# Chapter 10

Large-Animal Production



Lesson 10.1 Beef Industry

Lesson 10.2 **Dairy Industry** 

Lesson 10.3 **Equine Industry** 







# While studying, look for the activity icon to:



- Practice vocabulary terms with e-flash cards and matching activities. • Expand learning with video clips, animations, and interactive activities.
- Reinforce what you learn by completing the end-of-lesson activities.
- Test your knowledge by completing the end-of-chapter questions.

# Lesson 10.1

# **Beef Industry**

#### Words to Know

artificial insemination (A.I.)

backgrounding operation

beef

beef cattle Bos Indicus

Bos Taurus

bovine

breed

breed association

brisket bull

calf

calving chuck

commercial cattle

cow

cow-calf operation

cud

cutability

feedlot

flank

gestation

heifer herd

loin

offal

plate polled

primal cut

purebred

purebred breeder

rib

(Continued)

#### Lesson Outcomes

By the end of this lesson, you should be able to:

- Understand the size and the scope of the beef industry.
- Understand common terminology of the beef industry.
- Identify the major cuts of beef.
- Describe the components of the beef industry.
- Understand commonly used production systems in the beef industry.
- Describe different breeds of beef cattle in the United States.

#### Before You Read

Do an Internet search for breeds of beef cattle in the United States. Pick three breeds you would like to research and learn more about. Research at least one breed of which you have not heard of before.

The term *beef cattle* refers to cattle used to produce beef. *Beef* is the meat humans consume from harvested cattle. Examples of beef would be hamburger, steak, and roast beef. Beef cattle are not indigenous to the United States. Many historians report that when Columbus came to America, there were no domesticated animals. Cattle and other domesticated animals came to America on Columbus' second voyage in 1493.

# Beef Industry in the United States

Today, the beef industry in the United States is a large, multibillion dollar industry that contributes greatly to our economy. According to the USDA, the beef cattle industry generates \$44 billion in economic impact, and there are approximately 87.7 million head of cattle in our country. The average size cow herd in the United States is 40 head. The top five states (in order) in beef cattle production are Texas, Nebraska, Kansas, California, and Oklahoma, Figure 10-1.

# U.S. Beef Exports

In 2014, the U.S. beef industry exported 5.6 billion pounds of beef with the top export markets being Canada, Japan, Mexico, South Korea, and Hong Kong. In 2013, the average person spent \$288.17 on beef in the United States.

#### Careers

There are many careers within the beef industry. It is easy to become a rancher or cattle producer if your family raises cattle, Figure 10-2. What if you grow up in the city or have little experience with cattle? There are many opportunities to become engaged in the beef industry through breed associations, cattle shows, working on a farm or ranch that raises cattle, working at a feedlot, or being a large-animal veterinarian—the opportunities are endless!

Working on a farm, ranch, or at a feedlot requires some education. Working for a breed association usually requires a college degree, and being a veterinarian requires approximately eight years of college.

#### Words to Know

(Continued) round

ruminant seedstock

seedstock cattle producer steer

stocker operation subprimal cut

# Common Beef Cattle Terms

As with most animals, different terms are used to describe cattle during different stages of their lives:

- Calf—term to describe young
- Bull-young male
- Steer-castrated male
- Heifer-young female
- Bull-mature male
- Cow-mature female
- Calving-act of giving birth in cattle

#### Did You Know?

In today's society, the average person consumes approximately 70 pounds of beef per year.



Figure 10-1. The top states in beef cattle production. Are there certain climates or topography that make an area better suited for raising beef cattle?



Diamond K Ranch, Hempstead, TX

Figure 10-2. Careers in the beef cattle industry often begin with raising and showing cattle as part of an SAE or 4-H program.

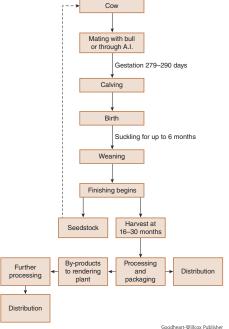


Figure 10-3. The production cycle of beef cattle. After studying the production cycle, visit www.g-wlearning.com to

test your knowledge.

# Production Cycle of Beef Cattle

Cows are bred through natural means (exposure to a bull) or through artificial insemination. Artificial insemination (A.I.) is a process where sperm is collected from a bull, processed and frozen for storage, and then thawed and placed in the reproductive tract of the cow. Once the cow is pregnant, she will carry the calf in gestation (pregnancy) for approximately 279–290 days. The gestation period varies, depending on the breed of cattle. The term calving is used to describe a cow who is in the process of giving birth.

When the calf is born, it will nurse its mother until six months of age when it is weaned or separated into a different pen or pasture from the cow. At weaning, calves of both sexes are sent to backgrounding operations to graze and gain weight prior to being sent to a feedlot. Some calves are kept as potential replacement breeding animals. These bulls and heifers are usually grazed and fed until an acceptable breeding age. Bulls usually reach breeding age at two years. Heifers are usually bred when they are 15–18 months of age so they can calve at approximately two years of age, Figure 10-3.

# The Beef Cattle Industry

There are many different segments of the beef cattle industry. The following are examples of different types of beef cattle operations in the United States. Some of these examples may be common in your geographic region.

# **Cow-Calf Operations**

Most beef cattle are born on cowcalf operations. These operations are commonly seen as you travel down highways or country roads. Cows are bred each year to produce calves for the market, Figure 10-4. These operations are usually family-owned with families providing the daily care and maintenance of the cow herd. These producers profit mainly from the sale of calves at weaning age, which is usually around 6–8 months of age.

# **Stocker Operations**

When calves are weaned from their mothers (6–8 months), they are often transferred to *stocker* or *backgrounding operations*. These operations use grazing pastures for cattle to provide moderate weight gain with minimal grain being added to their diet. This stage of production usually lasts from when calves are weaned until they are 12–18 months. At this time, they are taken to a feedlot.

# **Feedlot Operations**

In *feedlots*, large numbers of cattle are grouped based on size, genetics, and consistency in order to maximize profit for the feedlot. Cattle are not allowed to graze at feedlots. They are fed high-grain diets with roughage (hay) to increase fat deposition which, in turn, increases the quality of beef. Cattle usually spend four to six months in the feedlot. Most feedlots are located in the high plains of the United States. The Texas panhandle, Nebraska, Kansas, Iowa, and Colorado are the leading states in feedlot production, **Figure 10-5**.

# Seedstock Operations

Seedstock cattle producers raise cattle that are typically registered with a breed association. They may be referred to as purebred breeders. (A purebred animal is an animal species or breed achieved through the process of selective breeding.)

They produce *seedstock*: bulls, heifers, and cows that are used in registered breeding herds as well as commercial cattle

operations. These cattle are usually registered in a breed association with a documented pedigree and performance data (birth date, birth weight, weaning weight, yearling weight, maternal/milk or carcass data) that is useful to purebred and commercial cattlemen.



Red Angus Associati

**Figure 10-4.** Calves nurse for six months before weaning. *Do nursing cows have additional nutritional needs?* 



ianta Gertrudis Breeders International, Kingsville, Tex

Figure 10-5. Cattle on feedlots are grouped to maximize profit for the feedlot. How does grouping the animals by size, genetics, and consistency help maximize profit for the feedlot?

#### Associations

Each breed of cattle has an association for cattle producers who raise that specific breed. Most breed associations have websites and promotional materials about their breed available so you can learn more about them. Most states have a cattle producers' or cattleman's association. The National Cattleman's Beef Association (NCBA) is a national organization that promotes beef cattle and the beef industry in the United States.

# **Commercial Operations**

Commercial cattle are typically crossbred (composed of two or more breeds) and are not registered with a breed association. The goal of most commercial cattle producers is to produce cattle to sell to stocker operations and ultimately to feedlots to produce beef.

# Anatomy of Beef Cattle

In order to understand many of the principles behind the growth and physiology of beef cattle, it is important to know the basic parts of the animal. Figure 10-6 illustrates the parts of a beef steer. Knowledge of these parts becomes even more critical when participating in FFA Career Development Events, such as Livestock Evaluation or Meats Evaluation.

Beef cattle are ruminants, which means they can digest high amounts of roughage or forage, usually grass or hay. Their stomach is divided into four

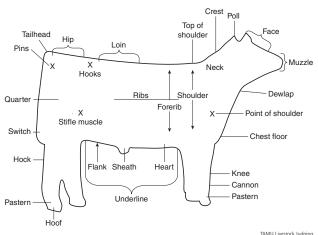


Figure 10-6. Aside from the distinctive physical variations of each breed, all beef cattle share the same basic anatomy. After studying the anatomy image, visit www.g-wlearning.com to test your knowledge.

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Figure 10-7. A good understanding of natural herd behavior may help workers stay safe and prevent harm to the cattle. Aside from reading reputable publications, how can you develop your own understanding of herd behavior? Who would be a good resource?

compartments: rumen, omasum, abomasum, and the reticulum. Ruminants like cattle are commonly seen chewing their cud, which is a regurgitation of the roughage and feed they have eaten to aid in further digestion.

#### **Herd Behavior**

Cattle stay together in groups called herds, Figure 10-7. It is important to understand how herd animals behave as a group when working with livestock. Each animal will imitate the behavior of other animals in the herd, particularly the nearest ones. This behavior causes the herd to function as a single entity. For example, the herd will move in one direction away from perceived danger, such as a predator. This movement is not planned and occurs spontaneously as lead animals begin the movement and each subsequent animal makes the same move. This is important to understand because any real or perceived danger may cause a herd to panic, creating a dangerous situation for workers and cattle alike.

It is also important to understand the natural hierarchy that forms in a herd. Lead animals establish their position and usually maintain it for extended periods of time. The herd composition continually changes as animals are added or culled (removed from the herd). This means the social structure changes each time the herd changes. Careful introduction of new cattle will help reduce the aggressive behavior and prevent potentially dangerous situations for workers and cattle.

# Maintaining Herd Health

Since cattle are herd animals, sickness and disease may easily spread throughout a herd if the animals are not properly vaccinated or if they live in unsanitary conditions. Keep the following points in mind when raising cattle:

Establish a complete herd health program and consistently implement regular vaccination and parasite control programs.



Figure 10-8. Although large-animal vets schedule regular visits to examine and treat animals, animals must sometimes be transported to veterinary facilities for surgery or other specialized treatment. Here, Dr. Gary Warner is performing a complex orthopedic procedure on a bovine athlete (bucking bull).

- Have a good working relationship with a large-animal veterinarian to ensure proper herd health management, Figure 10-8.
- Purchase replacement cattle only from reputable breeders who maintain high herd health standards.
- Observe new animals introduced into the herd for possible diseases and parasites.
- Maintain clear, complete, and accurate records for calving, breeding, weaning, and vaccination.
- Monitor cows during calving, especially first-calf heifers, to minimize potential harm to or loss of calves and cows.

# Handling Cattle

There is a great deal more information regarding breeding and handling of beef cattle than can be included in this chapter. Many of these concepts will be learned in other agricultural classes or in a real-world career

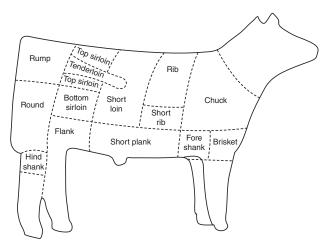
setting working with beef cattle. The following list of tips is not all-inclusive, but each point is important enough to remember when working with or around beef cattle.

- Cattle should be selected according to their intended use, the geographical area and environment in which they will be raised, and the breeder's personal preference of the traits he or she wants to produce with the cattle.
- Maintain human contact with the beef herd to make it easier to handle cattle when necessary.
- Break young calves to lead at an early age if they are going to be exhibited in shows and fairs.
- Maintain the correct ratio of cows to bulls for breeding purposes.
- Provide sufficient access to clean water at all times and provide shelter from harsh weather conditions when possible.
- Use safe actions when working around cattle. Avoid situations that startle or frighten them and always employ enough help when needed.

# **Cuts of Beef**

When beef cattle are harvested for meat, a beef carcass is cut into large primary pieces called primal cuts. The *primal cuts* of beef are chuck, rib, loin, round, brisket, plate, and flank, **Figure 10-9**.

Chuck—primal cut from the shoulder and neck of beef cattle. Flavorful, but may be tough and fatty and contain excess bone and gristle. Cuts of meat from the chuck include: 7-bone roast, arm pot roast (bone-in/boneless), blade roast, eye roast (boneless), eye steak (boneless), mock tender roast, mock tender steak, petite tender, shoulder pot roast (boneless), and top blade steak (flat iron).



TAMU Livestock Judging

Figure 10.9 The primal cuts of beef include the chuck, rib, loin, round, brisket, plate, and flank. After studying the image, visit www.g-wlearning.com to test your knowledge.

- Rib—tender primal cut made from the center section of rib (specifically
  the sixth through twelfth ribs). Cuts of meat from the rib include: rib or
  ribeye roast (large end), rib or ribeye roast (small end), rib steak (small
  end), rib eye steak (boneless or lip-on), back ribs, and short ribs.
- Loin—primal cut from the section between the ribs and the round, and above the flank. Cuts of meat from this area include: the porterhouse steak, T-bone steak, tenderloin roast, tenderloin steak, top loin steak, top sirloin cap steak, top sirloin steak (cap off), top sirloin steak, and tri-tip roast.
- Round—primal cut of meat from the hindquarters of beef cattle. It is lean
  and may be tough. Cuts from the round include: bottom round roast,
  rump roast, eye round roast/steaks, top round steak, round steak, round
  tip roast, round tip steak, and top round roast.
- Brisket—fairly tough, boneless primal cut that lies over the sternum, ribs, and connecting cartilage of beef cattle. Cuts of meat from this section include: corned beef, flat half, and whole brisket.
- Plate—tough, fatty primal cut of meat from the front belly of beef cattle, just below the rib cut. Cuts of meat from this section include: short ribs and skirt steak.
- Flank—a primal cut from the abdominal muscles of beef cattle. Cuts of meat from this section include the long, flat flank steak.
- Offal—the edible offal of cattle, including the liver. Offal is the entrails
  and internal organs of animals processed for food.

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The steaks, roasts, and hamburger meat that are commonly used as a source of protein in our diets are cut mainly from the round, loin, rib, and chuck. The cuts made from the primal cuts are called *subprimal cuts*. The way the subprimals are cut determines the quality of the final cut and its cost. Less expensive cuts of beef are cut from the brisket, plate, and flank.

# **Breeds of Beef Cattle**

#### Did You Know?

There are more than 50 breeds of cattle in the United States and over 800 breeds recognized worldwide. The species name for cattle is *bovine*. Within the bovine species, there are two subspecies, *Bos Taurus*, which describes the breeds that originated in Europe (England, Scotland, France, Germany, and Italy), and *Bos Indicus*, which describes cattle from more tropical countries (Asia, Africa, and India), **Figure 10-10**. A *breed* is a specific group of cattle that has similar appearance, characteristics, and behaviors that distinguish it from other cattle in the same species.

Bos Indicus breeds of beef cattle have Brahman influence in their pedigree. They are typically well suited to warmer climates and have a higher resistance to diseases and insects. They are very popular in the southeastern part of the United States because of their heat tolerance and ability to thrive on limited forage.

There are many other breeds of beef cattle other than those covered in the following sections. Several of the breeds discussed in the following sections also have miniature breeds that have evolved such as Miniature Herefords, Lowline Angus, and Minature Zebu to name a few. To find out more about breeds of beef cattle, contact the specific breed association.

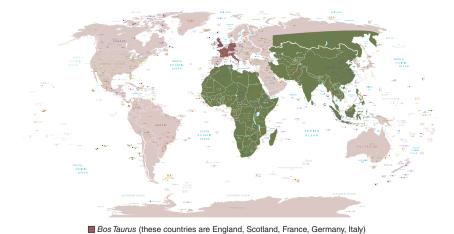


Figure 10-10. The subspecies Bos Taurus and Bos Indicus each originated in specific areas of the world. Are there certain characteristics or traits that developed in each subspecies that enabled them to thrive in their respective environments?

Bos Indicus (Asia, Africa, India)

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# **Bos Taurus** Cattle Breeds





riation American Angus Associa

Angus. Angus cattle originated in Scotland in the shires of Aberdeen and Angus. They are black in color and naturally **polled** (hornless). Angus are known for their maternal ability as well as carcass quality. Angus cattle are found in all 50 states in the United States, and the American Angus Association's branded beef program, Certified Angus Beef (CAB), is world renowned.





South Dakota Thomas Ranch Harry

**Charolais.** Charolais is one of the oldest French breeds of cattle. Charolais are solid white in color and are known for high growth rates and heavy muscling. Most Charolais cattle are naturally horned, but some are polled. They are commonly used in crossbreeding programs to produce smoky-gray colored calves that perform well in stocker and feedlot operations.





American Chianina Associatio

Chianina. Chianina cattle originated in Italy. They are one of the oldest breeds of cattle in the world. Chianinas are white in color with black skin pigment. In the United States, Chianinas are predominantly used in crossbreeding programs and will be black in color. They are known for exceptional growth. The terms Chi (pronounced key), Chi-Angus, and Chi-Maine are all associated with modern day Chianina-influenced cattle.

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# Bos Taurus Cattle Breeds (Continued)





Photo provided by the American Gelbyieh Association

Photo provided by the American Gelbyieh Association

**Gelbvieh.** Gelbvieh cattle came from Germany. They are a reddish-yellow color and are known for having excellent maternal characteristics. Many Gelbviehs in the United States today are black in color as a result of crossbreeding programs. The term *balancer* is used to describe Gelbvieh cattle that have 25%–75% Gelbvieh in their pedigree, with the remaining portion of the breed makeup being Angus or Red Angus.





Provided by American Hereford Association

Provided by American Hereford Association

Hereford/Polled Hereford. Hereford cattle originated in Herefordshire, England. Herefords are easily recognizable with their white face, red body, and white belly and legs. There are more Hereford cattle registered than any other breed of cattle. They are known for their longevity and being docile. Polled Herefords were developed in lowa by Warren Gammon. He sought out naturally polled Hereford cattle and started developing them as a breed. In 1995, the American Hereford Association and the American Polled Hereford Association merged to create the American Hereford Association, which today registers polled and horned Herefords.





North American Limousin Foundatio

Jorth American Limousin Foundation

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**Limousin.** Limousin cattle originated in France. When they were imported into the United States in the late 1960s, they were yellow to red in color. These cattle were known for their cutability and heavy muscling. (**Cutability** is the proportion of lean, salable meat yielded by a carcass.) Although most Limousin cattle are black in color, some red genetics still exist. Today, Lim-Flex cattle are gaining popularity. Lim-Flex must be 25%–75% Limousin and 25%–27% Angus or Red Angus and may have 12.5%, or 1/8, of their breed composition being another breed.





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Maine Anjou. Maine Anjou cattle originated in France and were the result of mating English Shorthorn bulls with Mancelle cows. They were originally bred to be draft animals. The first Maine Anjou semen was imported into the United States in 1970. These cattle were dark red and white in color. Today, most Maine Anjou cattle are black as a result of crossbreeding. Maine Anjou cattle are fast growing and produce high-quality carcasses. Over the last couple of decades, they have gained popularity in the club calf sector of the beef industry.





Angus Association of America

Red Angus Association of America

Red Angus. The Red Angus breed originated as a result of a recessive gene in Angus cattle. They have the same origin as Angus cattle, which are black in color. In the mid 1950s, a group of breeders chose to start raising and registering Red Angus cattle as its own breed. Red Angus have many of the same traits as Angus cattle; they are naturally polled, but due to their red color, are much more heat tolerant than black Angus cattle.





8 Ranch, Wharton, TX

V8 Ranch, Wharton, T

**Shorthorn.** The Shorthorn breed originated in northern England. They were a dual-purpose breed, used for milk and meat, and were originally known as Durhams. They are one of the oldest breeds of cattle. They are red, white, or roan in color and are horned. They are known for their maternal characteristics and their usefulness in crossbreeding programs. ShorthornPlus is a program designed to recognize and market Shorthorn-influenced genetics with animals that have 1/4 to 7/8 Shorthorn in their pedigree.

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# Bos Taurus Cattle Breeds (Continued)





Simmental. Simmental cattle originated in Switzerland and date back to the Middle Ages. Originally, they were a dual-purpose breed used to produce milk and meat. Since arriving in the United States in the late 1960s, they are noted for their fast growth, heavy muscle, and cutability. Simmentals in this era were typically red to yellow with white faces and were sometimes spotted. Today, most Simmentals are black or black with a white face. The terms SimAngus and SimSolutions refer to Simmental-influenced cattle that are crossed with other breeds, typically Angus.





the Texas Longhorn Breeders Association of America and Star Creek Ranc

Texas Longhorn. Texas Longhorns are descendants of the Spanish cattle brought over on Columbus' second voyage in 1493. Many of these cattle migrated north from Mexico and became acclimated to the environment of the southwestern United States. Texas Longhorns have horns that curve upward and may spread up to four to five feet. They are highly fertile and adapt to harsh conditions. They can survive on little forage, have excellent calving ease, and are known for their longevity.

# **Bos Indicus** Cattle Breeds





Beefmaster. Beefmaster cattle originated in south Texas in the 1930s. Tom Lasater developed this breed by crossing Hereford, Shorthorn, and Brahman cattle. There are no breed standards for color. Many Beefmasters are red, gold, or yellow in color, but some are black or even spotted. Beefmasters are hardy cattle that thrive in harsh conditions. They have excellent maternal ability and fertility.





Braford. Braford cattle were developed by crossing Brahman cows with Hereford bulls. This started at a ranch in Florida in the late 1940s. By crossbreeding these two breeds, cattlemen were able to use positive traits of each breed to form a breed that was well suited for its environment. Brafords have a Hereford-type color pattern: they are dark red with a white face and underline. They are typically 5/8 Hereford and 3/8 Brahman. Brafords are known for their maternal ability, high growth rate, and adaptability to a given environment.





Brangus. Brangus cattle were derived by crossing Angus Red Brangus. Red Brangus cattle originated in Texas in and Brahman cattle to arrive at a 3/8 Brahman and 5/8 Angus cross. The early crossing of these two breeds can be traced back to 1912 at a USDA Experiment Station in Louisiana. Brangus cattle are solid black and polled. They are known for maternal ability, rapid growth, and adaptability.

the late 1940s and are a result of crossing Brahman and Angus cattle. The unique thing about Red Brangus is that the breed percentages of Brahman and Angus can vary. Cattle can be registered with a 5/8 Brahman and 3/8 Angus cross, 1/2 Brahman and 1/2 Angus, or 3/8 Brahman and 5/8 Angus. This allows for geographic adaptability of a certain composite of breeds. Red Brangus cattle are hardy, red, polled, and well suited to a variety of conditions.

# Bos Indicus Cattle Breeds (Continued)





Brahman. Sometimes referred to as Zebu cattle. Brahman cattle were imported into the United States from India in the late 1800s and early 1900s. Brahman cattle are easily distinguished from other breeds: they have a large hump over their shoulders, black pigment, and long droopy ears. They also have excess skin hanging from their neck and throat region. Brahmans may be light gray, dark gray, red, or nearly black in color. Light gray is the most common color. They are typically horned and are used extensively in crossbreeding programs. Brahman cattle are known for their maternal ability and growth rate





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Simbrah. Simbrah cattle are a result of crossing Brahman and Simmental breeds. This breed evolved in the 1960s in the gulf coast region of the United States. Simbrahs are typically red with white markings, but there is no set color pattern for this breed. They combine positive traits of the Brahman and Simmental breeds and make excellent mothers, while having high performance and growth with added muscling. The Simbrah registry is housed at the American Simmental Association.



Santa Gertrudis. Santa Gertrudis cattle were developed on the King Ranch in south Texas. The breed is composed of 3/8 Brahman and 5/8 Shorthorn. Santa Gertrudis cattle are dark cherry red in color and may be horned or polled. This breed was developed to survive in the harsh conditions of south Texas where native grasses are often sparse. Santa Gertudis are hardy, disease-resistant cattle that easily adapt to many different production scenarios.

# Lesson 10.1 Review and Assessment

#### Words to Know

Match the key terms from the lesson to the correct definition.

- 1. A term to describe young and mature male beef/ dairy cattle.
- 2. A primal cut of meat from the rear region of
- 3. Primal cut from the shoulder and neck of beef cattle; flavorful, but may be tough and fatty and contain excess bone and gristle.
- 4. A specific group of cattle that has similar appearance, characteristics, and behaviors that distinguish it from other cattle in the same species.
- 5. A beef cattle operation in which young calves are allowed to graze pastures for moderate weight gain, before moving to feedlots.
- 6. The term used to describe a cow who is in the process of giving birth.
- 7. A term to describe young beef/dairy cattle.
- 8. A fairly tough, boneless primal cut that lies over the sternum, ribs, and connecting cartilage of beef cattle.
- 9. A cattle operation in which large numbers of cattle are grouped based on size, genetics, and consistency in order to maximize profit; cattle are fed high-grain diets and not allowed to graze.
- 10. Usually crossbred beef cattle produced for sale to stocker operations and feedlots.
- 11. An operation used to breed and birth beef cattle
- 12. Cattle that lack horns by natural or artificial means.
- 13. A term to describe young, female beef/dairy cattle that have not been bred.
- 14. The cattle breeds that originated in Europe.
- 15. A term to describe mature female beef/dairy cattle.
- 16. A group of cattle of a single kind that is kept together for a specific purpose.
- 17. The cattle breeds that originated in tropical countries such as Asia, Africa, and India.
- 18. The proportion of lean, salable meat yielded by a carcass.
- 19. A tender primal cut made from the center section of rib.

- A. backgrounding operation
- B. Bos Indicus
- C. Bos Taurus
- D. breed
- E. brisket
- F. bull
- G. calf
- H. calving
- I. chuck
- I. commercial cattle
- K. cow
- L. cow-calf operation
- M. cutability
- N. feedlot
- O. flank
- P. gestation
- O. heifer
- R. herd S. loin
- T. plate
- U. polled
- V. primal cut
- W. rib
- X. round
- Y. seedstock
- Z. steer



- A primal cut from the section between the ribs and the round, and above the flank of beef cattle.
- 21. The process of carrying young in the womb between conception and birth; pregnancy.
- 22. Castrated beef/dairy cattle.
- 23. Term used to describe the large primary pieces into which a beef carcass is divided.
- Bulls, heifers, and cows that are used in registered breeding herds as well as commercial cattle operations.
- 25. A tough, fatty primal cut of meat from the front belly of beef cattle, just below the rib cut.
- 26. A primal cut from the abdominal muscles of beef cattle.

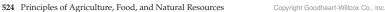
# Know and Understand

Answer the following questions using the information provided in this lesson.

- 1. Which beef cattle breeds are indigenous to the United States?
- 2. What is the approximate gestation period for beef cows?
- 3. At what age are heifers usually bred?
- 4. At what age are calves weaned and sold in cow-calf operations?
- 5. Identify the type of diet beef cattle enjoy while living in feedlot operations. Explain why they are fed this type of diet.
- 6. List the types of performance data kept on record for purebred cattle.
- 7. Explain why cattle chew cud.
- 8. Explain why it is a good idea to maintain some level of human contact with a herd of beef cattle.
- 9. List the primal cuts of beef.
- 10. Explain the difference between Bos Taurus and Bos Indicus.

# Analyze and Apply

- 1. How has the beef industry changed since it first began in the United States? Research the development of the beef industry in the United States. Find at least five major events that affected the course of the industry. How were these events significant?
- 2. The beef industry is strong in many other countries around the world. Aside from the United States, which countries produce and export a significant amount of beef and beef products? Who purchases or imports the most beef from these countries?
- 3. How large is the organic beef industry in the United States? How are these animals raised? What are they fed? How is it determined whether or not the cattle have been raised organically?





# Thinking Critically

- 1. What are some of the ethical issues surrounding the beef industry? Research these issues and choose a specific area that interests you. Use your research to write a brief argument for or against a specific issue.
- 2. The waste from cattle operations produces a considerable amount of methane. Is this methane production detrimental to the environment? How can methane produced from animal waste be used productively?

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# **Dairy Industry**

#### Words to Know

artificial insemination (A.I.)

butter buttermilk cheese condensed milk evaporated milk frozen yogurt homogenization ice cream mastitis milk milking parlor parturition somatic cell sour cream teats udder

yogurt

#### Lesson Outcomes

By the end of this lesson, you should be able to:

- Understand the size and scope of the U.S. dairy industry.
- Understand common terminology of the dairy industry.
- Identify common dairy products.
- Describe the components of the U.S. dairy industry.
- Understand commonly used production systems in the dairy industry.
- Describe different breeds of dairy cattle in the United States.

#### Before You Read

Take a moment to compare and contrast the differences and similarities between dairy cattle and beef cattle. Share the results with your classmates and teacher.

Dairy cattle are cattle raised for their ability to produce large amounts of milk. According to the USDA, there are approximately 9.2 million head of dairy cattle in the United States. Dairy cattle are found in all 50 states of the United States. More than 19% (1.78 million) of the total number of dairy cows are found in the state of California. The top five states (in order) in dairy production are California, Wisconsin, New York, Idaho, and Pennsylvania, Figure 10-11.

# Dairy Industry in the United States

The U.S. dairy industry contributes approximately \$140 billion to our economy. There are more than 50,000 dairies in the United States and more than 95% are family owned and operated. The average herd size for a dairy is 115 cows. Three-fourths of U.S. dairies have less than 100 cows, Figure 10-12. Eighty-five percent of milk produced in our country comes from dairies that have more than 100 cows. Dairy farms in the United States produce approximately 23 billion gallons of milk per year. The average dairy cow will produce almost 7 gallons of milk a day. That totals more than 2,500 gallons per year.

The main commodity produced from dairy cattle is milk and milk products. However, when dairy cattle are harvested, they also produce beef. Dairy calves account for approximately 14% of beef production in the United States. One in every five pounds of beef consumed in our country comes from dairy cattle.



Figure 10-11. Surprisingly, the top five states in dairy production are not all in the same area of the country. What makes a particular area more conducive to dairy cattle production than another?



Figure 10-12. Dairy operations are high-maintenance, labor-intensive operations. What are some of the jobs or careers involved in dairy cattle production?



Figure 10-13. Cheese is only one of the many dairy products most people consume on a regular basis. Have you ever made cheese? Was it difficult? Do you think any one kind is more complicated to produce?

# **Dairy Products**

Some of the most commonly consumed dairy products are types of fluid milk: fat-free or skim milk, low fat (1%) milk, reduced fat (2%) milk, and whole milk. Other commonly consumed dairy products are made from milk and include:

- Cream—the thick white or pale vellow fatty liquid that rises to the top of milk that is left to stand (unless it is homogenized). Homogenization is a process in which the milk's fat droplets are emulsified and the cream does not separate.
- Yogurt—a semisolid food made of milk and milk solids fermented by two added cultures of bacteria (Lactobacillus bulgaricus and Streptococcus thermophilus).
- Butter—a soft vellow or white food churned from milk or cream and used to spread on food, in cooking, and in baking.
- Sour cream—cream that has been fermented with certain kinds of bacteria. The bacterial culture sours and thickens the cream.
- Buttermilk—the slightly sour liquid left over after butter has been churned. It is used in baking and consumed as a drink.
- Ice cream—a sweet, frozen food made from no less than 10% butterfat and made in a myriad of flavors.
- Frozen yogurt—a frozen dessert that is lower in fat than ice cream and contains yogurt cultures that may or may not be active.
- Cheese—a solid food made from milk curd that is produced in a range of flavors, textures, and forms. The milk curd is pressed together and may be seasoned, or allowed to age or ripen with bacterial cultures, Figure 10-13.

# **STEM Connection** Is It a Dairy Product?

Many of us assume all the dairy products we purchase contain milk or cream. But do they? Make a list of all the dairy products you can think of, and then visit your local supermarket. Look at the ingredients labels. Do they all contain milk or cream? Were you surprised by your findings? What ingredients surprised you the most?

What other foods contain dairy products? Look at the labels of some of your favorite snack foods. Many flavored crackers, potato chips, and other snack foods contain dairy products as well.



Evaporated milk—a milk product made by removing about 60% of the water from ordinary milk. It may be used as a substitute for milk or cream.

*Condensed milk*—a heavily sweetened milk product made by removing about 60% of the water from ordinary milk. It may be used in baking and desserts.

Milk is used in many milk-based desserts including pudding (instant and cooked), custard (frozen and baked), and ice milk. It is used with breakfast cereals (cold and hot), in soups, and as the base for many types of sauces. It is easy to see the dairy industry's influence on our food supply with the wide variety of products that come from milk.

# Common Dairy Cattle Terms

The terminology used to describe dairy cattle is identical to the terminology used to describe beef cattle during different stages of their life:

- Calf-term to describe young dairy cattle
- Bull-young male
- Steer-castrated male
- Heifer-voung female
- Bull-mature male
- Cow-mature female
- Calving-act of giving birth

# Production Cycle of Dairy Cattle

The production cycle of dairy cattle is similar to that of beef cattle; however, some aspects of the production cycle are vastly different, Figure 10-14. Parturition, the act of giving birth, is what causes milk production in cows. When dairy cattle give birth, their calves are only allowed to stay with the cow and nurse for a short period of time, usually a few hours. The newborn calves are fed milk or milk replacer from a bottle until they reach 6-8 weeks of age.

Heifers are usually retained and placed into a replacement program where they are grown out to 15 months of age and bred. They will typically have their first calf at two years of age. Bull calves are usually grown out in similar fashion; most will be castrated and grown out for beef production. Only elite bull calves with superior genetics are selected to keep as bulls. Most dairy producers use artificial insemination (A.I.) to breed their cows and do not keep a bull at their farm. Artificial insemination (A.I.) is a process where sperm is collected from a bull, processed and frozen for storage, and then thawed and placed in the reproductive tract of the cow. A major advantage of A.I. in dairy cattle is that producers can breed their cows to the top bulls in the industry without having to ship either of the animals.

# Culling the Dairy Herd

A dairy cow will usually stay in the production herd about five years. There are several factors that can lead to cows being culled from the dairy herd:

Mastitis is inflammation of the mammary glands, which is usually caused by bacteria.

# Did You Know?

The National FFA Organization has a career development event called Milk Quality and Products, This competition is designed to teach students about milk quality and safety along with manufacturing and marketing of milk and dairy products. Ask your FFA advisor for more information.

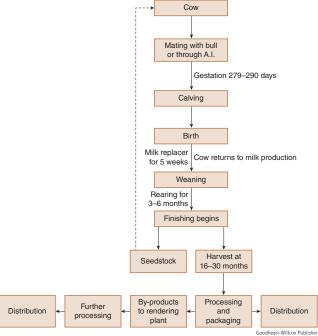


Figure 10-14. The production cycle of dairy cattle production is similar to that of beef cattle production. What are the main differences between the two cycles? After studying the production cycle, visit www.g-wlearning.com to test your knowledge.

- Inflammation of the udder is swelling and discoloration of the udder due to infection or injury. The *udder* is the baglike mammary gland of cattle (and other livestock) that has two or more teats hanging near the hind legs. The *teats* are the nipples of the mammary gland from which the milk is extracted. See Figure 10-15.
- Lameness is when the cow is having trouble moving on its feet and legs.
   Lameness becomes a serious issue for dairy cattle because they walk mainly on concrete to enter the milking parlor.

# Milking Parlor

The *milking parlor* is the section of a dairy where the cow is moved to in order for milking to occur. There are many different types and designs of milking parlors, **Figure 10-16**. When the cow moves into the milking parlor, there is a multistep process that occurs prior to and after milking:

- The cow's udder and teats must be cleaned and dried prior to milking.
- The milking equipment must be working properly and must be attached to the udder correctly to ensure maximum production.
- After the cow is milked, her teats must be disinfected with a teat dip. This prevents the spread of mastitis and other afflictions from cow to cow.



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Figure 10-15. It is vital for dairy operations to keep the udders and teats of their herd in top condition in order to maintain maximum milk production. What steps are taken to keep the udders free of infection or from physical damage? Are these steps performed on a daily basis?

- Once the milk leaves the cow, it must be cooled to a temperature below 45°F within a two-hour period.
- The milk is stored in tanks before the truck comes to transport it to a processing facility.
- The milk is tested before processing to make sure it meets health and safety standards.

Dairy farmers are required to meet specific standards and are paid a premium for milk that meets the industry standards. The requirements involve bacteria counts, *somatic cell* (white blood cell) counts, no added water, and no antibiotics present in the milk.

Dairy cows are typically milked twice a day. Some producers have seen increased production when milking three times a day, but this is time-consuming and cost-prohibitive for most dairy operations.





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Picsfive/Shutterstock.cor

Figure 10-16. Today's milking parlors are complex operations requiring daily cleaning and maintenance. How would extensive knowledge of plumbing benefit someone working in a dairy operation?

Figure 10-17. Dairy cow anatomy. After studying the image, visit www.g-wlearning.com to test your knowledge.

# Anatomy of Dairy Cattle

Learning the basic parts of dairy cattle is a fundamental step in learning to evaluate and judge dairy cattle, **Figure 10-17**. To further develop your knowledge and understanding of the confirmation and makeup of dairy cattle, talk to your teacher about the Dairy Cattle Evaluation and Management Career Development Event and the Dairy Handlers event in FFA.

# Maintaining Herd Health

Since cattle are herd animals, sickness and disease may easily spread throughout a herd if the animals are not properly vaccinated or if they live in unsanitary conditions. Keep the following points in mind when raising cattle:

- Establish a complete herd health program and consistently implement regular vaccination and parasite control programs.
- Have a good working relationship with a large-animal veterinarian to ensure proper herd health management.
- Purchase replacement females only from reputable breeders who maintain high herd health standards.

- Observe new animals introduced into the herd for possible diseases and parasites.
- Maintain clear, complete, and accurate records for calving, breeding, and vaccination.
- Monitor cows during calving, especially first-calf heifers, to minimize potential harm to or loss of calves and cows.

# Handling Dairy Cattle

There is a great deal more information regarding breeding and handling of dairy cattle than can be included in this chapter. Many of these concepts will be learned in other agricultural classes or in a real-world career setting working on a dairy or in the dairy industry. The following list of tips is not all-inclusive, but each point is important enough to remember when working with or around dairy cattle.

- Dairy cattle should be selected according to their intended use, the geographical area and environment in which they will be raised, and the breeder's personal preference of the traits he or she wants to produce with the dairy cattle.
- Remain calm and handle dairy cattle with ease when moving them in and out of the milking parlor to avoid slips, falls, and feet and leg injury.
- Extra caution must be exercised if the dairy producers uses bulls rather than artificial insemination. Dairy bulls are very mean and aggressive.
- Provide sufficient access to clean water at all times and provide shelter from harsh weather conditions when possible, Figure 10-18.
- Use safe actions when working around dairy cattle. Avoid situations that startle or frighten them, especially when approaching them in the milking process.

# Breeds of Dairy Cattle

The species name for dairy cattle is bovine. Dairy cattle are classified under the subspecies *Bos Taurus*. A breed is a specific group of cattle that has similar appearance, characteristics, and behaviors that distinguish it from other cattle in the same species. Let us take a look at the most popular dairy breeds in the United States and their characteristics.

# Did You Know?

Some of the top-producing Holstein cows have been known to produce more than 72,000 lb of milk a year! That is under ideal conditions as far as nutrition and milking three times a day versus two.



Catherine311/Shutterstock.com

Figure 10-18. It is essential for any living organism to have access to a clean and safe water supply. How would insufficient access to a safe water supply affect a dairy cow's milk production? How would it affect the dairy operation's profits?

# **Breeds of Dairy Cattle**



Ayrshire. Ayrshire cattle originated in the county of Ayr in Scotland prior to the 1800s. They were first imported into the United States in 1822. Ayrshires are red and white in color and are known for their udder quality, efficiency, and longevity. Ayrshire are moderate in size with mature cows weighing around 1,200 lb. They produce high-quality milk, which is popular in manufactured products.



Brown Swiss. Probably the oldest of all dairy breeds, the Brown Swiss originated in Switzerland. They were developed in the Swiss Alps and are known for their ability to adapt to different environments. Brown Swiss were imported into the United States in 1869. The Brown Swiss illustrated here is predominantly brown in color with a black nose encircled by a white ring. Brown Swiss are largeframed cattle. Mature cows will weigh around 1,400-1,500 lb. They are known for their docile temperament. The high protein content of their milk makes it highly desirable in the cheese industry.



Guernsey off the coast of France. The Guernsey breed was developed by French monks from crossbreeding and can be traced back over 1,000 years. They were first imported in the United States in 1831. Guernseys are fawn colored with white markings. Mature cows are smaller to moderate in size, weighing about 1,100-1,200 lb. They produce milk that is high in fat content and golden in color. Guernsev cattle mature early, adapt well, and are very docile.



Guernsey. Guernsey cattle can be traced back to the Isle of Holstein. Holstein is the most popular breed of dairy cattle in the United States and is the world's largest dairy breed. They make up more than 90% of the dairy cattle in this country. Holstein cattle originated in the Netherlands over 2,000 years ago. One of the provinces they were developed in is called Friesland. In other countries of the world, Holsteins are called Friesians. They are large-framed cattle with mature cows weighing more than 1,400 lb. Holsteins are known for their excellent milk production. The average Holstein cow produces more than 23,000 lb of milk a year.



**Jersey.** Jersey cattle are the second most popular dairy breed in the United States. Jersey cattle originated on the Isle of Jersey in the English Channel off the coast of France. They are one of the oldest dairy breeds and were are the smallest breed of dairy cattle in terms of size. to fawn color and sometimes almost black. Their points are black and they have a distinctive dished face. Jerseys



Milking Shorthorn. Shorthorns date back to the early 1500s and are probably the oldest breed of cattle. The Milking Shorthorn is a portion of the Shorthorn breed, which was a dual-purpose breed. Milking Shorthorns were developed in imported into the United States in the early 1800s. Jerseys Northeastern England in the valley of the Tees River. They were imported into the United States in the late 1700s. Milking Mature cows are usually 1,000 lb or lighter. They are cream Shorthorns come in an array of colors. Milking Shorthorns can range from red, to red and white or roan, much like Shorthorn beef cattle. Cattle are medium in size with mature cows weighing approximately 1,400 lb. Milking Shorthorns They rank first among all dairy breeds in fat content, which are known for their versatility and being docile. They are also appreciated for their easy calving and longevity.



are known for the exceptional fat content in their milk.

makes their milk popular for products such as ice cream.

Red and White (Holstein). Red and White dairy cattle are simply red Holsteins. The Red and White Dairy Cattle Association was started in 1964 in the United States. Their breed association is strong and growing. They have basically the same characteristics as Holsteins except for their variation in color. They are a larger breed in stature, like Holsteins, with mature cows weighing around 1,500 lb. They have excellent milk production.

# Lesson 10.2 Review and Assessment

# Words to Know

Match the key terms from the lesson to the correct definition.

- A fluid rich in protein and fat, secreted by female mammals for the nourishment of their young.
- The slightly sour liquid left over after butter has been churned. It is used in baking and consumed as a drink
- 3. The section of a dairy where the cow is moved to in order for milking to occur.
- 4. A heavily sweetened milk product made by removing about 60% of the water from ordinary milk.
- 5. A solid food made from milk curd that is produced in a range of flavors, textures, and forms.
- A milk product that has been fermented with certain kinds of bacteria; the bacterial culture sours and thickens the cream.
- 7. The act of giving birth.
- 8. The thick white or pale yellow fatty liquid that rises to the top of milk that is left to stand (unless it is homogenized).
- A semisolid food made of milk and milk solids fermented by two added cultures of bacteria.
- 10. A milk product made by removing about 60% of the water from ordinary milk.
- A soft yellow or white food churned from milk or cream and used to spread on food, in cooking, and in baking.
- 12. The baglike mammary gland of cattle that has two or more teats hanging near the hind legs.
- 13. A frozen dessert that is lower in fat than ice cream and contains yogurt cultures that may or may not be active.
- 14. A process where sperm is collected from a bull, processed, and frozen for storage, and then thawed and placed in the reproductive tract of the cow.
- 15. The nipples of the mammary gland from which the milk is extracted.
- 16. A white blood cell.
- 17. A process in which the milk's fat droplets are emulsified and the cream does not separate.

- A. artificial insemination (A.I.)
- B. butter
- C. buttermilk
- D. cheese
- E. condensed milk
- F. cream
- G. evaporated milk
- H. frozen yogurt
- I. homogenization
- ice cream
- K. mastitis
- L. milk
- M. milking parlor
- N. parturition
- O. somatic cell
- P. sour cream
- O. teats
- R. udder
- S. yogurt



- 18. A sweet, frozen food made from no less than 10% butterfat and made in a myriad of flavors.
- 19. The inflammation of the mammary glands which is usually caused by bacteria.

# Know and Understand 🗗

Answer the following questions using the information provided in this lesson.

- 1. True or False? Less than 65% of dairies in the United States are family owned and operated.
- 2. What is the main commodity produced from dairy cattle?
- 3. List five common products made from milk.
- 4. When dairy cattle give birth, their calves \_\_\_\_\_
  - A. nurse until they reach 6-8 weeks of age
  - B. stay and nurse for only a few hours
  - C. are placed in a nursery with nursing cows
  - D. None of the above.
- 5. Explain why dairy farmers commonly use artificial insemination to breed their cows.
- 6. Identify three reasons cows are culled from the dairy herd.
- 7. Explain why a cow's teats are disinfected after milking.
- 8. Once the milk leaves the cow, it must be cooled to a temperature below \_\_\_\_\_ °F within a two-hour period.
- 9. List three ways in which you can help maintain herd health.
- 10. List three points of proper handling of dairy cows.

# Analyze and Apply

- 1. Convert pounds of milk to gallons of milk.
- 2. Convert gallons to glasses of milk.

# Thinking Critically

- 1. Milk is used to make many food products. Develop a list of common foods that have milk as a major ingredient. What percentage of your daily diet includes milk and dairy products? Approximately how many pounds of milk or dairy products do you consume in a day? In a month? In a year?
- 2. There are many different kinds of milk: whole milk, 2% milk, 1% milk, skim milk. With a partner, make a chart with the different kinds of milk, what they are used for, how much fat is in each type, and how much price difference there is between each type.

# **Equine Industry**

#### Words to Know

allelomimetic behavior bars broodmare cecum

coldblood colt

conformation draft horse

English riding equine

equine assisted therapy equines

Equus asinus Equus caballus

farrier feral filly

foal foaling

frog

gelding hand

hinny

hotblood imprinting

jack

iennet jenny

light horse long-eared breed

modified monogastric

mule pony

(Continued)

#### Lesson Outcomes

By the end of this lesson, you should be able to:

- Understand the size and scope of the equine industry.
- Define common terms used in the equine industry.
- Describe the components of the equine industry in the United States.
- Differentiate between different types of equine animals based on physical characteristics.
- Identify and describe common breeds of equine animals.

#### Before You Read

Write down 10 facts you think you already know about the lesson topic. Discuss these facts with a partner. After reading the lesson, revisit your list and add any new information you found about the facts to the list. Have a conversation with your partner about how your knowledge of the topic changed after reading this lesson.

 ${
m W}$  hich livestock animal has historically been used as a food source, a power source, a weapon, a tool, a mode of transportation, a sporting event, a hobby, and even a companion? If you guessed the horse, you are absolutely correct. Winston Churchill once said, "The dog may be man's best friend, but the horse wrote history." Human history is closely intertwined with horses. Although the advent of the automobile, electric streetcars, and mechanized agricultural machinery once threatened the future need for the horse, the horse industry is still incredibly important to both horse owners and the economy in the United States.

# Equine Industry in the United States

Equines are animals in the family Equidae, which includes single-toed hooved animals like horses, asses, and zebras, Figure 10-19. Horses make up the largest population of equines in the United States, followed by asses, and less common equines such as zebras. According to the American Horse Council (AHC), there are well over nine million horses in the United States. The top five states by number of horses are:

- Texas
- Oklahoma
- Kentucky

- Tennessee
- Missouri

The majority of horses in the United States are kept by private owners for personal use such as pleasure riding, trail riding, and showing/ competition. Horses are also kept on breeding farms and in riding and training stables related to their specific use. According to the AHC, the equine industry directly employs almost half a million Americans and provides \$39 billion in direct sales. The equine industry is also a factor in more than \$100 billion of revenue in the United States every year, Figure 10-20.

# Common Equine Terms

When talking about equines, there are different terms for the animals based on gender, age, and subcategory:

- Foal—young equine of either gender
- Filly-female horse two years or younger
- Colt—male horse two years or younger
- Gelding-castrated male equine
- Mare—mature female horse

#### Words to Know

(Continued) rodeo roughstock sole stallion sterile stockhorse stud

## topline warmblood western riding white line

#### Did You Know?

New Jersey is the state with the most horses per capita.







Stefano Pellicciari/Shutterstock cor



Figure 10-19. The equine family includes all horses, asses, donkeys, and even zebras. What characteristics do these reglo/Shutterstock.com animals have in common?



**Figure 10-20.** The equine industry in the United States is a lucrative industry. Major events like the Kentucky Derby draw thousands of spectators and contribute to the more than \$100 billion the equine industry helps generate each year.

- Broodmare—mature female horse kept for breeding
- Stallion—mature male horse
- Jenny or jennet—female ass or donkey
- Iack—male ass or donkey

#### Did You Know?

The term stud is often misused to describe a mature male horse. The word stud is actually used to identify the place a stallion is kept for breeding. For example, if you had a stallion and were using him for breeding purposes, your farm or ranch would be the place the stallion was at stud.

# Production Cycle of Horses

While production operations exist for all equines, horses are by far the most common equines in production in the United States. Unlike cattle, horses are not bred for meat or milk production in the United States. Horses are bred primarily to continue bloodlines and to produce quality horses for specific uses, such as racing and showing, and to produce good stockhorses for ranch work or roughstock for rodeos.

The production of horses begins through natural breeding or through artificial insemination of the mare. Depending on the breed, a mare will carry the foal for 335 to 370 days. Larger horse breeds have a longer gestation than smaller or pony breeds. Most producers calculate foaling dates at an average of 342 days. Foaling is the term for the process of giving birth in all equine animals, Figure 10-21. A foal will nurse for 3–6 months before being weaned. The continued growth, training, and development of an individual horse will depend heavily on the intended use for the horse.





R Bar T Quarter Horse

Figure 10-21. A—This mare has just completed foaling. B—Nursing mares have very demanding nutritional needs. Make sure that you are feeding mares high-protein feed so that they do not lose muscle mass when nursing. What are some of the considerations that the producer should be mindful of to take care of this mare and her new foal?

# The Horse Industry

The most common sectors of the horse industry in the United States are:

- Horse showing
- Ranch work
- Rodeos
- Racing
- Recreational riding
- · Other horse employment

## Did You Know?

An easy way to remember the gestation of a horse is that it is about 11 months and 11 days for most horse breeds.



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# Horse Showing

Over the course of history, horsemen have tried to hone and compare their riding and fighting skills through show competitions. Think back to the times of jousting knights in armor where men competed for honor and position, as well as monetary compensation. Today's equestrians compete to show their horse training and handling skills, as well as the quality of their animals. Some equestrians train to reach one of the ultimate competitions, the Olympics.

Horse shows may be breed association championship shows or open to horses of any breed. There are also horse shows for different age and skill levels for both horses and riders. Many different associations sponsor horse shows. Almost anywhere in the country, you are certain to find a show that will match both your own and your horse's skill level and desired discipline.

Horse shows encompass both structural and performance disciplines. Horses are shown at halter based on their conformation to breed standards and based on specific criteria while performing. Some equitation events involve the judging of the rider's ability; other events are based more on the horse's ability. As you can see, there are horse-based events for every level of interest and skill.

The two widely recognized horsemanship disciplines in which horses are shown are English riding and western riding.



Figure 10-22. English riding and showing occurs with the use of an English saddle, like this one. There are many different modifications that can be made based on the specific use of the saddle. Can you think about how a dressage saddle might differ from a saddle used for jumping? After studying the image, visit www.g-wlearning.com to test your knowledge.

#### **English Riding**

In English riding, horses are ridden in an English saddle, Figure 10-22. One of the biggest differences between English and western riding is the use of the posting trot. This action requires the rider to rise up and down in rhythm with the two-beat gait of the trot. There are also differences in how the reins are held; English riding is completed exclusively with two hands on the reins. Some events in English riding are based on the skills horses and riders used for fox hunting in the English countryside. Horse show events using English riding include:

- Dressage
- Hunter under saddle
- · Hunt seat equitation
- Working hunter

Stadium and cross-country jumping are also events considered to be within the English riding discipline, Figure 10-23. In addition, there are also classes in which the horses are judged on their ability to pull a carriage.





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Mikhail Kondrashov/iStock/Thinkstocl

Figure 10-23. Both dressage and stadium jumping are considered English horse showing events. These events both demand careful communication between horse and rider to complete the required tasks.

#### Western Riding

Western riding is the discipline of horse showing in which horses are shown in a western saddle, Figure 10-24. Western riding disciplines are designed so that the horse can be shown with the reins in one hand. Traditionally, this allowed the rider's free hand to be used for handling ropes and other tools while working. Most of the western riding events are based on skills required by stockhorses used to move cattle. Western riding horse showing includes events like:

- Trail riding
- Western pleasure
- Western riding

# FFA Connection Horse Evaluation CDE

Do you think you would be a great horse show judge? Would you like to learn more about the specifics of conformation, equitation, and judged horse show events? The Horse Evaluation CDE through the National FFA Organization allows you the chance to judge both conformation and riding classes. This CDE is a great way to examine breed ideals and test your knowledge of the proper way to evaluate horses at halter and under saddle. You have the opportunity to place classes and then defend your placings through oral reasons.



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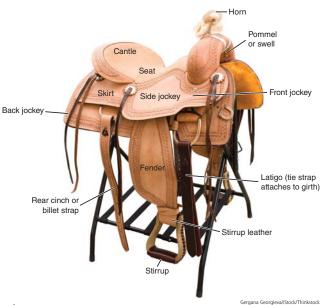


Figure 10-24. Western riding happens in a western saddle, like this one. How do you think the differences between this saddle and the English saddle help with western riding events? After studying the image, visit www.g-wlearning.com to test your knowledge.

Reining

544 Principles of Agriculture, Food, and Natural Resources

- · Working cow horse
- Cutting (Figure 10-25)

There are also timed western events which are placed by completing a task in the fastest time such as pole bending, stake race, team penning, and barrel racing.

# Ranch Work

Horses have been a tool used by ranchers since the era of the American West. Even with modern technology and machinery, horses are still used in many beef cattle operations as an efficient way to gather, sort, and work with cattle. Horses are more efficient, less likely to spook cattle, and are able to go into areas where many motorized vehicles are unable to gain access. It requires a specific level of athleticism, speed, and instinctive ability to work with cattle to be a good ranch workhorse. Horses that have been selected for these ranch working traits are called <code>stockhorses</code>.





Venessa Nel/Shutterstock

Figure 10-25. Western horse shows include events like western pleasure (left) and cutting (right). Some events require the horse and rider to demonstrate their skills in handling cattle.

Thousands of horses are used every day to help with ranch work around the country, Figure 10-26.

#### Rodeos

Another sector of the horse industry is rodeos. A *rodeo* is a sporting event comprised of events based on ranch skills that cowboys and horses used to work cattle in the American West, **Figure 10-27**. The first rodeos began when groups of neighboring ranch hands met to see who had the



has more to do with tradition or efficiency? What benefits could you see to using horses?

Figure 10-26. Even in today's world of modern equipment and technology, horses are still used as the primary means for moving and sorting cattle on many ranches. Do you think it

#### Did You Know?

Three different towns all claim to be the site of the first rodeo:

- Santa Fe, New Mexico, 1847
- Deer Trail, Colorado, July 4, 1869
- Pecos, Texas, 1883

Actually, much of the current rodeo structure is based on the rodeo held in Prescott, Arizona, on July 4, 1888. The Prescott Rodeo is still an annual event.

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best ranch skills. Today, horses are used

in rodeo events as both roughstock and

saddle horses. Roughstock animals are the bucking animals cowboys are scored on riding during rodeo events. The two

roughstock events that use horses are bareback riding and saddle bronc riding.

saddle for rodeo events including: steer

wrestling, tie-down roping, steer roping,

pole bending, and barrel racing. Rodeo is a very competitive industry, with levels of

competition ranging from youth rodeos

to high school and collegiate rodeos, and

cowboys and cowgirls.

adult rodeos for both part-time and full-time

Horses in rodeos are also used under

team roping, breakaway roping, goat typing,

Figure 10-27. Skills used to manage and give medical attention to cattle on ranches directly translate to rodeo events. Can you see the similarity between the actions of the ranch hands (left) and the team ropers (right)?



Figure 10-28. The majority of the horse racing in the United States is done with the Thoroughbred breed. It is called the "Sport of Kings" although sultans, czars, and even Queen Elizabeth have been known to get in on the action.

# Did You Know?

The most prestigious title in the Thoroughbred racing industry is the Triple Crown. To win the Triple Crown, a horse must win the Kentucky Derby, the Preakness Stakes, and the Belmont Stakes.

Racing

Horse racing, or the "Sport of Kings," in the United States is a multibillion dollar industry, Figure 10-28. The Thoroughbred breed is often seen as the ultimate racing

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horse. Consequently, the most notable races in the country, the Kentucky Derby, the Preakness Stakes, and the Belmont Stakes, are all Thoroughbred races. Other breeds are also involved in racing, but not to the scale of the

Race horses undergo a closely monitored exercise and nutrition program to ensure that they are in top physical condition before they race. While most horse races occur on a flat track with a single rider called a jockey, there are also jumping races called steeplechases, and harness racing where horses pull a small buggy called a sulky, Figure 10-29.



Figure 10-29. Chariot racing began in the Greek coliseums and continues today as an exciting (and dangerous) type of horse racing called harness racing. The small buggies are called sulkies.

# Recreational Riding

Many of the horses in the United States are kept for recreational riding. The owner may merely desire to use the horse for personal trail riding or other recreational activities like hunting. Many people join riding clubs so they can ride with other horse enthusiasts and share their love of riding and sometimes the expense of transporting their horses to riding venues across the country. Recreational riding is

available in many national parks and forests, with both managed and unmanaged trail opportunities.

# Equine Assisted Therapy

Many horse owners use their horses in equine assisted therapy programs. These programs use equine activities to improve the physical, occupational, or psychological health of the riders. Studies have found that equine assisted therapy can be helpful for individuals with conditions like ADHD, autism, cerebral palsy, depression, anxiety, developmental delays, and post-traumatic stress disorder, Figure 10-30.

# Guided Riding Experiences

Many people desire the opportunity to ride horses, even those who do not have the desire to own their own horses. Of these individuals, there are many novice horsemen



Figure 10-30. Studies have found that there are many benefits to using horses for therapy. This little boy is autistic and suffers from cerebral palsy. How do you think being involved with horses can enrich his life?

who choose to have a guided horseback experience. Dude ranches provide this opportunity for those who want the chance to experience horseback ranch work. Guided trail rides are available for many people who want to experience riding in a particular location, and are very common in vacation destination locations. Horse-oriented day camps are also popular for giving youth an equine experience. Novice riders who want to have a prolonged engagement with horses can sign up for riding lessons that provide a lesson horse for the student to use.

# Other Horse Employment

Another section of the equine industry in the United States is the use of horses as tools for completing a specific job. Even though the notion of using horses for our main source of power and transportation is a thing of the past, horses are still used in police and military work, and for pulling wagons and carriages.

Horses can be effective police officers. Especially in large cities, police officers ride horses to allow them a way to move through crowds. The height of a rider on a horse gives the officer a better vantage point for watching a situation, and the use of a horse provides the maneuverability of being on foot with the speed of having a motorized vehicle. Military cavalry units still exist, although most of their duties now are related to conducting ceremonies, rather than being used in battle.

Some horses also go to work every day as carriage horses in major metropolitan areas or at resorts and agricultural farm tours across the country.

# Anatomy of an Equine

The anatomy and physiology of horses and other equines is essentially the same. Equines come in all different sizes and are measured in four-inch increments called *hands*. The proper way to express a height in hands is the whole number of hands, followed by a decimal and any remaining inches. For example, if a horse was 50" tall, it would be 12.2 hands tall. An equine is measured to the top of its withers.

# Conformation

Conformation classes at horse shows are events in which horses are evaluated without a rider based on their structure in comparison to breed ideal anatomy. A horse's conformation is the correctness of its bone structure, musculature, and body proportions in relation to each other. Before you can accurately evaluate horses, you must first be acquainted with the external parts of a horse, Figure 10-31.

# **Connection** Horse Evaluation CDE

Are you interested in analyzing the proper conformation of horses? Do you want the opportunity to learn how to evaluate proper horsemanship? The Horse Evaluation CDE allows teams of FFA members to evaluate horses for conformation at halter and under saddle. Team members also complete a team activity related to the proper management and maintenance of animals in the equine industry.

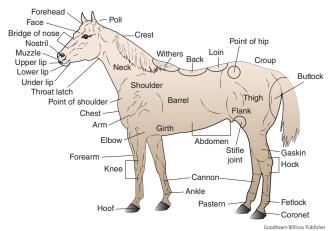


Figure 10-31. Understanding the parts of the external anatomy is an important part of being able to talk about correct conformation of horses. Can you name all the parts of this horse? After studying the image, visit www.g-wlearning.com to test your knowledge.

# **Equine Digestion**

The digestion of equines is different from the digestive systems of other livestock animals. Equines are considered modified monogastrics, which means that they have a stomach with a single compartment, but also have a special compartment in their intestine called the cecum, which helps them digest roughages, **Figure 10-32**. The *cecum* is a pouch-like area found at the beginning of the large intestine, where digestive microbes are housed to break down roughages.

# **Maintaining Herd** Health

There are some special considerations that equine producers need to take to ensure that their equine animals remain in good health. Keep the following things in mind when raising and training horses:

- Maintaining current and complete immunizations is important for all horses, especially those who will be in contact with other horses at shows and rodeos.
- Some equine diseases are transmitted by flies and mosquitoes. Establish

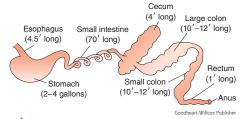


Figure 10-32. Horses only have one compartment to their stomach. In order to allow them to digest roughages, they have evolved an enlarged cecum. The cecum works similar to the rumen in ruminant animals and is in the same basic place on their digestive system as your appendix is on yours. After studying the image, visit www.g-wlearning.com to test your knowledge.

Did You Know?

There are very specific

ages at which horses'

replaced by permanent

teeth, and wear through

understand the ways that

horse teeth wear, you can

determine a horse's age by examining its teeth.

Hence the phrase, "Never

look a gift horse in the

mouth."

teeth come in, are

old age. Once you

- a pest management plan that will reduce these insects in your stable area, and use pest control on your horses during peak fly and mosquito season.
- Internal parasites, like roundworms and strongyles, can be a big problem for grazing animals. Grazing animals ingest the parasite eggs while grazing, especially when they eat roughage to the ground. Keep your horses on a regular deworming schedule.
- The most common cause of death in equines is *colic*, which is a general term for abdominal pain. Any horse showing signs of colic (i.e., sweating, refusing to eat, kicking at belly) should be carefully monitored and veterinary care sought if symptoms continue, Figure 10-33.
- Ensure that horses are fed high-quality feeds that are free from both mold and dust, which can cause serious digestive and respiratory complications for horses.
- Traveling with horses has certain health restrictions. Before crossing the state line with your horses, you will likely need a health inspection from a veterinarian and a blood test to ensure they are free from Equine Infectious Anemia.

#### **Hoof Care**

There is an important saying in equine science: no hoof, no horse. Managing equine health rests heavily on caring for hooves and

understanding the importance of the structures in the horse's feet.



Figure 10-33. Colic is the number one cause of death in horses and often requires surgical intervention. Even with surgery, recovery is not certain. If you are concerned that your horse has abdominal pain, seek veterinary attention immediately.

# Career Connection Equine Chiropractor

Straightening out the horse industry

Job description: Equine chiropractors work to diagnose and treat muscular and skeletal ailments in horses. Generally, they work with performance horses who need to be in top physical condition. Much like a human chiropractor, equine chiropractors perform massage, rehabilitation therapy, and spinal manipulation—they just do it with much larger patients.

Education required: Several training programs offer one-year or two-year certification programs in equine chiropractic services. Some specialized chiropractors are also licensed veterinarians.

Job fit: This job may be for you if you enjoy working with horses and horse owners, and you do not mind putting all your weight into the job, literally.



#### Leg Conformation

The lower leg of the horse has many small bones that support the entire weight of the animal. The internal structures of the lower leg are shown in Figure 10-34. Proper conformation will ensure that these bones are not put under additional stress. Selective breeding of horses with sound legs can be a huge benefit to offspring. Conformational defects in any of the structures in the lower leg can lead to the horse being unsound and affect the usefulness of the animal.

# **Hoof Composition**

The hoof may appear to be solid, but it is actually made up of several different components, Figure 10-35. The outer layer is hard and composed of semi-hard material similar to your fingernails. It is constantly growing and, like your fingernails, may be very thin or very thick. The outer layer attaches to the outer wall of the hoof. The point at which they attach is called the white line. Farriers (craftspeople who trim and shoe



Goodheart-Willcox Publisher

Figure 10-34. There are many small bones and connective tissue that make up the internal structure of the leg in horses. Many of these bones are associated with specific problems. For example, navicular disease is caused by inflammation and degeneration of the navicular bone, and laminitis affects the coffin bone. After studying the leg structure image, visit www.g-wlearning.com to test your knowledge.

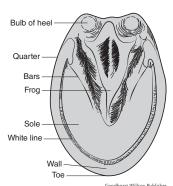


Figure 10-35. The bottom of a horse's hoof is designed to protect the internal structures and aid the body in pumping blood back to the horse's heart. What are some considerations you should be mindful of when caring for hooves? After studying the hoof image, visit www.q-wlearning.com to test your knowledge.

horses) use the white line as a guide for trimming and for setting nails.

The bottom of the hoof is called the *sole*. The sole is thick, hard, and somewhat flexible and protects the more sensitive part of the sole directly beneath the bones of the foot. The horse's sole protects the horse much like the sole of your shoe protects your foot. The *frog* is a triangular area in the middle of the sole. The frog helps circulate blood in the foot and from the bottom of the leg to the heart. The bars are located on either side of the frog. The *bars* are depressions in the sole of the hoof which provide stability for the walls and allow the frog to expand as the hoof impacts the ground.

A horse's hooves are designed to help absorb impact; however, there are risks from placing too much pressure on a section of the hoof. Placing too much pressure on a section of the hoof can cause bruising to the internal portion of the hoof. Excess pressure may be due to running on extremely hard surfaces or hard objects, such as rocks, impacting the sole. To avoid undue pressure, never run your horse on pavement, and take extra care to remove rocks and other hard objects from arenas and areas where horses are ridden.

#### Hoof Maintenance

The makeup of the hoof requires horse owners to take special care to ensure that hooves are appropriately maintained. Some of the considerations for hoof care include:

- Ensuring that your horses' hooves are kept trimmed and well maintained.
   Hooves should be trimmed or reshod every 6–8 weeks, Figure 10-36.
- Clean hooves with a hoof pick every time you groom your horse. Keeping the bars clean will allow the frog to function properly.
- Proper hoof moisture should be maintained to prevent cracking or fungal growth. Keep stalls clean to prevent ammonia exposure to hooves.



The behavior of horses is a topic that has been studied in depth. Horses

are driven by several instincts that guide much of their activities. These behaviors include:

 Fight or flight—horses will naturally try to remove themselves from situations that cause them fear, but will stand and fight if they feel cornered.

- Allelomimetic behavior—horses will copy what other horses do.
   Allelomimetic behavior is a range of activities in which the performance of a behavior increases the probability of that behavior being performed by other nearby animals. This instinctive herd mentality was originally developed to help horses stay in large groups to prevent predator animals from singling out individuals.
- Herd dominance—it is important to understand the natural hierarchy
  that forms in a herd. In a wild herd, lead animals establish their position
  and usually maintain it for extended periods of time. In domestic
  herds, the herd composition continually changes as animals are culled
  or added. This means the social structure changes each time the herd
  changes, which may lead to more instances of aggressive behavior as
  horses vie for the lead position. Careful introduction of new horses will
  help reduce the aggressive behavior and prevent potentially dangerous
  situations for workers and horses alike.

# **Handling Horses**

Horses are instinctively prey animals who have a natural fear of humans. Most horses receive some training shortly after birth, called *imprinting*, to ensure that they are accustomed to human interaction and will be safer to handle when they are older. Imprinting generally includes the foal learning to be haltered and led, along with tasks like allowing their feet to be picked up and allowing humans to touch their mouth, ears, and girth area, Figure 10-37.



Charlene Bayerle/Shutterstock.com

**Figure 10-37.** Working with foals as soon as possible after birth will help them overcome their instinctive fear of humans. Teaching a 100-lb foal to pick up its feet is a lot easier than teaching a 600-lb yearling or 1,000-lb 2-year-old.

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Olga\_i/Shutterstock.co

Figure 10-36. Hoof health is one of the most important parts of managing equine health. The triangular area at the back of the hoof is called a frog and functions like a pump to return blood from the hoof to the heart.

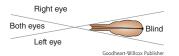


Figure 10-38. Horses have broad peripheral vision. They can see with both eyes out in front of them and to both their left and right sides with each respective eye. They also have a large blind spot behind them.

Horses are large and often unpredictable animals; in order to ensure both your own and the horse's safety, keep the following tips in mind when working with or around horses:

- Always approach a horse from a slow and consistent speed; quick movements can startle or spook the horse.
- Work with horses from an early age to help them become more comfortable around humans.
- Remember that horses have a well-developed "fight or flight" instinct. Never put a horse in a situation where it feels cornered.
- · Horses have good peripheral vision, but have distinct blind spots, Figure 10-38. Avoid standing in these blind spots to prevent spooking
- It is a well-known fact that horses kick. Do not walk directly behind a horse within reach of its hind legs, and always ensure the horse is aware of your presence.
- When tying a horse, use a quick-release knot. This will allow you to prevent yourself and/or the horse from becoming injured should it be spooked.

# Wild Horses and Burros

In the United States, there are still horses that some call wild, Figure 10-39. These "wild" horses are descendants of animals that escaped from the Spanish explorers in the fifteenth century. These horses are not actually classified as wild by scientific terms because they come from animals that have previously been domesticated. The correct term for animals that have historically been domesticated and now live in the wild with no human assistance is feral. Careful observation of these feral animals has helped horse behaviorists more accurately understand the instinctive behaviors of horses.

#### Did You Know?

More than 49,000 wild horses and burros currently roam on Bureau of Land Management (BLM) rangelands.



Figure 10-39. These feral horses, in the high mountain deserts of Nevada, live in groups dominated by both an alpha mare and a stallion. Horses like this live without human assistance or interaction and can allow for examination of natural horse behavior.

# Feral Horses and Burros in Western States

Prior to 1971, the feral horse herds were allowed to roam largely across western states without human interaction. The 1971 Wild Free-Roaming Horses and Burros Act set forth regulations and policies for the management of these herds. The Bureau of Land Management (BLM) currently has the responsibility for managing the feral horse population in the United States. Managing feral horses and burros is often a source of contention in the states where these animals roam. Herd numbers often exceed the number of animals that ranges can adequately support, and ranchers are concerned with cattle having to compete for grazing.

In order to reduce the number of animals on the rangeland, the BLM periodically conducts roundups of the animals and sorts out some horses and burros for public adoption. Figure 10-40. Many of these horses are also kept on feedlots or private ranches. Populations are also managed by treating mares with fertility control injections.

# East Coast Feral Horses

When most people think of wild horses in the United States, they picture those running across western states, not running free on

Figure 10-40. The BLM holds adoptions for the excess feral horses and burros rounded up from rangeland. In order to adopt a horse, you must meet minimum housing criteria and pay a \$125 adoption fee. Do you know someone who has adopted a "wild" horse?

an island on the East Coast. The Assateague horses are said to be descendants of horses owned by seventeenth century owners seeking to avoid fencing laws and livestock taxation. Others paint a more romantic story of the horses as descendants of shipwreck survivors. Feral horse herds can also be found on the Outer Banks of North Carolina. Populations in these areas are controlled through roundup and adoption operations, much like their Western counterparts.

# **Breeds of Equines**

The species name given to all horses, donkeys, and asses is equine. Within the equine species, there are two subcategories, Equus caballus and Equus asinus. Equus caballus is the scientific name for wild and domesticated horses, and Equus asinus is the scientific name for donkeys and asses.

# Types of Equines

The Equus asinus equines are often called the long-eared breeds. These asses and donkeys are characterized by their long ears, larger heads in proportion to their body, and flatter backs and croups. Horses, the subcategory Equus caballus, are broken down into three different categories based on size. Pony is the classification typically given to horses under 14.2 hands tall and weighing up to 900 lb. Light horses are around 14 to 16 hands tall and weigh generally between 900 and 1,400 lb at maturity. Draft horses are typically 16 to 18 hands tall and may weigh upward of 2,000 lb. They are characterized by their heavy bone and muscular build. It is important to note that height alone is not the only indicator of which subcategory a horse belongs in. For example, in cases where a light breed horse matures at under 14.2 hands tall, it is not necessarily considered a pony.

#### Did You Know?

The current claim for the tallest horse in the world belongs to a Belgian gelding named Big Jake. Big Jake weighed 240 lb at birth and stands almost 20.3 hands tall. He currently weighs more than 2,600 lb and consumes about 80 lb of hay and 40 qt of oats every day.

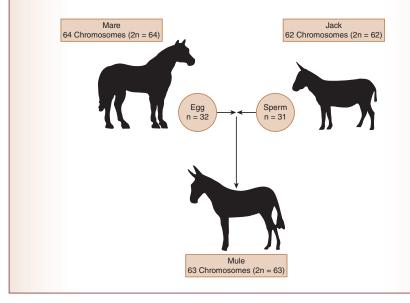
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# **STEM** Connection Mules: Hybrid Animals

You may wonder where mules fit into all of this equine stuff. Mules are actually a hybrid animal, combined by crossing a horse with an animal from the ass family. When a mare is bred to a jack, the offspring is called a mule. You can also breed to get a hinny, the product of a female donkey and a

There are some interesting scientific principles behind these hybrid animals. You see, even though they have a distinct male or female gender, all mules (and hinnies) are sterile, meaning they cannot produce offspring. This is because of some very specific things that happen in the creation of

During the process of meiosis, sperm and egg cells are created. These cells, also called sex cells, have half the regular number of chromosomes for that species. For example, horses have 64 chromosomes, meaning that a horse egg or sperm cell only has 32 chromosomes. In donkeys, there are 62 total chromosomes, leading to sperm and egg cells that have 31 chromosomes. When donkeys and horses mate, the result is a zygote (newly fertilized egg) that has 63 chromosomes. Because the DNA structure of horses and donkeys is so closely related, this zygote grows into a complete organism with 63 chromosomes. Mules function well until it comes time for them to create sex cells of their own. In meiosis, there is no way to split an uneven number of chromosomes, leaving mules and hinnies unable to create viable sperm or egg cells.



# Long-Eared Breeds (Equus asinus)



American Mammoth Jack. The American Mammoth Jack originated from a combination of breeds of donkey imported into the United States. These animals may be solid or have large white patches throughout their coat. Although they are called "mammoth," they are not large enough to be considered a draft breed. Typical heights are 13.5 hands for jennets and 14 hands for jacks.



Miniature Donkey. Miniature donkeys originated in the Italian islands of Sardinia and Sicily. These donkeys are small in stature, gray or grayish-tan in color, and typically under 9 hands at the withers. They are most frequently kept as companion animals and used for weed control.



Spotted Ass. The spotted ass is a color-based breed with spots of color and white. These asses may come in a variety of sizes and varied colors.



Standard Donkey/Burro. The Standard Donkey is association incorporating any ass or donkey having a coat characterized by its gray color and small stature, standing approximately 10 to 12 hands tall with a slender build. Burro is the name for a Standard Donkey that originated in North America. Burros exist in both domesticated and feral groups. Standard Donkeys and Burros are still used for transportation and as cart animals in many parts of Mexico and Latin America.

# **Pony Breeds**

Ponies are the smallest recognized breeds of horses and include miniature horses.



American Miniature Horse. The miniature horse is the smallest horse breed. In order to be considered a miniature horse, the animal must stand less than 8.2 hands at the withers. The breed standard requires these horses to have the same proportional conformation as their larger light breed counterparts. These horses originated from the Argentine Falabella horses, who were crossbred beginning in the fifteenth century to create a distinctly small breed of horse. While mainly used as companion animals, these horses are also used in shows and are showing promise as therapy animals, perhaps even replacing seeing-eye dogs for some individuals



Shetland. The Shetland Pony originated from the cart ponies used in the Shetland Isles to haul peat and coal. Their small size allowed the ponies to easily enter mines and pull coal carts. Shetlands range from 7 hands to a maximum height of 10.2 hands. They are heavy boned, muscular in build, and have thick necks and strong toplines (the muscles going over the haunches, back, and neck of a horse). Today, they are used primarily for youth riders, but are also shown in harness driving classes and used for pleasure driving.



Photo courtesy of Pony of the Americas Club, Inc./Impulse Photograph

Pony of the Americas (POA). The Pony of the Americas (POA) is a breed that originated in the mid-1950s in lowa. These ponies were developed as a combination of Shetland Ponies and Arabian and Appaloosa breeds. Today, the breed also incorporates Quarter Horse and Welsh Pony genetics. Characteristics of the breed include heights between 11.2 and 14 hands, muscular builds with slightly dished heads, and white sclera (the white outer ayer of the eyeball) around their eyes. They are most commonly found with a spotted coat pattern. POAs are used in many disciplines and are commonly trained for use by youth in competitions.

# **Light Horse Breeds**

Light horses are the horses that most people think about when they picture a horse. These horses are most commonly used as saddle horses. There are literally hundreds of breeds of light horses. Some of the most common breeds include the American Mustang, American Paint Horse, American Quarter Horse, Appaloosa, Arabian, Dutch Warmblood, Missouri Fox Trotter, Morgan, Tennessee Walking Horse, and the Thoroughbred.



horses in the American West. To be considered part of this breed, the horse must have come directly from the range or have parents who have come directly from the range. They are typically 14.2 to 15.2 hands tall and have heavy bone and combined with athletic ability and a willing disposition. large heads. Conformation varies greatly, depending on the genetics in the area where individual horses are found.



secret, AOHA World Champion Producer, Courtesy Clark Rassi Quarter Ho

American Quarter Horse. The American Quarter Horse Association is the largest breed registry in the United States, and the Quarter Horse is the most popular breed in the nation. The breed got its name from its ability to quickly sprint over a quarter mile. These horses are 14.2 to 16 hands tall and are characteristically eye appealing. They typically have a blending of an attractive head with a refined throatlatch and trim neck. Conformation standards include a long shoulder; deep girth; strong back, loin, and hip; and uniform muscularity in their hip, gaskin, forearm, and chest. Quarter Horses are considered one of the most versatile breeds. They excel at ranch work, both English and western showing, racing, and pleasure riding.



American Mustang. American Mustangs come from the feral American Paint Horse. The American Paint Horse breed originated in the United States as a registry for horses who have a coat pattern with large sections of white coloring. They have muscular hindquarters and strong toplines, They typically range from 14.2 to 16 hands tall. There are bloodline restrictions and horses must have a distinctive stockhorse body type. Horses who are the offspring of American Paint Horse parents, but who do not meet the coloring requirements, can also be registered in this breed. The American Paint is used in a wide spectrum of activities including showing, ranch work, racing, and pleasure riding.



Appaloosa. The Appaloosa breed originated from the horses of the Nez Perce Native Americans in the Pacific Northwest. This breed is characteristically 14.1 to 15.3 hands tall. Coloring often includes a spotted coat pattern on either their entire body or over their hindquarters. They are often seen with mottled or spotted colored skin, white sclera around their eyes, and striped hooves. Horses without spotted coloring can still be registered in this breed if their parentage is verified. Appaloosas are used for general riding, showing, and ranch work.

# Light Horse Breeds (Continued)



Original breed standard painting by Gladys Brown Edwards

Arabian. Arabian horses are descendants of the horses ridden in ancient Arabia. These horses have been carefully bred over thousands of years to create a horse that is refined in nature and exhibits the distinct characteristics of the breed. Arabians have a characteristic dished profile, large wide-set eyes, a broad forehead, small curved ears. and large nostrils. They also have a long arched neck, short muzzle. Their body should have a deep girth and wellback, refined bone structure, and high tailset. Arabians are used in a variety of events including showing, endurance racing, and pleasure riding.



Morgan. The Morgan horse originated in the late eighteenth century when a man named Justin Morgan of the breed and was known for a combination of speed and strength. The ideal Morgan horse stands between 14.2 distances. These horses range from 15.2 to 17 hands tall, a deeper throatlatch. Morgans should also have an angular have a well-chiseled head, long neck, high withers, deep shoulder, a compact body, and correctly angled hocks. Some Morgans are gaited, meaning they have a specific way of moving different from non-gaited breeds.



Sunrise Tradition, Courtesy of P Bar T Fox Trotters, Inde

Missouri Fox Trotter. Missouri Fox Trotters were developed in the Ozark Mountains to breed horses that could haul logs and work cattle. They are a combination of Arabian, Morgan, Standardbred, and Saddlebred horses. Missouri Fox Trotters are between 14 and 16 hands tall and weigh 900-1,200 lb. They should have symmetrical features with large bright eyes and a tapered sprung ribs. Fox trotters have a distinct fox trot gait. In this gait, the horse walks on its front legs while trotting on its hind legs. These horses are used primarily for pleasure riding, but are also used in showing and racing



**Thoroughbred.** The Thoroughbred breed originated in England from two types of Arabian horses and Turkish began promoting his stallion. This horse was the foundation horses. The horses were bred in an effort to create a horse that could carry weight with sustained speed over extended and 16 hands, has a straight face, well-rounded jowls, and and are most often a solid dark color or gray. Thoroughbreds chest and hindquarters, lean body, and long legs. In the United States, Thoroughbreds are widely used in racing, as well as in English horse showing and pleasure riding.

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# Warmbloods



Trakehner

dien/Shutterstock.com





**Dutch Warmblood** 

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The term warmblood is used to define horses that are a combination of larger draft horses, which are considered coldbloods, and more spirited light breeds like the Arabian and Thoroughbred, which are considered hotbloods. The result is a horse that is large in stature, but retains the athleticism of a light horse. Dutch Warmbloods are at least 15.3 hands tall at the withers, and are often found in heights up to 17.2 hands. These horses are most commonly used for show jumping, dressage, cross-country jumping, or the combination of all those events, called Three Day Eventing. Other warmblood breeds of note include the Hanoverian, Trakehner, and Holsteiner.

#### **Draft Breeds**

Draft horses are the historical powerhouses of the horse world. These animals have primarily been used to pull carts and farm equipment. Their large size defies their general calm disposition.



Hyjak Legacy Lady - Hyjak Legacy's Supreme Lady, M124671, Registered Belgian mare show by Oak Haven Belfians, DOB: 3/10/200

Belgian. Belgian horses originated in Belgium in the 1800s. These horses were bred specifically to be thicker bodied and heavier boned. They stand between 16 and 17.3 hands and have thick muscular chests, heavy bone, and strong loins and hindquarters. They are most commonly seen with a reddish brown (sorrel) body and a gold or tan (flaxen) mane and tail. These horses are often used for pulling carts and wagons, and are also used in horse weight-pulling competitions.



Percheron. Percheron horses originated in France, where they were used as war horses, for farm work, and for carriage pulling. They are usually black or gray in color, although they may be found in other colors. They typically stand between 16.2 and 17.3 hands tall and weigh an average of 1,900 lb. These horses are known for exceptional muscling in their lower thighs, allowing them to pull heavy loads over long distances. These horses are still used in farming applications in some areas, as well as being used as cart and wagon horses.



Clydesdale. Clydesdales originated in Scotland where they were used as farm horses. These horses are generally brown with a black mane and tail (bay), and have white markings on their legs and face. They are also well-known for having excess hair, or feathering, on their lower legs, Clydesdales typically mature between 17 and 18 hands, and weigh between 1,600 and 2,400 lb. They are used for pulling carts and wagons and in horse-pulling competitions, although some people use them for pleasure riding as well.



2014 National Grand Champion Shire Mare, courtesy of Jenson Shires, Blair, NI

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**Shire.** Shire horses are a minimum of 16.2 hands and average 17.1 hands. The ideal Shire should have a broad head, sloping shoulders, deep girth, and a strong short back. They should have heavy bone and large feet. Shires are most desirable in brown, bay, black, or gray. These horses are especially known for their ability to move large amounts of weight over short distances and are commonly used in horse-pulling competitions.

# Lesson 10.3 Review and Assessment

#### Words to Know 🗗

Match the key terms from the lesson to the correct definition.

- 1. The scientific name for wild and domesticated horses.
- 2. A female horse two years or younger.
- 3. A young equine of either gender.
- 4. The scientific name for donkeys and asses.
- 5. The correctness of an animal's bone structure, musculature, and body proportions in relation to each other.
- 6. The process of when an equine is giving birth.
- 7. A castrated male equine.
- 8. Training given to newborn equines to ensure they are accustomed to human interaction and will be safer to handle when they are older.
- 9. A mature female horse.
- 10. The species name given to all horses, donkeys, and asses.
- 11. The bucking animals that cowboys attempt to ride in rodeos.
- 12. The equine offspring of a female donkey and a stallion.
- 13. A male horse two years or younger.
- 14. A female ass or donkey.
- 15. The classification given to horses measuring 16 to 18 hands tall and weighing upward of 2,000 lb.
- 16. A mature male horse.
- 17. The classification typically given to horses around 14 to 16 hands tall and weighing between 900 and 1,400 lb at maturity.
- 18. Animals that have historically been domesticated and now live in the wild with no human assistance
- 19. A male ass or donkey.
- 20. Horse that has been selected for ranch working traits such as a specific level of athleticism, speed, and instinctive ability to work with cattle.
- 21. The equine offspring of a mare bred to a jack.

- A. colt
- B. conformation
- C. draft horse
- D. equine
- E. Equus asinus
- F. Equus caballus
- G. feral
- H. filly
- I. foal
- J. foaling
- K. gelding
- L. hinny
- M. imprinting
- N. jack
- O. jenny
- P. light horse
- Q. mare
- R. modified monogastric
- S. mule
- T. pony
- U. rodeo
- V. roughstock W. stallion
- X. stockhorse



- 22. A type of digestive system with a stomach that has a single compartment and a special compartment in the intestine called the cecum.
- 23. The classification typically given to horses under 14.2 hands tall and weighing up to 900 lb.
- 24. A sporting event comprised of events based on ranch skills that cowboys and horses needed to have in order to work cattle.

# Know and Understand

Answer the following questions using the information provided in this lesson.

- 1. True or False? A foal will typically nurse for 3-6 months before being weaned.
- 2. List the five most common sectors of the horse industry in the United States.
- 3. Identify four show events that are commonly found in English riding.
- 4. List five western horse showing events.
- 5. Explain why it is sometimes preferable to use horses instead of motorized vehicles in cattle operations.
- 6. The bucking animals used in rodeo events are referred to as \_\_\_\_\_ animals.
- 7. *True or False*? Equine activities are often used in therapy to improve the physical, occupational, or psychological health of the riders.
- 8. True or False? An equine is measured in feet to the top of its withers.
- Explain how the digestive system of equines differs from the digestive system of other livestock animals.
- 10. List and explain three actions you can take to help maintain equine health.
- 11. Explain the fight or flight behavior common to horses.
- 12. Explain why breeders use imprinting on newborn foals.

# Analyze and Apply

 Math. Horses are measured in hands (4" each). Calculate the following horse heights in hands. (Remember that you express the hands in whole numbers, then the number of remaining inches, i.e. 12.3 hands.)

A.48''

B. 56"

C. 62"

D.5'

E. 6' 1"

F. 6' 7"



2. Horses are driven by a combination of their instincts and training, and managing horses is a very intense industry. Imagine you are the owner of a horse boarding facility. Using the information from this lesson and your previous knowledge, write a list of ten "Barn Rules" that you would post in your facility and require all horse owners to follow.

# Thinking Critically

- There is a lot of controversy about feral horse populations in the United States. Conduct
  research on the Internet to find out why some organizations oppose the current
  management plan being used by the Bureau of Land Management (BLM). Compile
  a list of five arguments that opposition to the BLM has for the current Wild Horse
  Management Plan.
- 2. Horse slaughter is another controversial issue in the United States. Conduct research on horse slaughter in the United States and write 2–4 paragraphs explaining your personal opinion on whether horse slaughter should be legal in the United States. Use factual statements to back your opinion and cite your references.
- 3. Think about the wide difference in breeds of horses. Why do you think there is the need for so many different breeds?
- 4. What steps should be taken when introducing a new horse onto your ranch or farm?

# Chapter 10

# **Review and Assessment**

# Lesson **10.1**

# **Beef Industry**

#### **Key Points**

- The beef industry is vital to our economy and food supply.
- Beef production systems range from simple, family-owned operations to operations boasting thousands of head of cattle.
- The beef production systems work together to supply a constant and safe supply of beef in the United States and worldwide.
- No two breeds of beef cattle are the same, and each brings its own set of strengths and weaknesses to the industry.
- Through research and development, beef breeds have evolved to fit all climates, terrains, and geographic areas of the world.
- Raising beef cattle is the single largest segment of American agriculture.

# Words to Know

Use the following list and the textbook glossary to review and study the Words to Know from Lesson 10.1.

artificial insemination (A.I.) chuck plate backgrounding operation commercial cattle polled beef cow primal cut beef cattle cow-calf operation purebred Bos Indicus cud purebred breeder Bos Taurus cutability rib bovine feedlot round flank breed ruminant breed association gestation seedstock

brisket heifer seedstock cattle producer

bull herd ste

calf loin stocker operation calving offal subprimal cut



# Check Your Understanding

Answer the following questions using the information provided in Lesson 10.1.

- 1. At weaning, calves of both sexes are sent to \_\_\_\_\_ operations to graze and gain weight.
- 2. Most beef cattle are born on \_\_\_\_\_ operations.
- 3. Calves weaned from their mothers are often transferred to \_\_\_\_\_ operations.
- 4. Explain why cattle are fed high-grain diets with roughage in feedlot operations.
- 5. Explain why it is important to understand how herd animals behave in a group.
- 6. List four ways in which you can help maintain herd health.
- 7. List three points to keep in mind when handling cattle.

# Lesson 10.2

# **Dairy Industry**

# **Key Points**

- The dairy industry is vital to our economy and food supply.
- Dairy production operations range from small, family-owned operations to operations with a couple of hundred dairy cattle.
- The main commodity of the dairy industry is fluid milk.
- When dairy cattle are harvested, they also produce beef.
- There are innumerable products made from milk, ranging from cream, yogurt, and butter to cheeses and frozen desserts.
- The terminology used to describe dairy cattle is identical to that used to describe beef cattle.
- No two breeds of dairy cattle are the same, and each brings its own set of strengths and weaknesses to the industry.
- Through research and development, dairy breeds have evolved to fit most climates, terrains, and geographic areas of the world.

# Words to Know

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Use the following list and the textbook glossary to review and study the *Words to Know* from *Lesson 10.2*.

artificial insemination (A.I.) buttermilk condensed milk butter cheese cream

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evaporated milk milk frozen yogurt milking parlor udder homogenization parturition yogurt ice cream somatic cell mastitis sour cream

# Check Your Understanding 🗗

Answer the following questions using the information provided in Lesson 10.2.

1.	The process in which the milk's fat droplets are emulsified and the cream does no
	separate is referred to as

- 2. The act of giving \_\_\_\_ is what causes milk production in cows.
- 3. Heifers are usually retained and placed into a replacement program where they are grown out to \_\_\_\_ months of age and bred.
- 4. Dairy cows are culled from the dairy herd due to \_\_\_\_\_.
  - A. lameness
  - B. inflammation of the udder
  - C. mastitis
  - D. All of the above.
- 5. List four specific criteria milk must fulfill to meet industry standards.
- 6. Dairy cows are typically milked \_\_\_\_\_ a day.
- 7. List three factors that must be considered when selecting dairy cattle.
- 8. Explain why extra caution must be exercised if bulls are used for breeding rather than artificial insemination.

# Lesson 10.3

# **Equine Industry**

# **Key Points**

- The equine industry in the United States includes more than nine million animals and contributes more than \$100 billion in revenue annually.
- Horses are selectively bred to have characteristics that meet their desired discipline.
- Horses are used for showing, ranch work, rodeo, racing, recreational riding, and other highly specialized uses.
- Behavior plays an important role in handling and managing horses. Using caution around horses can prevent injuries to you or the horses you are working with.



Feral horses still exist in the United States. Hundreds of breeds of domestic horses have been developed in order to suit the needs of humans.

# Words to Know

Use the following list and the textbook glossary to review and study the Words to Know from Lesson 10.3.

allelomimetic behavior	feral	mare
bars	filly	modified monogastric
broodmare	foal	mule
cecum	foaling	pony
coldblood	frog	rodeo
colt	gelding	roughstock
conformation	hand	sole
draft horse	hinny	stallion
English riding	hotblood	sterile
equine	imprinting	stockhorse
equine assisted therapy	jack	stud
equines	jennet	topline
Equus asinus	jenny	warmblood
Equus caballus	light horse	western riding
farrier	long-eared breed	white line

# Check Your Understanding

Answer the following questions using the information provided in Lesson 10.3.

- 1. True or False? The majority of horses in the United States are kept by racing stables.
- 2. Horses are bred primarily to \_\_\_\_\_.
  - A. produce quality horses for racing and showing
  - B. continue bloodlines
  - C. produce individuals with superior traits for their given discipline
  - D. All of the above.
- 3. How long is the gestation period for a mare?
- 4. True or False? English riding disciplines are designed so that the horse can be shown with the reins in one hand.
- 5. Identify three common types of horse racing.
- 6. Explain why horses can be effective transportation for police officers.
- 7. Explain the main difference between an equine's digestive system and that of most other livestock.



- 8. How often should a horse's hooves be trimmed or reshod?
- 9. Explain why it is important to establish a pest management plan for use with and around equines.
- 10. What is the most common cause of death in equines and what are its symptoms?

#### Chapter 10 Skill Development

# STEM and Academic Activities

- 1. **Science.** Cheese is made from a chemical process that alters the milk protein using enzymes. What makes different varieties of cheese different? Choose three types of cheese to research and write a paragraph on each, describing the specific process for making that type of cheese. Then, compare and contrast your three cheese types so that you can explain how they are different. Be prepared to share your findings with the class.
- 2. Technology, Milking machines are incredibly fascinating machinery. To find out how the milking machine mirrors the actual suckling of a calf, conduct some research or ask a local dairyman. Draw a diagram that shows the parts of the milking machine that are required to ensure that dairy cows are milked efficiently.
- 3. Engineering. Cattle handling facilities are incredibly diverse. Imagine that you are the owner of a cow-calf operation and need to design a cattle handling area. In groups of two or three, research the common components of a cattle handling area, and design your layout. Make sure you include a squeeze chute or calf table, holding pen, and any other pens or structures that you think would be important.
- 4. Math. Working with a partner, measure the stalls in an equine stable. Calculate the number of square feet for each stall. Obtain prices for various types of bedding used for equines. Using the total square footage of the stalls, calculate how much bedding will be needed to provide adequate bedding for each stall. Calculate the cost of each type of bedding. Determine the cost for one month's bedding for all the stalls. If possible, include additional costs such as shipping and delivery.
- 5. Social Science. Why are businesses, homes, and livestock facilities usually in separate areas of a community? Are there instances where livestock may be kept on property that is not zoned as agricultural land? Interview the person in your community who is in charge of planning or zoning. Find out why zoning is considered important for the community and how a property owner can seek a zoning change. Obtain a copy of the community's zoning map and use it for a visual aid as you report your findings to the class.
- 6. Language Arts. Many stories, books, and poems have been written about horses. Choose one of the following titles, or one of your own favorites, to read and write a detailed book report. Use a standard format from your agriculture or English teacher. Create a diorama of your favorite or most memorable scene. Books to consider: Black Beauty by Anna Sewell, The Black Stallion by Walter Farley, The Horse Whisperer by Nicholas Evans, A Horse Called Wonder by Joanna Campbell.



# Communicating about Agriculture

- 1. Reading and Speaking. Research the products and services available for raising either cattle or equines. Collect promotional materials for a variety of products and services from product manufacturers. Analyze the data in these materials based on the knowledge gained from this chapter. With your group, review the list for words that can be used in the subject area of raising livestock. Practice pronouncing the word, and discuss its meaning. As a fun challenge, work together to compose a creative narrative using as many words as you can from your new list.
- 2. Speaking and Listening. Divide into groups of four or five students. Each group should choose one of the following types of beef cattle operations: backgrounding operation, cowcalf operation, and stocker operation. Using your textbook as a starting point, research your topic and prepare a report on the operation. Include topics such as costs, land needs, structural needs, and employees, as well as the types of challenges the operation faces. As a group, deliver your presentation to the rest of the class. Take notes while other students give their reports. Ask questions about any details that you would like clarified.
- 3. **Reading and Writing.** The ability to read and interpret information is an important workplace skill. Presume you work for a local, well-known dairy operation. Your employer is considering upgrading the milking parlor with new milking equipment. Your supervisor wants you to evaluate and interpret some research on several new milking systems. Locate at least three reliable resources for the most current information on new milking systems. If possible, contact representatives from the manufacturers, and (after explaining your project) ask them about their products and additional costs, such as delivery and installation and employee training on the new equipment. Write a report summarizing your findings in an organized manner.

# Extending Your Knowledge

- 1. Buying a horse is a huge financial responsibility. Even if you already have the horse and the equipment needed, there are additional costs such as entry fees for shows or rodeos, and medical fees. Figure the operating costs to keep a horse for one year. Research the cost for horse-related expenses in your area, and find the total. You will need to provide:
  - A. Housing—contact a local boarding facility to determine the cost per month for stall, paddock, or pasture rent.
  - B. Horse shoeing—calculate the number of trimmings or shoeings your horse will require per year (once every 6-8 weeks).
  - C. Feed—light breed horses will eat on average one ton of hay every three months. Find this cost plus the cost of any feed additives.
  - D. Vaccinations—most horses will receive annual and semiannual vaccinations. Contact an animal health provider to calculate this cost. Remember that this cost does not include other common costs like additional veterinary bills or paperwork for out-of-state travel.