

2017
CATTLEMEN'S
STEWARDSHIP
REVIEW



This report is dedicated to, and made possible by, U.S. cattle farmers and ranchers who work hard every day to responsibly raise beef.



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WELCOME TO THE BEEF COMMUNITY

Jaret Moyer, Moyer Ranch, Kansas
Joan Ruskamp, J & S Feedlot, Nebraska

The U.S. beef community is a diverse and fiercely independent group of people who are committed to creating the world's best beef. That means we value healthy animals, sustainable land and a safe product that helps ensure families — including our own — are nourished and strengthened by the beef they eat. We take pride in what we do and maintain a passion about the lifestyle we are privileged to live every day.

By feeding people around the world, we feel a sense of connection, not only to our beef, but also to the folks consuming it. Because of that responsibility, our industry continues to invest in research and make science-based decisions that improve what we do and the food we produce. This report is a way to benchmark our progress, celebrate our successes and identify opportunities for improvement.

We aren't just farmers and ranchers, but also animal caretakers, nutritionists, small business owners and environmentalists. Our communities depend on us in many ways to ensure rural economies are vibrant and strong. The people we employ depend on our farms and ranches that ultimately provide for their families. Our consumers depend on a quality product that provides important nutrients, like protein, zinc, iron and B vitamins.

This report is our story. It's a way to tangibly explain what is taking place throughout the beef community. Some things are tried and true, while others are innovative and new. At the end of the day, this is our way of life. We make decisions that contribute to the high-quality beef people love and expect. On behalf of the more than 700,000 U.S. cattle farmers and ranchers, we thank you for taking the time to learn more about what we do and why we do it.

CATTLEMEN'S STATEMENT OF PRINCIPLES

The beef community is committed to continuous improvement — whether it be in nutrition, animal welfare, food safety or sustainability. That commitment creates a strong desire to drive change, educate and learn. The Cattlemen's Statement of Principles, originally developed in 2011, is the pillar of the beef industry that all cattle farmers and ranchers strive to exemplify on their unique operations every day.

We believe in the following principles:

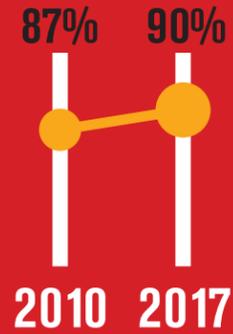
- **Preserving the environment:** We exercise good stewardship of the natural resources in our care by using science-based practices and principles that protect and sustain those resources for future generations. This includes minimizing soil loss, protecting water quality, promoting biodiversity, preserving wildlife and maintaining the overall health of the ecosystem.
- **Protecting our livestock:** We are honored to be stewards of our animals, and therefore, work daily to keep them safe, healthy and secure. We provide our animals with food and water; healthcare that prevents, controls and treats disease; and facilities and handling practices that promote safe and humane movement.
- **Providing quality food for consumers:** We are committed to providing consumers with wholesome, nutritious and high-quality beef options that support healthy and active lifestyles.
- **Enhancing food safety:** We are committed to continuous improvements in all aspects of food safety and dedicated to investing in research that leads to the application of science-based solutions.
- **Investing in our communities:** We are dedicated to being responsible citizens and active participants within our communities. That includes providing good jobs, contributing to the local economy and investing in community improvements and charities, including youth leadership organizations and faith-based groups. One of our core values is ensuring the health and sustainability of communities we live in.
- **Embracing innovation:** We recognize innovation based on sound science is vital to our industry as we strive to discover and apply new approaches that improve product quality and safety, animal health and environmental stewardship.
- **Creating a sustainable future:** We must operate our businesses in ways that meet consumer expectations for cattle care, environmental friendliness, beef safety and nutrition, while also ensuring our economic sustainability now and into the future. Successful, profitable cattle businesses help sustain local and national economies and provide opportunity for the next generation of farmers and ranchers.

Approved by cattle farmers and rancher leaders on the National Cattlemen's Beef Association Board of Directors at the Cattle Industry Annual Convention in February 2011.

CONTINUOUS IMPROVEMENT

BETTER BEEF

In 2010, 87 percent of cattle farmers and ranchers said they understand their management practices affect the safety and quality of beef. In 2017, that number increased to 90 percent.



“Our legacy will be that we took care of our cattle and always tried to do things the right way. We feel that this land, these acres here, are ours just for a short time. We are simply passing through and God has given us this to take care of and to bring it up to a better standard.”

– Susan Phillips, Valley View Farms, Virginia
(2015 Environmental Stewardship Award Winner)



“They’re my animals, they’re part of me, they’re the farm.”

– Cattle Feeder, New York

ABOUT THE CATTLEMEN’S STEWARDSHIP REVIEW

The Cattlemen’s Stewardship Review was developed by a team of people including scientists and industry experts. Research used is primary and secondary, like the Producer Profile Survey that was conducted for this report and data from the U.S. Department of Agriculture. Also included are a variety of research studies funded by the Beef Checkoff Program, such as the Sustainability Lifecycle Assessment and the National Beef Quality Audit.

In preparing this report, a variety of standards and a cross section of approaches and best practices have been used to inform the industry-wide view provided. With that said, reporting on behalf of an entire industry has its own set of challenges, especially when considering goal setting and measurement that applies across the beef community.

We are dedicated to being responsible citizens and active participants within our communities. That includes providing good jobs, contributing to the local economy, and investing in community improvements and charities, including youth leadership organizations and faith-based groups. One of our core values is ensuring the health and sustainability of communities in which we live.

We believe in the importance of these disclosure topics and we track progress in the ways we are able, while always looking for ways to broaden our tracking scope.

THE NATIONAL CATTLEMEN’S BEEF ASSOCIATION

The predecessor organization of the National Cattlemen’s Beef Association (NCBA) was initiated in 1898. Since its inception, the association has served as the marketing organization and trade association for America’s cattle farmers and ranchers. With offices in Denver and Washington, D.C., NCBA is a consumer-focused, producer-directed organization representing the largest segment of the nation’s food and fiber industry.

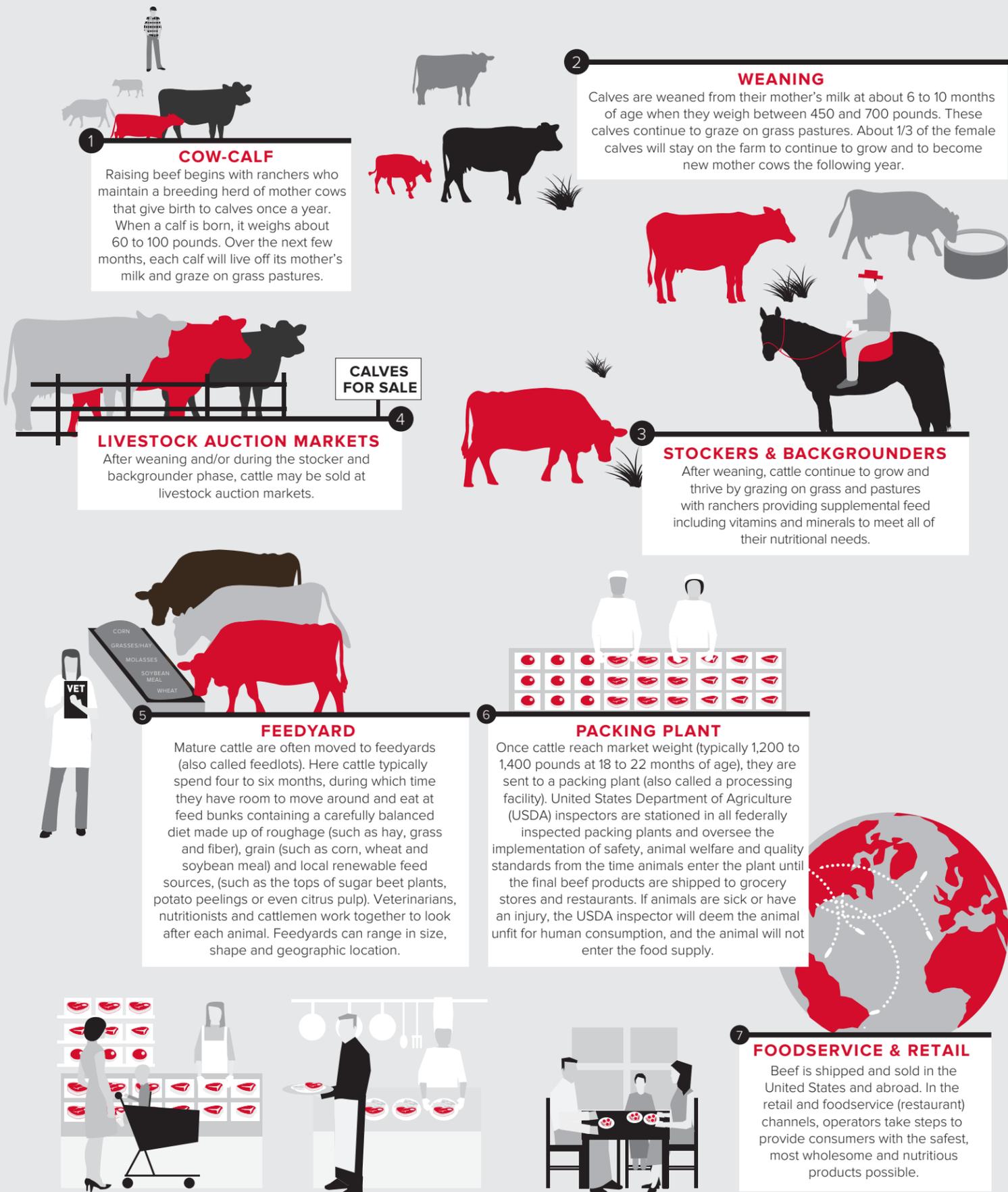
The NCBA Federation of State Beef Councils Division oversees beef and beef product promotion, research, information and related activities financed by the beef checkoff and similar market development investments. It also functions as the Federation of 45 Qualified State Beef Councils and carries out the duties and responsibilities assigned to the Federation by the Beef Promotion and Research Act and Order. In this way, NCBA coordinates state-national efforts to build demand for beef.

NCBA is the national trade association representing U.S. cattle producers, with more than 28,000 individual members and several industry organization members. NCBA represents more than 175,000 cattle producers and feeders. NCBA works to advance the economic, political and social interests of the U.S. cattle business and to be an advocate for the cattle industry’s policy positions and economic interests. The organization is also a contractor to the Beef Checkoff Program.

NCBA works to encourage the humane treatment of farm animals, the wise stewardship of natural resources and the implementation of good husbandry practices. The organization is involved in efforts like the Global Roundtable for Sustainable Beef and the U.S. Roundtable for Sustainable Beef, among others, to help ensure the continuous improvement in sustainability of the U.S. beef supply chain.



THE BEEF LIFECYCLE



THE BEEF BUSINESS LANDSCAPE



Beef has the most complex lifecycle of any food, and it takes two to three years to go from pasture to plate. Today's beef requires a dedicated community of experts who help create a wholesome, high-quality product that people can feel good about eating.

Farmers and ranchers face many uncertainties. These challenges range from market fluctuations to unpredictable weather, along with consumer demand, diet fads and nutrition trends.

All cattlemen and women are subject to the whims of Mother Nature – whether it be drought, floods or fire. These unpredictable situations create challenges for ranchers trying to implement long-term plans and run successful businesses. Additionally, consumers in the United States and abroad ultimately drive the demand for beef, so farmers and ranchers often shift their business models to ensure consumer expectations are being met.

Throughout the entire beef community, there is a shared commitment to raising cattle in a safe, humane and sustainable way. Working together, all segments of the value chain make the best use of resources like land, water and energy to raise beef that focuses not just on today, but the future. The result is delicious, healthful food for people to serve their families.

Approximately 80 percent of feedyards in the U.S. are family-operated and most have capacity for less than 1,000 head of cattle.

THE MANY BUSINESS MODELS OF BEEF

As of January 2017, there are more than 700,000 cattle farms, ranches and feedyards in the United States raising about 93 million beef cattle.¹ The vast majority are small, family-owned multi-generational businesses with an average beef cow herd of 40 head.²

Approximately 80 percent of feedyards in the United States are family-operated and most have capacity for less than 1,000 head of cattle — although feedyards that have greater than 1,000 head of cattle account for 80 percent of the beef inventory.² While the beef industry is thought to be the exclusive domain of men, an increasing number of these operations are operated by women; in fact, 11 percent of family-owned cattle farms/ranches are headed by women, and 5 percent of feedyards are owned by families that have a woman at the helm. While the average age of a cattle producer in the United States is 58, agriculture demographics are shifting to include more millennial farmers and ranchers, too.²

There isn't a one-size-fits-all approach to being successful in the beef industry. That's because beef is not vertically integrated like other livestock industries. Poultry and pork have each segment of their supply chain overseen by the same entity. That entity can be an individual farmer or a company. Beef is made up of many small businesses and suppliers who work together to ensure the product is ultimately delivered to consumers.

INCREASING COSTS

Between 2007 and 2012, agricultural production costs increased 36 percent. The largest expense categories in 2012 were feed, livestock and poultry purchases, fertilizer, hired labor and cash rent. The largest percentage increases were in seeds, chemicals and cash rent.²

The number of new farmers on beef cattle ranches was 19 percent fewer in 2012 than 2007, likely due to a significant drought that led to reduced herd size and higher beef prices.² There's a significant capital investment when starting or working to maintain a farm or ranch. When you're talking about raising beef, land is the largest upfront cost and is becoming increasingly difficult to find as our population grows.

THE ECONOMIC IMPACT

Americans love beef. That's clear when we look at the total U.S. beef consumption — in 2015, we ate about 17.3 billion pounds.³

What does that mean in terms of economic impact? A drive through a rural community makes the impact of ranching evident. Local businesses selling tractors, fencing, feed, cattle transportation services and animal care products line the roads. Small town bankers and veterinarians, as well as other professions such as doctors, dentists and sometimes tourism, also depend on ranch business.

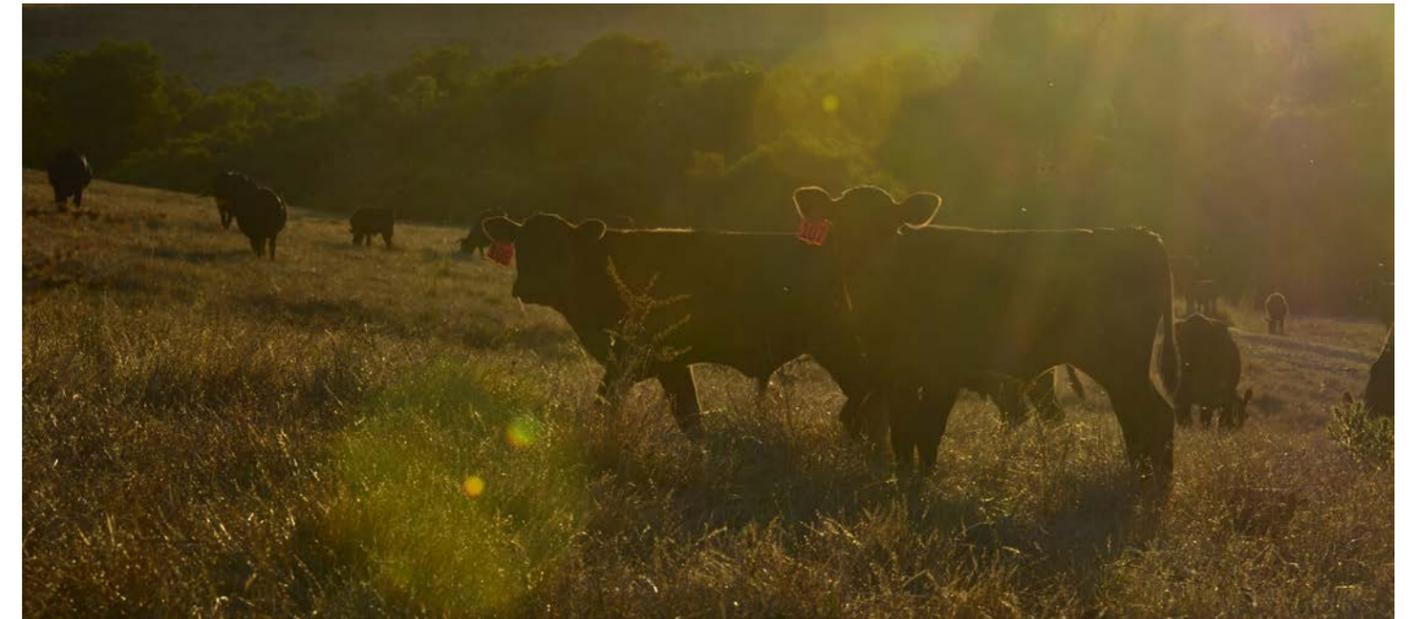
According to the U.S. Department of Agriculture Economic Research Service, the economic impact of the beef industry is \$88.25 billion in farm gate receipts for cattle and calves. When you broaden the lens to include all affiliated businesses, the beef industry directly and indirectly accounts for more than 1.4 million full-time jobs and more than \$188 billion in output to the national economy.

The demand for beef is growing on a global scale as well. The beef raised in the United States is also exported across the globe. In fact, due to strong demand for U.S.-produced beef, it is exported to more than 130 countries. The value of these beef exports is \$6.3 billion and top export markets for American beef include Japan, Canada, Mexico and South Korea.

The farm gate value is the net value of the product when it leaves the farm, after marketing costs have been subtracted.

WHAT IS THE BEEF CHECKOFF?

The Beef Checkoff Program was established as part of the 1985 Farm Bill. The checkoff assesses \$1 per head on the sale of live domestic and imported cattle, in addition to a comparable assessment on imported beef and beef products. The checkoff assessment became mandatory when the program was approved by 79 percent of producers in a 1988 national referendum vote.



The checkoff is collected by qualified state beef councils, which retain up to 50 cents on the dollar. The state councils forward the other 50 cents per head to the Cattlemen's Beef Promotion and Research Board, which oversees the national checkoff program, subject to USDA review. The 100 members of the Cattlemen's Beef Board represent all segments of the beef industry, including beef, veal and dairy producers, as well as cattle and beef importers, and are nominated by industry organizations and importers and appointed by the U.S. Secretary of Agriculture.

The structure of the Beef Checkoff Program is based on the following directives:

- All producers and beef importers pay the checkoff. Producers pay \$1 per head per transaction on live animals and a per pound equivalent on imports.
- Producers in the state may control up to half of the money collected by state beef councils.
- All national checkoff-funded programs are budgeted and evaluated by the Beef Board's Operating Committee.
- Beef Board members are nominated by fellow beef producers.



USDA'S ROLE IN THE BEEF CHECKOFF

Congress created a governmental entity – the Beef Board – to carry out the Beef Act's program, and the U.S. Secretary of Agriculture elaborated upon the powers and duties set out in the Act with development of the Beef Order. Congress delegated to USDA the responsibility for implementation and oversight of the Beef Promotion and Research Act and all associated beef checkoff programs.

The U.S. Secretary of Agriculture exercises comprehensive control over use of checkoff assessment revenues by the Beef Board and Operating Committee. The Secretary:

- Approves the Beef Board's annual budget, and the Board and Operating Committee may incur only those expenses that the Secretary deems reasonable.
- Approves the plans, projects and contracts of the Beef Board and Operating Committee.
- May inspect and audit the books and records of the Beef Board and the Operating Committee at any time.
- Appoints all members of the Beef Board based on nominations from beef organizations in each state.
- Exercises approval authority over all promotional, research and educational materials, including advertising, and all producer communications, in advance of their dissemination.

WELCOME TO THE U.S. BEEF COMMUNITY

People who raise beef have different preferences about what they're called based on their location in the United States. For this report, we'll refer to both beef/cattle farmers and ranchers, as well as cattlemen and women. The beef community includes the numerous and varied experts throughout the beef production process, such as farmers, ranchers, veterinarians, animal nutritionists, packers/processors, and even retailers and foodservice entities.



HEALTHIER ANIMALS



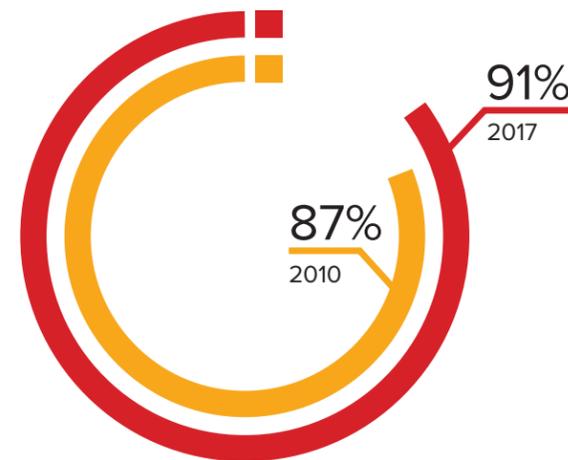
Animal care is at the heart of everything the beef community does. Beef farmers and ranchers are committed to raising healthy animals. In many cases, these farmers and ranchers have lived on the same land for generations, and their livelihoods depend on healthy cattle. A commitment to continuous improvement is engrained in farmers and ranchers across the country. It's the right thing to do, not only for the animals, but also for the consumer and the environment.

"I expect my cattle to be treated in as good a manner as I hope to be taken care of myself."
-Rancher, Texas

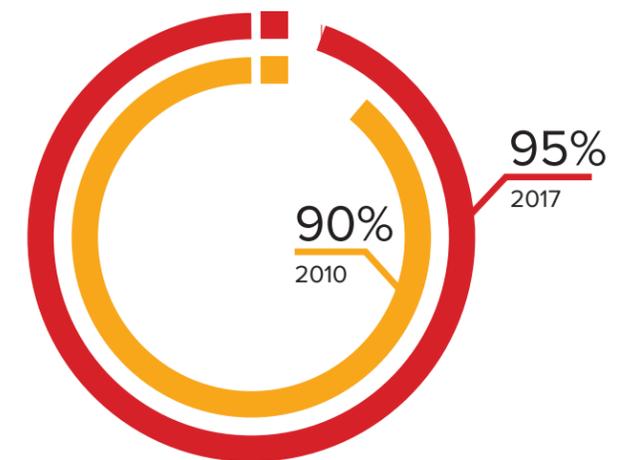
"Even though they're animals, my attitude is that they deserve the best I can give them. I care for them as one of my top priorities."
-Rancher, Washington

HOW WELL DO EACH OF THE FOLLOWING STATEMENTS DESCRIBE YOU AND YOUR MANAGEMENT PRACTICES ON A SCALE OF 0 TO 10?*

Make sure cattle are healthy, provide appropriate treatment when needed



Well-being of my cattle is job one for me



* Responses reference top three box score

SOURCE: Producer Profile Survey, 2017, Aspen Media

Animal care, also referred to as animal welfare and animal well-being, is an umbrella term that encompasses numerous factors. These factors are what guide the beef community each day to help ensure beef is safe and animals are humanely raised. While some aspects may vary due to the complexity of the beef lifecycle and the fact that beef is raised differently in various parts of the country, the commitment to animal care for beef farmers and ranchers is a top priority.

The following are important factors that all play a role in animal care:

-  **Facilities**
-  **Genetics**
-  **Nutrition**
-  **Health management**
-  **Humane slaughter**
-  **Quality assurance**

FACILITIES



There are beef farms and ranches across the country, in all 50 states, with vastly different climates and a wide variety of resources available. This is an important distinction within the beef community – numerous types of operations, weather factors and geography all contribute to the uniqueness and versatility of the farms and ranches where beef is raised.

A ranch in the southwest is going to manage their resources and facilities in a different way than a farm in the northeast. Weather, grass and breed differences all impact the types of facilities that are most beneficial on each individual operation.

Facilities are built with cattle comfort in mind. This was a focus area for Temple Grandin, Ph.D., world-renowned animal behaviorist and designer of livestock handling facilities, who has served as an advisor for several beef industry programs.

Cattle spend most their time on pasture, but when they move to a feedyard for the last four to six months of their lives, they are met with the same quality of care they received at the ranch. At the feedyard, cattle have constant access to water and free access to feed bunks (meaning they come and go as they please).

Feedyards do look different than cow-calf and backgrounding operations. The main difference is that cattle do not graze on pasture. Rather, they typically are separated into groups of 50-100 animals and have ample room to walk, run, socialize and lie down. They are fed a balanced diet, formulated by an animal nutritionist, typically twice a day.

Feedyard owners and employees, just like cow-calf farmers and ranchers, are deeply concerned about the welfare of the cattle in their care and are continually

Some feedyards are now using electronic identification tags, called RFID tags, to track animal movement in the yards, which helps identify cattle that are not coming to the feed bunk or moving frequently.



Early identification of sickness leads to better animal health and welfare, as well as a reduction in antibiotic use.

working to improve the well-being of every animal housed in the yard. The Beef Quality Assurance (BQA) program also provides guidance on how best to handle animals. Additionally, many feedyard owners require their employees to complete low-stress animal-handling training and complete the BQA certification program, so that all who encounter cattle are utilizing low-stress stockmanship methods to ensure a healthy environment.

GENETICS

Farmers and ranchers spend significant time and resources ensuring the genetics they select for their herd will improve the overall quality of the beef they are raising for America's consumers, and the cattle are best suited to the environment where they are raised.

Beef nutrition and efficiency begins on the farm with genetic selection. We know that some breeds' genetics contribute to more tender steak while other breeds of cattle are known for qualities such as calving ease, growth efficiency or producing more muscle mass. From a sustainability perspective, different breeds are better suited to certain climates and available resources.

POPULAR CATTLE BREEDS



HEREFORD

The Hereford breed originated in England nearly 250 years ago by farmers who needed cattle that were efficient at converting native-grasses into beef for a growing population. That trait continues to be a benefit for ranchers today as Herefords are widely used worldwide. Their popularity is due in part to their resilience in difficult climates, high reproductive performance and low maintenance costs.



ANGUS

Angus is probably the most recognized cattle breed. Angus cattle require little maintenance during calving season, are good mothers and are very feed efficient. They were developed from cattle native to the counties of Aberdeenshire and Angus in Scotland. Angus cattle are naturally polled (with no horns) and solid black or red.



CHAROLAIS

Charolais cattle originated from France and were brought to the U.S. in the mid-1930s. They are used in many crossbreeding programs to increase the amount of lean muscle on an animal because they are large-bodied, heavier cattle. Charolais cattle can withstand cold relatively well, are more heat tolerant than darker hided breeds and raise heavier calves. They are naturally horned; however, through genetic selection by farmers and ranchers, polled Charolais (with no horns) have become an important characteristic of the breed.

One of the best genetic management tools for improved reproduction in commercial beef operations is crossbreeding. Crossbreeding allows cattlemen and women to create a breed mix that combines the strong points of one breed to offset the weaker characteristics of another. This important focus on genetics contributes not only to animal performance and improved quality but also to the sustainability of beef.

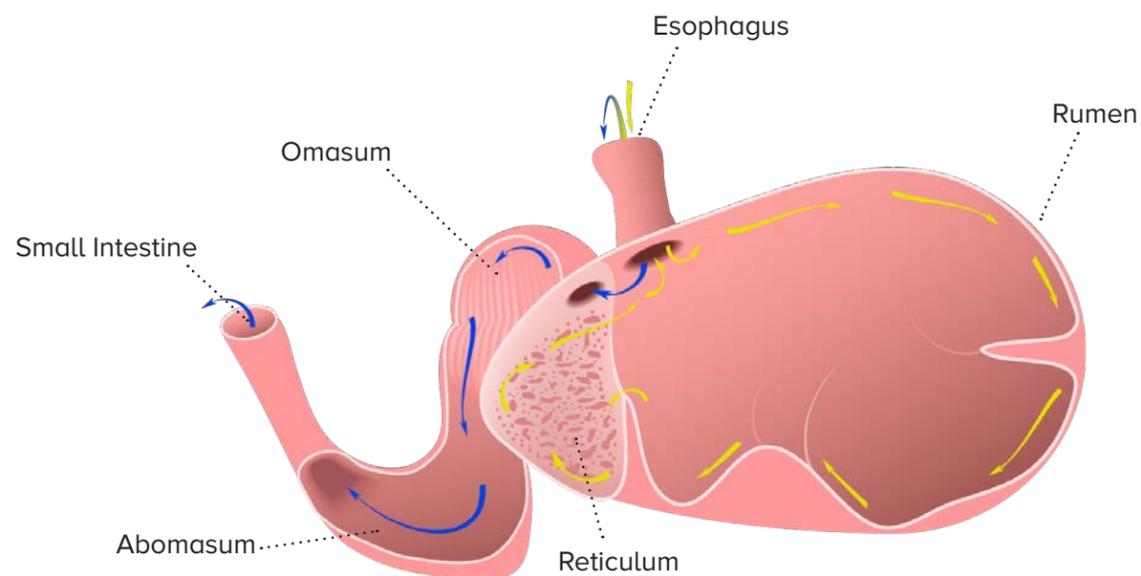


NUTRITION

The diet of beef cattle contributes to the efficient growth of the animal and the production of wholesome, delicious and nutritious beef. Cattle spend most of their lives grazing on grass — and some continue to graze solely on grass their entire lives to produce grass-finished beef. Many ranchers choose to raise grass-finished beef because they live in an area with lush grasses. But most beef cattle — approximately 95 percent — are finished on grain in a feedyard. Cattle in feedyards typically reach market weight around three to six months earlier than those raised on grass alone.

Cattle in feedyards are fed a carefully crafted diet 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. While at the feedyard, cattle are fed rations that are formulated by an animal nutritionist whose sole responsibility is to ensure the animals are receiving all the nutrients necessary for them to thrive.

It's important to point out that beef cattle, like other ruminants, have a digestive system that includes a multi-compartment stomach that can digest fibrous materials such as grass, corn stalks, cottonseeds, alfalfa and grass hays, for example.



Bacteria and protozoa residing in the stomachs of cattle release nutrients that can be utilized by ruminant animals, but not humans. Unlike most other animals, cattle can consume co-product feeds like corn gluten, distillers grains, brewers grains, potato by-products, soybean hulls, citrus pulp and other products that are considered waste products and might otherwise end up in landfills. This means cattle are acting as “upcyclers” in our food system. Rather than simply recycling, cattle are upgrading human inedible material or food waste into high-quality protein and essential micronutrients, such as zinc, iron and B vitamins.

A typical finishing diet may include high percentages of grains that 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 in the muscle. Corn and wheat are good sources of energy and carbohydrates for cattle. There are also many other beneficial feed ingredients.



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 in fiber which is necessary for rumen health.



Barley is another good source of energy and carbohydrates.



Sugar beets are nutritious, palatable and energy rich.



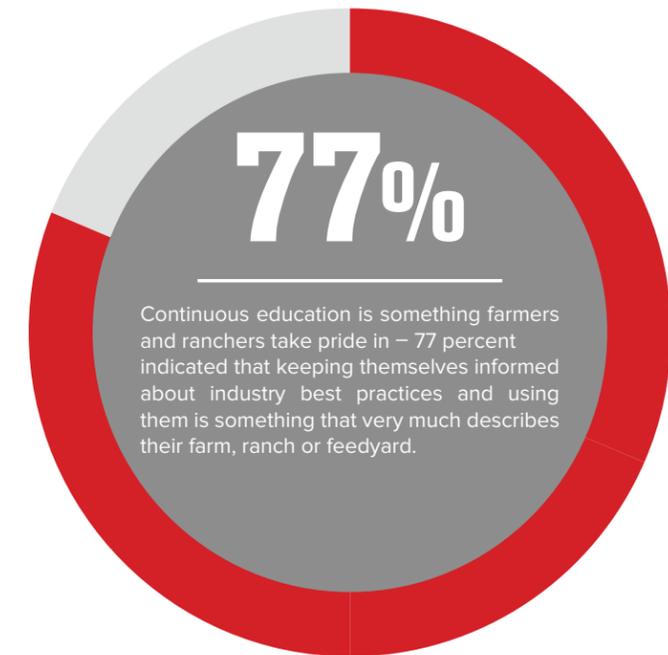
Distillers grains are extremely high in protein and fiber.

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

HEALTH MANAGEMENT

Cattle farmers and ranchers have many tools in their toolkits to keep the animals in their care healthy, including nutrition programs, veterinary care, proper housing, management practices, vaccines and antibiotics, when necessary. No matter the tool, when it comes to animal health, the practices are science-based, regulated and, above all, good for the animal and the consumer.

One way the beef community ensures healthy animals is through working with veterinarians. Farmers and ranchers form strong relationships with a licensed vet, called a veterinarian-client-patient relationship, to receive authorization to use the appropriate treatment for a specified illness and time period.



SOURCE: Producer Profile Survey, 2017, Aspen Media

VACCINATIONS

Vaccines for cattle work just like they do for humans – they're a version of the virus that's given to build immunity. Disease prevention is a core element of any herd health plan.

This typically includes vaccinating calves to protect them from common diseases, like bovine viral diarrhea virus (BVDV). Just like vaccinations in human medicine, cattle are given vaccinations to boost their immunity against debilitating diseases and illnesses.

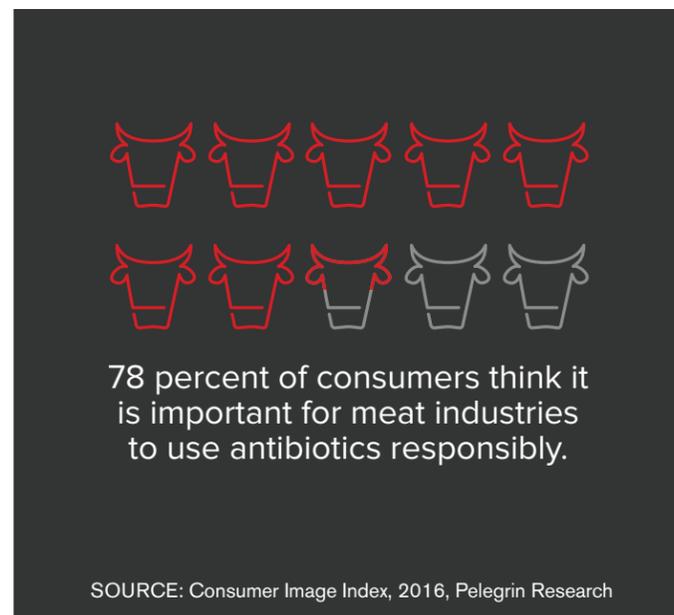
One vaccination as a calf can help an animal live a healthy life.

When vaccinations are administered, careful attention must be paid to how and where the injection is given. The beef community follows protocols for injection procedures based on the type of vaccination and the mode of action.

ANTIBIOTICS

Antibiotics are used in cattle for the same reasons they are in humans, to treat illness. They work by suppressing targeted agents in the body to attack infection.

The beef community is committed to responsible use of antibiotics because maintaining effective tools for cattle health is integral to the viability of a farm or ranch.



A significant part of the BQA program involves antibiotic stewardship training, including following withdrawal times (the amount of time required for a drug to be fully processed by the animal's body), the prevention of environmental contamination, the need for good record-keeping and the importance of a veterinarian-client-patient relationship.

Antibiotics are used for three reasons in the livestock industry:

- **To treat sick animals:** Animals, just like people in all types of families and homes, get sick. Without appropriate antibiotic treatment, animals could suffer.
- **To prevent or control disease:** Human and animal health treatment differs. In humans, doctors often treat the individual. In farm animals, veterinarians often treat the herd, as well as the individual. Preventing and controlling the spread of disease is critical to keeping animals safe and healthy.
- **To promote growth:** As of 2017, antibiotics that are medically important in human medicine are no longer used through feed and water for growth purposes in accordance with Food and Drug Administration (FDA) Guidance 209 and 213. This claim has been removed from the label of these products.

CLASSES OF ANTIBIOTICS

There are many different classes of antibiotics. Some of these classes are used in animals only, some are used in humans only, some are used in both animals and humans (for different purposes), and some are considered medically important or critical for human medicine. The conversation about antibiotic use in animals is crucial. It is also complex.

More than 30 percent of all antibiotics used in the beef industry are ionophores, a subset of antibiotics never used in human medicine. They enable beneficial bacterial populations in the rumen to become more efficient, thus requiring less feed to provide the same or more energy for the animal's growth and development.

RECENT ANTIBIOTIC GUIDELINES AND GOVERNMENT OVERSIGHT

FDA Guidance 209 and 213 (effective December 2016) and the Veterinary Feed Directive (effective October 2015) moved over 95 percent of all shared class antibiotics used in the beef industry to be under veterinary oversight and prevent use in animals for growth promotion purposes.

In addition, there are several layers of protection in place to ensure antibiotics are used to keep animals healthy without harm to public health. A drug sponsor must submit an average of 75 different studies to establish an antibiotic's safety in three key areas: human safety, animal safety and environmental safety.

Government oversight doesn't stop once an antibiotic is approved for use in food animals. Both the FDA and the U.S. Department of Agriculture (USDA) collaborate on food safety monitoring programs. The FDA sets the standards for what levels of antibiotic residues are allowed in meat. The USDA tests and monitors beef before it makes it to the consumer. By law, no meat sold in the United States can contain antibiotic residues above the Maximum Residue Levels (MRLs) set by the FDA to ensure safety.

The FDA also regulates dosage and withdrawal times for all antibiotics used in cattle raised for food. Farmers and ranchers who do not abide by the FDA guidelines for antibiotic use can be fined, go to jail and/or put on a widely circulated list that will negatively impact their business success moving forward. Responsible use programs, such as BQA, give cattlemen and women specific guidelines to safely and properly use antibiotics in their herd health management systems.

HORMONES

Another livestock production area of interest to consumers is the use of hormones. Hormones are found naturally in plants, animals, humans, foods and the environment.

Under the guidance of a veterinarian or animal nutritionist, hormone implants are given to animals in targeted ways by placing a small, slow release pellet containing anywhere between 10-120 milligrams (one milligram is one-thousandth of a gram) under the hide on the animal's ear at a specific point in the animal's life. This stimulates the gland that naturally produces hormones, and the result is leaner beef.



The hormone levels that are left are much less than what is found naturally in other foods.

- A 3 oz. serving of steak = about 1.3 to 1.9 nanograms of estrogen (a nanogram means parts per billion or one-billionth of a gram — you can visualize this as one blade of grass on a football field)
- 3 oz. cabbage = 2,017 nanograms of estrogen
- 1 egg = 993 nanograms of estrogen
- ½ cup peas = 452 nanograms of estrogen
- ½ cup of potatoes = 300 nanograms of estrogen

The FDA and the USDA approve the safety of food products, and FDA sets a tolerance on hormone levels that can be found in food. The average serving of beef has thousands of times less than what the FDA allows.

Using hormones helps the beef community raise lean beef while using fewer resources. More beef can be produced per animal with less feed and water for greater efficiency and sustainability.

Consumers always have a choice. Providing that choice and ensuring consumers feel confident in the beef they buy is a priority for farmers and ranchers. If a consumer prefers beef without added hormones, naturally raised or certified organic beef choices are available.

HUMANE SLAUGHTER

Beef farmers and ranchers are aware of the sacrifice that beef animals make to provide us with high-quality protein. As such, it is the expectation that every animal be treated with respect always, particularly during slaughter.

Humane slaughter begins when the cattle arrive at the processing facility. In keeping with Transportation Beef Quality Assurance guidance, cattle are unloaded in a timely fashion to keep the amount of time they are on the truck to a minimum. Drivers assist facility employees in slowly and carefully unloading cattle from the truck and moving them to a holding pen where they have access to clean, fresh water and can move around freely.

In addition, the walkways, holding pens and the knock box, which is where the animal is rendered unconscious by a captive bolt gun, are all designed with the welfare of the animal in mind.

Many modern U.S. slaughter facilities were designed or inspired by world-renowned animal behaviorist Dr. Temple Grandin, Ph.D. The facilities work with the natural instincts of cattle to move them. For example, a serpentine system winds around until it reaches the entry to the facility. The sides of the system are solid so that workers on the other side of the walls don'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 throughout the process.



QUALITY ASSURANCE PROGRAMS

All the previously discussed practices are provided with guidance, support, best practices, protocols and ongoing evaluation that the BQA program provides to the industry to help ensure the consumer, the animal, the environment and the beef community are cared for within guidelines and regulations.

BQA is a nationally coordinated, state-implemented program that provides accepted scientific knowledge coupled with common sense husbandry techniques to raise cattle under optimum management and environmental conditions. The BQA program has more than 75 state coordinators, who reach beef farmers and ranchers throughout the United States.

BQA was designed for cattlemen and women by cattlemen and women and follows FDA, Environmental Protection Agency (EPA) and USDA guidelines as well as Hazard Analysis and Critical Control Point (HACCP) principles.

More than 100,000 farmers and ranchers have voluntarily signed up to be part of BQA, which is a testament to the beef community's commitment to animal welfare.

ADVISORY BOARD

The BQA Advisory Board is made up of a wide variety of farmers, ranchers, veterinarians, nutritionists, academics and industry experts from across the United States. They meet quarterly throughout the year to evaluate the program, discuss trending topics, and make recommended changes or updates, if needed. They work very closely with state coordinators to execute BQA at the local level.

When beef farmers and ranchers implement best management practices for the BQA program, they assure their cattle are the best they can be. Yes, this is good business, but it is more than that. It's the right thing to do.

BEEF QUALITY ASSURANCE AWARD WINNER

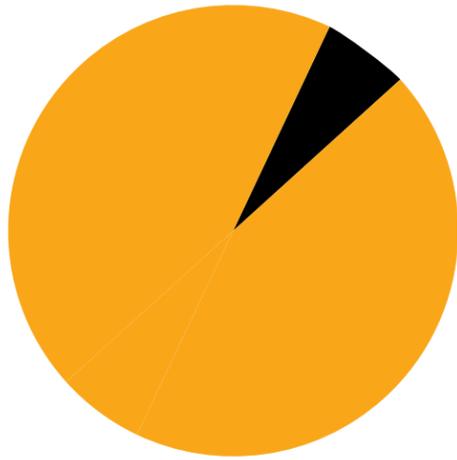
Located in Northeastern Colorado, Magnum Feedyard is a progressive feedyard started in 1943 before current owner Steve Gabel took over the operation in 1993. Since then, the feedyard has grown from a capacity of 3,500 head to nearly 22,000. Steve and his family have upgraded their facilities to provide a high level of animal comfort and safety for the animals and their employees. "Even though the feeding cattle portion is something that becomes very routine and systematic, it's about doing little things right," said Steve Gabel. To "do the little things right," Magnum has implemented 26 standard operating procedures based on BQA standards. Audrey Gabel explains, "BQA training is a requirement of all employees, I think our employees walk away enlightened and refreshed with the training."

The beef community voluntarily implements these practices because it's smart, ethical, good for the animals and the consumer. BQA is valuable to all beef and dairy producers because it:

- Demonstrates commitment to food safety and quality.
- Upholds consumer confidence in beef products.
- Protects the beef industry from additional and burdensome government regulations.
- Improves sale value of marketed beef cattle.
- Enhances herd profitability through better management.

While the BQA manual provides a framework for program consistency, each state still determines the appropriate programs for their producers. Because the beef community is so diverse, this regional autonomy is necessary to ensure the best production practices are being adhered to across the country based on local conditions.

BQA guidelines, assessments and additional resources can be found at bqa.org.



93 percent of producers claim that responsible transport, handling and slaughtering is very important to the future of the beef industry.

SOURCE: Producer Profile Survey, 2017, Aspen Media



Like so many things in the U.S. beef community, a mindset of continuous improvement is the focus for beef farmers and ranchers when it comes to caring for animals. Through each of these important areas – facilities, genetics, nutrition, health management, humane slaughter and quality assurance – the beef industry is focused on the care and well-being of animals throughout the value chain.

BETTER BEEF



97 percent of cattle farmers and ranchers think producing safe beef is a top priority for the future of the industry.

SOURCE: Producer Profile Survey, 2017, Aspen Media

For more than 150 years, America's farmers and ranchers have been in the business of producing safe and wholesome beef to nourish families through all life stages. The goal each year is to continually produce better beef by implementing research-based improvements across the following three areas:

- Nutritional Value
- Beef Quality
- Safety Assurance

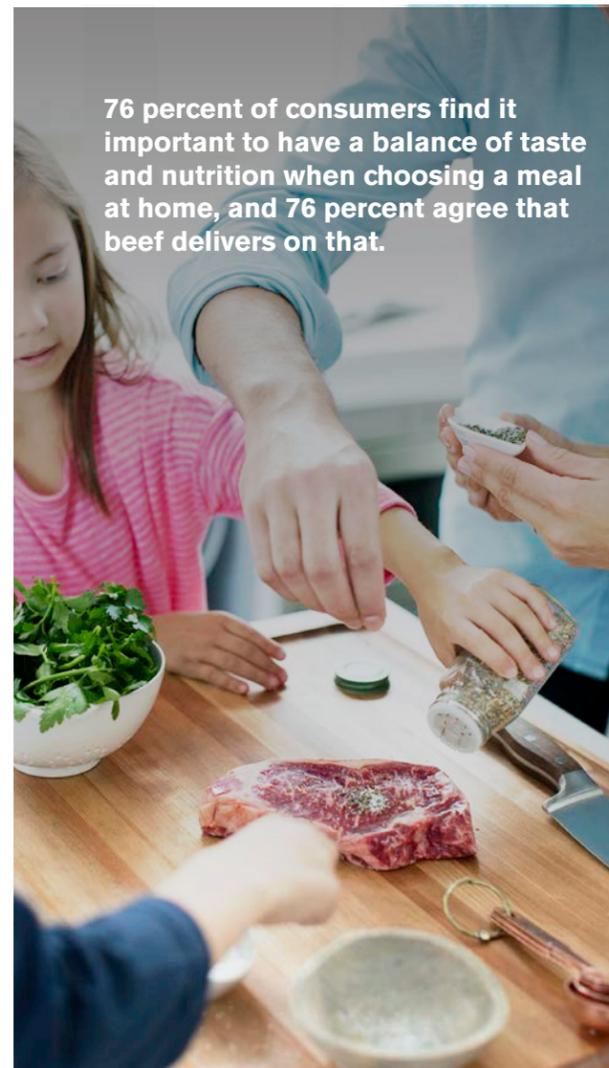
Significant investments in research have helped us better understand the nutritional attributes of beef, the role of beef in a healthy diet, and how to improve the safety, tenderness and overall quality of beef.

THE ROLE OF NUTRITION RESEARCH

Since the 1920s, America's cattle farmers and ranchers have supported nutrition research to help advance the understanding of beef's role in a balanced, healthful lifestyle.

The prospect of conducting nutrition research to address public misperceptions about the nutritional value of beef played a critical role in the decision by farmers and ranchers to vote in favor of funding a mandatory checkoff program in 1985. The beef checkoff nutrition research program remains the only research initiative focused solely on establishing and communicating the role of beef in a balanced diet. Today's nutrition research program conducts, monitors, evaluates and disseminates beef-related human nutrition research. A primary goal of checkoff research is to facilitate public access to research results by publishing in peer-reviewed scientific journals.

While nutrition research is the foundation for all checkoff-funded nutrition communications, the "Statement of Principles Regarding Nutrition and Health," first adopted by the beef industry in 1984, guides all efforts to expand and communicate the credible, science-based evidence that supports beef's place in the diet. This Statement of Principles is reviewed, updated and re-adopted every five years by cattlemen and women to demonstrate the industry's commitment to science, education and communication initiatives.



SOURCE: Consumer Beef Index, 2016, Pelegrin Research

THE EVOLUTION OF LEANER BEEF

Farmers, ranchers, packers, processors, retailers, researchers, nutrition professionals and even consumers have worked together to help shape the evolution of today's lean beef. A leaner beef supply is a demonstration of the beef industry's commitment to provide consumers with the great-tasting, nourishing beef that meets their nutritional needs and their expectations. Changes in cattle breeding and management along with trimming practices of processors, retailers and foodservice operators over the years resulted in an estimated 44 percent reduction in available total fat and a 29 percent reduction in saturated fat per capita contributed by beef, as calculated from the total beef available in the U.S. on an annual basis.

This effort required an extensive and long-term collaboration with the USDA Nutrient Data Laboratory, Texas Tech University, Texas A&M University and Colorado State University, to conduct research to update beef's nutrient composition to reflect the leaner beef currently available in today's marketplace. This data has been and continues to be reported in the USDA National Nutrient Database for Standard Reference, which is considered the gold-standard resource for the nutrient composition of food, used around the world by researchers, educators, dietitians and the media for accessing the most current nutrient data on the food supply. The evolution of a leaner beef supply and its resulting beef nutrient data is chronicled in the checkoff-funded "Lean Matters" available on BeefResearch.org.

Demonstrating beef's trend toward leaner products while maintaining quality and taste, the American Heart Association® has certified nine beef cuts and 10 beef recipes with its Heart-Check Mark. The Heart-Check Mark has been on food packaging in stores for two decades, but now it can also help consumers choose healthy recipes. In addition to being heart-healthy, the recipes are triple tested in the Beef. It's What's For Dinner. Culinary Center for ease of cooking and taste.



Enjoying Lean Beef in a Heart-Healthy Lifestyle
BEEF CUTS AND RECIPES HEART-CHECK CERTIFIED BY THE AMERICAN HEART ASSOCIATION®



About two-thirds of people who indicate they want to eat more beef think lean beef fitting in a healthy diet is an important factor.

SOURCE: Consumer Beef Index, 2016, Pelegrin Research

BEEF AS A FIRST FOOD

Leading authorities like the American Academy of Pediatrics, the World Health Organization and the USDA recommend the early inclusion of meat in an infant's diet. At around 6 months of age, the infant's nutritional needs change and, at the same time, the nutritional composition of breast milk changes. The iron and zinc in breast milk are not sufficient to meet an exclusively breastfed infant's needs at this age, so complementary foods can protect the infant against iron and zinc deficiencies, which are associated with long-lasting negative effects on a child's development, learning, behavior and growth.

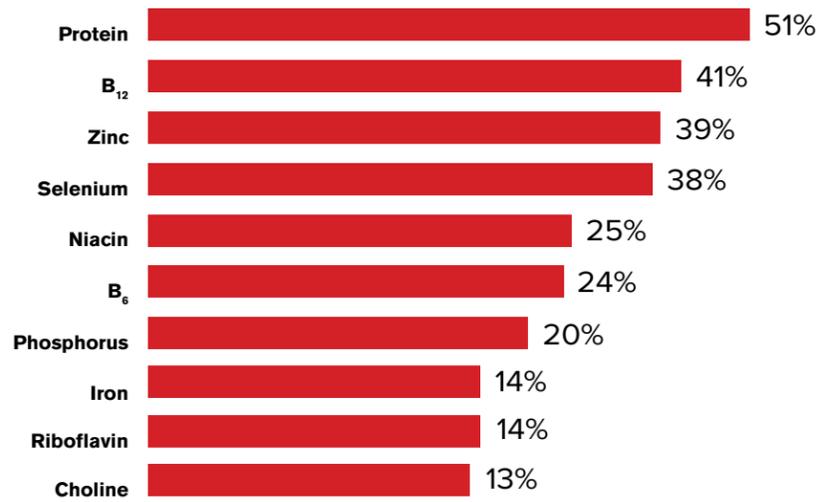
In recent years, the checkoff's nutrition research program has invested in studies to determine the effect of beef on the iron and zinc status of breastfed infants, compared to iron and zinc-fortified infant cereal or an infant cereal fortified with iron only. Illustrating the increased absorption of iron from beef, a study found the iron in pureed beef is more readily absorbed and able to meet the physiologic demands of the growing infant, although iron intake from pureed beef is much less than the total iron intake from either of the cereals.⁴ In a similar study, 7-month-old breastfed infants who consumed beef puree had more than double the zinc intake of infants receiving iron-fortified infant rice cereal, but 16-fold greater absorbed zinc.⁵ Overall, these results support the premise that beef is a recommended first food for breastfed infants.

The consumption of beef at a time when a food source of adequate iron and zinc is essential may help support the infant's optimal physical and cognitive development.

BEEF'S NUTRITIONAL BENEFITS

At a time when the United States and other developed countries are struggling with quality nutrition, beef offers a nutrient-dense solution for satisfying appetites while providing more nutrients in fewer calories than many other foods. Beef is a good or excellent source of 10 nutrients essential to a healthful diet, and the beef checkoff's human nutrition research program continues to examine the role of beef in a healthful diet. The current nutrition roadmap focuses on three topic areas: healthy dietary patterns with beef, physical performance and satisfaction.

A 3-ounce serving of beef (173 calories) contributes less than 10% of calories in a 2,000-calorie diet, yet it supplies more than 10% of the Daily Value for:

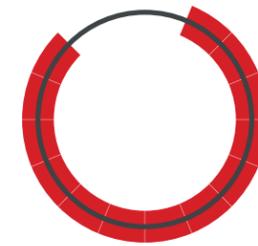
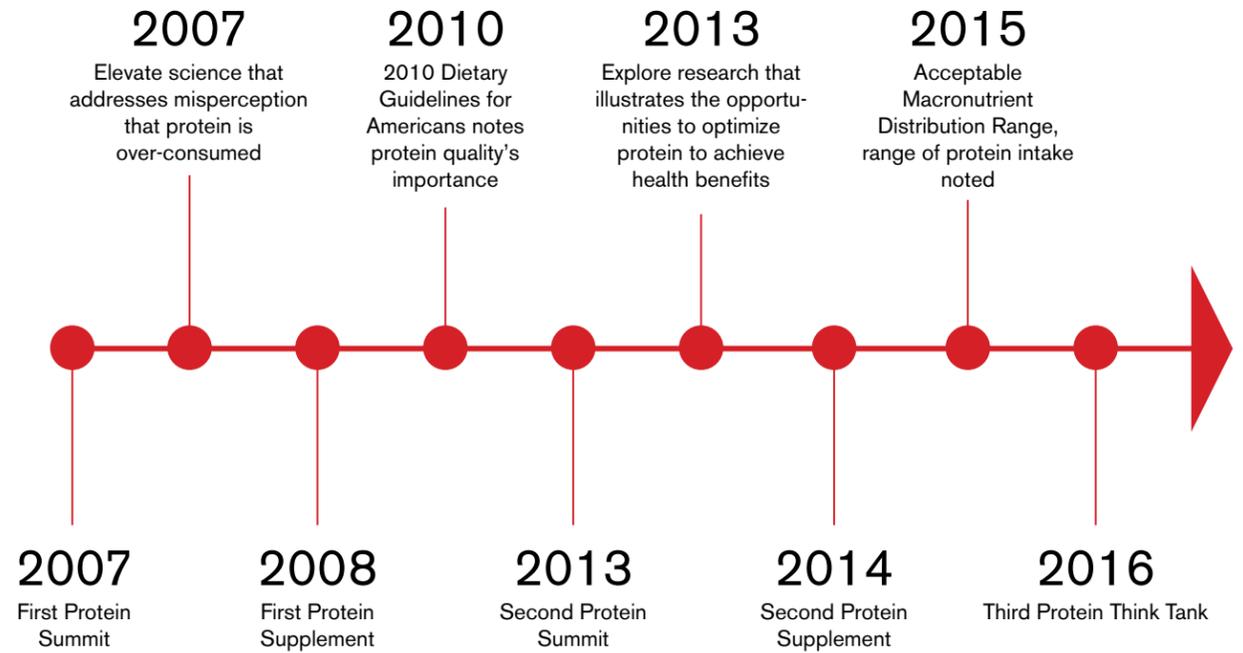


SOURCE: Electronic Code of Federal Regulations. 42 FR 14308, Mar. 15, 1977, 21 CFR 101.9(c)(9). Guidance for Industry: A Food Labeling Guide (14, Appendix F) Available at <https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm064928.htm>. US Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory. USDA National Nutrient Database for Standard Reference, Release 28, 2015. Available at <https://ndb.nal.usda.gov/ndb/>. Based on cooked servings, visible fat trimmed. NDB# 13364.

Considering the total beef supply in the United States, beef consumption significantly contributes to the intake of protein, vitamins B₆ and B₁₂, zinc, iron, niacin, phosphorus and potassium for all age groups, with a contribution of only 5 percent of total calories, less than 9 percent of total fat intake and less than 1 percent of sodium intake. While beef is a leader in providing these essential nutrients in the diets of Americans, it is not being overconsumed as often asserted. According to the 2015-2020 Dietary Guidelines, Americans on average consume about 1.5 ounce equivalents of beef (fresh lean and cured) daily.⁶

PROTEIN SUMMIT 2.0

The Beef Checkoff Program has focused efforts on expanding the discourse among researchers and nutrition experts on the often-overlooked role of protein in the diet. In October 2013, more than 60 nutrition researchers and thought leaders convened to review and discuss new research on protein and its role in public health during "Protein Summit 2.0." The original Protein Summit, held in 2007, proved to be a tremendous success in advancing the dialogue on protein's role in health and in debunking myths that Americans consume too much protein. In fact, manuscripts from the supplement published in the *American Journal of Clinical Nutrition* have been downloaded more than 360,000 times.



Today, 86 percent of consumers agree that beef is a great source of protein.

SOURCE: Consumer Beef Index, 2016, Pelegrin Research

CLARIFYING INCONSISTENT SCIENCE: RED MEAT AND CANCER

As part of its ongoing commitment to understanding beef's role in a balanced and healthful diet, America's farmers and ranchers have supported extensive reviews of the existing evidence on red meat, including beef and cancer risk, to clarify inconsistent and often conflicting science available in the literature.

In response to a call for data by the International Agency for Research on Cancer (IARC), the beef checkoff, on behalf of farmers and ranchers – as well as scientists who conducted independent reviews – submitted evidence for its consideration. The scientific evidence presented to IARC by the beef checkoff and independent scientists demonstrates that the scientific evidence does not support a causal relationship between red meat and cancer. The studies identified by IARC that found association between red and processed meat and cancer were weak in magnitude, not statistically significant, and weakening over time as nutrition research improves.

Context around understanding the evidence on red meat and cancer risk is available at BeefResearch.org and includes peer-reviewed abstracts and full text articles on a variety of cancer topics, all of which find no causal evidence linking beef consumption to any type of cancer.

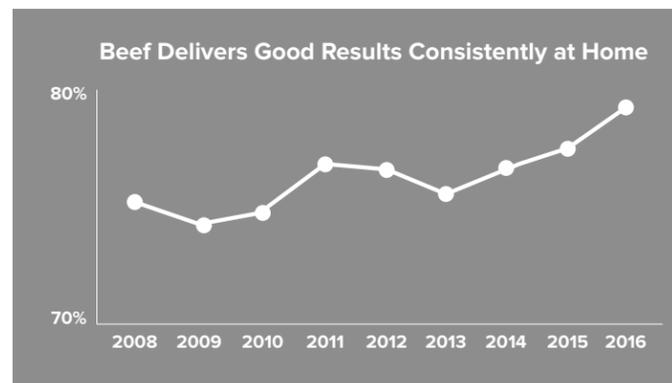
BEEF QUALITY IMPROVEMENTS

The beef industry is driven by continuous improvement in taste and tenderness to ensure consumers get the maximum benefit and enjoyment from beef every time they cook beef at home or order it at a restaurant. Using checkoff funding to partner with academics throughout the country, product quality research enables the industry to continuously update beef product quality based on meat science to meet consumer desires, while simultaneously adding value for beef farmers and ranchers through every animal presented for slaughter.



79 percent of consumers agree that beef delivers good results consistently when making a meal at home — this number is trending up since 2008 (73 percent). In 2016, 86 percent of millennial parents agreed beef delivered good results consistently.

SOURCE: Consumer Beef Index, 2016, Pelegrin Research



To evaluate the effectiveness of checkoff-funded research, as well as quality programs managed by industry participants across the production chain, the Beef Checkoff Program initiated two very important assessments in the early 1990s — the National Beef Quality Audit (NBQA) and the Beef Tenderness Survey (NBTS). Both surveys are conducted every five years.

Since its inception, NBQA has provided the industry a meaningful set of guideposts and measurements relative to the quality of the U.S. beef supply. Quality issues revealed in the audits are addressed in subsequent years and re-assessed in the next audit.

Similarly, NBTS provides data to help identify those attributes related to tenderness that need to be addressed, and in the 1990s the surveys showed work was needed across all sectors to optimize beef's tenderness potential. As the most recent survey in 2015/2016 revealed, beef has never been so tender. Increased aging times demonstrate that processors are putting more focus on tenderness. In addition, longer, more gradual chilling procedures in processing help reduce potential tenderness problems. Farmers and ranchers follow best management practices for animal handling, reducing animal stress and ensuring animal health to help create higher-quality beef, which helps avoid any quality or tenderness problems that could result from poor management.



90 percent of beef farmers and ranchers agree that low stress animal handling practices are part of their current management practices

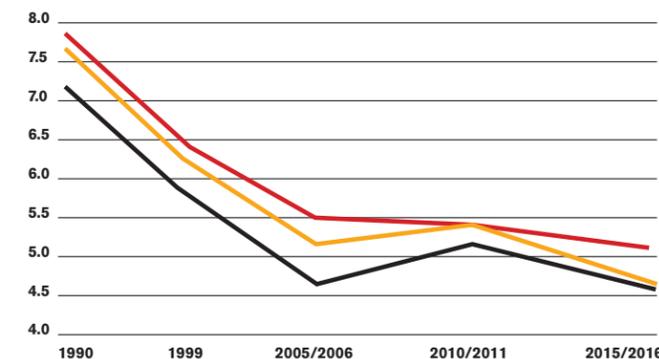
SOURCE: Producer Profile Survey, 2017, Aspen Media

Improvements in tenderness have closely followed the increased attention to producing more Choice grade cattle. Choice and Prime carcasses now account for almost 75 percent of total carcass grades, whereas they accounted for 62 percent in the 1995 National Beef Quality Audit. While the amount of Prime beef is only slightly higher than it was 20 years ago, the amount of Choice beef has surged.

TENDERNESS IMPROVEMENTS OVER TIME

The Tenderness Survey has traditionally utilized the Warner-Bratzler Shear Force test to quantify the firmness and toughness of a cut's muscle fibers. Higher numbers indicate tougher meat. The chart shows the improvements in the three retail cuts that have been evaluated in all five surveys.

Warner-Bratzler shear force values (lbs) of retail steaks, NBTS 1990-2015/2016



The results of the 2016 National Beef Quality Audit and the 2015/2016 Beef Tenderness Survey confirm the beef industry's notable progress since the early 1990s in efforts to respond to consumer demands for consistently tender, leaner and more flavorful beef. Despite the challenges of the last 10 years, including drought, fluctuating supply, increased input costs and the recession, the quality of the beef being produced in the United States has remained steady and often improved. With tenderness goals being achieved, the industry is now dedicating focus to other factors impacting beef quality. The highest priority for the industry through 2020 is the understanding of flavor complexity and optimizing flavor consistency to meet the variety of taste preferences among consumers.



Prime grade beef is produced from young, well-fed beef cattle. It has abundant marbling and is generally sold in restaurants and hotels.

Choice grade beef is high quality, but has less marbling than Prime.

Select grade beef is slightly leaner than Prime and Choice because it has less marbling. It can lack some tenderness, flavor and juiciness as compared to the higher grades.

Marbling plays a major role in these quality grades. Marbling - the small flecks of white fat within beef muscle - is key to beef's great flavor, tenderness and juiciness.

BEEF'S VERSATILITY

The consumer has always been able to choose a beef cut to fit a particular cooking method or dish. Some cuts are best when grilled, others roasted. Some provide a better eating experience when marinated, while some make the perfect hamburger. Today, the consumer has even more beef choices, all of which will deliver a unique eating experience.



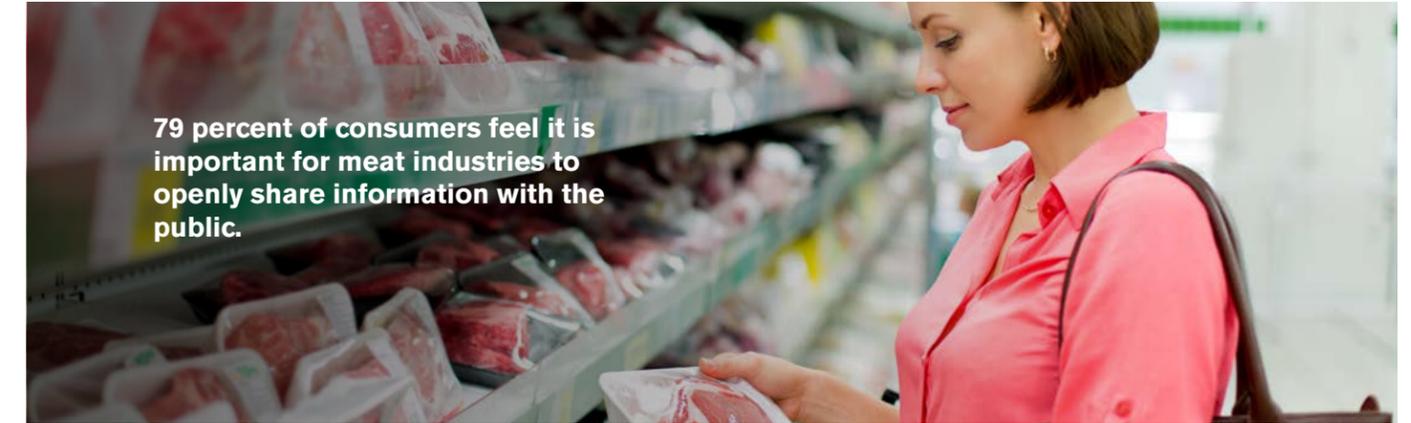
Over ¾ of consumers agree that it is easy to pick the right cut for what you are preparing, there are options that are quick and easy to prepare, and that beef is a great starting point for a variety of meal options.



SOURCE: Consumer Beef Index, 2016, Pelegrin Research

In the last 15 years, new cuts from a variety of individual muscles have been introduced to provide consumers increased options at both retail and foodservice. Other cuts may be reapportioned to provide beef packages with groupings of single servings to accommodate consumer desires and families of different sizes. Many times cuts at retail are offered with recipe instructions so families can experiment with, and enjoy, a variety of flavors. Overall, consumers have more options than ever before to customize their beef-eating experiences and satisfy their family's preferences.

BEEF CHOICES



79 percent of consumers feel it is important for meat industries to openly share information with the public.

SOURCE: Consumer Beef Index, 2016, Pelegrin Research

Today's consumer is interested in how and where food is produced. The beef community prides itself on beef that is raised responsibly and results in choices that are safe and nutritious, no matter what production method is followed. The variety of production practices are often indicated on the product label or restaurant menu, which allows consumers to choose the type of beef they prefer for their families. The U.S. Department of Agriculture approves these labels for beef products from cattle raised according to specific criteria:

GRAIN-FINISHED
(most beef is raised this way and likely doesn't have a specific label claim)

THIS BEEF COMES FROM CATTLE THAT...

- Spend the majority of their lives eating grass or forage
- Spend 4-6 months at a feedyard eating a balanced diet of grains, local feed ingredients, like potato hulls or sugar beets, and hay or forage
- May or may not be given U.S. Food and Drug Administration (FDA)-approved antibiotics to treat, prevent or control disease and/or growth-promoting hormones

GRASS-FINISHED OR GRASS-FED

THIS BEEF COMES FROM CATTLE THAT...

- Spend their whole lives eating grass or forage
- May also eat grass, forage, hay or silage at a feedyard
- May or may not be given FDA-approved antibiotics to treat, prevent or control disease and/or growth-promoting hormones

CERTIFIED ORGANIC

THIS BEEF COMES FROM CATTLE THAT...

- Never receive any antibiotics or growth-promoting hormones
- May be either grain- or grass-finished, as long as the USDA's Agriculture Marketing Service (AMS) certifies the feed is 100% organically grown
- May spend time at a feedyard

NATURALLY RAISED
(may be referred to as "never-ever")

THIS BEEF COMES FROM CATTLE THAT...

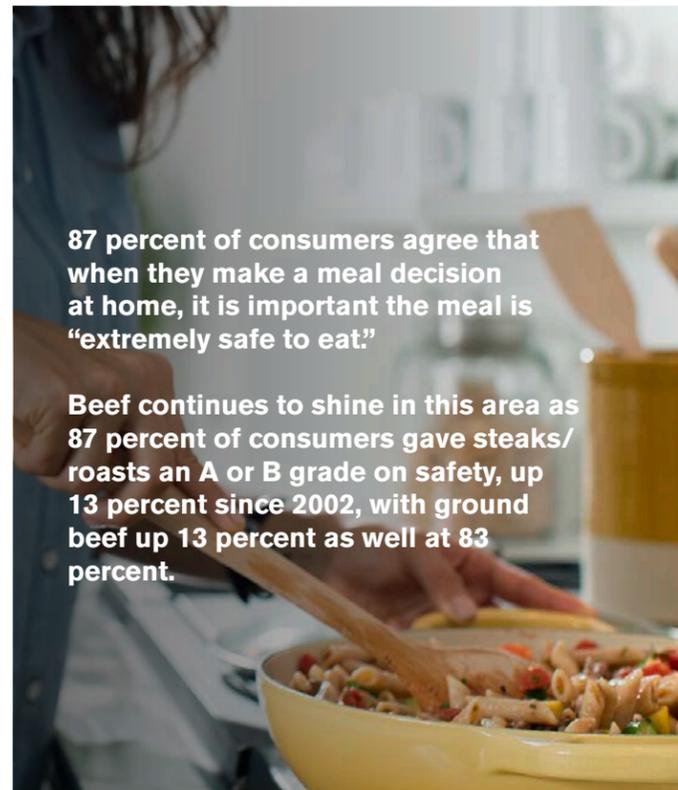
- Never receive any antibiotics or growth-promoting hormones
- May be either grain- or grass-finished
- May spend time at a feedyard

ENHANCING THE SAFETY OF BEEF

The safety of the beef supply has been, and always will be, a crucial focus for all members of the beef community. Ensuring, and enhancing through a dedication to continuous improvement, the safety of beef on American tables is imperative to the sustainability of the industry. Research and cross-sector collaboration is also critical to enhancing the safety of beef.

The many variables involved in raising cattle — weather, soil, feedstuffs, genetics/breeds and production types — all affect the bacteria that are found on cattle as well as within their gastrointestinal tracts. As a result, beef safety research today has shifted to investigate bacterial dynamics found within production systems to try and gain an understanding of effects of these variables. Farmers and ranchers understand that they are the first link in the beef safety chain.

As the industry gains knowledge of the ecology of the live animal environment, tools can be developed



87 percent of consumers agree that when they make a meal decision at home, it is important the meal is “extremely safe to eat.”

Beef continues to shine in this area as 87 percent of consumers gave steaks/roasts an A or B grade on safety, up 13 percent since 2002, with ground beef up 13 percent as well at 83 percent.

SOURCE: Consumer Beef Index, 2016, Pelegrin Research
SOURCE: Safety Tracker, 2017, Ipsos Public Affairs

to shift or change the microbial community found on hides and in animal intestines. The goal is to develop interventions and recommend production changes that can reduce the risk of pathogens entering processing plants on cattle hides and within their bodies.

A proactive research program combined with collaboration across all industry sectors has led to the implementation of comprehensive safety systems within the beef production chain.



95 percent of producers said their management practices are consistent with producing safe food. One way they ensure that is through managing the health of their herd — 95 percent also claimed they manage the health of their herd to produce safe food.

SOURCE: Producer Profile Survey, 2017, Aspen Media

BEEF INDUSTRY SAFETY INNOVATIONS: SNAPSHOT

When faced with recalls and foodborne illness linked to beef products, the beef industry focused on pathogen reduction efforts in the processing plants. New technologies and interventions in the processing sector have been the most impactful. The incidence of *E. coli* O157:H7 and other pathogens has been reduced due to the application of enhanced testing programs, multiple-hurdle intervention programs and information sharing between companies. With this success, the focus of producer investments has shifted to pre-harvest programs and solutions, and the target pathogen has changed from *E. coli* O157:H7 to *Salmonella*.

1993	A major <i>E. coli</i> O157:H7 outbreak was tied to ground beef served at Jack in the Box. The beef checkoff funded a Blue Ribbon Task Force of scientists to identify new ways to improve beef safety.
1994	USDA Food Safety and Inspection Service (FSIS) identified <i>E. coli</i> O157:H7 as an adulterant and began a sampling program to test for the pathogen in federally inspected establishments and retail stores. Safe food handling instructions on labels for fresh and frozen meat and poultry were required in retail stores.
1994	The beef industry, with funding support from the beef checkoff, initiated research that over time would investigate more than 25 different harvest-level beef safety interventions.
1997	Beef Industry Food Safety Council (BIFSCo) formed. Members of BIFSCo range from farmers and ranchers to processors and retailers who collaborate to solve food safety challenges.
2003	BIFSCo hosts its first <i>E. coli</i> O157:H7 Summit where leaders convened to discuss solutions and refine best practices for each segment of the industry.
2004	Using 2004 data, the Centers for Disease Control and Prevention (CDC) reported a 42 percent decrease in illnesses caused by <i>E. coli</i> O157:H7. Dramatic multi-year reductions in illnesses from <i>E. coli</i> O157:H7 meant the U.S. was below the Healthy People 2010 goal of 1.0 case per 100,000 persons, according to the CDC.
2004	The first version of a best practice publication for beef producers (<i>E. coli</i> O157:H7 Solutions: The Pre-harvest Commitment) was released by BIFSCo and the beef checkoff. This was later updated in 2016.
2007	BIFSCo hosted the sixth annual Beef Industry Safety Summit and distributed video on best practices for collecting beef samples for <i>E. coli</i> testing; the video was sent to 675 processing facilities across the U.S.
2008	The beef checkoff began the “Safe and Savory at 160” program, educating consumers about the safety and quality benefits of using a meat thermometer when cooking with ground beef.
2011	From 1999 through 2011, cattlemen invested more than \$30 million of their beef checkoff dollars to beef safety efforts. In addition, the beef community invests over \$550 million yearly, to implement, maintain and validate safety controls and conduct product testing.
2012	BIFSCo and the beef checkoff host the 10th Beef Industry Safety Summit.
2014	Checkoff-funded research continues a decade-long investigation of <i>Salmonella</i> harborage in the beef carcass and interventions and management strategies to reduce pathogen load in cattle.
2016	Research results focused on antimicrobial resistance formation, detection and prevention are shared with food industry decision makers at international conferences and published in peer-review journals.
2017	BIFSCo and the beef checkoff host the 15th Beef Industry Safety Summit. Sessions focused on the advancements in pathogen detection systems including whole genome sequencing, antimicrobial use, stewardship and resistance, and best practices to produce safe non-intact beef products.

In addition, the development of antimicrobial resistance in bacteria found within the beef supply chain is an area of focus. Data is being collected that will expand the knowledge on how resistance develops and the impact of diverse production practices on resistance development. The impact of environmental factors on the development of resistance in bacteria is also being addressed. This is a broad and long-term focus due to the tremendous diversity across production settings and geographical locations.

A key synergy that has increased the impact of funds invested by beef farmers and ranchers for safety research is the collaboration with other groups representing poultry and pork. There are many safety threats that are risks to all three protein groups. Pathogens and diseases can impact multiple species; therefore, a joint effort to understand the basic ecology of pathogens and improve the technologies used to detect bacteria, along with educating all stakeholders on safety threats and tools available to address those threats, benefits all protein groups. Discussions on research priorities with organizations that have research funds such as USDA have also led to co-funded projects.

THE BEEF INDUSTRY FOOD SAFETY COUNCIL (BIFSCO)

BIFSCO is a coalition of industry executives, beef farmers and ranchers, university and government scientists, industry association executives and experts representing each sector in the beef chain. BIFSCO's mission is to engage all sectors in a strategic, coordinated effort to enhance the safety of U.S. beef products through research, education and communication. All members are dedicated to the BIFSCO principle of collaboration to produce the safest possible American beef product. Since its 1997 inauguration, BIFSCO has been responsible for the implementation of numerous technological innovations that continue to advance the safety of U.S. beef.

In 2003, representatives from every sector of the beef industry collaborated to produce unified best practices to serve as a roadmap for making beef an even safer product. The resulting Best Practices Documents function as the industry guidance for food safety practices and procedures. Written and approved by the people who use these practices daily, the documents include only tested and proven procedures. The more than 10 Best Practice Documents are updated as needed to incorporate the most current science, technology, learnings and regulations that help make

safety systems more robust. They are posted to the BIFSCO website, BIFSCO.org.

BEEF INDUSTRY SAFETY SUMMIT

BIFSCO and the Beef Checkoff Program hosted the first-ever *E. coli* Summit in San Antonio, Texas in 2003. More than 200 beef industry leaders representing each link in the beef production chain — from cow-calf producers and feedlot operators, to packers, processors, retailers and foodservice operators — attended the Summit. Representatives from all sectors pledged their commitment to the collective goal of reducing and controlling *E. coli* O157:H7.

The annual Beef Industry Safety Summit continues today to serve as the forum for all partners to share knowledge and discuss issues to ensure continued progress toward meeting the industry's collective safety goals. Success in managing the prevalence of *E. coli* O157:H7 in beef has opened the door for the industry to address other safety challenges. The 15th Anniversary Summit in 2017 featured expert speakers and robust attendee discussions on such cutting-edge topics as whole genome sequencing, antibiotic stewardship and the development of antimicrobial resistance for over 250 industry attendees.

THE GOALS OF THE ANNUAL BEEF INDUSTRY SAFETY SUMMIT INCLUDE:



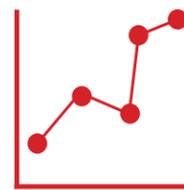
Education of new regulations



Knowledge sharing among companies



Dialogue with regulatory agencies to ensure focused approach to address safety threats



Research data sharing



THE ROLE OF USDA'S FOOD SAFETY AND INSPECTION SERVICE

The Food Safety and Inspection Service (FSIS) is the agency of the USDA responsible for ensuring that the commercial supply of meat, poultry and egg products in the United States is safe, wholesome, and correctly labeled and packaged. Sharing the common goal of protecting U.S. consumers, FSIS and the beef industry regularly collaborate in support of efforts to safeguard the beef supply. Every year at the Summit, FSIS provides an agency update to Summit attendees on potential regulatory actions that would impact different beef industry sectors. Both the agency and industry leaders support and encourage open dialogue to ultimately better serve the public.

As they have for more than 150 years, beef farmers and ranchers will continue to produce safe and wholesome beef for decades to come. A focus on the nutritional value, tenderness and flavor, accessibility and safety assurance of the beef choices available to American consumers will drive the beef community to produce better beef.

SMARTER RESOURCE USE



It is often an untold story, but ranching families have led conservation efforts across the United States for generations. Today's farmers and ranchers are some of America's embodiments of true environmentalism. They have an innate love and appreciation for land preservation because it in turn supports their families. These hard-working people are dedicated to caring for the resources entrusted to them, and they also know first-hand that good management demands they care for the environment – for their own welfare as well as for future generations.

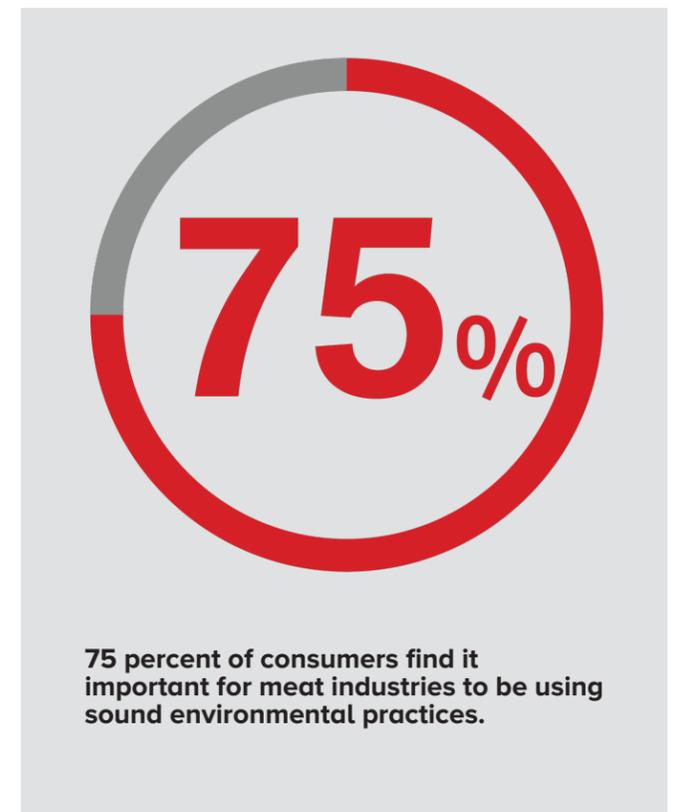
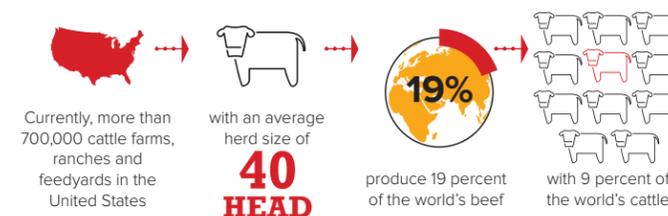
CONSERVATION IS IMPORTANT



SOURCE: Producer Profile Survey, 2017, Aspen Media

A sustained global population is another driver of smarter resource use. By 2050, 70 percent more food will be required to feed the growing population without a commensurate increase in the planet's natural resources to support additional production. Smarter agricultural production around the globe will be needed to meet the demand.

America's farmers and ranchers recognize the importance of continually improving production practices to produce more beef with fewer resources. This is not a new challenge. Currently, 700,000 cattle operations in the United States, with an average herd size of 40 head, produce 19 percent of the world's beef with 9 percent of the world's cattle.⁷



SOURCE: Beef Consumer Image Index, 2016, Pelegrin Research

THE BEEF INDUSTRY SUSTAINABILITY ASSESSMENT

In 2011, beef farmers and ranchers determined it was time to document the progress being made by the industry and identify other improvement opportunities. With checkoff funding, the beef community embarked on a comprehensive lifecycle assessment (LCA) to quantify and benchmark all aspects of beef industry sustainability. The National Cattlemen's Beef Association, a contractor to the beef checkoff, led the process with a large research and advisory team made up of scientists and industry experts.

For cattlemen and women, the definition of sustainability comprises much more than environmental considerations. Today, a sustainable food supply balances efficient agricultural production with environmental, social and economic attributes.

The beef industry was the first food system to set a benchmark and develop a roadmap toward improved sustainability that encompasses all three aspects of sustainability. The Beef Industry Sustainability Assessment was designed to capture how industry changes and improved management practices have affected beef's long-term sustainability. The benchmark year of 2005 was selected to reflect the widespread use of distillers grains as a feed ingredient in feedyards. The final benchmark year, 2011, represented the current beef value chain at the time of the study.

The research included an evaluation of thousands of data points across all supply chain segments to quantify the industry's progress since 2005. For the pre-harvest segment, the LCA was completed using data from the USDA's Meat Animal Research Center in Clay Center, Nebraska. This documentation of data allows the industry, for the first time, to provide science-based answers to questions about sustainability and identify opportunities for improvement. The LCA showed an overall 5 percent improvement in the environmental impact of the U.S. beef value chain between 2005 and 2011.

The completed Beef Industry Sustainability Assessment has been subjected to extensive third-party and peer review. The pre-harvest segment results are published in the *Journal of Animal Science*. The U.S. Beef – Phase 1 Eco-efficiency Analysis, which examined the entire beef value chain, was certified by NSF International in July 2013.

The sustainability assessment is now being expanded to include data from seven individual cattle-producing regions across the country. By incorporating region-specific information into the study, the research will be more representative. This information identifies regional opportunities for improvement and allows the beef story to be customized for particular areas of the country. The sustainability assessments for all seven regions will be complete by 2018.



As part of the sustainability program, the Beef Checkoff Program has funded an executive summary of the sustainability assessment, an executive summary of ecosystem services, a research review on beef cattle welfare co-authored by renowned animal scientist Temple Grandin, a review of beef cattle systems lifecycle assessment, two lifecycle assessment reports and two reports on food loss, one assessing the impacts of food waste on sustainability. These materials are available at BeefResearch.org.



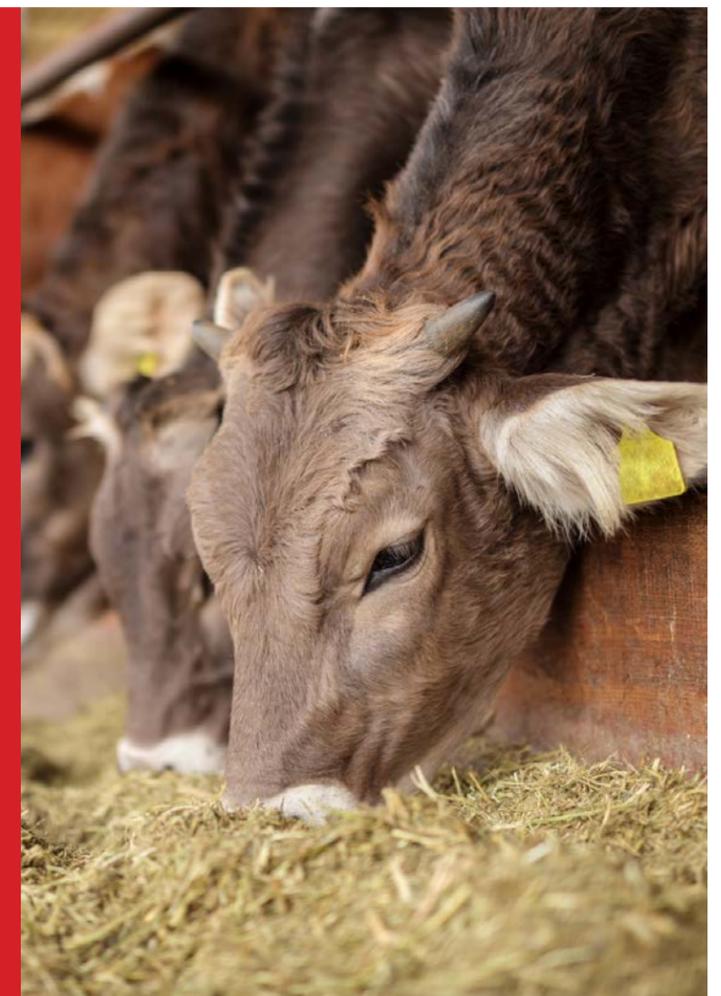
GLOBAL ROUNDTABLE FOR SUSTAINABLE BEEF

The National Cattlemen's Beef Association is a board member of the Global Roundtable for Sustainable Beef (GRSB), a global, multi-stakeholder initiative formed in 2012 to focus on beef sustainability efforts. The GRSB mission is "to advance continuous improvement in sustainability of the global beef value chain through leadership, science and multi-stakeholder engagement and collaboration." GRSB developed a Principles and Criteria Document as well as a standard definition for sustainable beef that regional roundtables, such as the U.S. Roundtable for Sustainable Beef, can use as a consistent baseline for the work that's done. These materials are available at grsbeef.org.

THE U.S. ROUNDTABLE FOR SUSTAINABLE BEEF

The U.S. Roundtable for Sustainable Beef (USRSB) is a multi-stakeholder initiative formed in 2015 to advance, support and communicate continuous improvement in the sustainability of the U.S. beef value chain. The organization's vision is for the U.S. beef value chain to be the trusted global leader in environmentally sound, socially responsible and economically viable beef.

There are five constituencies involved in the USRSB: producers, allied industry, packers/processors, retail and civil society. To date, the largest constituency is the producer sector. USRSB efforts are currently focused on finalizing metrics, by sector, for each of six high-priority indicators: animal health and well-being, efficiency and yield, water resources, land resources, air and greenhouse gas emissions, and employee safety and well-being. Information on USRSB is available at usrsb.org.



ENVIRONMENTAL STEWARDSHIP AWARD PROGRAM

To honor the farmers and ranchers who make environmental stewardship a priority on their farms and ranches while also improving production and profitability, the Environmental Stewardship Award Program (ESAP) was created in 1991. Celebrating its 27th year in 2017, the award continues to highlight the nation's cattle farmers and ranchers who serve as leaders and models for good stewardship practices. There have been nearly 160 regional operations representing 33 different states recognized through the program.

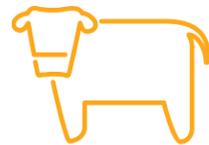
While the program highlights environmental stewardship, it also provides fellow farmers and ranchers with examples and ideas that may be useful on their own farm and ranching operations.

Since 1991, one national winner and up to seven regional winners are awarded each year by a selection committee — a group of representatives from universities, conservation organizations, and federal and state agencies. The judges base their choices on the nominee's management of water, wildlife, vegetation, air and soil, along with leadership abilities and the sustainability of the business.

Smarter beef production — producing more with less — is sustained across the United States because cattlemen and women are committed to production principles that contribute to, and enhance, a healthy environment, including:



CONSERVING NATURAL RESOURCES



CARING FOR ANIMALS



RESPECTING THE OPEN RANGE



PROTECTING BIODIVERSITY & WILDLIFE



INNOVATING ACROSS OPERATIONS

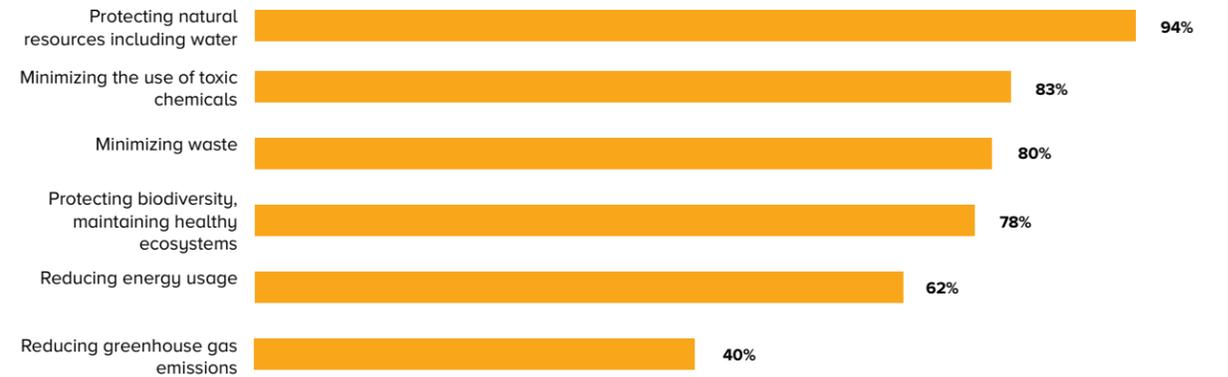


ADDRESSING CLIMATE CHANGE

“For 25 years, I have been involved in a conservation reserve program. I work with the Nature Conservancy and Wildlife Division to promote wildlife and keep our water clean.”
-Rancher, Kentucky

SOURCE: Producer Profile Survey, 2017, Aspen Media

CATTELMEN AND WOMEN PLACE A VERY HIGH PRIORITY ON NATURAL RESOURCES AND A HIGH PRIORITY ON USING FEWER CHEMICALS, LESS WASTE AND BIODIVERSITY



SOURCE: Producer Profile Survey, 2017, Aspen Media

CONSERVING NATURAL RESOURCES

Conservation principles are used at every point in the beef production chain, starting with the farmers and ranchers who run grazing-based cow-calf and stocker operations to the cattlemen and women who feed cattle at feedyards. The practices look different based on geography and type of operation, but collectively, the efforts farmers and ranchers make across the country help maintain and improve the environment. The United States is generally recognized as the world model for raising sustainable beef because today's system is so efficient, meaning U.S. farmers and ranchers can raise more beef, more affordably and more consistently, with a smaller cattle herd while using fewer natural resources.

A Washington State University study found each pound of beef raised in 2007 used 20 percent less feed, 30 percent less land, 14 percent less water and 9 percent less fossil fuel energy than in 1977, while also generating 18 percent fewer carbon emissions.⁸

WATER USE AND QUALITY

The Beef Industry Sustainability Assessment found that for every pound of edible, consumed beef produced in the United States, 614 gallons of water are required. Approximately 95 percent of this water is for the irrigation of crops used for feeding beef cattle. Water used directly for drinking water by cattle represents around 1 percent of the total water used in beef production. Because of the impact of irrigation to the total water required per unit of beef, the true water footprint of any given pound of beef purchased by a

consumer can vary, depending on whether the product purchased came from an animal whose feed had required irrigation. Encouragingly, irrigation technology used by farmers continues to improve, which means each drop of water is used more efficiently to sustain plants, and less is lost to the air by evaporation or by running off fields.

Regarding water quality, between 2005 and 2011 emissions to water decreased 10 percent as a result of several improvements in production and management practices, attributable in part to the increased crop yields requiring decreased fertilizer use.

Conserving water quality is a top priority of 2015 Environmental Stewardship Award winner Valley View Farms, located in Virginia's Shenandoah Valley within the Smith Creek Watershed, which has been listed as impaired.

“When you get to where you think you're going to be, need to be, you're always seeing how you can make improvements to be even better,” Mike Philips, Valley View Farms, said in explaining his commitment to continuous improvement.



Owners Mike and Susan Philips implemented a combination of herbaceous and forested riparian buffers, a vegetated area near a stream, to protect all the water features on their farm.

The Philips are one cattle operation among many who employ everyday water conservation and environmental efforts including conducting water quality tests, fencing off streams to protect fish and waterways, reclaiming, filtering and reusing water whenever possible, creating man-made irrigation ponds and increasing aeration in manure-holding lagoons. Cattle farmers and ranchers reuse or recycle water by collecting rainfall or using wells to use less water and make sure the environment is sustainable for future generations.



A recent publication from the National Academies of Sciences, Engineering, and Medicine quantified how much grain is required to finish one conventional, grain-finished beef animal in the United States. The authors found that 80.8 percent of the total feed required was human inedible forage, which includes grass on range and pasture lands, hay and silages. Another 9.9 percent of the total feed was comprised of human inedible byproducts, along with a small portion of vitamins and minerals. Only 9.3 percent of the total feed required was grain (mostly corn), of which a portion would be human edible. Consequently, the feed U.S. cattle eat is largely not in competition with the human food supply.⁹

CARING FOR ANIMALS

A key component of U.S. farmers and ranchers' conservation efforts is their dedication to the health and well-being of the animals in their care. Research demonstrates that healthier animals are more productive, which translates into more efficient conversion of feed and water resources into nutrient-rich beef for consumers. Beef farmers and ranchers work closely with veterinarians and other professionals, like animal nutritionists, to ensure the use of the best preventative health and husbandry practices. Continuing education programs delivered by land grant universities, or programs like Beef Quality Assurance, are some of the resources U.S. farmers and ranchers use to stay up-to-date on the latest information to improve animal handling and management.

APPRECIATING THE ROLE OF RUMINANTS IN OUR FOOD SYSTEM

Beef cattle are ruminant animals, which means they have a specialized stomach that contains four compartments. The largest of these compartments is called the rumen (hence, ruminants), which is home to trillions of microscopic bacteria, protozoa and fungi. The trillions of microorganisms in the rumen of cattle and the cattle themselves have a mutually beneficial relationship. The microbes are provided a comfy home and a constant food supply from the feed that cattle eat.

Because of the unique biology of cattle, they fill an important role in our food system and the U.S. bio-economy by using human inedible feeds or eating things that people cannot [see box]. Human inedible feeds for cattle include the plants cattle eat on range and pasture lands unsuitable for cultivated agriculture, and byproducts from the biofuels, fiber and human food industries. By using byproducts that would otherwise go to waste, cattle are enhancing the sustainability of other industries. For example, cattle eat distillers grains from the corn ethanol industry, cottonseed that is a byproduct of cotton production and beet pulp that is a byproduct of sugar beet production. The relative difference in the human nutritional value of the feeds cattle eat versus the human nutritional value of beef can be substantial. This means cattle are acting as "upcyclers" in our food system by upgrading human inedible material or food waste into high-quality protein and essential micronutrients. Research from the University of California, Davis found that in some U.S. grain-finished beef production systems, more

human edible protein is generated in the form of beef than cattle consume in the form of feed.¹⁰

The cost of the upcycling service provided by cattle is the production of methane from the rumen by microorganisms. The methane naturally released from the mouths of cattle, called enteric methane, contributes a substantial portion of the total greenhouse gas emissions produced by beef cattle. The Beef Sustainability Assessment found that enteric methane made up 42 percent of the total carbon footprint of beef from grass-to-plate. While there is research ongoing at land grant universities exploring ways to practically and cost-effectively reduce natural emissions of enteric methane, it is important to recognize methane production is the tradeoff of the sustainable service of upcycling cattle provide.

RESPECTING THE OPEN RANGE

Range and pasture lands are located in all 50 states. According to the USDA Economic Research Service, livestock grazing is the primary use of an estimated 614 million acres of permanent grassland, pasture and rangeland, which accounts for 27 percent of all U.S. land and 60 percent of all agricultural land.¹¹

Much of the land cattle graze is not suitable for growing other food products. Raising cattle on it more than doubles the land area farmers and ranchers can use to raise food for the world's growing population.

When properly managed, livestock grazing can be used as a tool to lower wildfire risk by controlling the amount, height, and distribution of grasses and forage that fuel wildfires.

The grazing lands used by cattlemen and women can be privately owned or leased from the government. The Bureau of Land Management (BLM) estimates that 300 million acres of open space, primarily in the West, has been preserved by public ownership. BLM has designated this public land for multiple activities that support national interests, including grazing beef cattle. Commonly called "public lands ranching," cattle ranchers lease the land from the government for grazing and, at the same time, commit to caring for the land in an effort to preserve it for the future.

Grazing cattle on public lands means cattlemen and women play an important role in protecting public landscapes, both by enhancing ecosystems and by keeping much of this land safe from degradation. Without being able to utilize and graze cattle on this

public land, the private property owned by farmers and ranchers — which are interspersed with public land — would likely be lost to development, and the open rangeland that comprises much of the West today would be lost forever.

Did You Know...

...that nearly half of the lower 48 states is grazing land: range, pasture, hay and grazed forest?

...that properly managed grazing is one of the most energy-efficient ways of producing food and fiber?

...that grazing lands help improve water supplies for residential, commercial, agricultural and recreational uses?

...that many wildlife species rely on grazing lands for habitat and food?

...that carbon sequestration (absorption of atmospheric carbon by soil and plants) occurs when farmers and ranchers practice good grazing land management? And that carbon sequestration is a key to mitigating climate change?

...that grazing lands could be developed by farmers and ranchers as a source of biomass energy and raw materials, which could reduce U.S. reliance on imported products?

SOURCE: Natural Resources Conservation Service

Farmers and ranchers are dependent on the land and fully appreciate the importance of conserving grazing land resources and the benefits these lands offer all U.S. citizens. Recognizing this, the 1996 Farm Bill included a provision to provide technical assistance to grazing rangeland managers. This program offers opportunities for better grazing land management; protecting soil from erosive wind and water; using more energy-efficient ways to produce food and fiber; conserving water; providing habitat for wildlife; sustaining forage and grazing plants; using plants to sequester greenhouse gases and increase soil organic matter; and using grazing lands as a source of biomass energy and raw materials for industrial products. As they've acquired this expertise, today's farmers and ranchers can be proud of the role they play in providing a high-quality protein to a growing population, while, at the same time, implementing management practices to reduce global warming, protect wildlife and preserve the environment.

PROTECTING BIODIVERSITY AND WILDLIFE

In the West, where productive, private lands are interspersed with large areas of rockier, less desirable public lands, biodiversity of species depends greatly on ranch land.

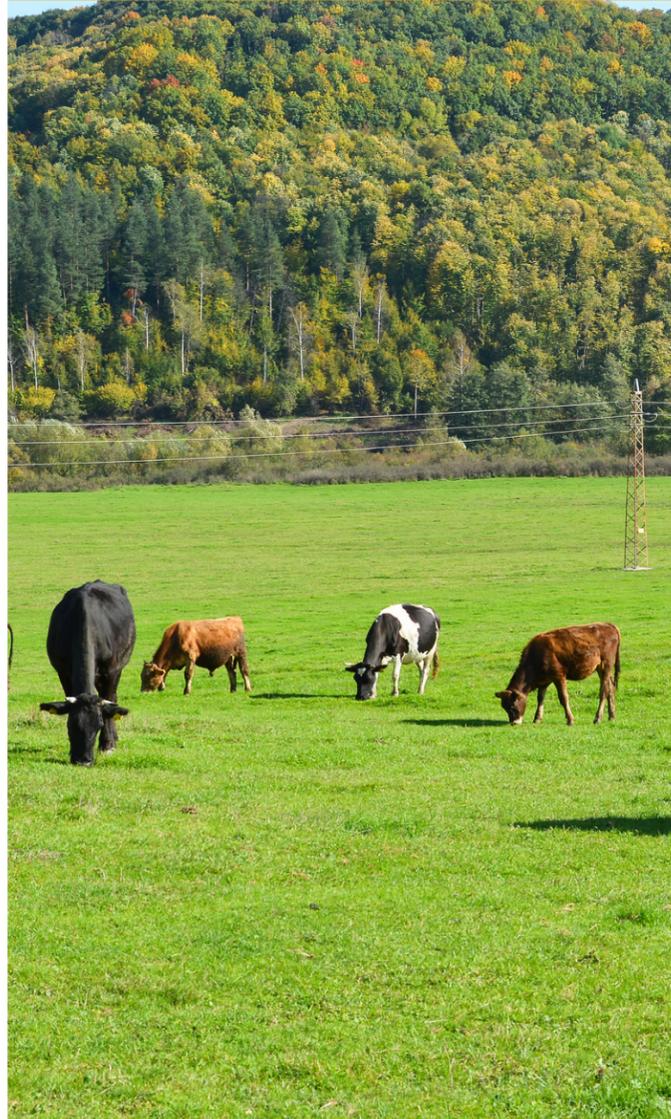
To understand the contribution of ranchers to enhance or conserve ecosystems, an exploratory survey was conducted to document how public land ranchers value and manage for ecosystem services.

Overall, western ranchers rank livestock operations first in importance, followed by the maintenance of open space, clean water production, providing hunting and fishing access, maintaining biodiversity, providing aesthetically pleasing landscapes, providing recreational activities, sequestering carbon and producing biomass. Ranchers are generally active in controlling invasive plant species, most often by using targeted grazing, which is the application of ruminant livestock, such as beef cattle, sheep or goats, at a determined time, duration and intensity to accomplish specific vegetation or landscape goals, such as reducing invasive plant species.

Ranchers often manage rangelands to enhance wildlife habitat. While the species targeted for wildlife habitat management naturally varies across the West, the species mentioned most often by survey respondents include mule or whitetail deer, elk, turkey, pronghorn, sage-grouse, goose and quail. The reasons for implementing practices to protect riparian areas included livestock exclusion, improving water quality, improving livestock distribution, improving wildlife habitat and improving fish habitat.

Wildlife in the eastern and central parts of the country also rely on private ranch and farm lands, and other private lands, to provide habitat. Michelle Banks of the Natural Resources Conservation Service (NRCS) writes in her blog, "Private lands are essential for providing habitat for nearly two-thirds of all species listed as threatened or endangered under the Endangered Species Act (ESA). Through WLFW (Working Lands for Wildlife program), NRCS works with conservation partners and private landowners to restore populations of declining wildlife species, provides regulatory certainty and strengthens rural economies. The nation's farmers, ranchers and forest managers provide not only food and fiber for the world, but also provide a variety of environmental benefits, including healthy habitat for wildlife."¹²

The 2016 Environmental Stewardship Award winner was Smith Creek Ranch in Austin, Nevada. This 230,000-acre ranch is an important habitat for Lahontan cutthroat trout and sage grouse, and their stewardship efforts have included restoration of more than two miles of creek bed on the ranch. Additionally, Smith Creek Reservoir on the ranch provides habitat for migrating waterfowl and irrigation water, while meadows on deeded lands supply hay and provide habitat for sage grouse and other wildlife. Through extensive monitoring of rangeland, Smith Creek Ranch has also demonstrated the compatibility of livestock and sage grouse with practices that reduce habitat loss, fragmentation and degradation.



INNOVATING ACROSS OPERATIONS

Farmers and ranchers recognize the important role they play in contributing to a more sustainable food supply. They support research and the development of technologies to continuously facilitate greater efficiency in beef production. Some innovations being utilized on farms and ranches across the country include manure management programs, use of food waste in feed rations, and increased renewable energy use on operations.



Couser Family

MANURE MANAGEMENT PROGRAMS

The proper management of manure, through its capture, storage, treatment and use, can be a benefit to both farm productivity and the environment. In a feedyard, cattlemen carefully contain the manure generated at their facilities. Local farmers and ranchers then use this manure scraped from cattle pens as a natural fertilizer for their crops. In turn, the feedyard may buy grains from those farmers to feed their cattle. This reduces the use of synthetic fertilizers, which account for about four times more nitrous oxide emissions on cropland and grassland than manure.

2010 Environmental Stewardship Award winner, Couser Cattle Co., helped develop a 50-million gallon local investor-owned ethanol plant in 2006. The plant is seven miles from Couser's feedlot. "We raise the seed corn that raises the grain for ethanol. We use the distillers grain from the ethanol to feed cattle. We use manure from the cattle to fertilize the next crop of seed corn so the cycle can continue," Bill Couser explained, describing the value and efficiency in re-using resources.

USE OF FOOD WASTE IN FEED RATION

Based on estimates from USDA's Economic Research Service, between 30 and 40 percent of the food supply is wasted each year in the United States. The Environmental Protection Agency (EPA) estimates that one-fifth of the municipal solid waste entering the nation's landfills is attributable to food waste. Feeding food waste to cattle can provide a triple benefit by lowering feed costs for farmers and ranchers, helping food manufacturers reduce food waste disposal costs and improving the environmental impacts of wasted food.

Cattle are an ideal animal to make use of a variety of food co-products/by-products wasted in the manufacturing process. Unlike poultry and swine, the diet of a ruminant animal normally consists of fibrous plant material that is difficult to digest by people but gives the ruminant the unique ability to convert these materials into energy.

In Wisconsin, about 62,000 acres are dedicated to potato production, which results in almost 1.3 million tons annually. Culled potatoes, or those that do not meet prescribed standards for size and visual blemishes, can be incorporated into properly balanced feed rations for both dairy cattle and feedyard beef cattle.¹³

Some restaurants, dining halls and even grocery stores are collecting food waste that can be treated and fed to livestock. At some of their store locations, Darden Restaurants, which owns LongHorn Steakhouse, Olive Garden and others, collects and sends scraps to be converted into animal feed. Rutgers University claims to divert about 4 million pounds of food waste from landfills to animal feed use. The practice of feeding people's leftovers to livestock is not new, but its use is gaining momentum as a way to address food waste while reducing the environmental impact of agriculture.

RENEWABLE ENERGY USE

Farmers and ranchers take seriously their commitment to be good stewards of the land and their animals. To support this responsibility, many of them are adopting a variety of new technologies, including biofuels and solar energy, to reduce energy costs and contribute to improved air quality, while helping the country move toward energy independence. USDA's NRCS offers a program, the Environmental Quality Incentives Program, that provides farmers with technical and financial support to improve their energy efficiency while reducing air pollutants and greenhouse gas



“Our on-the-farm bio-diesel facility will make us more sustainable as a farm. We will use the crops to make fuel and then use the co-products, the cooked soybean or sunflower meal, as a source of protein for the cattle. Nothing that we use to make the fuel will leave the farm. That means stewardship!”

- Annie Dee, 2007 Environmental Stewardship Award Winner

emissions. Many states also have complementary programs to support farmers and ranchers in achieving their energy goals.

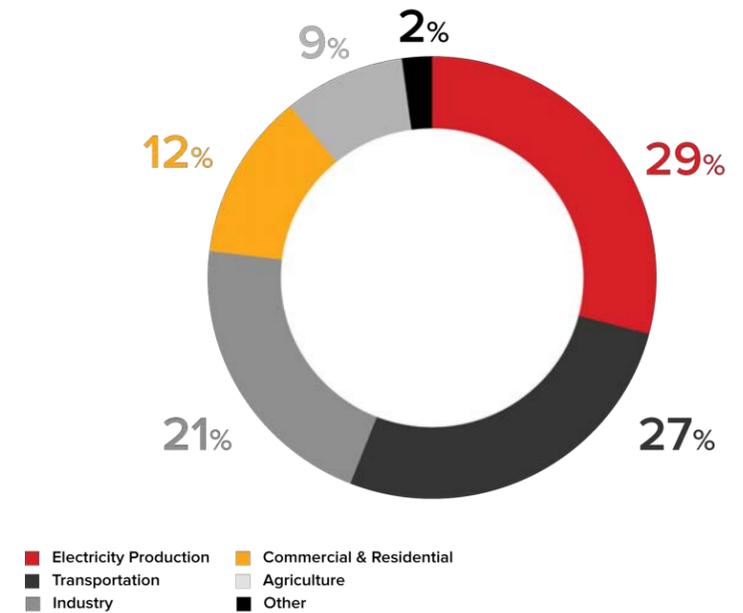
To combat high fuel prices and help address global warming, the Dee River Ranch in Alabama is making use of vehicles powered by alternative fuels. The ranch is run by Mike and Annie Dee, a featured customer of USDA's NRCS and a 2007 Environmental Stewardship Award winner. Mike and Annie are working in cooperation with Auburn University Natural Resources Management and Development Institute to install a farm alternative fuel production plant that will use soybeans, sunflowers and canola grown on the farm. Annie says, “Our on-the-farm bio-diesel facility will make us more sustainable as a farm. We will use the crops to make fuel and then use the co-products, the cooked soybean or sunflower meal, as a source of protein for the cattle. Nothing that we use to make the fuel will leave the farm.”

The diversity of their operation allows the Dee family to optimize the land as a resource by focusing on the land's best use. Mike says, “The cattle operation is an integral part of our whole operation. It helps us utilize our acreage that is not hospitable to row crops. Some of our land is very suited to grow forage and that's the best use of the land. To be able to harvest that forage with the cattle is the most efficient use of the land.”¹⁴



ADDRESSING CLIMATE CHANGE

Percentage Contribution to U.S. Greenhouse Gas Emissions



SOURCE: United States Environmental Protection Agency, Sources of Greenhouse Gas Emissions
<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

As with the production of all foods, raising beef results in greenhouse gas emissions (GHG). However, unlike many other cattle-raising areas of the world where raising livestock accounts for a much greater percentage of total greenhouse gas emissions, direct emissions from beef production in the United States are estimated to be only 1.9 percent of total U.S. GHG emissions, according to the EPA. Since the 1970s, GHG emissions per pound of beef have been reduced between 9 and 16 percent. As the environmental sciences advance, GHG emissions in the future will continue to decline.

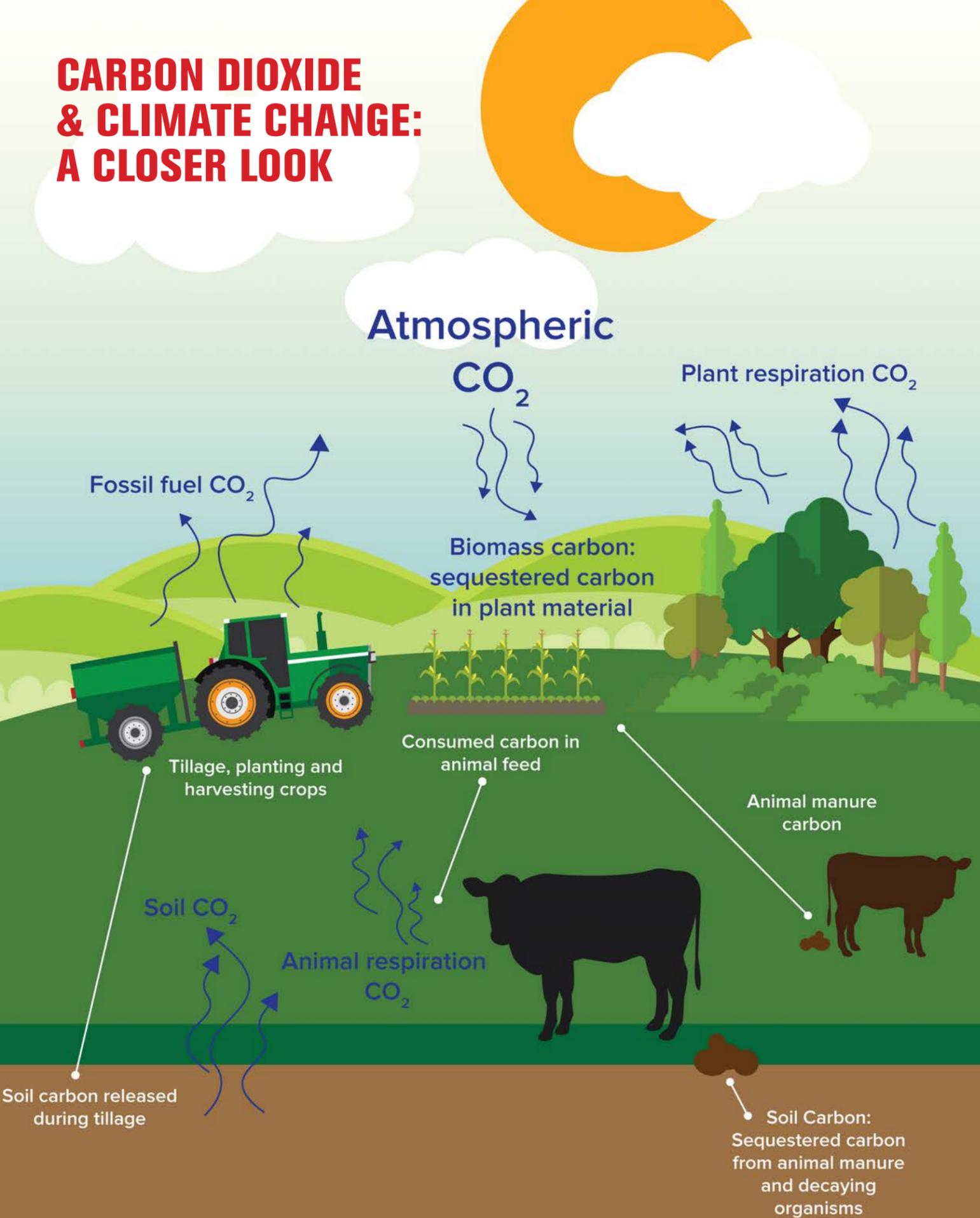
According to the EPA, human activities are responsible for the last 150 years of increased GHG emissions in earth's atmosphere. The largest contributors to the increased emissions in the United States is burning fossil fuels for electricity, heat and transportation. All of agriculture is responsible for 9 percent.

Men and women who make a living off the land understand they are at the mercy of Mother Nature. They are accomplished at accepting risks over which they have no control, but the potential threats posed by climate change could be a hazard to the health of their animals and their business sustainability. Recent droughts, extreme blizzards and flooding all have negatively impacted farmers and ranchers across the country.

Raising cattle has a positive role to play in reducing GHG emissions. Carbon sequestration, the long-term capture and storage of carbon in soil and plants, is a promising method of reducing GHG emissions into the atmosphere. Crop lands, when tilled, release carbon into the atmosphere. Beef cattle production can play an important role in furthering carbon sequestration through the production of human food from untilled pastures and grasslands, and the integration of cattle grazing into “no-till” cropping systems.

Cattle farmers and ranchers have a strong commitment to managing their land, animals and resources in a way that ensures longevity and care. Stories featured here are just a few examples of how this is being done throughout the country. The beef community is focused on continuous improvement and creating a more sustainable product.

CARBON DIOXIDE & CLIMATE CHANGE: A CLOSER LOOK



STRONGER COMMUNITIES



We define stronger communities as the many contributions beef farmers and ranchers make to the areas in which they work and live. This includes focusing on family and future generations, training and educating, giving back with donations of time and resources, maintaining a healthy workforce and contributing to the economy.

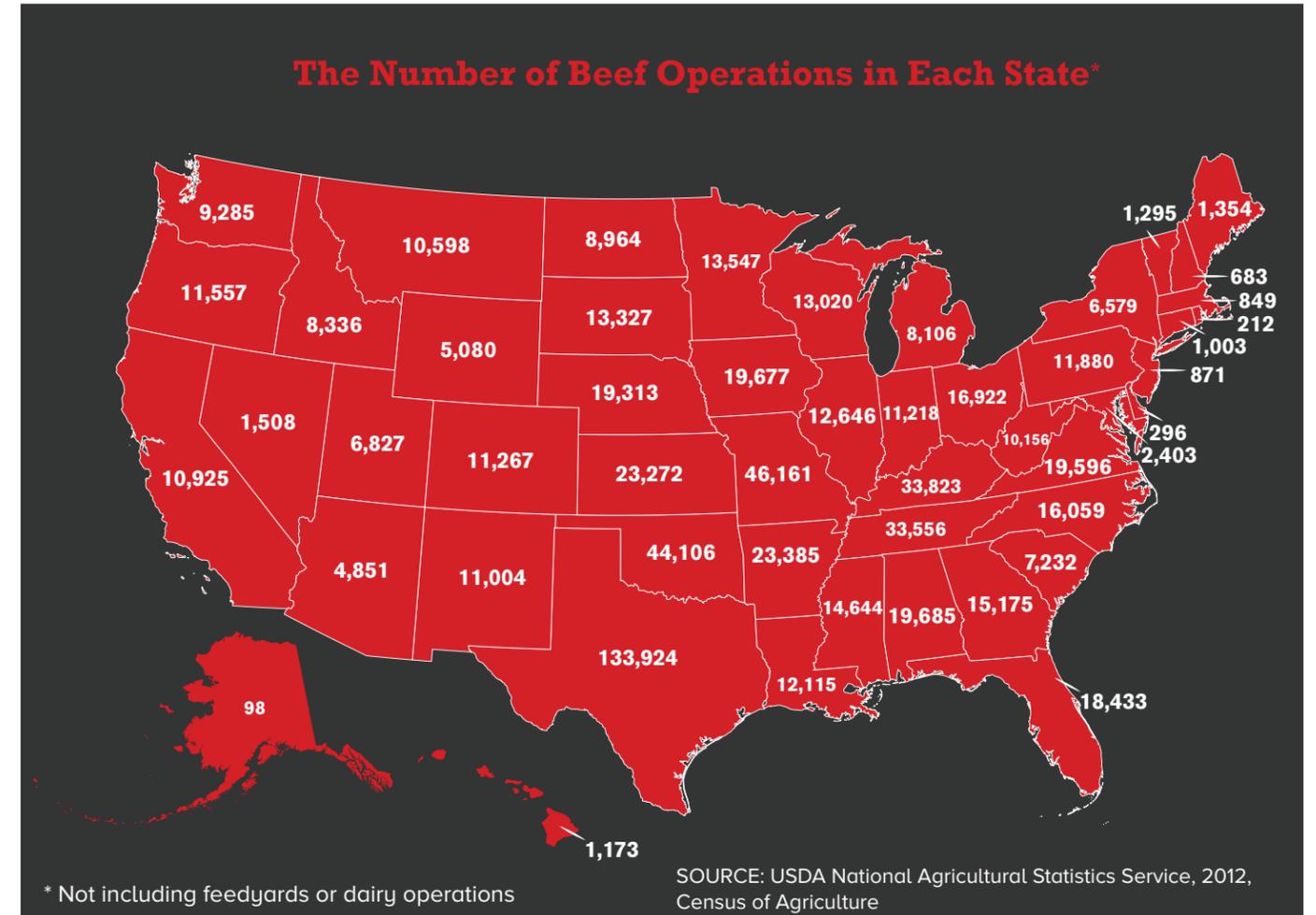
While they may be from different parts of the United States with different ages, backgrounds and production methods, members of the beef community share the same values.



SOURCE: USDA National Agricultural Statistics Service, 2012, and Producer Profile Survey, 2017, Aspen Media

WHERE WE ARE TODAY

While the number of beef operations varies, the beef community touches every state. From Alabama to Wyoming, beef farmers and ranchers play an integral role in local communities.



In 2017, for the second time – first in 2010 to inform the previous Cattlemen’s Stewardship Review – a national study looked broadly and deeply at American cattle farmers and ranchers to assess not only basic demographics but also their management practices, perceptions of the future of the industry, values, community engagement and leadership activities. While subtle differences occurred between the surveys, most insights hold true.

Telephone surveys were conducted with nearly 700 cow/calf ranchers, stocker/backgrounders, seedstock operators, farmer feeders and feedyard operators

around the country in early 2017. The sample size was skewed toward professional cattlemen and women, or those who depend on cattle for a substantial percentage of their livelihood.

American beef farmers and ranchers differ widely in terms of age, size of operations, acres managed and other variables. But they share some important commonalities, with a focus on doing the right thing for the animals and their land to ensure a safe and healthful product that will lead to a successful business and the possibility of passing on their operation to future generations.

FAMILY AND FOCUS ON FUTURE GENERATIONS

The beef community is made up of families; in fact 91 percent of operations are family-owned.² This longstanding commitment brings with it a strong sense of pride in the lifestyle, the animals and the land. With so much of the country being removed from agriculture, it's these farmers and ranchers who not only keep food on our plate but also keep a vital piece of our heritage alive and well.

Raising beef is a family affair, with nearly 90 percent of farmers and ranchers stating they employ family members. There is also a focus on longevity. More than half (58 percent) of cattle operations have been in the same family for three generations or more, with 13 percent spanning five or more generations.¹⁵

THE AMERICAN CATTLEMAN OR CATTLEWOMAN: A SNAPSHOT

The average age of a beef farmer or rancher is 58, and 80 percent of those individuals are married, which is 30 percent higher than the U.S. average. Additionally, 9 out of 10 cattlemen and women have children.



SOURCE: USDA National Agricultural Statistics Service, 2012, Census of Agriculture, and Producer Profile Survey, 2017, Aspen Media



What does sustainability mean to you?

Sustainability means responsibly and efficiently producing beef. That includes managing resources both for today and tomorrow. One way we do this is through rotational grazing, which helps to utilize native grasses as efficiently as possible by intensively grazing one pasture for a short period of time then providing a long-term rest period. This is based on season and forage availability. Essentially, I want to ensure that future generations of my family will be able to feed future generations of America.

How important is animal welfare on your ranch?

Animal welfare is an integral part of what we focus on every day. As an animal caretaker, it's second nature and a priority for me to make sure our cattle aren't stressed or uncomfortable. We're constantly looking to professionals for advice and best practices, including our veterinarian and cattle nutritionist as well as animal handling experts like Dr. Temple Grandin and the late Bud Williams.

How do you use technology on your ranch?

What we do has changed so much because of technology. From checking markets on my iPhone when I'm in the middle of a pasture to keeping detailed inventories of cattle on the iPad while chute-side, we generally use some form of technology in everything we do. Technology has also greatly impacted

MEET YOUR RANCHER: BRAD BELLAH



6th Generation Rancher
Throckmorton, TX
Segment of the beef industry:
Cow/Calf, Stocker, Feedyard

research within animal genetics, health and nutrition. Cattlemen and women now have more data and resources available to them to ensure herd health.

How are you working to build on your dad's legacy on your family's ranch?

My ultimate goal is to not only maintain but also improve and grow what my father and grandfather have built. I'm constantly striving to do better.

What does it mean to you to be raising your children on your family farm?

The one room school that my Pop and his nine siblings attended sat on a ranch my dad now runs. I can't put into words how I feel when my dad and I ride past those school steps, and I can't wait for the day that the twins are riding alongside us. Raising my kids where so many generations of my family grew up and raised their own families adds an element to life that few people today get to experience and that I do not take for granted.

EDUCATION AND TRAINING

Cattle farmers and ranchers prioritize continuous education and training, both for themselves and their employees. This commitment starts with an investment in the youngest generation, through contributions of time and resources to youth organizations. Nearly half of cattle farmers and ranchers are involved with 4-H, Future Farmers of America, youth sports, Boy/Girl Scouts, their church youth group or another entity.¹⁵ The focus on youth is not by accident, as this engagement with young people is the best way to inspire future careers in agriculture and a greater respect for how food is grown and raised.



A COMMUNITY OF ADVOCATES

The Masters of Beef Advocacy Program (MBA) is a self-directed online training program designed to equip beef producers and industry allies with the information they need to be everyday advocates for the beef industry. The checkoff-funded MBA program, established in 2009, has over 10,000 graduates from 49 states. Five courses are included in the program.

1. The Beef Community explores the people involved in producing beef, from pasture to plate.

2. Raising Cattle on Grass covers the cow-calf and stocker/backgrounder stages of the beef lifecycle.

3. Life in the Feedyard highlights what goes into ensuring cattle receive proper care and a healthy diet in the feedyard stage of the beef lifecycle.

4. From Cattle to Beef explains how cattle are humanely slaughtered and processed into beef products.

5. Beef. It's What's for Dinner. shares best practices on how to properly store, handle and cook beef to ensure a safe and enjoyable eating experience.

Cattlemen and women are well-educated with 36 percent having at least an undergraduate degree, and 18 percent having advanced degrees¹⁵ (compared to 33 and 12 percent of the U.S. adult population, respectively). Raising beef is an intellectually challenging and rewarding lifestyle that requires a tremendous amount of experience and training.

GIVING BACK

Maintaining healthy and sustainable communities is a core value of the beef community. In addition to contributing to the greater U.S. economy, cattle farmers and ranchers are dedicated to being responsible citizens and active participants within their communities. This includes providing good jobs, contributing to the local economy, and investing in community improvements and charities, including youth leadership organizations and faith-based groups, among others.

There are many ways cattlemen and cattlemen contribute to their local communities:

- Nearly half are involved with a youth organization
- More than 1/3 – 39 percent – donate their time to other civic organizations, compared to a national average of 7 percent
- About 20 percent of U.S. cattlemen and cattlemen have served in the military, more than the national average of 14 percent
- 97 percent vote, compared to just 64 percent of the general population
- One-half have run for elected office

SOURCE: Producer Profile Survey, 2017, Aspen Media, and U.S. Census Bureau, 2015, Current Population Survey



U.S. cattle farmers and ranchers are not just generous with their time; they also contribute financially to charitable causes. More than one-half of farmers and ranchers donate at least \$500 annually to local and national charities, in addition to support of churches or religious organizations, and 38 percent donate at least \$1,000 each year. This is in addition to the state and national cattle and beef groups they contribute to which, in turn, participate in national charitable events.

HEALTHY WORKFORCE

Nearly 90 percent of farmers and ranchers state that ensuring and maintaining a healthy workforce is important to the future of the industry. This includes a focus on safety, job creation/fair compensation and management plans.¹⁵

According to the checkoff-funded Sustainability Lifecycle Assessment, there was a 32 percent reduction in occupational illnesses and accidents between 2005 and 2011. This achievement was the product of many segments of the supply chain improving their protocols, including the packing plant sector. Additionally, the implementation of animal handling programs like Beef Quality Assurance also creates a safer environment for both the employees and the cattle.

Eighty-two percent of farmers and ranchers agree that fair compensation for labor is a high priority for the future of the beef industry. Because many small cattle farmers and ranchers employ only family members, the inclusion of formalized employee training programs is more prevalent in larger operations. The majority (73 percent) of feedyards have nutrient management plans in place, and nearly 60 percent have environment plans as well. These practices all contribute to a more equipped and engaged workforce.¹⁵

CONTRIBUTIONS TO THE ECONOMY

The economic impact of the beef industry is \$88.25 billion in farm gate receipts for cattle and calves.¹⁶



When you broaden the lens to include all affiliated businesses, the beef industry directly and indirectly accounts for more than 1.4 million full-time jobs and more than \$188 billion in output to the national economy.

In addition to contributions to the national economy, cattle farms, ranches and feedyards contribute significantly to the economies of many states.

TOP FIVE STATES IN NUMBER OF CATTLE:

-  TEXAS
-  NEBRASKA
-  KANSAS
-  CALIFORNIA
-  OKLAHOMA

TOP FIVE STATES IN NUMBER OF CATTLE FEEDYARDS:

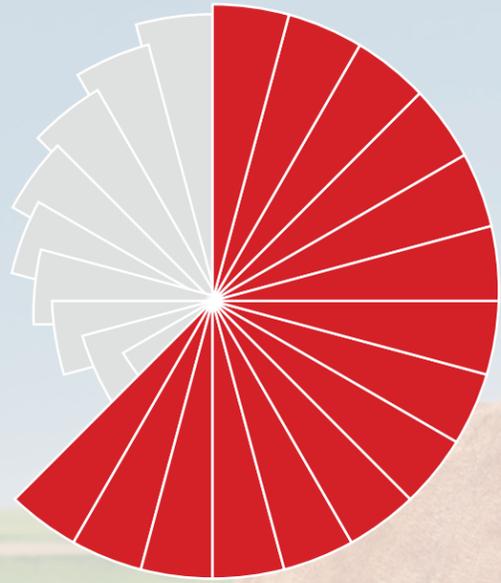
-  TEXAS
-  NEBRASKA
-  KANSAS
-  COLORADO
-  IOWA

SOURCE: Livestock Marketing Information Center, 2017

RESOURCES/ASSETS PURCHASED FROM LOCAL AREA/COMMUNITY



SOURCE: Producer Profile Survey, 2017, Aspen Media

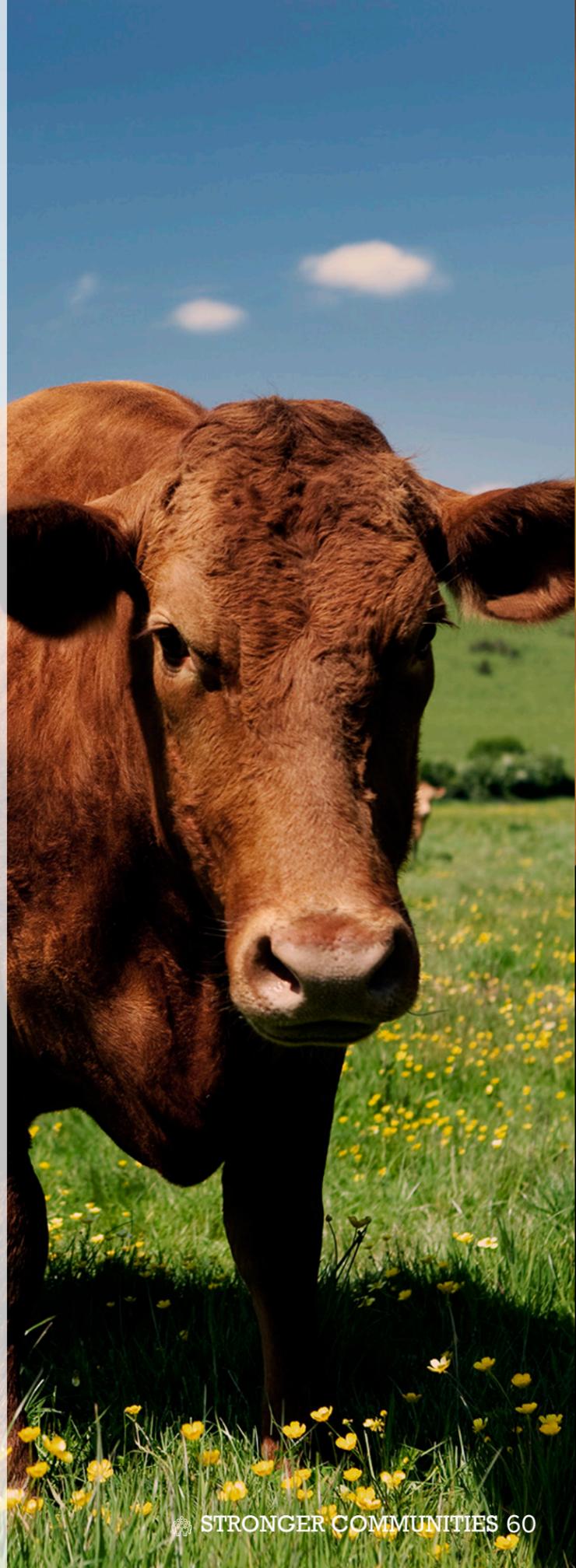


62 percent of consumers feel its important for meat industries to support their local economies.

SOURCE: Consumer Beef Index, 2016, Pelegrin Research

The beef raised in the United States is also exported across the globe. In fact, due to strong demand for U.S.-produced beef, it is exported to more than 130 countries. The value of these beef exports is \$6.302 billion and top export markets for American beef include Japan, Canada, Mexico and South Korea.²

Maintaining the commitment to build stronger communities is a goal for beef farmers and ranchers. These important values – family and future generations, training and education, giving back, a healthy workforce and contributing to the economy – all help create a better beef industry. At the end of the day, the beef community raises their animals and cares for their own families, employees and resources with these principles in mind.



A LOOK TO THE FUTURE

As the beef community looks to the future, there will be an ongoing focus to not only improve beef as a product and the process in which it's raised, but also to appreciate and honor the tradition and history associated with this important industry. Between now and our next report, the beef industry remains focused on continuous improvement, research investments, analyses and ongoing measurement. We are evolving to meet current and future needs, while better understanding our impacts and improving the tools and approaches we have available to meet and exceed expectations.

In 2017, Beef. It's What's For Dinner celebrates its 25th year. The people behind the product and the healthful, great-tasting beef remain the longstanding pillars of this iconic brand.

Visit BeefItsWhatsForDinner.com to learn more about beef and the people who raise it, and visit BeefResearch.org for a deeper dive on much of the research that informed this report.

ACKNOWLEDGEMENTS

Thank you to all involved in sharing how this community responsibly raises beef. Without your support, research, writing, interviews and creative expertise, the 2017 report wouldn't have been possible.

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