



OKLAHOMA
CareerTech

Introduction to Agriscience

Unit 5
The Beef Cattle Industry

Student Edition

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AG3001

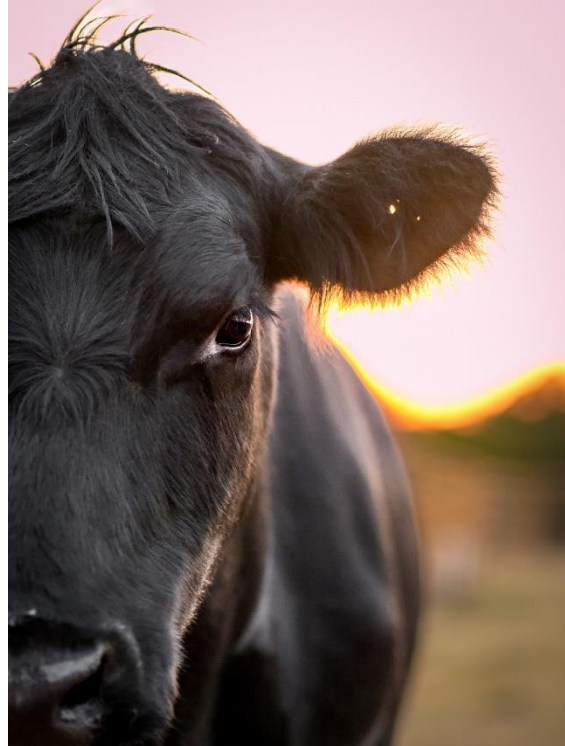
Unit 5

The Beef Cattle Industry

The value of the beef market in the United States in 2024 was around \$108 billion and the U.S. has been one of the leading countries in beef exports, production, and consumption. The top producing states for cattle and calves are Texas, Nebraska, Kansas, California and Oklahoma. A beef producer's income depends on the ability to identify cattle breeds and select quality animals. For consumers, it is important to know as much as possible about the beef industry to ensure purchases of beef products are wise and cost effective.

OBJECTIVES

1. Discuss the history of the beef cattle industry and its role today.
2. Identify major breeds of beef cattle and their characteristics.
3. Identify factors to consider when selecting beef cattle for a specific purpose.
4. Discuss the phases of beef production.
5. Locate the parts of a beef animal.
6. Determine the consumer products derived from beef cattle.



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KEY WORDS

bovine
bull
calf
castrate
composite breed
cow
crossbred

heat tolerance
heifer
polled
purebred
roan
steer



PhotoDisc Image

Beef Cattle History

Cattle have played an important role in the development of mankind. Not only have they always been used as a food source, but they serve as beasts of burden as well. As they were domesticated, the appearance of cattle changed. Today, modern cattle have been developed to suit the changing needs of the beef industry.

It is believed that cattle were first domesticated in Europe and Asia during the Stone Age. Modern cattle are descended from two species of wild cattle. These two species are called *Bos taurus* and *Bos indicus*. The *Bos taurus* species produced European-style cattle breeds, such as the Angus and the Hereford. These breeds are adapted to cooler climates and tend to have

a docile nature. The *Bos indicus* species comes from India. Cattle breeds that are descended from this species are adapted to hot climates. They have a hump over the neck, droopy ears, and loose skin. They are also known as the Zebu type. The word *Bos* is the genus name for cattle also known as **bovine**.

Cattle were first brought to North America by early settlers from Europe and the British Isles. The settlers primarily used them as work animals, rather than raising them for beef as is done today. The beef industry began to develop as the United States expanded into the Great Plains during the nineteenth century (1800s). The vast grassy areas of the plains were well suited for grazing animals such as cattle.



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Before the invention of refrigeration, there was no way to keep meat fresh while it was being transported from one area of the country to another. Cattle had to be slaughtered near the consumer markets. This gave rise to the great cattle drives. Cattle were brought from the range to the market where they were then sold. As refrigerated transport in trains (and later refrigerated trucks) became available, the cattle drives were discontinued.



Chisholm Trail Heritage Center photo

Cattle are raised across the United States, but the modern cattle industry is concentrated in the South and Midwest. Because of large areas of grazing land and an abundance of crops used to produce feed for the cattle, conditions in these areas are best suited to raising cattle. In the past 40 years, consumers have developed a desire for leaner beef. Because of this, many different breeds of cattle have been developed that better meet this need. Newer breeds that produce a leaner carcass are more common today. In addition, cattle breeders will continue to improve breeds to meet changes in production conditions. For example, a drastic change in the types of feed available could make it more beneficial to switch to raising other types of cattle.

SAE IDEA:
Placement
Work as a beef feedlot assistant.

Hereford, Angus, and Shorthorn breeds were predominant in the past. Today there are more than 40 breeds of cattle raised for the beef industry. Many of these breeds combine *Bos taurus* and *Bos indicus* types of cattle to make use of the best characteristics of both.

Major Breeds

Three breeds dominated the United States in the mid-1900s—the Hereford, Angus, and Shorthorn. Although these breeds still exist today, other breeds have joined them. As America's demand for leaner meat grew, more exotic breeds were introduced. The Charolais, Limousin, Simmental, and Maine Anjou are a few breeds brought to the United States for their leanness of meat and efficient growth.

Typically, each breed is characterized by colors or characteristics. Some may have one or two solid colors while other breeds may be **roan**, a mixture of colors. Some breeds are horned while others are **polled**, naturally without horns. Each breed has characteristics that make them desirable over other breeds, such as meat quality, milking ability, fertility, heat tolerance, growth efficiency and disposition, to name a few. For example, the Angus is known for its excellent meat quality, while the Brahman is known for its **heat tolerance** or ability to withstand hotter climates.

Once breeders learned the desirable characteristics of each breed, new breeds began to develop in the United States. There was a need for a breed that would withstand the heat of southern states, such as Texas, and provide superior meat quality. As a result, the Brahman and Angus were crossed to develop the Brangus. The Beefmaster breed is a combination of the Brahman, Shorthorn, and Hereford breeds. A cross between the Shorthorn and Brahman resulted in the Santa Gertrudis. A breed formed from two or more established breeds is a **composite breed**.

MAD COW DISEASE

Mad cow disease, or bovine spongiform encephalopathy (BSE), is a fatal disease of the central nervous system in cattle that was first identified in cattle in the United Kingdom in 1986. Scientists believe that the disease was spread among cattle from the practice of using meat and bone meal in the animals' diet. The exact cause of the disease is not yet known. Strong actions have been taken to eradicate the disease in Great Britain. In 2003, Mad Cow Disease appeared in the U.S. and Canada in isolated cases. According to the Centers for Disease Control and Prevention, changes to feed policies have since made BSE extremely rare. However, animal health professionals continue to monitor suspicious deaths in cows to watch for a potential recurrence of BSE.



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Due to the beef market's desire for black-hided cattle, many breed colors have changed from their once characteristic color to mostly if not all black. Cattle with black hides tend to sell at a higher price than cattle with other color hides. As the first step in qualifying for programs such as Certified Angus Beef, cattle producers have started to incorporate Angus genetics into their herds leading to cattle with mostly black hide, which is the USDA definition on Angus-type cattle.

Angus

The origin of the Angus breed is unknown, but it can be traced back to two Scottish breeds. Today, the Angus is the most widely known breed of beef cattle due to marketing efforts. Certified Angus Beef has increased the visibility of the black breed. The Angus is known for its solid black color along with its excellent meat quality. This is a polled breed with a moderate frame. Because many people associate black cattle with the Angus and high meat quality, black hides are becoming desired in many breeds.



American Angus Association photo

Chianina



ACA-AJA photo

This horned breed originated in Italy and was named after the Chianina (pronounced Kee-a-nee-na) Valley. As one of the oldest breeds in the world and dating back to pre-Roman empire, they were originally used for draft and meat production. The Chianina was originally white with black pigmentation on tongue, palate, nose, tail switch, and around its eyes. Today, many Chianinas are found to be black in color. Chianinas are sometimes crossed with Angus cattle (Chiangus), Herefords (Chiford), and Maine-Anjous (Chimaine).



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Hereford

The Horned Hereford originated in England and was originally much larger, weighing more than 3,000 pounds, than it is today. A farmer in Iowa developed the Polled Hereford by breeding Horned Herefords that failed to develop horns. Physically the Hereford (polled or horned) is red with a white face and may also have white on the neck,

underline, legs, and tail switch. It is moderate in size, docile and hardy. The Hereford has very little pigmentation to the mucous membranes, which may make them more susceptible to eye diseases. The American Hereford Association includes both polled and horned cattle.

The Mini Hereford breed was genetically developed with the use of dwarf-free Hereford bloodlines. This breed looks like a typical Hereford, just smaller in frame size. To be classified as miniature, the frame is measured at the hip with most Miniature Herefords ranging from 38 to 43 inches.



Photo provided

Shorthorn

The Shorthorn is from northern England and was often called a Durham after the county in which it originated. Even though the Shorthorn can be variations of red and white, roan (mixture of hair color) is the most common. This horned or polled breed was originally used for both milk and meat production, and the females are considered good mothers. Today, there are associations for both the beef Shorthorn and the dairy Shorthorn.



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Charolais

This breed originated in central France and was developed as a dual-purpose breed for milk and meat production. The Charolais is typically white or off-white in color and can be polled or horned. It is a large-framed, heavy-muscled breed. Charolais have light color pigmentation to the nose, inner ears, and other body cavities. The King Ranch in Texas is noted for importing the first Charolais bulls to the United States.



American-International Charolais Association photo

Simmental

The Simmental breed gets its name from where it originated, the Simme Valley in Switzerland. When first introduced, the color was light yellow, red, or spotted, with a white head, brisket, and belly and red spots around its eyes. Today, Simmentals can still be found with these color patterns; however, they also can be black, solid in color, or have white on the face. Simmentals can be horned or polled. They were originally used for milk and meat production and as a draft animal.



Jupiter Images



DeRouchey Cattle Company photo

Maine Anjou

Originating from Brittany, France, the Maine-Anjou was developed as a cross between the Shorthorn and Mancelle breeds. These two breeds combined to create a rugged, meat-producing breed. The Maine-Anjou was named after two provinces that border Brittany: Maine and Anjou. It originally was a dark cherry red or black, with some white spots. Today, it is often found solid black and can be polled or horned. It is a docile breed with good marbling in the meat.



North American Limousin Foundation photo

Limousin

This breed was developed in France near Limoges, which is how the breed gained its name. Limousin cattle are typically a red-gold color fading to light buckskin around their legs and muzzle. Current day Limousins can be solid black. The breed is noted for carcass leanness and having large loin areas. Many colleges use Limousin cattle in their beef research programs.

Brahman

In India, cattle are only used for milk and drafting. It was with breeds of cattle from India, Brazil, and West Indies that the Brahman was developed in the United States. Brahman cattle are characterized by the large hump over their shoulders, droopy ears, sloped rump, and loose skin. This breed can be a variety of shades of gray, black, and red. Brahmans have an unpredictable temperament and are genetically resistant to some diseases such as tick fever.



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Brangus

The Brangus was developed in the United States as a cross between the Angus and Brahman breeds. For a Brangus to be registered with the American Brangus Breeders Association, it must be 5/8 Angus, 3/8 Brahman, polled, and black. The hump on a Brangus is slightly less prominent than a Brahman but is

apparent on many animals. The Brangus was developed to combine many of the desirable characteristics of an Angus and Brahman into one breed.



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Beefmaster

The Beefmaster is another cross between breeds. Developed in south Texas, it is a cross between Hereford (1/4), Shorthorn (1/4), and Brahman (1/2) cattle. There is no standard color for Beefmaster cattle, but this breed is typically red or dun color. The ears on a Beefmaster are set slightly lower and drooped. They are a hardy breed and the females are good milkers.



Beefmaster Breeders United photo

Santa Gertrudis

The Santa Gertrudis was developed in Texas at the King Ranch, which was in search for a breed that could withstand the harsh climates and insects while continuing to be productive. It is a 3/8 Brahman, 5/8 Shorthorn blend, deep red in color, and can be horned or polled. It is a hardy breed and adaptable to many environments.



Santa Gertrudis Breeders International photo

Red Angus

The Red Angus shares many of the same traits as the black-hided Angus. The Angus breed is primarily black; however, the breed carries a recessive gene for red hides. Many breeders in warmer climates prefer the Red Angus because of its meat quality, quick growth, and easy calving traits while having a cooler hide due to the red color.



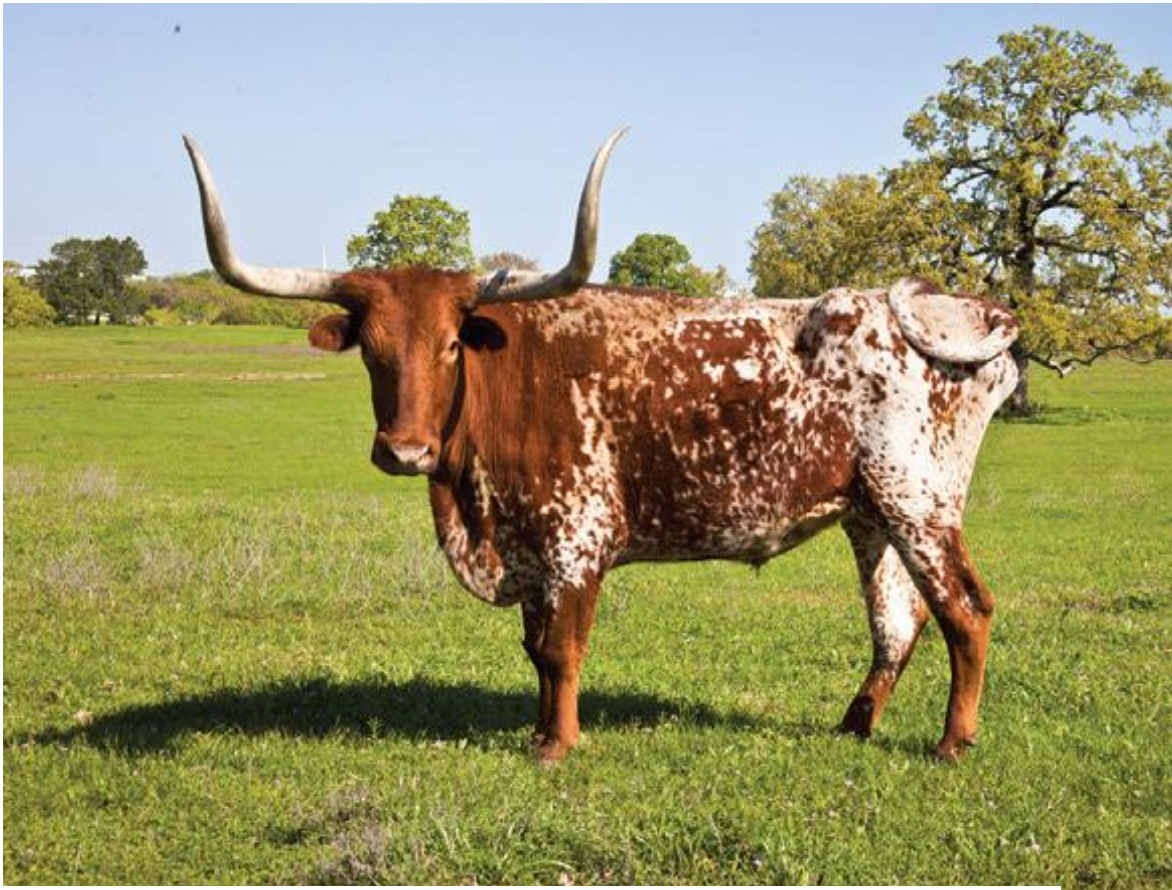
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No matter what the beef breed, certain terms remain consistent throughout the beef industry. When a beef animal is born, it is called a **calf**. This calf is either a **bull**, young uncastrated male, or a **heifer**, young immature female. If a producer plans to raise the bull for breeding stock, the breeder will not **castrate**, or remove its testicles. If the purpose of the calf is for slaughter, the animal will most likely be castrated, which then turns the male calf into a **steer**. If a heifer is kept as breeding stock and gives birth to a calf, she is then called a **cow**.

THE TEXAS LONGHORN — A SYMBOL OF SURVIVAL

Like the buffalo, the Texas Longhorn, a romantic symbol of the Old West, was once nearly wiped out. However, unlike the buffalo, the Longhorn was not slaughtered and hunted, but rather it was almost bred into nonexistence. The Longhorn is the only breed naturally adapted to North America. The origin of the breed can be traced to cattle brought to Mexico more than 500 years ago by the Spanish. For centuries, they bred naturally in Mexico and the southwestern parts of the United States. The breed developed strong endurance and resistance to diseases and harsh conditions.

After the Civil War, cattle breeders began to prefer European-style cattle, and the demand for Longhorns began to fade until they were on the brink of extinction. In 1927, a federal grant allowed for the purchase and preservation of one of the few remaining herds of Longhorns. In the early 1960s, there were about 2,500 in the United States. Today, largely because of the high-quality meat and the colorful hides, the demand for Texas Longhorn cattle has never been greater. As the only breed supported by federal legislation, the Texas Longhorn, along with animals such as the American bison and white-tailed deer, is protected on the Wichita Mountains Wildlife Refuge in Oklahoma. The refuge, established by Congress in 1901, serves as a sanctuary for cattle preserving them as a cultural and historical species.



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Selecting Beef Cattle

The cattle producer's decision of which breed to produce is almost as important as the initial decision to enter the cattle business. Before purchasing cattle, there are many factors to consider, such as the intended use, performance, environmental tolerance, and personal preference. These factors should be understood and prioritized.

First, producers should ask themselves, "How will the cattle be used?" Producers may raise cattle for different purposes. For example, the Texas Longhorn is often raised as a hobby or novelty breed. Some breeds, such as the Dexter, are used as a dual-purpose breed (milk and meat production). Other breeds are used for commercial beef production or a purebred breeding operation.

For any specific purpose, different breeds may be available that emphasize traits that are useful for that purpose. Examples of such traits for a beef animal include frame size, structural soundness, muscling, and carcass quality. Each breed also has performance traits that should be considered including weaning weight, carcass quality, growth rate, and reproductive ability.

Different breeds of cattle are adapted to thrive in different conditions. Such factors include heat and cold tolerance, feed preference and foraging ability, disease and parasite resistance. The producer should feel comfortable with the breed of cattle selected. Factors that may influence personal preference include horned or polled, temperament, and management requirements.

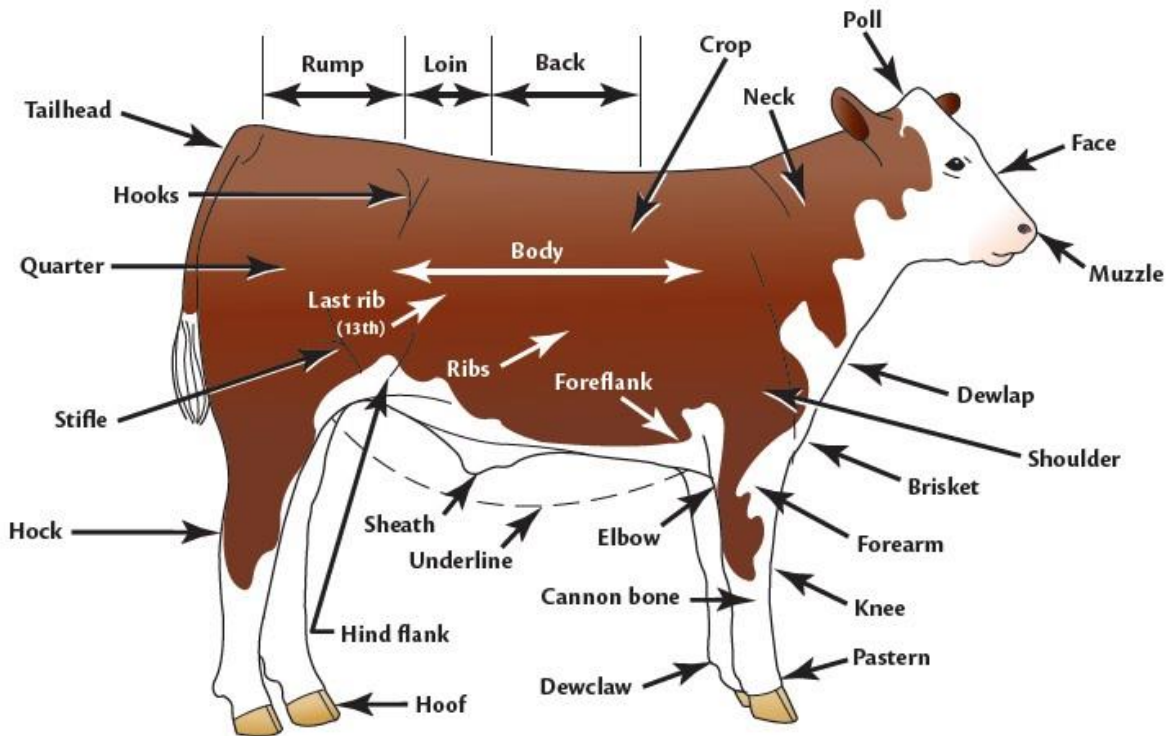
SAE IDEA:
Exploratory
Plan and implement a
hands-on livestock field trip.



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Parts of a Beef Animal

Beef cattle and dairy cattle are very similar in their body parts; however, the focus on a beef animal is to produce meat instead of milk. The most important parts on a beef animal for meat production include the loin, quarter, shoulder, brisket, and ribs. Each of these parts provides cuts of meat purchased by the consumer. Indicators of fat can be found on the ribs, brisket, and tailhead, to name a few.



Phases of Production

There are four major phases of beef production: purebred, cow-calf, stocker, and feedlot. Some producers may implement more than one phase, while some may focus only on a cow-calf or stocker operation.

Purebred Operations

A purebred operation is the first phase of production. A **purebred** animal is one that has only the original breed within its bloodlines. If two breeds, such as Angus and Hereford are bred, the offspring is considered a **crossbred**. Different breeds will produce animals with different characteristics. For instance, some animals have a smaller or larger frame, some are adapted to different climates, and some may grow faster than others. This provides producers with animals that have the characteristics they desire.

Cow-calf Operations

A cow-calf operation produces calves that will be grown and sold for beef. The operator keeps a breeding herd of cows and one or more bulls. The cows and bull are sometimes of different breeds, which allow the producer to further accentuate the traits he or she desires. Each year, the cows are bred so they will all calve within a relatively short period, usually during the late winter or early spring. The calves are kept on pasture with their mothers until weaning age, which usually occurs in the fall at about six to eight months. During this time, the calves grow to a weight of about 300 to 500 pounds. Prior to weaning, the operator will castrate, dehorn, and mark the calves (with branding or ear tags).

Cow-calf operators who use a pasture-breeding system will need one mature bull for every 25 to 30 cows.



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Stocker Operations

The next phase of beef production is the stocker operation. The stocker purchases weaned calves from a cow-calf operation. The calves are raised on forage or range for several months while they grow. The goal of a stocker operation is to allow the animal to mature to a point where it is heavy enough to be sold to the next phase of production. The animal needs to stop growing so its body can store fat in the desired way. There is a trend toward sending weaned calves directly to the feedlot. Production methods that allow a calf to be weaned at a heavier weight make it possible to bypass the stocker phase of production.

Feedlot Operations

When the animal has reached a sufficient maturity and weight, it will be sold to a feedlot. Feedlot operations are the final phase before the animal is sent to slaughter. During this time, the animal is fed a high-grain diet that is designed to put the correct finish or fat on the animal. Feedlots are often large, automated operations. The animals are penned together and fed as much of the ration as they will eat. The goal is to fatten the animals to improve the quality of meat and then send them to slaughter. The beef animal typically spends about 120 days at the feedlot and is 18 to 24 months old when it is ready for slaughter.

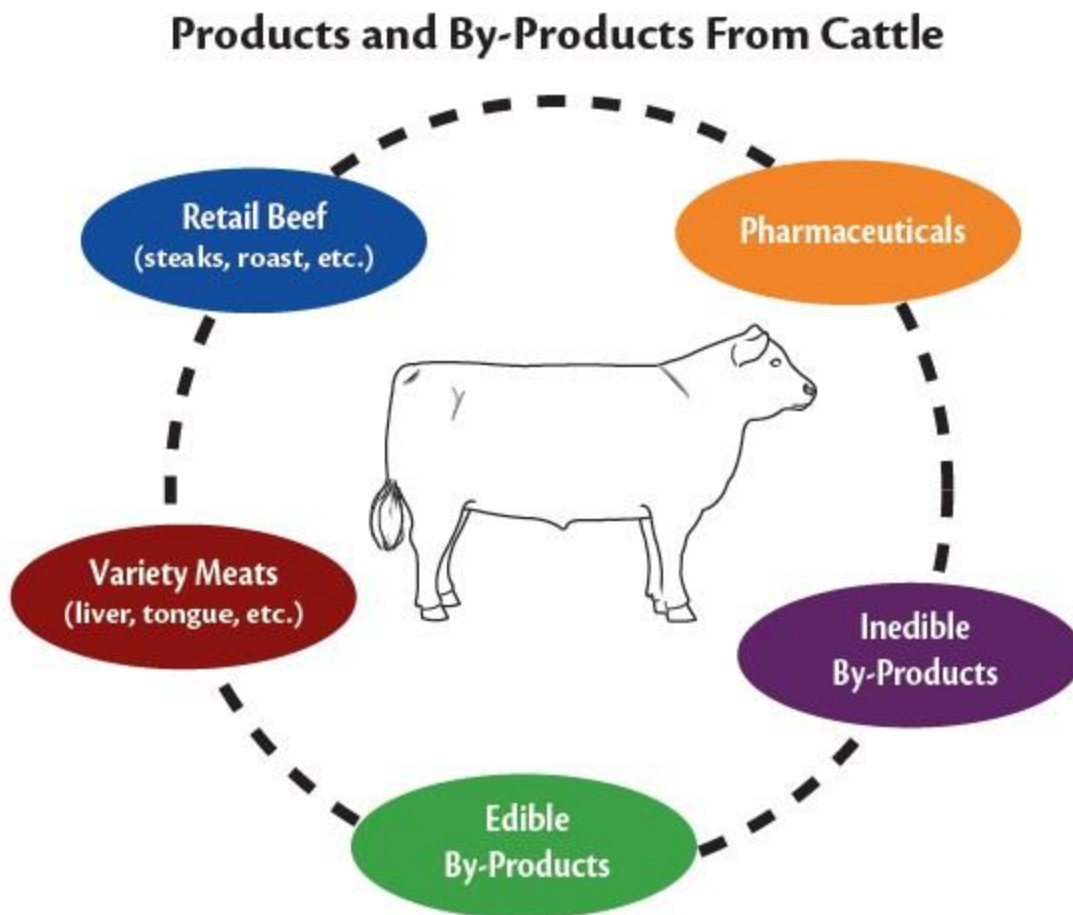
SAE IDEA:
Entrepreneurship
Purchase stocker calves for wheat pasture in the winter or grass in the summer.

Consumer Products

Beef may be what's for dinner, but that's not the only use for beef. Beef by-products are also in the walls around you, the asphalt in roads, the fluids in cars, and the magazines you read. Because of the many uses for beef by-products, 99 percent of the beef animal is used. From household items to pharmaceuticals, beef by-products are benefiting people in everyday life.

Household Items

Many household items use ingredients derived from beef by-products. Stearic acid, which is derived from beef fat, is commonly found in cosmetics, soaps, and shampoo. Photographic film for cameras is made using a beef by-product. Pet foods and pet toys, such as rawhide chews, are often made from beef by-products. Other examples include bone china, leather goods, candles, crayons, toothpaste, insecticides, shaving cream, fabric softeners, glue, paints, upholstery, and floor wax.

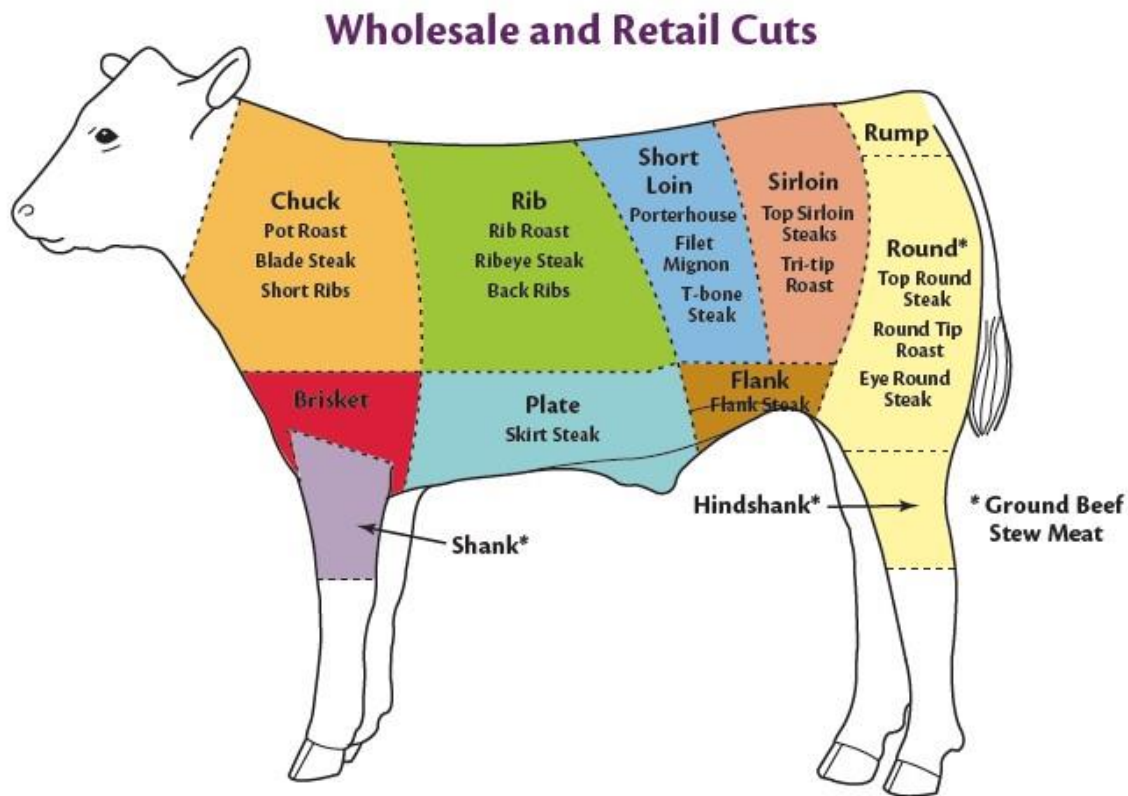


Industry and Manufacturing

You might be amazed at the products that have beef by-products in them. Lubricants, cleaners, fertilizers, and printing ink are just a few of these items used in industry. Additional examples include hydraulic brake fluid, car polishes and waxes, asphalt, high gloss for magazines, molds for plastics, cement blocks, whitener for paper, textiles, and drywall.

Edible Goods

You may think only of hamburger or steak when you think of beef, but there are many edible goods that make use of beef or its byproducts. Beef provides a variety of meat cuts which are sometimes ground for uses such as hamburgers. The liver, heart, kidneys, and tongue are called variety meats. These are sold at the grocery meat counter. Other foods, such as candy, shortening, ice cream, and chewing gum, often use a beef by-product as an ingredient. Some other examples are mayonnaise, marshmallows, sausage casings, yogurt, head cheese, gelatin, cookies, and shortening.



Pharmaceuticals

Many medicines use cattle hormones and other beef by-products. Some common ways they are used include thyroid replacement therapies, wound cleansing agents, anemia treatments, suppositories, and pill coatings. Although beef and its by-products are renewable resources, it is important to use as much of the animal as possible to get the maximum economic value from the animal and to reduce waste. As a consumer, you can also prevent waste in purchasing wisely and using all of what you purchase.

blood factors	used to make anti-rejection drugs and treating hemophilia
chymotrypsin	promotes healing of skin
collagen	used in plastic surgery
glucagon	used for treating low blood sugar
heparin	an anticoagulant (blood thinner) used to treat blood clots
insulin	used for treating diabetes or high blood sugar
pancreatin	aids in food digestion
thrombin	a coagulant that helps blood clot
vitamin B-12	supplement used to prevent B- complex deficiencies

SAE IDEA:

Research

Survey homes in your community to determine awareness of the use of animal by-products.

UNIT SUMMARY

The uses of beef cattle have greatly changed since they were first brought to North America. Today, beef cattle fulfill the needs of the consumer by providing a food source, as well as other valuable products such as pharmaceuticals and cosmetic supplies. There are a variety of breeds to suit a producer's desires. While all beef cattle breeds are raised to produce a meat product, there are other factors taken into consideration such as heat tolerance, disposition, and growth efficiency. A producer may choose to engage in one or more phases of beef cattle production; however, some may choose to specialize in a particular area. No matter the phase operated, beef cattle producers have a common goal to produce a good quality meat product for consumers while raising healthy livestock for profit.

UNIT REVIEW

1. What is the difference between *Bos taurus* and *Bos indicus* cattle?
2. Why were cattle first brought to North America by early settlers?
3. What brought about the need for cattle drives?
4. Give an example of a composite breed.
5. Give a physical description for five breeds of beef cattle.
6. What color are many breeds of cattle today?
7. Name three breeds that are a crossbred using the Brahman breed.
8. What is the difference between a heifer and a cow?
9. State five factors a cattle producer may take into consideration when selecting beef cattle.
10. What are eight of the main parts on a beef animal?
11. Explain each of the phases of beef cattle production.
12. What are three household items made from cattle?
13. How has industry and manufacturing used cattle by-products?
14. What uses has the medical industry had for cattle?

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