualities such as calving ease, mobility or producing more muscle mass. But many consumers may not know that farmers and ranchers spend significant time and

³<http://www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf>

⁴<http://www.choosemyplate.gov/dietary-guidelines.html>

resources ensuring that the genetics they select for their herd improve the overall leanness and quality of the beef they are serving to America's consumers.

As we discussed previously, almost all cattle are raised on grass and finished on grain while some cattle may be grass-finished. When it comes to nutrition, the primary difference is the fat content and fatty acid profile, specifically omega-3 fatty acid. Omega-3 fatty acids make up 1% and 4% of the fatty acid profile in grain-finished and grass-finished beef, respectively.⁵ However, since beef is not a primary source of omega-3 fatty acids, the difference is not generally recognized as preferential, or enough to have an impact on human health. The American Heart Association does not list beef as a good source of omega-3 and instead recommends fatty fish, such as salmon, as a primary source.

While grass-finished beef tends to be slightly leaner, leanness is better determined by grade and choosing the right cut than the way the animal was raised. According to the USDA, a serving of beef qualifies as "lean" if it contains 4.5 grams or less of saturated fat, less than 10 grams of total fat and less than 95 mg of cholesterol per 100 grams (3.5 ounces). Whether they are grass- or grain-finished, there are more than 29 cuts of beef that meet the government guidelines for "lean" including many consumer favorites such as tenderloin, strip steak and 95% lean ground beef.

All types of beef, regardless of the way it is finished, is a good source of four essential nutrients and vitamins, providing more than 10 percent of the daily recommended value, and an excellent source of six nutrients and vitamins, providing more than 20 percent of the recommended daily value, and can be part of a nutritious and balanced diet. We will review those nutrients and their importance to human health in the final course: Beef. It's What's for Dinner.

SECTION 4 – SUSTAINABILITY

In addition to health and nutrition, another issue on the minds of many consumers is sustainability. Consumers want to know that the food they are purchasing was produced in a manner that will leave Earth's precious resources intact for future generations. It is important to let consumers know that people in the beef community share this goal but for us, sustainability is not just about the environment, it also entails social and economic factors. Farmers and ranchers must consider all of these facets when producing safe, nutritious beef for a growing consumer base.

Ensuring a sustainable food supply is undoubtedly one of the greatest societal challenges. By 2050, 70 percent more food will be required to feed the growing population and all agriculture production will be needed to meet the increasing demand. The beef community recognizes the important role it plays in contributing to more sustainable food and has committed to a journey toward more sustainable beef. The beef industry defines sustainable beef as meeting growing global demand by balancing environmental responsibility, economic opportunity and social diligence throughout the supply chain.

⁵ Daley CA, et al. A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef. Nutrition Journal 2010;9-10.

From 2005 to 2011, the overall sustainability of beef improved 5 percent, and the environmental and social sustainability of beef improved 7 percent. All segments of the beef value chain are responsible for these improvements. Specific to the segments of the beef industry where cattle are raised on grass, beef farmers and ranchers have improved crop yields, animal performance, reproductive efficiency and animal nutrition, and have reduced water, fertilizer and fossil fuel use. Additionally, beef farmers and ranchers go to great lengths to be good stewards of the environment, no matter which production method they follow. In fact, 85 percent of all beef farmers and ranchers, regardless of the type of beef they produce, say environmental conservation is important to their success. This is a testament to the process of raising cattle on grass and utilizing resources to produce a safe, healthy and environmentally conscious product. Furthermore, today, the average beef farmer and rancher has 13 practices in place to accomplish environmental and social improvement goals such as soil nutrient management programs, rotational grazing and monitoring, managing wildlife habitat, and improving animal care and handling.

Environmental efforts by cattle farmers and ranchers help manage and protect more than 500 million acres of permanent grassland and a variety of wildlife and endangered species. Farms and ranches provide habitat for 75 percent of America's wildlife. Cattle grazing also provides a number of ecosystem services such as improvement in water quality that aids in providing clean drinking water to humans and the uptake of carbon from the atmosphere to help offset carbon emissions.

Another important aspect of cattle grazing is the use of land resources that are not suitable for crop production to produce food. To feed a growing world, food production systems must be matched to available resources that improve land production efficiency. A large portion of livestock grazing takes place in the western United States, where the land is not always suitable for growing crops and many cattle graze on public lands. Livestock grazing represents the earliest use of public lands, leading our nation's expansion westward. Public lands ranching was organized in 1934 with the Taylor Grazing Act which gave grazing preference to ranchers who were already established and making beneficial use of the forage and water on a given range.

There are many environmental benefits to public lands grazing which consumers may not be aware of; for example: well-managed grazing help prevent the invasion of noxious weeds, decreases the risk of catastrophic wildfire and encourages robust forage growth and healthy root systems.

Currently there are more than 22,000 public lands ranchers who own nearly 120 million acres and manage more than 250 million acres of public land. These ranchlands constitute a large portion of wildlife and riparian areas in the western United States.

SECTION 5 – SAFETY

Throughout the beef lifecycle farmers and ranchers take precautions to guarantee safety for themselves and their cattle. During a beef animal's time on the farm or ranch, it may undergo many animal health and herd management practices to aid in the production of safe, nutritious beef. These procedures are carried out with the safety of the animal in mind and farmers and ranchers partake in training to ensure the best possible management practices. Healthy cattle are critical to producing safe beef and

the beef community has long had a commitment to producing safe beef across all sectors of the beef lifecycle, starting with cow/calf farms and ranches.

Since the beginning of livestock production, animal husbandry has involved caring for animals in the way best for the animal and the farmer or rancher. Today's principle-based animal husbandry must also incorporate best practices to achieve beef farmers' and ranchers' mission of feeding an enormous number of people worldwide by providing safe and wholesome beef. These guiding principles are common knowledge within the beef community but some consumers may not realize the lengths that beef farmers and ranchers go to in order to keep their cattle comfortable and cared for – such measures as:

- Clean feed (free from fecal contamination);
- Clean water (free from fecal contamination);
- Appropriately drained and maintained environments; and
- Relative freedom from pests, such as biting insects,

help keep cattle healthy and progressing through the beef lifecycle.

SECTION 6 – SUMMARY

Consumers seek to know where their food comes from, which is a reasonable expectation. In talking about how beef gets from the pasture to their plate it is important to explain that most cattle are raised on a combination of both grass and grain in the U.S. In fact, for as long as cattle have been raised for beef in this country farmers and ranchers have supplemented cattle diets with grain.

Raising cattle on grass is one of the most natural farming and ranching production practices; all cattle spend a significant portion of their lives grazing from pastures and native grasslands across the nation. These same grasslands and pastures, which allow the efficient conversion of inedible plant species to high-quality protein for American consumers, also provide a home and habitat to 75% of the nation's wildlife. Furthermore, because 85 percent of U.S. grazing lands are unsuitable for growing crops, raising cattle on grasslands allows farmers and ranchers to more than double the amount of land that can be used to raise food.

The beef production lifecycle starts on cow-calf farms and ranches where calves are born and raised on their mother's milk and grazing on grass. According to the U.S. Department of Agriculture, there are approximately 619,000 beef cattle farming and ranching operations in the United States. 97 percent of these cattle farms and ranches are family owned and operated.

On the cow-calf farm or ranch, calves are born and raised on grass and their mother's milk for anywhere between 4 to 8 months before being weaned from their mothers and either sent to other pastures to graze or on to a feedyard to be finished on grain.

Good animal care begins on the farm or ranch where the calf is born. During a calf's time on the farm, cattle farmers and ranchers will implement common animal health practices that were developed by veterinarians and other animal science experts for proper cattle herd and health management.

Beef farmers and ranchers also employ programs such as Beef Quality Assurance to provide them with training in proper animal handling, castration methods and pain control, recording keeping and the administration of vaccinations and antibiotics. These procedures are industry approved and scientifically proven to be safe for the animal and the farmer or rancher in order to maintain high-quality herd health.

Consumers want to know that farmers and ranchers are using antibiotics judiciously and are not endangering the beef supply by irresponsibly treating cattle without safeguards. By adhering to strict guidelines and procedures, such as withdrawal times and proper record keeping, farmers and ranchers can assure consumers that they are doing the right thing to produce safe, nutritious beef.

Nutritious, lean beef starts on the farm with genetic selection. Farmers and ranchers devote significant time and resources to selecting the best genetics for their herd based on their production cycle and their herd management goals. A farmer or rancher who raises grass-finished beef raises a herd with different genetic factors than a farmer or rancher who produces grain-finished beef.

Both grass-finished beef and grain-finished beef provide consumers with more than 10 percent of 10 essential nutrients including zinc, iron, protein and B vitamins. Both grain-finished and grass-finished beef can meet the government guidelines for lean. Leanness is better determined by the grade and the specific cut than the production method.

Farmers and ranchers are just as concerned about sustainability as consumers and go to great efforts to ensure that they are implementing procedures and producing beef in a way that is socially, economically and environmentally sustainable. Environmental efforts by cattle farmers and ranchers help manage and protect more than 500 million acres of permanent grassland and a variety of wildlife and endangered species. More than 85 percent of the land where cattle are grazed in the U.S. is not suitable for crop production either due to soil type, rainfall, topography or other factors. The best use of this land is to allow animals to graze it.

Finally, all consumers, including farmers and ranchers, want to know that their food is safe and healthy and that it was produced with the welfare of the animal in mind. Healthy cattle are critical to producing safe beef for consumers and farmers and ranchers ensure healthy cattle by providing proper care and a safe environment during their time on the farm or ranch. Clean feed and water, freedom from pests and protection from predators are all components of raising healthy cattle.



Masters of Beef Advocacy 2.0

Lesson 3: Life in the Feedyard

INTRO

Welcome to Course Three: Life in the Feedyard. As we discussed in the previous course, Raising Cattle on Grass, many consumers today have very little understanding of how beef gets from the pasture to their plate and they want to know more. That's why it is important to discuss the various stages in the beef lifecycle and remind them nearly all beef cattle in the United States are raised on grass pasture and finished in a feedyard on a combination of grasses, grains and other feed cattle can utilize due to their unique digestive system. The combination of raising cattle on grass and finishing them on grain allows us to produce a year-round supply of beef at an affordable price with less land, water, feed and fuel.

Unfortunately, according to research conducted by the beef checkoff, many consumers may associate feedyards with negative perceptions of "factory farming" perpetuated by animal rights activists -- animals "crammed" together, "wallowing in their own manure," and being "force fed" corn and "pumped full" of hormones and antibiotics. However, we in the beef community know that feedyard owners and employees go to great lengths to provide ample space to roam and grow, high-quality health care and optimal nutrition to cattle during their life in the feedyard.

Understandably, consumers have questions about feedyards. Many have never seen a feedyard in person and we probably haven't done a very good job explaining the important role they play in the beef community, buying cattle from large and small family farmers and ranchers around the country and supplying packers and processors with the consistent supply of animals of similar age and quality they need to provide a year-round supply of fresh beef to restaurants and grocery stores. Frankly, most consumers today aren't old enough to remember a time when this wasn't always the case. So let's go back to the beginning and examine why feedyards were developed in the first place.

SECTION 1 – HISTORY OF FEEDYARDS

The development of cattle feedyards is an important story to share with consumers who want to know more about where their beef comes from. As cattle farmers and ranchers, you are passionate about your animals and your way of life and are engaged with consumers who want to learn more about the beef community and the beef lifecycle. According to an industry historian⁶ cattle were first brought to the United States on the second voyage of Columbus in 1493 and for the first 400 years the relatively small numbers of cattle were raised solely on pasture, primarily for milk and draft purposes. The earliest mention of corn feeding and cattle "fattening" in historical documents

⁶[Development of a corn-based beef industry](#), L.R. Corah, Certified Angus Beef LLC, Wooster, OH 44691

appeared in the late 1800s around the time of the arrival of British breeds, which were better suited to grain fattening than the Spanish breeds brought over by Columbus.

Prior to the Civil War, cattle had begun to move in large numbers into Texas and states west of the Mississippi, including California. The center of the U.S. cattle and beef industry migrated westward from western Kentucky in 1860 to Kansas by the late 1890s. With the western migration of the cattle industry in the 1800s, the number of total U.S. cattle and calves more than doubled by 1900⁷.

This was the start of the agriculture industrial revolution. As ranchers were learning how to more efficiently raise cattle, technology was improving in another area of agriculture production: crop farming. Crop yields were exploding and farmers and ranchers had plentiful corn and grains but pondered what to do with their hard-earned yields. In the early 1900s, buoyed by the success of hybrid corn varieties and improved irrigation techniques, Corn Belt farmer feeders began buying calves and yearlings in the fall and “wintering” them on corn silage for 220 to 280 days. By 1940 cattle feeding pioneers William Monfort and William H. Farr were feeding cattle in Colorado and in 1951 Earl Brookover of Kansas brought the first commercial cattle feeding operation to the High Plains.

Cattle farmers and ranchers were learning how to raise more cattle using the resources that were readily available to them locally, rather than trekking thousands of miles to a railroad in order to finish and sell just one herd. It was suddenly possible to feed large numbers of cattle in one location and so, to cut transportation costs, grain farm and feedyard locations merged.

But the first large-scale commercial cattle feeding operations have their origins in the Imperial Valley of California, where carrot farmers first brought in cattle in large numbers to dispose of the carrot tops that were left over after carrots were processed and sent to markets and dry goods stores. This practice continues today with the feeding of leftover material from potato production in the Pacific Northwest, sugar beets in the upper Midwest, and distiller’s and brewer’s grains remaining from ethanol and alcohol production around the country. There are many more examples of locally-available “co-products” of other food production that can be utilized as cattle feed.

Soon, meat packers followed the path of feedyards and moved closer to the cattle. Cattle were no longer sent from all across the southern states by rail to places like Chicago, where large slaughter houses were located. It made more sense to move the slaughterhouses closer to where the animals. It was much easier to ship sides of beef to butchers in the cities than to ship live, fully grown animals.

Feedyards are an exciting conglomeration of sciences – water conservation technology, agronomy, biology, engineering, nutrition, psychology, physiology – that are constantly being tweaked to find the perfect balance to produce safe, nutritious beef while

⁷ <http://afccerc.tamu.edu/publications/Publication-PDFs/CM%201-00%20The%20U.%20S.%20Cattle%20and%20Beef%20Industry%20and%20the%20Environment.pdf>

conserving natural resources and keeping the best interest of the animal top of mind. Feedyards employ numerous professionals in their fields – veterinarians, nutritionists, managers, cowboys – who want to provide a comfortable life for cattle while producing a high-quality product for the consumer.

In the remainder of this course we'll examine some of the intricacies of raising cattle in a feedyard and learn how to answer questions from consumers about a beef animal's life in the feedyard.

SECTION 2 – ANIMAL CARE

Feedyards are often a hot topic of conversation among animal rights organizations and modern agriculture critics. Not surprisingly, consumers want to know that cattle in feedyards are being cared for properly, are being given high-quality nutrition and are being treated humanely. The good news is that as members of the beef community, and beef consumers, you care about the quality of care that cattle receive in a feedyard as much as anyone!

There are many common misperceptions about the care of cattle in feedyards. Some of the concern comes from cattle being housed in pens that may appear to “crowd” the cattle. Cattle that live in feedyards have ample room to walk, run, play and lie down. In fact, much of the “crowding” that is noticed in feedyards actually comes from the animals natural herding instincts. Cattle like to be in groups and will often all stand or lie together in a pen. The truth is most feedyards provide an average of 125-250 square feet of pen space per animal. When consumers attend feedyard tours, they often are surprised at how spacious a feedyard actually is and many times will share their sentiment with others. These interactions are what you, as members of the beef community, should be striving to provide for consumers who want to learn more about cattle in feedyards.

Feedyards owners and employees, like cow/calf farmers and ranchers, deeply care about the welfare of cattle in the feedyards and are continually working to improve the welfare of every animal housed in the yard. In fact, many of them grew up on farms and ranches caring for livestock. Many feedyard owners require employees to complete low-stress animal handling training or complete the beef checkoff funded Beef Quality Assurance (BQA) program so that all employees who come in contact with cattle are practicing low-stress management and are ensuring a healthy environment for the cattle.

In addition to feedyard employees undergoing training, many semi-truck drivers who pick-up and deliver cattle to and from the yard have completed Trucking Quality Assurance (TQA), which is a program designed to provide training in the areas of biosecurity, animal handling, unloading and loading cattle, weather and truck and trailer maintenance. BQA and TQA are prime examples of the beef community's commitment to supreme animal care at all stages of the beef lifecycle.

Another common concern about cattle that are housed in feedyards is their health and the subsequent use of antibiotics and growth hormones. Cattle in feedyards are monitored constantly by trained personnel for potential health and wellness concerns. Professional cowboys called pen riders will survey the cattle pens daily to spot sick animals. When an animal is sick, they are removed from their pen, taken to the feedyard hospital area and properly

treated under the care of the attending feedyard veterinarian. Those animals remain in a special sick pen until they are deemed healthy enough to return to the herd. It's important to share with consumers that just as with humans, mass treating cattle with antibiotics is not the proper way to medicate. Treating each animal individually ensures that animal health is at the forefront of the feedyard's goals and keeps overhead costs down.

Growth hormones, primarily estrogen, are used in feedyard animals to replace natural hormones that are absent from the animal due to castration. As we discussed in "Raising Cattle on Grass," intact bulls are much more aggressive and dangerous to people and other cattle than steers. This is particularly true when they are placed together in feedyard pens. Castration reduces the aggressiveness but also reduces their natural levels of testosterone as well, which decreases their urge to fight with each other. Small levels of FDA-approved growth hormones are therefore administered to replace the natural hormones and promote increased growth, which contributes to producing more beef using fewer natural resources.

Often consumers hear that cattle are "pumped full" of hormones but the reality is a very small amount of hormone is delivered through a small implant placed under the skin behind the ear of the animal. This, in turn, stimulates the animal's own natural hormone production. More important, the level of hormones in a steak from an animal that was given a growth hormone implant is not much higher than a non-implanted animal, about 1.9 nanograms versus 1.7 nanograms, on average. The average difference, .2 nanograms per pound, is less than the natural fluctuation of hormones in the animal. In other words, it is entirely possible that the meat from an animal that was never given a growth hormone could have higher levels of estrogen than the meat from an animal that was, based on the day, or even hour, it was processed.

Consumers want to know that farmers and ranchers are being diligent in regards to safeguarding both human and animal health and well-being. When speaking to consumers about growth promotants and antibiotics, you can assure them that farmers and ranchers play special attention to withdrawal times for every growth promotant or antibiotic that is administered to an animal. Withdrawal times allow the animal's body to metabolize growth promotants and antibiotics prior to harvest to ensure residues do not exceed safe limits. The FDA requires a withdrawal period between when an animal is treated and when it can go to slaughter and these withdrawal times are strictly followed and enforced by regular testing and inspection by FSIS inspectors during slaughter and processing. In fact, the Federal Meat Inspection Act has mandated that the FSIS test for residues of growth promoting products at slaughter since 1967.

Of course, everything that grows contains hormones so ALL animal and plant foods contain hormones. The only "food" we consume that does not contain hormones is salt, a mineral. In fact, many foods that consumers enjoy including many plant foods such as cabbage and soybeans, contain significantly more estrogen than beef. One pound of soybean oil can contain as much as 900,000 nanograms of estrogen, or 450,000 times more than a pound of beef, whether or not the animal received an implant. The important takeaway for consumers is that all beef, whether or not the animal received a growth hormone, can be part of a healthy diet.

SECTION 3 – BEEF NUTRITION

As we discussed earlier, beef cattle, like other [ruminants](#), possess a digestive system that includes a multi-compartment stomach that can digest fibrous materials such as grass, corn stalks, cottonseeds, alfalfa and grass hays, etc. Bacteria and protozoa that reside in cattle's stomach make it possible to release nutrients from fibrous feeds that can be utilized by ruminant animals, but not humans. Unlike most other animals, cattle can consume coproduct feeds like corn gluten, distiller's grains, brewer's grains, potato chips, soybean hulls, citrus pulp and other products that are considered waste products.⁸

Some of the feedstuffs that cattle consume in feedyards are genetically modified organisms or GMOs, also called bioengineered foods. These feeds may include corn, soybeans, canola, alfalfa and cotton. You may encounter consumers who have concerns about the safety of feeding bioengineered crops to cattle and how those feeds may affect both their own health and the cattle's health as well. Rightfully so, consumers want to know that the foods they are consuming and feeding their families are healthy and safe for consumption. The good news is that there are a multitude of studies that have shown no harm to either animals who have consumed bioengineered feeds or humans who have consumed food products from those animals. In fact, a study conducted by researchers from the University of California, Davis reported that the performance and health of food-producing animals consuming GMO feeds is comparable to that of animals consuming non-GMO feed.⁹ The study, which examined nearly 30 years of livestock-feeding studies, and represented more than 100 billion animals, is a comprehensive source of information providing evidence that GMO fed-animals do not pose a health hazard to humans.

As for human health, governmental regulatory agencies, scientific organizations and leading health associations—including the World Health Organization, the American Medical Association, the U.S. National Academy of Sciences, and the British Royal Society—have examined the evidence and all come to the same conclusion: consuming foods containing ingredients derived from bioengineered crops is safe to eat and no riskier than consuming the same foods containing ingredients from crop plants modified by conventional plant breeding. In the United States the Food and Drug Administration regulates the safety of foods and food products from plant sources, including food from genetically engineered plants, and foods from genetically engineered plants must meet the same FDA requirements, including safety requirements, as foods from traditionally bred plants.

Cattle in feedyards are fed a formulated ration consisting of grains, roughage and vitamins and minerals. A variety of feed ingredients are used to help optimize cattle nutrient intake and maintain their natural muscle building ability, leading to leaner muscle composition instead of fat. While housed in the feedyard, cattle are fed rations that are formulated by an animal nutritionist whose sole responsibility is to ensure the animal is receiving all of the necessary nutrients.

⁸ <http://www.epa.gov/oecaagct/ag101/printbeef.html#cycle>

⁹ https://asas.org/docs/default-source/jas-files/jas8124_final.pdf?sfvrsn=4

When cattle arrive in the feedyard, they are fed a receiving diet that is very high in forages, which helps the cattle's stomach transition from a primarily grass diet to a diet that contains higher grain content. Following the receiving diet, cattle will gradually be stepped up to a higher concentration of grain and other feedstuffs such as corn, distiller's grains, barley, soybean hulls and other concentrates. Similar to how a child's diet changes as they grow from toddler to teenager, this diet provides higher energy levels cattle need to keep growing at this stage of their lives.

The transition to the final diet usually takes place over three to five steps and may involve increasing the number of times per day cattle are fed. During feeding times, the feedyard crew will deliver premixed rations containing the various forages and grains to the feedbunk so that the cattle can eat at freewill. Feedyard owners allow a certain amount of bunkspace per animal so that every animal has access to feed at their own free choice. Like high school students in the cafeteria, cattle are creatures of habit and will often eat at the same spot at the bunk every day.

A typical finishing diet may include high percentages of grains which serve a critical role in the development of nutritious beef. A higher concentrate diet enables cattle to convert feed into pounds of muscle and develops a high level of marbling. It's commonly known that corn is a good source of energy and carbohydrates for cattle but why do we include these other feed ingredients in their ration? Well, soybean meal is very high in protein which is essential for muscle development. Cottonseed hulls, which are most often used in the southern United States, are high fiber and high in energy. Barley is yet another good source for energy and carbohydrates. Don't forget to share with consumers that while cattle may consume larger amounts of grain in the later stages of finishing, they are still receiving several pounds per day of forages such as grass hay, silage or alfalfa; all of which provide ample amounts of roughage in the diet.

Many consumers may be surprised to learn about the four compartment stomach in cattle and how the stomachs work together to digest complex starches like corn and a variety of forages. The rumen, as it turns out, does not process corn and starches all that differently from humans. The microbes extract the energy from the starches and convert them into volatile fatty acids which are then absorbed into the small intestine, just like humans absorb energy.

The other three stomachs, the reticulum, omasum and abomasum, all serve their own purposes as well. You can describe the reticulum as a sort of catch-all for foreign objects and as a site for regurgitation and rumination, also known as "chewing the cud." The reticulum has the appearance of a honeycomb and it's not uncommon for objects such as buttons or wire to be found embedded in the stomach wall. Reticulum is also a familiar form of tripe and is considered a delicacy in many countries.

The functions of the omasum are not extensively defined outside of water absorption and filtering of stomach products. However, the abomasum is well-known as the "true stomach" and has an acidic pH that enables it to prepare protein sources for further digestion and absorption in the small intestine, just like humans,

Approximately 95% of all beef raised in the United States is finished in a feedyard. The amount of time required for cattle to reach optimum market weight is shorter in the feedyard than cattle raised exclusively on grass. Cattle in feedyards typically reach market weight around 3-6 months faster. However, some cattle are finished to their market weight solely on grass to produce grass-finished beef. For consumers, that means a variety of beef choices such as grain-finished, grass-finished, natural and certified organic beef. Grain-finished beef is the most widely produced, and consumed, form of beef in the United States however, in countries where grains are not as widely available, such as Australia, grass-finished beef is much more prevalent.

Regardless of feeding regime, research suggests that beef from both grass-fed and grain-finished cattle contributes a wide variety of important nutrients to the U.S. diet and consumption of either can be compatible with efforts to improve the overall diet quality of Americans.

SECTION 4 – SUSTAINABILITY

As mentioned in previous modules, the beef community is committed to a journey toward more sustainable beef. The beef industry defines sustainable beef as meeting growing global demand by balancing environmental responsibility, economic opportunity and social diligence throughout the supply chain.

In research funded by the beef checkoff, the beef industry showed an overall improvement in sustainability by 5 percent from 2005-2011, and the environmental and social sustainability of beef improved 7 percent. While all segments of the beef value chain have contributed to this, specific to the feedyard segment, improvements are due to crop yields, animal performance, animal nutrition, resource use efficiency, responsible use of technology and improved manure management.

Feedyards allow for cattle to reach market weight at an earlier age. In fact, animals that are finished in a feedyard are ready for harvest approximately 6-12 months earlier than cattle that are finished on grass. This is mostly due to the improved nutrition that cattle receive while in the feedyard. From a sustainability perspective, this improvement in growth and performance results in fewer emissions to air and water, less land used and reduced energy consumed per pound of beef produced. Because of the more confined nature of feedyards, they also allow for management of manure by agriculture engineers that reduces leaching and allows for manure to be used to fertilize crops, which lessens fertilizer use. In addition, water and air quality are monitored and managed in compliance with the strict U.S. Environmental Protection Agency regulations that govern concentrated animal feeding operations.

As was mentioned in the animal care section, consumers are concerned about the use of growth hormones and antibiotics in beef production. However, administering antibiotics when an animal is sick is the responsible action to take and its well-known that healthy animals are more efficient than sick animals. Growth hormones are another tool that feedyard owners and employees can use to promote growth which yield more

beef using fewer natural resources, such as water and forage, and therefore contribute to a more sustainable production chain.

According to a 2013 study from the United Nations Food and Agriculture Organization (UNFAO), “Wider adoption of existing best practices and technologies in feeding, health and husbandry, and manure management ... could help the global livestock sector cut its outputs of global warming gases as much as 30 percent by becoming more efficient and reducing energy waste. For ruminants – **cows**, mainly -- the greatest promise involves improving animal and herd efficiency. This includes using better feeds and feeding techniques, which can reduce methane (CH₄) generated during digestion as well as the amount of CH₄ and nitrous oxide (N₂O) released by decomposing manure.”¹⁰

Today’s feedyards are helping continuously improve the sustainability of beef by focusing on the key areas identified by the FAO report: animal health and feed efficiency. According to the report, “Wider use of already-existing best practices and technologies could significantly help sector reduce outputs of global warming gases.”

SECTION 5 – SAFETY

Safety is a concern throughout the beef lifecycle, for beef farmers and ranchers and the cattle they raise. As was mentioned in previous modules, healthy cattle are critical to producing safe beef and the beef community has a long standing commitment to producing safe beef across all sectors of the beef lifecycle.

In the feedyard, the first step is to ensure pens are well-maintained, clean, appropriately drained and free from pests. Rodents and insects can serve as vectors for bacterial and viral conditions, therefore regular maintenance and cleaning of feed bunks, storage bins and feedyard buildings can aid in the prevention of infestations and ultimately, the spread of costly diseases.

Beef safety is a top concern for all members of the beef community, from cow/calf farmers and ranchers, to feedyards, to foodservice operators and consumers. It takes commitment from all sectors of the beef community to produce safe beef, which is why the beef checkoff has invested more than \$35 million in beef safety research and outreach since the early 1990s to continually improve beef’s safety.

However, there is a common misperception that bacteria linked to foodborne illness only occurs at feedyards – this is not true. Some bacteria are harmless and are found in the digestive system of healthy animals, including cattle, whether they are eating grass in the pasture or grain in a feedyard. Bacteria like generic strains of *E. coli* serve an important purpose in the digestive process. However, certain strains of *E. coli* can cause severe illness and can be life-threatening. These types of *E. coli* are called pathogenic (meaning cause illness) and include *E. coli* O157:H7 and other strains. Humans can ingest pathogenic *E. coli* through consumption of leafy green vegetables,

¹⁰ <http://www.fao.org/news/story/en/item/197608/icode/>

swallowing lake water or coming in contact with cattle manure – essentially pathogenic *E. coli* is not isolated to one specific source.

The beef community has invested more than \$35 million in beef safety research and outreach since 1993, when *E. coli* O157:H7 first became a safety concern in ground beef products. Most of this research and other efforts to date have focused on controlling *E. coli* and *Salmonella* in the slaughter process, essentially to prevent bacteria from the intestines or hides of animals from coming into contact with the meat surface. These efforts, in collaboration with other food industries, have contributed to the reduction of *E. coli* O157 illnesses to less than one incidence per 100,000 people across all food products as tracked by the Centers for Disease Control and Prevention.

Building on this success, research efforts have studied pre-harvest interventions, such as vaccines, feed additives/ingredients and management practice changes to reduce the potential for cattle to carry pathogenic bacteria like *E. coli* O157:H7 or *Salmonella*. As more pre-harvest options become available, feedyard owners and operators will work to incorporate the technologies into their operations.

While cleanliness of production areas is not currently proven to directly affect the burden of pathogenic bacteria such as *E. coli* O157:H7 or *Salmonella*, principle-based animal husbandry lays a good and necessary foundation for optimum animal health and welfare. Today's principle-based animal husbandry must also incorporate best practices to achieve beef producers mission of feeding an enormous number of people worldwide by providing safe and wholesome beef. Therefore, principle-based animal husbandry should be included in every feedyard owner or operator's proven best practices involving live animals.

As we discussed in the Raising Cattle on Grass module, there are basic principles of cattle management that help keep cattle healthy and efficiently progressing through the beef lifecycle. As a review, here are those management principles again:

- Clean feed (free from fecal contamination);
- Clean water (free from fecal contamination);
- Appropriately drained and maintained environments; and
- Relative freedom from pests, such as biting insects.

These practices are fundamental to any livestock operation, are grounded in good animal husbandry and should be incorporated as targeted practices to aid in the reduction of bacterial presence.

SECTION 6 – SUMMARY

Feedyards are an exciting conglomeration of sciences – water conservation technology, agronomy, biology, engineering, nutrition, psychology, physiology – that are constantly being tweaked to find the perfect balance to produce safe, nutritious beef while conserving natural resources and keeping the best interest of the animal top of mind. Feedyards employ numerous professionals in their fields – veterinarians, nutritionists,

managers, cowboys – who want to provide a comfortable life for cattle while producing a high-quality product for the consumer.

There are many common misperceptions about the care of cattle in feedyards. Some of the concern comes from cattle being housed in pens that may appear to “crowd” the cattle. Cattle that live in feedyards have ample room to walk, run, play and lie down. In fact, much of the “crowding” that is noticed in feedyards actually comes from the animals natural herding instincts. Cattle like to be in groups and will often all stand or lie together in a pen. The truth is most feedyards provide an average of 125-250 square feet of pen space per animal.

Another common concern about cattle that are housed in feedyards is their health and the subsequent use of antibiotics and growth hormones. Cattle in feedyards are monitored constantly by trained personnel for potential health and wellness concerns. Professional cowboys called pen riders will survey the cattle pens daily to spot sick animals. When an animal is sick, they are removed from their pen, taken to the feedyard hospital area and properly treated under the care of the attending feedyard veterinarian. Those animals remain in a special sick pen until they are deemed healthy enough to return to the herd.

Often consumers hear that cattle are “pumped full” of hormones but the reality is a very small amount of hormone is delivered through a small implant placed under the skin behind the ear of the animal. This, in turn, stimulates the animal’s own natural hormone production. More important, the level of hormones in a steak from an animal that was given a growth hormone implant is not much higher than a non-implanted animal, about 1.9 nanograms versus 1.7 nanograms, on average. The average difference, .2 nanograms per pound, is less than the natural fluctuation of hormones in the animal.

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¹² https://asas.org/docs/default-source/jas-files/jas8124_final.pdf?sfvrsn=4

nearly 30 years of livestock-feeding studies, and represented more than 100 billion animals, is a comprehensive source of information providing evidence that animals fed bioengineered foods do not pose a health hazard to humans.

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methane (CH₄) generated during digestion as well as the amount of CH₄ and nitrous oxide (N₂O) released by decomposing manure.”¹³

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¹³ <http://www.fao.org/news/story/en/item/197608/icode/>



Masters of Beef Advocacy 2.0

Lesson 4: From Cattle to Beef

INTRO

Welcome to Course Four: From Cattle to Beef. As we discussed in the previous course, Life in the Feedyard, many consumers today have very little understanding of how beef gets from the pasture to their plate and they want to know more.

That's why it is important to discuss the various stages in the beef lifecycle, especially the slaughter process. Some consumers may not make the natural association between cattle and beef. However throughout this module you will hear how we can connect with consumers and answer their questions about slaughter whether it is about slaughter facility safety, animal care concerns or how slaughter facilities are continuously improving their environmental footprint.

SECTION 1 – HISTORY OF MEATPACKING IN THE US

When European settlers first brought cattle and hogs to North America they were primarily slaughtered on an “as needed” basis by the farmers who owned them. Since beef was difficult to preserve, cattle were typically slaughtered year-round. Fresh beef was sold out of retail meat shops operated by local colonial butchers who supplied meat to others in the community but rarely distributed outside of the town of origin. Pork, on the other hand, could be salted, smoked and packed in wooden boxes for storage and shipping, which is where the term “meat packing” originated. The first known meat packing business was started by William Pyncheon in Boston in 1662 to supply packed pork to plantations in the West Indies in trade for molasses.

Following the Revolutionary War, as settlers pushed west over the mountains and brought cattle and hogs with them, the Ohio Valley became the center of livestock production and with the advent of the Industrial Revolution in the 1800s, eastern cities grew and the demand for meat increased. In 1818 the first meatpacking plant west of the mountains opened in Cincinnati and began shipping barrels of cured pork by boat throughout the Ohio and Mississippi River Valleys. By the mid-1800s, Cincinnati became the pork processing capital of the world earning the nickname “Porkopolis.”

However, since beef did not preserve well and river transportation was too slow for transporting fresh meat, beef slaughter remained largely in the hands of small, local butchers until the coming of the railroad. By the late-1800s most producers east of the Mississippi and north of the Ohio rivers – in states like Illinois, Indiana and Ohio – had access to railroad lines and began shipping livestock to large Eastern packing houses. Shipping cattle by rail was more efficient, dependable and cheaper than driving cattle to market and higher net prices for farmers led to a surge in cattle production. Cattle

numbers increased 61 percent between 1850 and 1860, double the growth of the previous decade.

As railroads and settlers pushed west, livestock production followed and by the end of the Civil War in 1865, Chicago had surpassed Cincinnati as the center of the packing industry. That same year the Union Stockyard opened on the south side of Chicago, connecting the railways of the east to the railways of the west. As we discussed in "Raising Cattle on Grass" this was the start of the great cattle drives up the Chisolm trail from Texas to the Flint Hills of Kansas where cattle were loaded on trains in Kansas and shipped to Chicago for slaughter. However, shipping fresh beef remained a challenge until the invention of artificial refrigeration in the 1850s.

George Hammond designed the first refrigerated rail car for shipping fresh meat and is credited with the first shipment of dressed beef to the East in 1869, from his meatpacking plant near Chicago to Boston. Gustavus Swift, a cattle buyer from Massachusetts who moved to Chicago in 1874, eventually improved on Hammond's refrigerator car design and expanded fresh beef shipments to the East. Established pork packer Philip Armour followed suit and, along with Hammond and Nelson Morris, a German immigrant who sold cattle to the Union Army during the Civil War, established branch houses in the East. By 1888, Armour, Swift, Hammond and Morris accounted for about 90 percent of the cattle in the Union Stockyard and producer two-thirds of the nation's dressed beef supply.

The refrigerated rail car also made it more economical to slaughter cattle closer to the supply and the extension of railways and livestock production to the Great Plains prompted the largest Chicago packing companies to build branch plants in Kansas City, Omaha, Sioux City, Wichita, Denver, Fort Worth, and elsewhere throughout the West. Cattlemen began breeding animals for meat quality, rather than for their ability to survive long drives and soon the US was exporting beef to England, which claimed to have the best beef in the world up to that point.

By the turn of the century meat packing had become the nation's largest industry with one billion dollars in annual sales, exceeding the annual budget of the United States government. The growing population's demand for meat and the escalated volume of livestock entering stock yards led to the development of a conveyor system, which increased speed and efficiency. The industry continued to expand during this period, as a result of increasing demand and increasing distribution possibilities. This rapid expansion also created sanitation and safety concerns. In 1906, Upton Sinclair's book, *The Jungle*, sensationalized these concerns and meat sales dropped dramatically.

Concerns about sanitation and safety led to passage of the Federal Meat Inspection Act in 1906 which mandated federal government inspection of meat processing facilities conducting business across state lines. Although meat packers initially resisted government intervention in their business, when the Act was updated and modified by the Wholesome Meat Act of 1967, requiring that states have inspection programs "equal to" that of the federal government administered by the Food Safety and Inspection

Service of the United States Department of Agriculture, it was supported by the meat industry.

Today, slaughter facilities are still located where there is a high concentration of cattle and feedyards. Several large beef processing facilities still operate in the Eastern United States, most modern facilities are located in the "beef belt" states of Texas, Oklahoma, Kansas, Colorado and Nebraska, as well as Arizona, California, Utah, Idaho and Washington State in the West. One of the common misperceptions among consumers today is that meat processing has become more centralized over the past century when, in fact, the shift has been from slaughter facilities concentrated in big cities to rural communities. Today, four major meat packers account for 80 percent of all beef production compared to the "Big Five" in the early 1900s that controlled roughly 90 percent of the beef supply.

In the remainder of this course we'll examine some of the details involved in the slaughter process and learn how to answer questions from consumers about the transition from cattle to beef.

SECTION 2 – ANIMAL CARE

Beef farmers and ranchers are aware of the sacrifice that beef animals, and all livestock, make to provide high quality protein to nourish our bodies. Our expectation, like many consumers, is that every animal is treated with respect at all times during the beef lifecycle, especially during slaughter. As a member of the beef community, you can help address consumer expectations for humane slaughter by discussing the steps that are taken to ensure humane treatment at slaughter.

First, consumers need to know that that proper treatment is mandated by law. Since 1978, the Humane Slaughter Act has ensured a humane and proper death for all food animals. The Humane Slaughter Act is an amendment to the Federal Meat Inspection Act to "require that meat inspected and approved under such Act be produced only from livestock slaughtered in accordance with humane methods and other purposes." The Humane Slaughter Act sets the standards for how livestock should be slaughtered and is taken seriously by all members of the beef community.

Humane treatment at slaughter begins when cattle arrive at the slaughter facility. In accordance with Transportation Quality Assurance, which is part of the Beef Quality Assurance producer education program, cattle should be unloaded in a timely fashion in order to keep the amount of time they are on the truck at a minimum. Certified drivers will assist facility employees in slowly and carefully unloading the cattle from the truck and moving them to a holding pen where they have access to clean, fresh water and are able to move around freely.

Employees who handle the live cattle receiving areas complete routine training programs for animal care and are held to standards set forth by auditing parties. For example, a third-party audit program developed and implemented by the American Meat

Institute enables owners to keep track of the number of animals that go through the system, the percentage of animals that are deemed “downers” – or animals that cannot stand or walk on their own – and how many injuries are recorded. By monitoring and keeping track of these figures, owners and managers of slaughter facilities can make changes when appropriate to stay abreast of current animal welfare standards and ensure that high-quality animal care is given to every animal.

The walkways, holding pens, and the knock box, which is where the animal is rendered unconscious by a captive bolt gun, are all designed and built with the welfare of the animal in mind. Many modern U.S. slaughter facilities were designed or inspired by world renowned animal behaviorist Temple Grandin. The facilities work with the natural instincts of cattle to move them as if they are going back in the direction from which they came. This serpentine system winds around until it reaches the entry to the facility. At this point the cattle are in a single-file line and are calmly moved forward towards the knock box, where they are rendered unconscious by a trained operator using a captive bolt gun. The sides of the system are solid so that human presence on the other side of the walls doesn't cast unusual shadows or alarm the cattle.

Slaughter facility owners and employees go to extreme lengths to ensure that cattle receive high quality care during euthanasia. This care is evident in all steps of the slaughter process, from the moment the truck driver unloads the cattle at the slaughter facility to the moment the animal is rendered unconscious on the kill floor. Many consumers may not understand the phrase “kill floor” however you can ease their concerns by explaining that this industry term is used to describe the area where cattle are rendered insensible by a captive bolt and exsanguinated before being processed into large primal cuts of beef.

While systems designed with the best intentions for animal care and handling are extremely valuable, it is the employees of slaughter facilities that must ensure proper animal handling and euthanasia. After all, good animal care boils down to people.

SECTION 3 – BEEF NUTRITION

The goal of all members of the beef community is to provide consumers with the best possible eating experience each time beef is served. Consumers can dictate this experience as well by choosing cuts with varying amounts of intramuscular fat – or marbling -- based on their dietary needs. We will touch on choosing lean cuts in the final course: “Beef. It's What's for Dinner.” In this section we will investigate how slaughter facilities play a role in reducing fat in healthy cuts of beef.

Studies have shown that consumers are increasingly worried about the fat content in their food which in turn has had a negative impact on beef consumption. To combat this negative nutritional stigma, the beef community has been proactively reducing beef's fat content without sacrificing quality. Some of the “fat-reducing” efforts have taken place on the farm, ranch or in the feedyard, through careful consideration of the types of feedstuffs that cattle receive, as we discussed in Raising Cattle on Grass and Life in the

Feedyard. Other developments have taken place in the slaughter plant, where fabrication employees trim much of the external fat off of beef primals.

The fatty acid profile of beef is unique in that it varies based on where the fat is actually located. For example, the external fat on a cut of beef is mostly saturated fat. However, most of the external fat is removed during carcass fabrication at the facility, trimming at the grocery store or by the consumer during meal preparation, so very little external fat is generally consumed. On the other hand, intramuscular fat, or marbling, is rich in monounsaturated fats. In fact, monounsaturated fats, which are the same kind of fat found in avocados and olive oil, make up more than 50% of the fatty acid profile of intramuscular fat.

Beef carcasses can be assigned a quality grade that relates to several factors including intramuscular fat or marbling, skeletal bone maturity, texture and appearance of the lean muscle. The quality grade assigned to a carcass is an indicator of the tenderness, juiciness and flavor potential of the cuts from that carcass. Although there are eight designations – prime, choice, select, standard, commercial, utility, cutter and canner – the top three, prime, choice and select, are most commonly seen by consumers. As it relates to beef nutrition, the grade can be an indicator of total fat content. For example, prime beef will have more fat than choice or select grade, across all cuts in the animal. We will discuss beef quality grades in more detail in the final course: Beef. It's What's for Dinner.

SECTION 4 – SUSTAINABILITY

As we have discussed in previous courses, improving the sustainability of beef production requires efforts at every stage of beef production. This is certainly true for the slaughter process, where many improvements have already been made and opportunities exist for continuous improvement in the future.

Beef production involves more complex biological processes than any other food system. Efforts at slaughter facilities are very important to the industry's path toward more sustainable beef. These include improvements in environmental, social and economic pillars of beef. At the slaughter facility level, all three aspects of sustainability have improved over the past several years. For example, beef has lowered its environmental foot print, specifically when dealing with water, through improvements in packing plant water efficiency, the installation of gray water recycling equipment in slaughter facilities and the increased use of recovered biogas from wastewater lagoons at slaughter facilities, which lowers the need for fossil fuels.

Additional improvements at the packing plant level have been the installation of covered lagoons, which lowers community nuisance odors and reduces packing plant dependence on fossil fuels, the conversion of boilers from diesel to natural gas and reduced packaging requirements through the use of right-size packaging. In addition, the reduction in occupational illnesses and hazards and the reduction in *E.coli* O157:H7 contamination has also contributed to the improvement in beef's social sustainability.

Major innovations and investments in infrastructure by the packing sector contributed heavily to the recent improvements in beef industry sustainability. Increased efficiency is undoubtedly the greatest contributor to sustainability, and it will continue to be the beef value chain's best opportunity for future progress.

SECTION 5 – SAFETY

As we discussed earlier, safety has been a major focus in the meat industry since the passage of the Meat Inspection Act in 1906 but safety efforts in the beef industry have intensified since the 1990s. In 1993, more than 600 people fell ill after eating hamburgers at Jack-in-the-Box restaurants contaminated with a little known bacterium called *E. coli* O157:H7. Four children died as a result of their illnesses. Few Americans had ever heard of *E. coli* at the time and the Centers for Disease Control and Prevention didn't even list it as a reportable disease.

A major wake up call for the beef industry, the Jack-in-the-Box outbreak prompted changes in state and federal health codes, the internal cooking temperature recommendation for ground beef was raised to 155 degrees and *E. coli* became a reportable disease in all 50 state health departments. Working together, the beef community began funding research and formed the Beef Industry Food Safety Council to share research and best practices for preventing *E. coli* from entering the beef supply, primarily focused on meat processing.¹⁴

In 1997, CDC set what are called the Healthy People 2010 goals for reduction of foodborne illnesses from *E. coli*, salmonella and other pathogenic bacteria. The goal for *E. coli* was to reduce the infections caused by *E. coli* O157:H7 from any food by half, from 2.1 cases per 100,000 people to 1 case per 100,000 by 2010. Although that is all *E. coli*-related illnesses, not just beef, efforts throughout the beef community helped meet that goal a year early, in 2009. *E. coli* was the only bacteria that met its goal. The new Healthy People 2020 goals call for cutting that number in almost half again; to less than .6 cases per 100,000 people and the beef community is committed to helping meet that goal.

American consumers can be confident that the Food Safety and Inspection Service, or FSIS, ensures that meat and poultry products are safe, wholesome and correctly labeled and packaged. Under the Federal Meat Inspection Act, FSIS inspects all raw meat and poultry sold in interstate and foreign commerce, including imported products. The Agency also monitors meat and poultry products after they leave federally inspected facilities.

In the early era of meat inspection, the primary concern of FSIS inspectors at slaughter facilities was to monitor for animal diseases, and they relied almost entirely on visual inspection of animals, products and facility operations. However, over the past several decades, refinements in animal production have reduced disease and created a more

¹⁴ <http://www.foodsafetynews.com/2013/01/food-safety-since-jack-in-the-box-progress-made-and-progress-still-needed/#.VEI7xFJ0zcs>

consistent animal population. Thus, today's inspectors are focused on unseen hazards such as microbiological and chemical contamination as well as monitoring for animal disease.

Today, FSIS conducts both random sampling and sampling for targeted substances. This monitoring provides a 95 percent assurance that a residue of any targeted substance is detected if it occurs in more than 1 percent of product lots. In fact, major segments of the industry have extremely low incidences of illegal substances and overall, the number of domestic monitoring samples containing residues in violation of FSIS acceptable limits is about 1 percent of samples tested.

The federal government isn't the only entity continuously working towards a safer food supply. The beef community has made significant strides in better understanding foodborne illness as it relates to beef products and beef production. Reductions in human illness are due, in part, to beef community research efforts to develop new safety interventions. Beef farmers and ranchers have shown great commitment to fund beef safety research and outreach programs through the Beef Checkoff on both pre-harvest and post-harvest understanding and solutions. In fact, since 1993, the beef checkoff has spent more than \$35 million on beef safety research, outreach and education. Furthermore, the beef industry invests more than \$550 million annually to implement interventions, conduct microbial testing and validation post-harvest.

The majority of this work originally focused on the harvest and processing sectors, as they offered the greater opportunity for improving beef safety. However, more than ten years ago, the industry began to more aggressively research food safety interventions at the pre-harvest level – at farms, ranches and feedyards. The goal was, and remains today, to build upon the success achieved using in-plant safety interventions and apply the same concept further back in the production chain to create another layer of safety.

There are several pre-harvest interventions that have been implemented to control and reduce the prevalence of bacterial contamination – many of which consumers, and even members of the beef community, may not be aware of. Many of these interventions are focused on pathogens like *Salmonella* and *E. coli* and are implemented at the feedyard level. For example, feedyard managers may administer a probiotic to help reduce the prevalence of pathogens. Vaccines have also been developed for *E. coli* O157:H7 and *Salmonella* which have been shown to decrease the presence of these bacteria as well.

Beef slaughter in modern, high-speed slaughter facilities involves more than thirty operations involving several workers which can result in the external contamination of the carcass. These potential risk factors are identified by slaughter facility management and incorporated into each facility's individual Hazard Analysis and Critical Control Point plan or HACCP plan. Every slaughter facility has a unique HACCP plan that specifically address identified risk points in the plant and incorporates interventions to combat pathogenic contamination. For example, plant workers will trim the carcass in what is known as "spot carcass decontamination" to remove visible fecal matter that may be harboring *Salmonella*, *E. coli* or other non-O157:H7 Shiga-toxin producing *E. coli* or

STEC as part of the FSIS “zero tolerance” performance standard for fecal contamination.

Other bacterial interventions that are used to increase beef safety include chemical decontamination and thermal decontamination. Chemical decontamination involves spraying a low-concentrate (1-3%) of organic chemical agent such as acetic or lactic acid to the carcass to reduce the potential for bacteria to grow on carcass tissue.

Thermal decontamination interventions takes place by spray-washing carcasses with water above 80°C (176°F) and has been proven to be a very efficient decontamination strategy.¹⁵ Another thermal decontamination strategy is exposing carcasses to pressurized steam either with a handheld steam vacuum for small areas that may have contamination or in a steam cabinet which commonly occurs after washing of the carcass sides. These and other decontamination stations are strategically located throughout a beef slaughter facility and the sequential intervention system has been validated as reducing the potential for contamination on beef carcasses.

As the beef community continues to take great strides towards safer beef, more developments in the prevention of bacterial contamination are implemented at every stage of the slaughter process, from the slaughter room to the shipping area.

At this time, there are no controls that specifically address non-O157:H7 STEC. FSIS considers controls for *E. coli* O157:H7 to be effective against non-O157:H7 when implemented according to scientific report.¹⁶

Consumers may recognize the term “ammonium hydroxide” from the media surrounding lean, finely textured beef or what became commonly referred to as “pink slime.” Lean, finely textured beef is 100% beef and is produced by separating the fat on the beef trimmings from the lean using a high speed centrifuge and then misting the product with either ammonium hydroxide or citric acid. Ammonium hydroxide and citric acid are chemical decontaminants that can be used for beef trimmings to combat *E. coli*, *Salmonella* and other non-O157:H7 STEC and are generally recognized as safe (GRAS) by FSIS. The term “generally recognized as safe” is used to describe food additives that have been reviewed and approved by the Food and Drug Administration for use in food production. Ammonium hydroxide is actually used in the production of other food products such as puddings and baked goods.

The production and use of lean, finely textured beef, which is actually composed of 94-97 percent lean and only 3-6 percent fat, allows the beef community to produce more lean beef using fewer cattle. In fact, if lean, finely textured beef is not produced, 1.5 million additional head of cattle would need to be slaughtered annually to make up the

¹⁵ Bacon, R.T., Sofos, J.N., Belk, K.E., and G.C. Smith. 1999. *Evaluation of Multiple-Hurdle Microbiological Interventions to Include Pre-Evisceration Spray-Washing and Other Technologies – For Beef Carcass Decontamination*. These references are really old. If references are going to be used, there should be many more in this document. Should standardized throughout the modules how references will be used.

¹⁶ http://askfsis.custhelp.com/app/answers/detail/a_id/1511/kw/non-O157%20STEC%20%2B%20slaughter/session/L3RpbWUvMTQxMjcxMjA4MS9zaWQvU0lvQjdpNG0%3D

difference which, as you can imagine, has a substantial impact on natural resources and sustainability.¹⁷ The lean, finely textured beef event is a prime example of the need for engaging with consumers about commonly accepted and proven safe practices used in the slaughter and meat processing segments of the beef lifecycle.

Although the numerous interventions that are incorporated at critical control points are vital to beef safety, the beef community double checks the efficacy of these prevention procedures through rigorous product inspection, in every federally inspected slaughter facility, daily. Under the Federal Meat Inspection Act, FSIS inspects all raw meat and poultry sold in interstate and foreign commerce, including imported products. FSIS inspectors are responsible for conducting a thorough examination of the lymph nodes, organs and entire carcass in addition to inspecting raw and fully cooked products including smoked products, canned meats and even frozen dinners. Beef from federally inspected facilities is subject to inspection by trained USDA officials that evaluate every carcass for wholesomeness and state inspected facilities follow similar practices with state inspectors. Meat that has been federally inspected and passed for wholesomeness is stamped with purple food-grade vegetable dye on each of the main sections of the carcass.

Although every precaution is taken to ensure that only beef that is safe for human consumption leaves the processing facility, occasionally a beef recall occurs. This may be due to potential bacterial or foreign material contamination, products were not inspected properly, or allergens not labeled properly. In the event of a recall, FSIS issues a release that recalls not only the suspect beef but several batches of beef that were produced both before and after the suspect batch. This is done to ensure that all potentially affected beef is recalled and is done in the best effort to avoid potentially unsafe beef from reaching retail outlets and ultimately, consumer dinner tables.

A serious topic in the beef community is Bovine Spongiform Encephalopathy, more commonly known as BSE or “mad cow disease.” BSE is a degenerative, neurological disease caused by folded proteins called prions that build up in the central nervous of cattle and eventually kill nerve cells – typically BSE only affects cattle older than 30 months of age. It’s important to remember that most cattle in the U.S. are slaughtered younger than 24 months of age and are not susceptible to BSE. While BSE has not been found in meat or milk, it can be found in affected cattle in brain and spinal cord tissue. In 2004, to prevent the transfer of potential prions, the USDA initiated a requirement that all cattle older than 30 months of age undergo the removal of specified risk materials (SRMs) such as the brain, spinal cord and surrounding bone during slaughter. A percentage of carcasses from these cattle are tested by the USDA and are not released into the food supply unless the results are negative. Another piece of the BSE surveillance program in the U.S. is the mandate that all cattle with any signs of neurological disorder, regardless of age, be tested for BSE and not allowed to enter the human food chain. Furthermore, downer cattle – cattle that cannot stand or walk on their own – were banned from the food supply in 2004. While this is one potential sign of a neurological disorder, a downed animal could also be caused by an injured leg or

¹⁷ <http://www.meatami.com/ht/a/GetDocumentAction/i/76184%20>

other ailment. While not all downer cattle pose a potential health threat, the downer ban is a precaution taken to ensure the safety of the American beef supply from BSE.

When you speak to consumers who have questions about how cattle are processed into beef, you can assure them that every precaution is taken in an effort to deliver a safe beef product to their grocery store or restaurant.

SECTION 6 – SUMMARY

Now it's time to test your slaughter facility knowledge. Please complete the following 10 question quiz. If you get a question wrong, you can go back into the course to find the correct answer. You'll need to score at least a 70 percent before advancing to the next section. Good luck!

Beef farmers and ranchers are aware of the sacrifice that beef animals, and all livestock, make to provide high quality protein to nourish our bodies. As a member of the beef community, you can help address consumer expectations for humane slaughter by discussing the steps that are taken to ensure humane treatment at slaughter which begins when cattle arrive at the slaughter facility. In accordance with Transportation Quality Assurance, which is part of the Beef Quality Assurance producer education program, cattle should be unloaded in a timely fashion in order to keep the amount of time they are on the truck at a minimum. Certified drivers will assist facility employees in slowly and carefully unloading the cattle from the truck and moving them to a holding pen where they have access to clean, fresh water and are able to move around freely. The walkways, holding pens, and the knock box, which is where the animal is rendered unconscious by a captive bolt gun, are all designed and built with the welfare of the animal in mind. Many modern U.S. slaughter facilities were designed or inspired by world renowned animal behaviorist Temple Grandin.

Slaughter facility owners and employees go to extreme lengths to ensure that cattle receive high quality care during euthanasia. This care is evident in all steps of the slaughter process, from the moment the truck driver unloads the cattle at the slaughter facility to the moment the animal is rendered unconscious on the kill floor. Many consumers may not understand the phrase "kill floor" however you can ease their concerns by explaining that this industry term is used to describe the area where cattle are rendered insensible by a captive bolt and exsanguinated before being processed into large primal cuts of beef. While systems designed with the best intentions for animal care and handling are extremely valuable, it is the employees of slaughter facilities that must ensure proper animal handling and euthanasia. After all, good animal care boils down to people.

The goal of all members of the beef community is to provide consumers with the best possible eating experience each time beef is served. Consumers can dictate this experience as well by choosing cuts with varying amounts of intramuscular fat – or marbling -- based on their dietary needs. Studies have shown that consumers are increasingly worried about the fat content in their food which in turn has had a negative

impact on beef consumption. To combat this negative nutritional stigma, the beef community has been proactively reducing beef's fat content without sacrificing quality.

The fatty acid profile of beef is unique in that it varies based on where the fat is actually located. For example, the external fat on a cut of beef is mostly saturated fat. However, most of the external fat is removed during carcass fabrication at the facility, trimming at the grocery store or by the consumer during meal preparation, so very little external fat is generally consumed. On the other hand, intramuscular fat, or marbling, is rich in monounsaturated fats. In fact, monounsaturated fats, which are the same kind of fat found in avocados and olive oil, make up more than 50% of the fatty acid profile of intramuscular fat.

Improving the sustainability of beef production requires efforts at every stage of beef production. This is certainly true for the slaughter process, where many improvements have already been made and opportunities exist for continuous improvement in the future. Efforts at slaughter facilities are very important to the industry's path toward more sustainable beef. These include improvements in environmental, social and economic pillars of beef. At the slaughter facility level, all three aspects of sustainability have improved over the past several years. For example, beef has lowered its environmental foot print, specifically when dealing with water, through improvements in packing plant water efficiency, the installation of gray water recycling equipment in slaughter facilities and the increased use of recovered biogas from wastewater lagoons at slaughter facilities, which lowers the need for fossil fuels.

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Safety has been a major focus in the meat industry since the passage of the Meat Inspection Act in 1906 but safety efforts in the beef industry have intensified since the 1990s. In 1993, more than 600 people fell ill after eating hamburgers at Jack-in-the-Box restaurants contaminated with a little known bacterium called *E. coli* O157:H7. A major wake up call for the beef industry, the Jack-in-the-Box outbreak prompted changes in state and federal health codes, the internal cooking temperature recommendation for ground beef was raised to 155 degrees and *E. coli* became a reportable disease in all 50 state health departments.

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There are several pre-harvest interventions that have been implemented to control and reduce the prevalence of bacterial contamination. Many of these interventions are focused on pathogens like *Salmonella* and *E. coli* and are implemented at the feedyard level. For example, feedyard managers may administer a probiotic to help reduce the prevalence of pathogens. Vaccines have also been developed for *E. coli* O157:H7 and *Salmonella* which have been shown to decrease the presence of these bacteria as well.

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Masters of Beef Advocacy 2.0

Lesson 5: Beef. It's What's for Dinner

INTRO

Welcome to the final MBA Course: Beef It's What's For Dinner. As we discussed in the previous courses, many consumers today have many questions about how beef gets from the pasture to their plate. They want to know more about the safety of their food, if the animals were cared for properly, whether raising beef is sustainable and how they can incorporate beef into a healthful diet. But for many consumers the biggest barrier to choosing beef may simply be lack of knowledge of how to choose and prepare the right cut for their family to enjoy a satisfying meal.

In this course, we will discuss the ways consumers can choose the right beef cuts for their family and how to successfully prepare them in their home, as well as focus on many nutritional benefits of today's beef.

SECTION 1 – HISTORY

Beef. It's What's for Dinner. One of the most recognized advertising campaigns in history is more than a slogan; it is a statement that captures the sentiment of many American consumers: beef is the premier protein choice for memorable occasions. Launched in May, 1992, by the beef checkoff and advertising firm Leo Burnett, the "Beef. It's What's for Dinner" radio and TV ad campaign featured the iconic orchestration "Hoe-Down" from the musical score to *Rodeo* by renowned American composer Aaron Copeland.

The ads originally featured actor Robert Mitchum. Following his death in 1997 the campaign slogan was changed to "Beef. It's What You Want" with voice-overs from several anonymous narrators. However, the new campaign was not as successful and "Beef. It's What's for Dinner" was brought back in the Fall of 1999 with Sam Elliott as the voice of beef.

As beef checkoff budget contracted over the past decade due to a smaller cow herd and declining value of the checkoff dollar, the "Beef. It's What's for Dinner" campaign moved from TV advertising to radio, online advertising and print advertising, including popular consumer publications such as *Cooking Light*, *Men's Health* and *People Magazine*. Currently, the brand is focusing all its media efforts on digital advertising, as this is the media that most older Millennial consumers look to for food and recipe inspiration.

Today, Beef It's What's for Dinner has gone digital with a website, BeefItsWhatsForDinner.com, with accompanying sites on Facebook, Twitter, Instagram, Pinterest and other popular social media sites. Utilizing the latest digital media

technology, Beef. It's What's for Dinner meets today's consumers where they go to for help in preparing delicious and nutritious meals—online!

Whether through television, radio, magazine or digital advertising, the “Beef. It's What's for Dinner” campaign still strives to fuel America's passion for beef by making beef accessible to every consumer. Whether a Millennial looking for affordable meals they can cook in under 30 minutes, a parent looking for nutritious meals their kids will enjoy or a baby boomer wanting a meal that will help them maintain physical activity as they age, “Beef. It's What's for Dinner” will provide a solution. You can help in this effort by passing along tips for choosing and preparing the right beef cut in your conversations with consumers, either in person or online. We will cover those tips later in this course. But first, let's talk about Animal Care, Nutrition, Sustainability and Safety as they pertain to the consumer in choosing and preparing beef.

SECTION 2 – ANIMAL CARE

Animal care and animal well-being are highly important during all stages of the beef lifecycle – consumers want to know that the beef they are purchasing and consuming is humanely raised and slaughtered. Often times, they will refer to the label on the beef packaging to try to garner information about how the animal was raised and processed. However, just merely reading the label is not a reliable way to determine if an animal was raised and slaughtered humanely. Beef farmers and ranchers from various production types – whether grass-finished, grain-finished, natural and organic – care deeply about their livestock and do their best to provide them with comfort and high-quality animal care. These are virtues that can't be adequately described on a label that may only state “natural,” “grain-fed” or “grass-finished.”

Some retailers and meat processing companies have developed their own “humanely raised” labels to certify that the animals met certain guidelines established by the retailer. In order to fully understand what these labels mean, consumers need to ask the retailer what standards are required for the label and how they verify those standards are met. Once again, however, regardless of what is on the label, the fact is that cattle farmers and ranchers strive to give their animals the best possible care at all times and consumers should feel confident in the industry's commitment to offer beef that is humanely raised and slaughtered – without having to look at the label.

SECTION 3 – BEEF NUTRITION

Beef is one of the most powerful nutrients in the food chain and is also one of the most popular. Today, consumers are growing more and more health conscious and want to know that the food they are eating is nutritious and providing them with the fuel they need to live healthy lifestyles. The great news is that beef can accommodate all diets!

Beef is a high-quality protein that provides 10 essential nutrients for optimal health. You can share with consumers that a 3-ounce serving of beef is an *excellent* source of protein, zinc, selenium, niacin, vitamin B6 and vitamin B12 and, on average, is about

170 calories per serving. To be an excellent source of a nutrient, according to government dietary guidelines, a food must provide more than 20 percent of that nutrient based on recommended daily values in a 2,000 calorie diet. On top of that, beef is also a *good* source, meaning that it provides more than 10% of the recommended daily value, of phosphorus, iron, riboflavin and choline.²⁰ But don't worry, you don't have to remember all 10 nutrients beef provides. Just remember 10/10/10: one 3-ounce serving of lean beef provides *more* than 10 percent of 10 essential nutrients and vitamins for *less* than 10 percent of your daily calories. That's a good bang for your calorie buck! So grab a pen and write this down:

>10%
10 essential nutrients
<10% of daily calories

Now keep that pen out and write down: ZIP+B. If you can remember ZIP+B you can remember half of the 10 essential nutrients beef provides: Zinc, Iron, Protein and B vitamins. Although all 10 of the essential nutrients beef provides are vital for healthy bodies, these five are the most recognized by consumers for the benefits they provide in a healthful diet. For example, zinc helps your body maintain a healthy immune system, while B vitamins are needed for healthy metabolism, which helps provide energy throughout the day. The iron in beef helps your body transport and use oxygen to help you power through the day. And most consumers will know the importance of protein in the diet, but if they are unsure, you can share with them that protein is crucial to muscle growth and development, supplies fuel for the body and can help satisfy your hunger and maintain a healthy weight. In fact, a 3-ounce serving of beef provides 25 grams of protein, about half of the Daily Value, which is the minimum amount to prevent deficiency.

When talking to consumers about the benefits of protein, some consumers point out that you don't have to eat meat to get protein. In fact, there are many plant-based sources of protein such as beans, nuts, legumes, and leafy green vegetables. However, most plant-based proteins are not complete proteins, meaning they don't contain an adequate portion of all nine of the essential amino acids necessary for the dietary needs of humans. In addition, it often takes more than twice the same amount of calories to get the same amount of protein from alternative food sources. For example, you would have to eat 1 ½ cups of cooked black beans, at 341 calories, to get the same amount of protein found in a 3-ounce serving of cooked beef, which averages at 170 calories, depending on the cut of beef. That's twice the calories for the same amount of protein. And while many people know peanut butter is a source of protein, you would have to eat about six tablespoons of peanut butter, at 564 calories.²¹ One of the trendy plant-based proteins, a grain called quinoa [pronounced keen-wa] comes with an even higher calorie load. You'd have to eat three cups of quinoa, at 666 calories, to get the same amount of

²⁰ U.S. Department of Agriculture, Agricultural Research Service. 2013. USDA National Nutrient Database for Standard Reference, Release 26. Available at: <http://www.ars.usda.gov/ba/bhnrc/ndl>.

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protein found in a 3-ounce serving of cooked beef. When it comes to protein, beef is chock full of fuel for your body and lifestyle and just five percent of calories in the American diet come from beef.²²

One of the more contentious issues about eating beef is the misperception that beef contains a lot of saturated fat, which has been thought to contribute to heart disease. For more than 50 years, doctors and nutritionists have encouraged consumers to cut fat from their diets in order to promote good heart health which has led some consumers to avoid beef due to the saturated fat content. However, 66 percent of beef cuts sold at retail are lean after being cooked and trimmed, and thanks to these increased trimming practices, the external fat in retail cuts has decreased by 80 percent in the last 20 years.^{23,24} For example, sirloin steak now contains 34 percent less fat than it did in the 1960s. This improvement has come from the dedication of members of the beef community to providing consumers with the beef they desire and enjoy.

Of course, beef does contain fat but did you know that 10 percent or less of saturated fat and total fat in the American diet comes from beef? Furthermore, beef is considered one of the top sources of monounsaturated fat,^{25,26} which is the same kind of fat found in olive oil. About half of the fatty acids in beef are monounsaturated fats.

There is a growing body of evidence that shows that beef can actually help satisfy your hunger and maintain a healthy weight. For example, research published in the *American Clinical Journal of Nutrition* suggests that eating a higher protein breakfast, such as one including a high-quality protein like beef, boosts satiety and reduces hunger and brain responses involved with food cravings more than a typical ready-to-eat breakfast that is lower in protein.²⁷ Currently, Americans consume 2/3 of their total daily protein intake at dinner, which doesn't leave much room for protein at other meals. However, new research shows that distributing protein evenly throughout the day - 25-30 grams per meal, plus snacks - may be the most beneficial for overall health and wellness benefits.”

The role of red meat, specifically beef, in a healthful diet, is a constant topic of discussion in the nutrition world. Media reports covering the latest study claiming a link between beef and chronic diseases such as heart disease and cancer are often overstated, leading consumers to believe these associations have been proven.

²² Zhanovec M, O'Neil CE, Keast DR, Fulgoni VL 3rd, Nicklas TA. Lean beef contributes significant amounts of key nutrients to the diets of US adults: National Health and Nutrition Examination Survey 1999-2004. *Nutr Res* 2010;30:375-81.

²³ FreshLook Marketing Group (an IRI company), the leading U.S. source of grocery scanner data for meat and produce purchasing, 52 weeks ending 1/26/14.

²⁴ McNeill SH, Harris KB, Field TG, Van Elswyk ME. The evolution of lean beef: identifying lean beef in today's U.S. marketplace. *Meat Sci* 2012;90:1-8.

²⁵ Cotton PA, Subar AF, Friday JE, Cook A. Dietary sources of nutrients among US adults, 1994 to 1996. *J Am Diet Assoc* 2004;104:921-30.

²⁶ National Cancer Institute, Risk Factors Monitoring and Methods Branch. Food sources of oleic acid (MFA 18:1), listed in descending order by percentages of their contribution to intake, based on data from the National Health and Nutrition Examination Survey 2005-2006. Available at: http://riskfactor.cancer.gov/diet/foodsources/fatty_acids/table1.html.

²⁷ Leidy HJ, Ortinau LC, Douglas SM, Hoertel HA. Beneficial effects of a higher-protein breakfast on the appetitive, hormonal, and neural signals controlling energy intake regulation in overweight/obese "breakfast-skipping" late-adolescent girls. *Am J Clin Nutr* 2013;97(4):677-88.

Many diet and health studies, however, are epidemiological studies that are useful in identifying potential correlations but NOT to pinpoint cause and effect.

The fact of the matter is that the link between food and cancer is unknown. No single food has ever been proven to *cause* cancer. However, what most health experts do agree on is that the best way to avoid chronic disease is to maintain a healthy weight. And, as we have previously discussed, beef provides nutrients like zinc, iron, protein and B vitamins our bodies need to be physically active and high-quality protein, like beef, has been proven to help maintain a healthy weight.

Furthermore, the Beef in an Optimal Lean Diet study, commonly called the BOLD study, found that when lean beef was included each day in a heart-healthy diet, LDL cholesterol (the bad cholesterol), was reduced 10% from baseline – virtually the same as when study participants followed the DASH or dietary Approaches to Stop Hypertension” Diet which has been named the best overall diet by for five years running^{28,29}.

Although BOLD and DASH diets were both rich in fruits, vegetables, whole grains and low-fat dairy products, the diets differed in their primary protein source. The BOLD diet’s primary protein source came from lean beef while DASH included white meat and plant protein. The BOLD diet included an average of 4.0 oz/day of lean beef, while the DASH diet included 1.0 oz/day of lean beef. Also, both diets kept saturated fat levels below 6% of total calories. Again, both diets were found to be effective in reducing LDL cholesterol by 10%.

Additionally, the study also found that the BOLD-PLUS diet, which included 5.4 oz lean beef per day, was more effective at reducing systolic blood pressure when compared to the other diets lower in total protein. These findings suggested that total protein, not type of protein, is important for eliciting reductions in systolic blood pressure.

Overall, the BOLD study demonstrates that lean beef can play a crucial role in a healthful diet and shouldn’t be overlooked when making healthy food purchases for your family.

For aging consumers, maintaining muscle can be a challenge. In fact, similar to osteoporosis – or bone loss – as we get older we can lose muscle mass, a condition called sarcopenia. Maintaining skeletal muscle in an older person requires a moderate serving of a high-quality protein source with each meal.

Clearly, beef is good for the body but consumers should remember to pair beef cuts with whole grains, fruits and vegetables. These things combined can help consumers, and their families, enjoy a balanced healthful diet, like those outlined in the Dietary Guidelines for Americans and *MyPlate*.

SECTION 4 – SUSTAINABILITY

One of the greatest opportunities for improvement with regard to sustainability is a reduction of food waste. An estimated 40 percent of all food produced in the United States is wasted, contributing to losses in efficiency across the entire food value chain. Food waste costs the average American family approximately \$2,500 annually. In addition to food security issues, food waste has environmental impacts as well, contributing to greenhouse gases from solid waste landfills. Together with the beef community, consumers can make continuous

²⁸ <http://health.usnews.com/best-diet/best-overall-diets>

²⁹ <http://www.reuters.com/article/2015/01/06/health-diets-idUSL1N0UK21V20150106>

improvements. According to the United States Department of Agriculture (USDA), beef is one of the least wasted commodities, with 20 percent spoiled or not eaten at the consumer level. It is still a significant burden and represents a major opportunity to improve beef industry sustainability.

The beef community recently completed a first-of-its-kind [life cycle assessment](#) which was certified by NSF International, an organization that provides benchmarks on economic, environmental and social contributions in the United States. The check-off funded lifecycle assessment revealed that by cutting beef waste in half, the full beef value chain would achieve an approximate 10 percent improvement in full-chain sustainability.

Working together, consumers and the beef community can work towards improving not only beef sustainability, but full scale sustainability as well.

SECTION 5 – SAFETY

Purchasing and preparing beef safely is just as important as the way beef is raised, slaughtered and processed. Consumers want to know that what they are putting in their grocery cart is safe for their family, as well as nutritious.

While farmers, ranchers and food processors do their very best to ensure a safe beef product reaches the grocery store, consumers also play a large role in food safety as well. It is critical for consumers to understand the importance of properly thawing and preparing beef, avoiding temperature abuse and cooking it to the proper temperature.

For example, many consumers may not realize the importance of constant temperatures for their beef purchases. Keeping raw beef cold, below 41 degrees F, until you are ready to prepare it will ensure a more consistent meal that is more flavorful. Consumers can temperature control beef by refrigerating beef products immediately upon returning home from the grocery store or freezing beef for later use. Consumers should avoid allowing beef to be outside of refrigeration for extended periods of time.

Another important aspect of purchasing beef is how you plan your grocery trip. That's right – the order in which you buy your groceries is important. You should purchase your refrigerated products such as beef and milk last so that they spend as much time as possible in the refrigeration unit and as little time as possible in the cart. Additionally, you should never place raw meat products next to grocery items that don't have to be cooked. By encouraging consumers to do their grocery shopping after their other errands can help prevent temperature abuse of beef products.

Perhaps one of the most crucial parts of preparing beef in-home is to pay close attention to the potential for cross-contamination. Consumers should never use the same utensils or cutting boards for cooked beef that were also used for raw beef. All utensils and plates should be washed thoroughly with hot, soapy water before being reused. This not only applies to cross-contamination between cooked and raw beef but to cross-contamination between raw beef and uncooked foods such as vegetables, grains and fruits.

Defrosting beef often provides challenges to consumers, especially when meal prep turns into a last-minute decision. However, quick meal preparation doesn't mean it has to be unsafe. For example, consumers can defrost ground beef in as little as four minutes in the microwave by placing the meat in a plastic Ziploc bag and alternating between 30 second bouts of heat and massaging the ground beef, until completely thawed. There are also a few ways to defrost or thaw whole muscle cuts, such as steaks or roasts, including submerging beef in cold water for an hour or removing beef from the freezer and thawing overnight in the refrigerator. Following these easy thawing methods can help ensure a tasty and safely prepared beef meal.

After purchasing and prepping beef, the easy part is the cooking. We already discussed how to choose the appropriate cooking method based on the cut of beef however, the temperature to which beef is cooked is critical to the safety, and ultimately, the enjoyment of beef. Cooking beef properly destroys potentially harmful pathogens such as *E. coli*, *Salmonella* and *Listeria monocytogenes*. Regardless of the method of cooking, all whole muscle beef cuts, such as steaks and roasts, should be cooked to at least 145 degrees Fahrenheit and ground beef should be cooked to 160 degrees Fahrenheit. After removing from heat, consumers should allow beef to rest for three minutes before serving.

By following proper handling, thawing and cooking food safety procedures, consumers can be confident that they are serving their family beef that is wholesome and safe.

SECTION 6 – CHOOSING AND PREPARING THE RIGHT BEEF CUT

Preparing and cooking meals for friends and family is often a relaxing and fulfilling event for many consumers, but some may find stress in determining how to cook certain cuts and what proper cooking temperatures are for beef. You can help consumers by sharing information about what cuts are best prepared in which ways.

When purchasing beef at the grocery store, consumers may get confused by the various labels that describe the quality grade of beef cuts. Quality grades are assigned in the slaughter plant to about 95% of all USDA graded carcasses and are based off of the amount of marbling and the maturity of the muscle on a beef carcass. Marbling, or intramuscular fat, is more tender than muscle and contributes to flavor. Therefore increased levels of marbling are associated with improvements in tenderness and flavor. This is why cuts like the ribeye and t-bone are more tender than a roast – they contain more marbling.

There are six levels of marbling which correlate to a quality grade that you see on packages at the grocery store; prime, choice or select. Those six levels are moderately abundant and slightly abundant, moderate and modest, and small and slight. Moderately abundant and slightly abundant are both related to prime. Moderate marbling is indicative of a high choice product and modest marbling is associated with

average choice products. Small marbling and slight marbling relate to low choice and select, respectively.

Flavor and taste are extremely important to beef community members and consumers alike. The utmost goal of the beef community is to provide the consumer with the best possible eating experience each time a consumer chooses beef. By knowing which cuts are more flavorful and tender, you can help consumers choose cuts that meet their expectations for a delicious meal. For example, did you know that rich beef flavor moves from the front of the beef carcass to the back? Cuts from the chuck will have a rich flavor whereas cuts from the round will have more of a mild flavor. Cuts from the rib, loin and sirloin, which are in the middle of the carcass, will have more of a moderate flavor.

So, if a consumer is looking for a lot of marbling with a moderate flavor, you can easily refer them to a prime T-bone, which will surely deliver both a high level of marbling and the moderate beef flavor they are seeking.

Pairing the right cut with the proper cooking method is a key component of ensuring a good eating experience. Let's begin with grilling, one of America's favorite ways to prepare beef. Some of the best cuts for grilling include the strip steak – sometimes calls a Kansas City Strip, which is a bone-in strip, or a New York Strip, which is boneless – Flank Steak, Ribeye and T-bone Steak.

To prepare a steak for grilling, remove it from the refrigerator shortly before the grill is ready. You can season beef with herbs and spices prior to grilling, but hold the salt until you take the steak off the grill. Salting prior to grilling removes moisture from the meat. Place the steaks on the grill over medium heat for best results, turning only once. Use a meat thermometer to determine the proper doneness, according to your preference. Grill to an internal temperature of 145 degrees for medium rare, 160 for medium and 170 for well done.

Always let a steak rest for at least five minutes prior to cutting into it. This allows the juices to reabsorb into the meat for a juicier steak.

Broiling beef is a good option for steaks when you don't have access to a grill. Some of the best cuts for broiling include the T-Bone steak, tenderloin steak and 93% lean ground beef patties.

Set your oven for broiling and preheat for 10 minutes, season the beef with herbs or spices, as desired, then place beef on rack of the broiling pan and broil to your desired doneness. Again, after cooking, season beef with salt, if desired.

Skillet cooking, or pan-broiling, is a good option for preparing ground beef for tacos or other recipes that call for ground beef as an ingredient. Choosing 95 percent lean or leaner ground beef will reduce the fat content.

Heat a nonstick skillet over medium heat until hot and add the ground beef. When skillet cooking ground beef crumbles, break into $\frac{3}{4}$ inch crumbles and stir occasionally. When finished, drain off the excess drippings to reduce the fat.

Pan-frying is another good option when you don't have access to a grill. Some of the best cuts for pan-frying include cubed steak, sirloin tip steak and the flat iron steak.

Heat a small amount of oil in a heavy, non-stick skillet over medium heat until hot. Remove beef from the refrigerator and season, as desired, place beef in the preheated skillet and pan fry until desired doneness, turning occasionally. Be careful not to overcrowd beef in the skillet. As always, season beef with salt after cooking, if desired.

Stir-fry is another popular preparation method. Some of the best cuts for stir-fry include Top Sirloin, Sirloin Tip Steak and Flat Iron.

Cut beef into thin, uniform strips and marinate to add flavor. Heat a small amount of oil in a wok or large non-stick skillet over medium heat until hot. Stir-fry beef in half-pound batches to prevent overcrowding, which steams the beef. Continuously turn beef with a scooping motion and cook until the outside surface is no longer pink. Add additional oil for each batch, if necessary.

Braising or pot-roasting beef works well with cuts that are less tender than steaks, including cuts from the chuck such as a pot roast or short ribs, and cuts from the round including a bottom round roast or boneless bottom round steak. Braising also works well with brisket.

Slowly brown the beef on all sides in a small amount of oil in a heavy pan over medium heat then pour off the drippings. Season as desired and add a small amount of liquid – $\frac{1}{2}$ to 2 cups – such as broth, water, juice, beer or wine. Cook tightly and simmer gently over low heat on top of the range or in a preheated 325 degree oven until beef is fork tender.

Stewing is another good method for less tender cuts from the chuck and round.

Coat beef lightly with seasoned flour then heat a small amount of oil in a heavy stockpot over medium heat. Slowly brown beef in batches on all sides and pour off the drippings. Cover beef with liquid such as broth, water, juice, beer or wine and add herbs or seasonings, as desired. Bring the liquid to a boil, then reduce the heat to low. Cover tightly and simmer over low heat until fork tender.

Slow cooking beef is another option for the cuts such as brisket, pot roast and stew meat.

Place vegetables on the bottom and around the sides of the slow cooker and place beef on top (for extra beefy flavor brown beef before place in the slow cooker). Add liquid

such as broth, water, juice, beer or wine, cover and cook on either high or low until beef is fork tender.

Oven roasting beef is a popular cooking method around the holidays but can also turn any meal into a special occasion. Some of the best cuts for roasting include a strip roast, ribeye roast or tenderloin roast.

Remove the roast from the refrigerator and place directly on rack in a shallow roasting pan, fat side up. Preheat the oven and season roast with herbs and seasonings, as desired. Insert an ovenproof thermometer so the tip is centered in the thickest part of the roast, not resting in fat or touching bone. Remove roast from oven when it reaches 5 to 15 degrees UNDER the desired doneness and transfer to a carving board and tent loosely with aluminum foil. Let roast stand for 15 to 20 minutes before slicing. The temperature will rise 5 to 15 degrees to reach desired doneness and roast will be easier to carve.

Marinating or rubbing steaks will add flavor and improve tenderness of some cuts. If you just want to add flavor to a tender steak like a T-bone, strip, ribeye or tenderloin. If you are short on time, a rub is the best choice. If you have an additional 15 minutes to 2 hours you can use a marinade to add flavor. Some steaks such as the flank or skirt steak will benefit from marinating to improve tenderness. For these cuts you want to use a tenderizing marinade that contains acidic ingredients – such as lemon juice or flavored vinegar – or natural enzymes, like ginger or pineapple. If marinating for tenderness you'll need an additional 6 to 24 hours.

Another important aspect of the beef eating experience is pairing beef with complementary foods that will enhance beef's great taste. Beef is a natural source of the umami flavor that is derived from glutamates, which are the salts of an amino acid. The umami taste is described as meaty, savory and delicious and, when paired with other umami rich foods, the two will have a magnifying effect on each other and produce 8x more flavor. Examples of this umami synergy are experienced when consumers pair red wine, bacon, aged cheeses, tomatoes or mushrooms with beef.

Of course these aren't the only foods that beef can be paired with for a great eating experience. There are many other foods and seasonings that pair well with beef including bell peppers, onions, garlic, thyme, peppercorns, mustard and soy sauce, just to name a few.

Some prime examples of beef pairings that will yield a delicious eating experience are:

- Steak with Bleu Cheese
- Prime Rib with Red Wine Mushroom Sauce
- Sesame-Soy Beef Stir-Fry
- Beef & Wild Mushroom Ragout

By pairing your favorite cut of beef with complementary foods that are rich in umami flavoring you can be confident that your meal will be savory and delicious.

Ground beef is known for its flexibility and ease of implementation in a diverse culture of food and is one of most highly purchased and consumed beef products in the U.S. Many consumers are surprised to know that ground beef and hamburger, which are used interchangeably both in conversations and recipes, are different products. You can clarify the difference for them by explaining that hamburger may have added beef fat mixed in, up to 30%, but ground beef may not have additional fat mixed into the grind. This difference in fat content can also make purchasing decisions confusing. For example, a grocery store may have three different kinds of ground beef for sale: 93/7, 90/10 and 80/20. The average consumer may not know that these numbers indicate the lean to fat ratio. You can explain that a 93/7 package of ground beef is 93% lean and 7% fat, 90/10 indicates 90% lean and 10% fat and 80/20 is 80% lean and 20% fat. So a consumer who wants a leaner product should choose the 93% lean package of ground beef. Many people may prefer a higher fat content, such as 80/20, for things like burgers. The higher fat adds flavor and juiciness. Consumers should know that there are ground beef choices that can be part of a healthful dietary pattern.

Many consumers may believe ground turkey or ground bison are leaner than ground beef. However, while bison is very lean, the fat content of any ground meat varies depending on the mix of lean and fat. Many restaurants tout turkey and veggie patties as “healthier” burgers but you’d have to check the nutrition info for their menu for fat content.

A great conversation starter with a consumer who is concerned about the fat content of beef is to ask: which is leaner, ground beef, bison or turkey. The answer, of course, is “it depends.” You have to check the label in the store or ask for the menu nutrition info at your favorite restaurant to be sure.

To maximize your eating experience and get the most flavorful results from your beef meal remember these five easy cooking tips from culinary expert and long-time chef, Dave Zino.

1. Always cook steaks to medium rare to medium doneness to maximize umami
2. Always use an instant read meat thermometer to determine doneness
3. Never use a fork to turn steaks; you are piercing the beef and losing flavorful juices
4. Pair Umami rich ingredients with beef to magnify the Umami eating experience
5. Rubs and marinades are a great way to enhance beef’s flavor profile.

These and other beef cooking and handling tips can be found online at [BEEF IT'S WHAT'S FOR DINNER DOT COM](http://BEEF.IT'S.WHAT'S.FOR.DINNER.DOT.COM). By sharing these cooking tips, you can instill confidence in consumers that they can try new cuts that are flavorful, easy to prepare and fit into a healthy, balanced diet.

SECTION 7 – SUMMARY

Now it's time to test your beef purchasing and cooking knowledge. Please complete the following 10 question quiz. If you get a question wrong, you can go back into the course to find the correct answer. You'll need to score at least a 70 percent before advancing to the next section. Good luck!

Animal care and animal well-being are highly important during all stages of the beef lifecycle – consumers want to know that the beef they are purchasing and consuming is humanely raised and slaughtered. Often times, they will refer to the label on the beef packaging to try to garner information about how the animal was raised and processed. However, just merely reading the label is not a reliable way to determine if an animal was raised and slaughtered humanely. Beef farmers and ranchers from various production types – whether grass-finished, grain-finished, natural and organic – care deeply about their livestock and do their best to provide them with comfort and high-quality animal care. These are virtues that can't be adequately described on a label that may only state “natural,” “grain-fed” or “grass-finished.”

Some retailers and meat processing companies have developed their own “humanely raised” labels to certify that the animals met certain guidelines established by the retailer. In order to fully understand what these labels mean, consumers need to ask the retailer what standards are required for the label and how they verify those standards are met. Once again, however, regardless of what is on the label, the fact is that cattle farmers and ranchers strive to give their animals the best possible care at all times and consumers should feel confident in the industry's commitment to offer beef that is humanely raised and slaughtered – without having to look at the label.

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throughout the day. The iron in beef helps your body transport and use oxygen to help you power through the day. And most consumers will know the importance of protein in the diet, but if they are unsure, you can share with them that protein is crucial to muscle growth and development, supplies fuel for the body and can help satisfy your hunger and maintain a healthy weight. In fact, a 3-ounce serving of beef provides 25 grams of protein, about half of the Daily Value, which is the minimum amount to prevent deficiency.

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³³ Cotton PA, Subar AF, Friday JE, Cook A. Dietary sources of nutrients among US adults, 1994 to 1996. *J Am Diet Assoc* 2004;104:921-30.

³⁴ National Cancer Institute, Risk Factors Monitoring and Methods Branch. Food sources of oleic acid (MFA 18:1), listed in descending order by percentages of their contribution to intake, based on data from the National Health and Nutrition Examination Survey 2005-2006. Available at: http://riskfactor.cancer.gov/diet/foodsources/fatty_acids/table1.html.

³⁵ Leidy HJ, Ortinau LC, Douglas SM, Hoertel HA. Beneficial effects of a higher-protein breakfast on the appetitive, hormonal, and neural signals controlling energy intake regulation in overweight/obese “breakfast-skipping” late-adolescent girls. *Am J Clin Nutr* 2013;97(4):677-88.

called sarcopenia. Maintaining skeletal muscle in an older person requires a moderate serving of a high-quality protein source with each meal.

Clearly, beef is good for the body but consumers should remember to pair beef cuts with whole grains, fruits and vegetables. These things combined can help consumers, and their families, enjoy a balanced healthful diet, like those outlined in the Dietary Guidelines for Americans and *MyPlate*.

One of the greatest opportunities for improvement with regard to sustainability is a reduction of food waste. An estimated 40 percent of all food produced in the United States is wasted, contributing to losses in efficiency across the entire food value chain. Food waste costs the average American family approximately \$2,500 annually. In addition to food security issues, food waste has environmental impacts as well, contributing to greenhouse gases from solid waste landfills. Together with the beef community, consumers can make continuous improvements. According to the United States Department of Agriculture (USDA), beef is one of the least wasted commodities, with 20 percent spoiled or not eaten at the consumer level. It is still a significant burden and represents a major opportunity to improve beef industry sustainability.

The beef community recently completed a first-of-its-kind [life cycle assessment](#) which was certified by NSF International, an organization that provides benchmarks on economic, environmental and social contributions in the United States. The check-off funded lifecycle assessment revealed that by cutting beef waste in half, the full beef value chain would achieve an approximate 10 percent improvement in full-chain sustainability. Working together, consumers and the beef community can work towards improving not only beef sustainability, but full scale sustainability as well.

While farmers, ranchers and food processors do their very best to ensure a safe beef product reaches the grocery store, consumers also play a large role in food safety as well. It is critical for consumers to understand the importance of properly thawing and preparing beef, avoiding temperature abuse and cooking it to the proper temperature.

For example, many consumers may not realize the importance of constant temperatures for their beef purchases. Keeping raw beef cold, below 41 degrees F, until you are ready to prepare it will ensure a more consistent meal that is more flavorful. Consumers can temperature control beef by refrigerating beef products immediately upon returning home from the grocery store or freezing beef for later use. Consumers should avoid allowing beef to be outside of refrigeration for extended periods of time.

Another important aspect of purchasing beef is how you plan your grocery trip. That's right – the order in which you buy your groceries is important. You should purchase your refrigerated products such as beef and milk last so that they spend as much time as possible in the refrigeration unit and as little time as possible in the cart. Additionally, you should never place raw meat products next to grocery items that don't have to be cooked. By encouraging consumers to do their grocery shopping after their other errands, you can help prevent temperature abuse of beef products.

Perhaps one of the most crucial parts of preparing beef in-home is to pay close attention to the potential for cross-contamination. Consumers should never use the same utensils or cutting boards for cooked beef that were also used for raw beef. All utensils and plates should be washed thoroughly with hot, soapy water before being reused. This not only applies to cross-contamination between cooked and raw beef but to cross-contamination between raw beef and uncooked foods such as vegetables, grains and fruits.

Defrosting beef often provides challenges to consumers, especially when meal prep turns into a last-minute decision. However, quick meal preparation doesn't mean it has to be unsafe. For example, consumers can defrost ground beef in as little as four minutes in the microwave by placing the meat in a plastic Ziploc bag and alternating between 30 second bouts of heat and massaging the ground beef, until completely thawed. There are also a few ways to defrost or thaw whole muscle cuts, such as steaks or roasts, including submerging beef in cold water for an hour or removing beef from the freezer and thawing overnight in the refrigerator. Following these easy thawing methods can help ensure a tasty and safely prepared beef meal.

Preparing and cooking meals for friends and family is often a relaxing and fulfilling event for many consumers, but some may find stress in determining how to cook certain cuts and what proper cooking temperatures are for beef. You can help consumers by sharing information about what cuts are best prepared in which ways.

When purchasing beef at the grocery store, consumers may get confused by the various labels that describe the quality grade of beef cuts. Quality grades are assigned in the slaughter plant to about 95% of all USDA graded carcasses and are based off of the amount of marbling and the maturity of the muscle on a beef carcass. Marbling, or intramuscular fat, is more tender than muscle and contributes to flavor. Therefore increased levels of marbling are associated with improvements in tenderness and flavor. This is why cuts like the ribeye and t-bone are more tender than a roast – they contain more marbling.

There are six levels of marbling which correlate to a quality grade that you see on packages at the grocery store; prime, choice or select. Those six levels are moderately abundant and slightly abundant, moderate and modest, and small and slight. Moderately abundant and slightly abundant are both related to prime. Moderate marbling is indicative of a high choice product and modest marbling is associated with average choice products. Small marbling and slight marbling relate to low choice and select, respectively.

Flavor and taste are extremely important to beef community members and consumers alike. The utmost goal of the beef community is to provide the consumer with the best possible eating experience each time a consumer chooses beef. By knowing which cuts are more flavorful and tender, you can help consumers choose cuts that meet their expectations for a delicious meal. For example, did you know that rich beef flavor

moves from the front of the beef carcass to the back? Cuts from the chuck will have a rich flavor whereas cuts from the round will have more of a mild flavor. Cuts from the rib, loin and sirloin, which are in the middle of the carcass, will have more of a moderate flavor.

So, if a consumer is looking for a lot of marbling with a moderate flavor, you can easily refer them to a prime T-bone, which will surely deliver both a high level of marbling and the moderate beef flavor they are seeking.

Use a meat thermometer to determine the proper doneness, according to your preference. Grill to an internal temperature of 145 degrees for medium rare, 160 for medium and 170 for well done. Always let a steak rest for at least five minutes prior to cutting into it. This allows the juices to reabsorb into the meat for a juicier steak.

Beef is a natural source of the umami flavor that is derived from glutamates, which are the salts of an amino acid. The umami taste is described as meaty, savory and delicious and, when paired with other umami rich foods, the two will have a magnifying effect on each other and produce 8x more flavor. Examples of this umami synergy are experienced when consumers pair red wine, bacon, aged cheeses, tomatoes or mushrooms with beef.

Of course these aren't the only foods that beef can be paired with for a great eating experience. There are many other foods and seasonings that pair well with beef including bell peppers, onions, garlic, thyme, peppercorns, mustard and soy sauce, just to name a few.

Some prime examples of beef pairings that will yield a delicious eating experience are:

- Steak with Bleu Cheese
- Prime Rib with Red Wine Mushroom Sauce
- Sesame-Soy Beef Stir-Fry
- Beef & Wild Mushroom Ragout

By pairing your favorite cut of beef with complementary foods that are rich in umami flavoring you can be confident that your meal will be savory and delicious.

To maximize your eating experience and get the most flavorful results from your beef meal remember these five easy cooking tips from culinary expert and long-time chef, Dave Zino.

1. Always cook steaks to medium rare to medium doneness to maximize umami
2. Always use an instant read meat thermometer to determine doneness
3. Never use a fork to turn steaks; you are piercing the beef and losing flavorful juices
4. Pair Umami rich ingredients with beef to magnify the Umami eating experience
5. Rubs and marinades are a great way to enhance beef's flavor profile.

Lesson 1: The Beef Community Quiz Key

1. What are the “Two Cs” that should guide your conversations with consumers about beef?
 - We’re Concerned, We’re Capable
 - We’re Consumers; We’re Cautious
 - **We Care; We’re Capable**
 - We’re Concerned; We’re Cautious
2. Who is involved in the ‘beef community?’
 - Farmers and ranchers
 - Dieticians and nutritionists
 - Chefs and grocers
 - **All of the above**
3. What percentage of beef cattle farms and ranches are family owned?
 - 10%
 - 50%
 - **97%**
 - 25%
4. Where does the beef lifecycle begin?
 - **On a cow/calf farm or ranch**
 - At a feedlot
 - The sale barn
 - The grocery store
5. How many essential vitamins and nutrients does beef provide?
 - 2
 - 7
 - 5
 - **10**
6. What is the average size of an American beef cattle herd?
 - 100 head of cattle
 - 250 head of cattle
 - **50 head of cattle**
 - 10 head of cattle
7. Where is a growth promotant implant placed on the animal, if used?
 - In the animal’s mouth
 - **On the back the ear, under the skin**
 - At the tailhead
 - At the 12th rib
8. What is the definition of ‘natural’ according to the U.S. Department of Agriculture?

- Grass-finished beef
- Beef from horned cattle breeds
- Minimally processed
- Beef from a young animal

9. True/False: Grass-finished beef takes longer to raise than grain-finished beef.

10. Which of the following cuts of beef are designated as lean?

- Tenderloin and top sirloin steak
- 80% lean ground beef
- Ribeye
- Chicken breast

Lesson 2: Raising Cattle on Grass Quiz Key

1. Most cattle in the U.S. are raised on a combination of [blank] and [blank].
 - a. Grass and hay
 - b. Corn and distillers grains
 - c. Grass and grain**
 - d. Corn and wheat
2. Open space and pastures, managed by farmers and ranchers, provides habitats for [blank] percent of America's wildlife.
 - a. 50
 - b. 75**
 - c. 95
 - d. 25
3. Because 85 percent of U.S. grazing lands are unsuitable for growing crops, raising cattle on grasslands allows farmers and ranchers to more than [blank] the amount of land that can be used to raise food and allows us to raise cattle in all 50 United States
 - a. Double**
 - b. Triple
 - c. Quadruple
 - d. I wasn't paying attention 😊
4. According to the U.S. Department of Agriculture, there are approximately {blank} beef cattle farming and ranching operations in the United States. [Blank] percent of these cattle farms and ranches are family owned and operated.
 - a. 1 million/95
 - b. 741,211/90
 - c. 250,000/93
 - d. 619,000/97**
5. Match the cow/calf farm term with the definition (two lists side by side – matching pairs):
 - a. bulls (intact males)
 - b. cows (females who have given birth)
 - c. heifers (young females)
 - d. steers (castrated males)
6. Match the type of weaning with the facets of production (each aspect should pop up and users will need to choose the correct answer between fenceline and complete):
 - a. Cows out of sight and sound from calves (complete weaning)
 - b. Nose to nose contact (fenceline weaning)
 - c. Must use a strong barrier (fenceline weaning)
 - d. New location for cows (complete weaning)

7. Match the management strategy with the benefit (two lists side by side – matching pairs):
 - a. Branding (herd identification purposes)
 - b. Branding (individual record-keeping)
 - c. Castration (improve tenderness of meat)
 - d. Castration (limit aggressive behavior)

8. True/False: The most commonly used class of antibiotics in animal agriculture, Tetracycline is the least used in human medicine.

9. True/False: Whether they are grass- or grain-finished, there are more than 29 cuts of beef that meet the government guidelines for “lean” (according to the USDA, a serving of beef qualifies as “lean” if it contains 4.5 grams or less of saturated fat, less than 10 grams of total fat and less than 95 mg of cholesterol per 100 grams (3.5 ounces)).

10. The beef industry defines *sustainable* beef as meeting growing global demand by balancing [blank] responsibility, [blank] opportunity and [blank] diligence throughout the supply chain.
 - a. Environmental/Economic/Social
 - b. Personal/Equal/Financial
 - c. Financial/Economic/Personal
 - d. This is too hard 😊

Lesson 3: Life in the Feedyard Quiz Key

For individuals taking the course online: There is an error to the quiz in the lesson *Life in the Feedyard*. Question #3 regards Transportation and Beef Quality Assurance – the actual answer is **Beef and Transportation** however, the quiz accepts **Beef and Trucking** as the correct answer. We are working to fix this error but until then, please select **Beef and Trucking** to #3.

Questions for Life in the Feedyard

1. The earliest mention of corn feeding and cattle “fattening” in historical documents appeared in the late [blank] around the time of the arrival of British breeds, which were better suited to grain fattening than the Spanish breeds brought over by Columbus.

- a) 1700s
- b) 1800s**
- c) 1900s
- d) 1600s

2. While the perception perpetuated by animal rights activists is that cattle are “crammed” in to feedyards, the truth is most feedyards provide an average of [blank] square feet of pen space per animal.

- a) 50-100
- b) 100-200
- c) 125-250**
- d) 250-500

3. Fill in the blank: _____ Quality Assurance and _____ Quality Assurance are two checkoff-funded programs that are examples of the beef community’s commitment to supreme animal care at all stages of the beef lifecycle.

Answer: “Transportation and Beef” or “Beef and Transportation” - not acceptable is “Beef and Beef” or “Transportation and Transportation.”

4. Which of the following are safeguards for human health against growth promotant and antibiotic residues in meat? (choose all that apply)

- a) Observing proper withdrawal times**
- b) Pumping animals full of hormones and antibiotics
- c) FSIS inspection and testing during slaughter and processing**
- d) Not using antibiotics or growth promotants in feedyards

5. Which of the following is a consumer benefit of growth promoting implants?

- a) Stimulate animal’s own hormone production

- b) Replace natural hormones that are absent from the animal due to castration
- c) Promote increased growth, which contributes to producing more beef using fewer natural resources.
- d) Make more profit for the producer

6. True/False – There are a multitude of studies that have shown no harm to either animals who have consumed bioengineered feeds or humans who have consumed food products from those animals.

6. Which of the following may be included in a typical feedyard ration?

- a) Soybean meal
- b) Blood meal
- c) Corn
- d) Hay and other forage
- e) Alfalfa
- f) Antibiotics

7. Fill in the blank: Animals that are finished in a feedyard are ready for harvest approximately _____ months earlier than cattle that are finished on grass.

Answer: 6-12 months

8. According to the lifecycle assessment funded by the beef checkoff, the beef industry showed an overall improvement in sustainability of [blank] while the environmental and social sustainability of beef improved by [blank] from 2005-2011?

- a) 7/5%
- b) 10/12%
- c) 12/10%
- d) 5/7%

9. According to a 2013 study from the United Nations Food and Agriculture Organization, [blank] could help the global livestock sector cut its outputs of global warming gases by as much as 30 percent.

- a) Reducing global meat consumption by 15%
- b) Raising cattle exclusively on grass pastures
- c) Wider adoption of existing best practices and technologies in feeding, health and husbandry, and manure management
- d) Banning deforestation in the Amazon

10. True/False: Bacteria linked to foodborne illness, like E. coli O157:H7, only occur at feedyards.

Lesson 4: From Cattle to Beef Quiz Key

1. Connect the dates (mix and match)

First known meatpacking business was started by Williams Pynchon in Boston	1869
First meatpacking plant west of the Appalachian Mountains opened in Cincinnati	1865
Union Stockyard opened in Chicago (hint: the same year the Civil War ended)	1818
First shipment of dressed beef by refrigerated railcar (from Chicago to Boston)	1662

2. Walkways, holding pens and the knock box at a slaughter plant are all designed with the welfare of the animal in mind and are meant to decrease the amount of stress during animal handling. Who is the world renowned animal behaviorist responsible for the design of animal handling facilities that are present in many slaughter plants?

- a) Dr. Doolittle
- b) Temple Grandin
- c) Claire Danes
- d) Jack Hanna

3. [Blank] is a part of the Beef Quality Assurance producer education program and dictates how cattle should be handled during transport and unloading at the slaughter plant.

- a) The downer ban
- b) Transportation Quality Assurance
- c) The knock box
- d) Humane Slaughter Act

4. As it relates to beef nutrition, the grade can be an indicator of total fat content. For example, [blank] beef will have more fat than [blank] or [blank] grade, across all cuts in the animal.

- a) Choice/Prime/Select
- b) Prime/Choice/Select
- c) Prime/Select/Choice
- d) Select/Choice/Prime

5. True/False: Monounsaturated fats, the kind of fats that are found in avocados and olive oil, make up more than 50% of the fatty acid profile of intramuscular fat or marbling.

6. Match the sustainability improvement with the appropriate category (social or environmental): (drag and drop question)

- a) Reduction in occupation illnesses and hazards – social
- b) Reduction in *E. coli* O157:H7 contamination – social
- c) Improvement in packing plant water efficiency - environmental

- d) Increased use of recovered biogas from wastewater lagoons – environmental
- e) Right size packaging – environmental

7. Match the following safety interventions that are implemented to control and reduce the prevalence of bacterial contamination with either “pre-harvest” or “post-harvest.”

- a) Administration of probiotics – pre-harvest
- b) *E. coli* and *Salmonella* vaccines – pre-harvest
- c) Spot carcass decontamination – post-harvest
- d) Chemical decontamination using a low concentration (1-3%) of acetic or lactic acid – post-harvest
- e) Spray-washing using water above 176°F (80°C) – post-harvest

8. The production and use of lean, finely textured beef, which is composed of _____% lean beef, allows the beef community to produce more lean beef using fewer cattle. In fact, if lean, finely textured beef was not produced, _____ additional head of cattle would need to be slaughtered to make up the difference.

- a) 85-90%; 1 million
- b) 90-95%; 1 million
- c) 94-97%; 1.5 million
- d) What is lean, finely textured beef?

9. Drag and drop: Which of the following precautions are taken against the potential transfer of prions which are responsible for bovine spongiform encephalopathy (BSE)?

- a) Removal of specified risk material (SRM) in cattle older than 30 months of age
- b) Eye scanning cattle upon arrival at plant
- c) Banning downer cattle from the food supply
- d) Only slaughtering cattle from the USA
- e) Testing all cattle with signs of neurological disorder

10. Since 1993, the beef checkoff has spent more than \$[blank] million on beef safety research, outreach and education. Furthermore, the beef industry invests more than \$[blank] million annually to implement interventions, conduct microbial testing and validation post-harvest.

- a) 550/35
- b) 50/350
- c) 35/550
- d) 350/50

Lesson 5: Beef, It's What's For Dinner Quiz Key

1. True/False: Consumers can tell if an animal was treated humanely or not by reading labels that indicate "organic" or "grass-finished."

2. Matching: Match the essential nutrient with the benefits they provide in a healthy diet.

Zinc	Helps your body maintain a healthy immune system
Iron	Helps your body transport and use oxygen to help you power through the day
Protein	Crucial to muscle growth and development, supplies fuel for the body and can help satisfy your hunger and maintain a healthy weight
B vitamins	Needed for healthy metabolism, which helps provide energy throughout the day

3. Fill in the blank: One ____ serving of beef provides more than ____ percent of ____ essential nutrients and vitamins for less than ____ percent of your daily calories.

A: 3, 10, 10, 10

4. True/False: Beef is considered one of the top sources for monounsaturated fat, which is the same kind of good fats found in avocados and olive oil.

5. The checkoff-funded beef lifecycle assessment revealed that if consumer waste of beef was cut in half, the full beef value chain would achieve approximately how much improvement in full-chain sustainability?

- a) 5%
- b) 7%
- c) 10%
- d) 50%

6. While farmers, ranchers and food processors do their very best to ensure a safe beef product reaches the grocery store, consumers also play a large role in food safety. Choose from the below the measures consumers can take in the grocery store and at home to be confident they are serving their family beef that is safe.

Word bank: purchase refrigerated products last at the grocery store, refrigerate beef immediately upon returning home, cook all beef to 160°F, never use the same utensils and cutting boards for cooked beef and raw beef, thaw beef at room temperature on the kitchen counter, do your grocery shopping before all your other errands, never use same utensils for raw beef and vegetables, keep raw beef below 41°F

7. Match the appropriate temperature with the cut of beef it relates to:

Ground beef – 160

Whole muscle cuts – 145

8. Pair the cooking method with the appropriate cut of beef:

Grilling – T-bone steak

Pan-frying – Cubed steak

Stir-fry – Top sirloin

Braising – Bottom Round Roast

Slow cooking – Brisket

Marinating – Flank steak

9. Which of the following foods are rich in umami taste and are a delicious pairing choice for beef?

a) Red wine

b) Bleu cheese

c) Mashed potatoes

d) Mushrooms

e) Brussel sprouts

f) Brown rice

g) Tomatoes

h) Kale

i) Bacon

10. An estimated ____ percent of all food produced in the U.S. is wasted. However, According to the United States Department of Agriculture (USDA), beef is one of the least wasted commodities, with 20 percent spoiled or not eaten at the consumer level.

1. a) 40/20

b) 30/20

c) 40/30

d) 30/10