Agriculture Career Development: Livestock Evaluation
Student Workbook

Objective Sheet
Information Sheets
Assignment Sheets
Job Sheets

Developed by the
Curriculum and Instructional Materials Center
for the Division of Agriculture Education
Oklahoma Department of Career and Technology Education
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Student Workbook

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INTRODUCTION
Beef cattle production contributes significantly to the economy of the United States. Beef cattle are a commodity and can be graded for quality and yield. The consumer ultimately determines the ideal beef animal. Consumers want beef that is healthy and lean but still retains its taste. As a producer of beef cattle, the more you know about breeds, quality and yield grades, and how to determine desirable characteristics of different classes of cattle, the better prepared you will be to make profitable decisions in your operation.

FOCUS ASSIGNMENT
1. Read the Texas Agricultural Extension Service publication Genetic Strategies for Beef Cow Herds. It is available online at http://animalscience-extension.tamu.edu/rain/academics/genetics/L5341-genstrategies.pdf.

2. Write a brief summary indicating the key points in the article.

UNIT OBJECTIVE
After completing this unit, you will show the following competencies by mastering the activities on the Assignment Sheets and by scoring at least 85% on the Written Test.

SPECIFIC OBJECTIVES
1. Identify characteristics of major breeds of beef cattle.
2. Identify considerations in selecting beef cattle breeds.
3. Match breeds and characteristics to a market. (Assignment Sheet 1)
4. Identify the parts of a beef animal.
5. Choose correct responses about indicators of muscling.
6. Choose correct responses about indicators of finish.
7. Identify types of defective front and hind legs.
8. Identify desirable characteristics of a cow.
9. List desirable characteristics of a bull.
10. Label wholesale cuts of beef.
11. Choose correct responses about USDA quality grade standards for slaughter cattle.
13. Identify the effect of yield grade factors on yield grade.
14. Choose correct responses about the primary desired traits for the ideal market steer.
15. Evaluate a class of slaughter cattle. (Assignment Sheet 2)
16. Choose correct responses about criteria used for grading feeder cattle.
17. Distinguish among USDA frame size standards for feeder cattle.
18. Distinguish among USDA thickness standards for feeder cattle.
19. Evaluate a class of feeder cattle. (Assignment Sheet 3)
20. Distinguish among common performance data used to calculate EPDs.
21. Interpret an EPD. (Assignment Sheet 4)
22. Choose correct responses about the primary desired traits when evaluating beef cattle for production.
23. Distinguish between genotype and phenotype.
24. Select correct responses about choosing replacement animals.
25. Respond to keep/cull scenarios. (Assignment Sheet 5)
26. Research industry and consumer trends in livestock production. (Assignment Sheet 6)
Objective 1
Identify characteristics of major breeds of beef cattle.

**WORDS YOU SHOULD KNOW**

- **Breed**
  - Group of animals having a common origin and characteristics that distinguish them from other groups within the same species

- **Breeder**
  - Owner of the dam at time of service

- **Crossbreeding**
  - Mating of animals of different breeds

- **Feed efficiency**
  - The units of feed consumed per unit of weight gained

- **Marbling**
  - Fat distributed in the muscle tissue of beef

- **Polled**
  - Naturally hornless

- **Purebred**
  - Animal of a recognized breed that is eligible for registry in the official herdbook of that breed

- **Angus**
  - Angus is one of the most popular breeds of cattle in the United States. Angus cattle are black in color, have a smooth hair coat, are polled and dark skinned. Angus cattle have a moderate frame and good maternal traits of calving ease and milking ability.

**FIGURE 1**
- Color - Black
- Smooth hair coat
- Dark Skin
- Polled
- Moderate frame
- Good maternal traits
- Ease of calving and milking ability

Photo courtesy of American Angus Association.
They are popular both as range cattle and as feedlot cattle. Angus cattle do not contract cancer eye or problems with sunburned udders. In general, they tend to produce a carcass of high quality and well-marbled meat.

- **Red Angus** — The Red Angus breed was developed from the black Angus and has many of the same characteristics of the black Angus. The breed was developed by mating Angus that carried the recessive red gene. The red color reflects sunlight and makes the Red Angus more heat tolerant.

![Figure 2](Image)

**NOTE:** Angus cattle producers may choose to become involved in the Certified Angus Beef™ program, which certifies premium beef and has the involvement of the USDA.

- **Beefmaster** — Beefmaster cattle have a variety of colors with reds and duns being common. Beefmaster cattle are the result of crossbreeding Herefords, Shorthorns, and Brahman cattle. Beefmaster cattle can be either horned or polled. The breed was developed based on the following traits: weight, conformation, milking ability, fertility, hardiness, and disposition.
  - Color - variety of colors with reds and duns being common
  - Cross between Hereford, Shorthorn, and Brahman cattle
  - Polled or horned

![Figure 3](Image)
- **Brahman** — Brahman cattle vary from light gray to red to black in color, are intermediate in size, and are horned. They have a hump over the shoulders, loose skin (dewlap) under the throat and large drooping ears. Brahman cattle have dark skin pigmentation and do not contract cancer eye. They are known for their hardiness, resistance to disease and insects, and heat tolerance. Brahman cattle have the ability to sweat freely. Brahman cattle do well under adverse conditions such as poor forage and drought. Other positive traits include milking ability, longevity, rapid gain, quality carcass, and an unpredictable disposition. Brahman cattle are often used in crossbreeding programs.

![FIGURE 4](Image)  
*Photo courtesy of American Brahman Breeders Association.*

- **Brangus** — Brangus cattle, a cross between Brahman and Angus, have many of the characteristics of Brahman and Angus cattle. They are solid black in color, polled, with loose hide and large floppy ears. Brangus cattle are adaptable to a variety of climates, have good maternal traits, feed efficiency, and are disease and parasite resistant. Other traits include excellent growth rate, a desirable carcass with good marbling, and hardiness.

![FIGURE 5](Image)  
*Photo courtesy of Skyhawk Brangus, Tyler, TX.*
**Charolais** — Charolais cattle are white to light straw with pink skin. Large framed and heavily muscled, charolais can be horned or polled. They are often used in crossbreeding programs to increase frame size and muscling. They have a high feed efficiency and are adaptable to many different areas.

**FIGURE 6**

Photo courtesy of Big Creek Charolais, Harrisonville, MO.

**Chianina** — The color, size, and type of Chianina cattle vary because of the prevalence of crossbreeding. The original cattle were white with a black switch. Chianina have black skin pigmentation, high heat tolerance, and a good disposition. They are a very large breed, noted for fine textured meat. Chianina, adaptable to a wide variety of climates, are good foragers, have good maternal traits, and are resistant to disease and insects. Popular in crossbreeding, they are used to improve growth rate.

**FIGURE 7**

Photo courtesy of American Chianina Association.
• **Gelbvieh** — The Gelbvieh breed has a medium frame and produces a very acceptable carcass. Gelbvieh cattle vary in color from cream to reddish yellow. They are well known for high milking ability. Other traits associated with Gelbvieh cattle include rapid early growth, lean yield, and fertility.

![FIGURE 8](Photo courtesy of American Gelbvieh Association.)

• **Hereford/Polled Hereford** — Hereford cattle have red bodies with white on their faces, belly, legs, and switch. Hereford cattle are horned, docile and easily handled. They have a moderate frame size, and are noted for their vigor and hardiness. Herefords have the ability to produce calves under adverse conditions, have very good foraging ability that makes them well suited to the western regions of the United States.

✓ **NOTE:** Polled Herefords have the same traits as Herefords but do not have horns.

![FIGURE 9](Photo courtesy of Sand Hill Farms, Haviland, KS.)
• **Limousin** — Both horned and polled, Limousin cattle are a golden red color. Recently, black lines of Limousin cattle have been developed. They have a moderate, heavily-muscled frame, and are known for their carcass leanness. Other traits include feed efficiency, calving ease, moderate milk, docility, and muscle growth efficiency.

![FIGURE 10](Photo courtesy of North American Limousin Foundation (www.nalf.org)).

• **Maine-Anjou** — Maine-Anjou cattle are very dark red with white markings on the head, belly, rear legs, and tail and have light pigmentation of the skin. Modern Maine-Anjou are more solid in color and a large percentage of registered Maine-Anjou are black. Maine-Anjou are a large breed and are usually horned. In general, Maine-Anjou cattle are docile and easily handled. Other traits include a fast growth rate, good disposition, feed efficiency, and a well-marbled carcass. Maine-Anjou cattle are commonly used in crossbreeding programs.

![FIGURE 11](Photo courtesy of American Maine-Anjou Association).
• **Santa Gertrudis** — Santa Gertrudis cattle are cherry red and are horned or polled. Developed from Brahman and Shorthorn crosses, they have loose hides with folds of skin on the neck and a sheath or naval flap. They produce a desirable carcass with little waste fat. Other traits include calving ease, good mothering abilities, good milking ability, disease and insect resistance, and adaptability to warmer climates.

**FIGURE 12**

![Santa Gertrudis Cattle](image)

*Photo courtesy of Santa Gertrudis Breeders International.*

• **Shorthorn/Polled Shorthorn** — Shorthorn or polled shorthorn are red, white, or roan in color. They have a medium-sized frame, good maternal traits, such as milking ability and calving ease, and a calm disposition. Other traits include good growth rate, reproductive performance, and longevity. Shorthorn cattle are adaptable to many climates and are often used in crossbreeding. They produce a quality carcass.

**FIGURE 13**

![Shorthorn Cattle](image)

*Photo courtesy of American Shorthorn Association.*

• **Simmental** — Simmental were originally red and white or light yellow and white in color. Today, all colors and color patterns, ranging from almost solid black to spotted color patterns, can be found in Simmental cattle. Simmental commonly have pigmentation around the eyes as well as the udder and scrotum. They are large framed, heavily muscled, with a lean carcass. They are a horned breed, but the polled gene has been incorporated into the breed. Traits associated with Simmental include docility, rapid growth, early sexual maturity, adaptability to a wide range of climates, milking ability, and longevity.
OBJECTIVE 2
Identify considerations in selecting beef cattle breeds.

There is no one “best” breed of cattle for all traits. Specific breeds have unique characteristics that may make them better suited to certain production environments. In addition, there can be a wide variation of genetics within a breed. Selecting a breed is only the first step in successful cattle production. The selection and proper management of the herd ultimately determine whether or not an operation is successful. The decision of which breed to produce is both an economic and personal one. Major factors to consider in selecting beef cattle breeds include:

- **Breeding stock cost and availability** — High quality breeding stock must be available at a reasonable cost.

- **Environment** — The breed needs to be suited to the particular environment in which they will be raised. Some considerations related to environment include climate and available feed and forage.

  **EXAMPLE:** The good foraging ability of Hereford cattle makes them well suited to the western regions of the United States.

- **Marketing** — The cattle producer should determine the market demand. In addition, if the producer wants to participate in a certified beef program, certain requirements regarding production must be met.

  **✓ NOTE:** Some associations offer certified beef programs. Animals that are certified may bring higher prices.

- **Personal preferences** — An individual’s personal desires will affect the choice of a breed. Producers should select a breed that they will be proud to raise.
• Production qualities desired and type of production — The functional traits most important to the producer will affect breed selection. For example, producers may want to introduce certain traits into a herd by using a crossbreeding program. In addition, the type of production, such as feeder cattle, cow-calf operations, or commercial feedlot will influence breed selection.

EXAMPLE: Charolais cattle are often used in crossbreeding programs to increase frame size. Crossing the Charolais with a breed that has good maternal traits would be a good choice for a cow-calf operation.

OBJECTIVE 3
Complete Assignment Sheet 1.

OBJECTIVE 4
Identify the parts of a beef animal.

FIGURE 15

- Tailhead
- Hooks
- Quarter
- Last rib (13th)
- Stifle
- Hock
- Hind shank
- Rump
- Loin
- Back
- Body
- Crops
- Neck
- Forehead
- Face
- Muzzle
- Shoulder vein
- Dewlap
- Shoulder
- Brisket
- Forearm
- Knee
- Pastern
- Foreflank
- Cannon bone
- Hind flank
- Dew claw
- Hoof
**OBJECTIVE 5**

Choose correct responses about indicators of muscling.

- Long rump
- Sharp turn over sirloin area
- Muscling in shoulder and forearm
- Wide stance in front and rear
- Rounded topline

**FIGURE 16**

Indicators of Good Muscling

**OBJECTIVE 6**

Choose correct responses about indicators of finish.

- Rolls around tailhead
- Flat loin and wide top
- Fat over ribs behind shoulder
- Deep body and full middle
- Deep and wide brisket
- Full flank
- Square rump
Objective 7
Identify types of defective front and hind legs.

✓ NOTE: An animal must have structurally correct legs if it is to be profitable, particularly if it is to be used for breeding. It should stand on ample legs that are correctly placed under its body.

- Front legs
Hind legs

**FIGURE 20**

Back Legs

Correct  Out in the hocks  Cow-hocked

**FIGURE 21**

Back Legs

Correct  Post-legged  Sickle-hocked
OBJECTIVE 8
Identify desirable characteristics of a cow.

WORDS YOU SHOULD KNOW

<table>
<thead>
<tr>
<th>word</th>
<th>definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>cow</td>
<td>mature female beef animal</td>
</tr>
<tr>
<td>dam</td>
<td>female parent</td>
</tr>
<tr>
<td>heifer</td>
<td>bovine female less than three years of age that has not borne a calf</td>
</tr>
</tbody>
</table>

FIGURE 22

Desirable Characteristics of a Cow

- Feminine head
- Clean, neat throat and brisket
- Wide chest
- Large bones
- Deep bodied
- Strong topline
- Long rump
- Distinct tailhead that is smooth but free of fat
- Adequate muscling in stifile area
Objective 9

List desirable characteristics of a bull.

**Words You Should Know**

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>bull</td>
<td>uncastrated male beef animal</td>
</tr>
<tr>
<td>sire</td>
<td>male parent</td>
</tr>
</tbody>
</table>

- Correct leg placement
- Strong pasterns
- Well-developed udder and teats
- Clean flank
- Strong, masculine head
- Clean throat, dewlap, and brisket
- Muscular forearm
- Rugged bones
- Clean flank
- Well-developed testicles
- Strong pastern
- Strong and correct feet and legs
- Muscling at round and stifle
- Smooth, distinct tailhead
- Long rump
- Thick loin
- Strong back
- Adequate spring of rib and depth of chest
- Well-developed chest
- Long body
Ideal Characteristics of a Bull

- Strong masculine head
- Adequate spring of rib and depth of chest
- Thick loin
- Smooth, distinct tailhead
- Long rump
- Muscling at round and stifl
- Long body
- Long body
- Clean flank
- Well-developed testicles
- Strong and correct feet and legs
- Strong pasterns
- Adequate length of legs
- Rugged bones
- Muscular forearm
- Clean throat dewlap, and brisket
- Ideal Characteristics of a Bull

- Strong masculine head
- Adequate spring of rib and depth of chest
- Thick loin
- Smooth, distinct tailhead
- Long rump
- Muscling at round and stifl
- Long body
- Long body
- Clean flank
- Well-developed testicles
- Strong and correct feet and legs
- Strong pasterns
- Adequate length of legs
- Rugged bones
- Muscular forearm
- Clean throat dewlap, and brisket
- Ideal Characteristics of a Bull
**OBJECTIVE 10**
Label wholesale cuts of beef.

**FIGURE 24**

- Chuck
- Rib
- Short Loin
- Sirloin
- Round
- Shank
- Brisket
- Short Plate
- Flank

**OBJECTIVE 11**
Choose correct responses about USDA quality grade standards for slaughter cattle.

- Livestock grades are a communication tool for buyers and sellers of a commodity (cattle). The primary method of evaluating quality in live cattle is by evaluating fat thickness. The quality grades indicate the palatability of the meat. The quality in slaughter cattle is based on the amount and distribution of finish, the firmness of the muscling, and the physical characteristics related to maturity. Quality grade standards are broken into two sections: a section dealing with steers, heifers, and cows and a section dealing with bullocks. There are age limitations for the different grades. The age limitation for bullocks for all quality grades is no more than 24 months.
The quality grades for steers and heifers are Prime, Choice, Select, Standard, Commercial, Utility, Cutter, and Canner. Cows have the same quality grades except that there is no Prime grade. Quality grades for bullocks are Prime, Choice, Select, Standard, and Utility. The Prime, Choice, and Standard grades are generally for steers, heifers, and cows less than 42 months. The Select grade applies to steers, heifers, and cows and generally for animals no greater than 30 months. The Commercial grade is generally for steers, heifers, and cows greater than 42 months. The Utility, Cutter, and Canner grades have no age limitations for steers, heifers, and cows. Basic indications of the grades appear below. For a more detailed description of quality grades, refer to the USDA guidelines for grades of slaughter cattle.

- Animals that have the higher quality grades of Prime and Choice will have qualities such as a fat covering over the crops, back, ribs, loin, and a thick rump; muscling that is firm; brisket, flanks, and cod or udder that appear full and distended; and a smooth fat covering.

- Cattle qualifying for the Select grade will have a thin fat covering over the back and loin, brisket, flanks, twist, and cod or udder that appear slightly full; and firm muscling.

- Cattle qualifying for the Standard grade have a very thin fat covering over the back, loin, and ribs.

- Commercial grade cattle have a slightly thick fat covering over the back, ribs, loin, and rump and have moderately firm muscling.

- The Utility grade varies with age from a very thin covering of fat for younger cattle to a slightly thick fat covering for older cattle.

- The Cutter grade varies from the degree of finish being practically nonexistent in younger cattle to a very thin fat covering in older cattle.

- The Canner grade applies to those cattle that do not meet the minimum specifications for the Cutter grade.
OBJECTIVE 12
Choose correct responses about USDA yield grade standards for slaughter cattle.

The Yield Grade represents the expected amount of closely trimmed, retail cuts that the carcass will produce. The Yield Grades for slaughter cattle follow the same factors as used for beef carcass yield grade standards. Yield grades for slaughter cattle are denoted by the numbers 1 through 5.

- **Yield Grade 1** represents the highest cutability or yield of closely trimmed retail cuts. Yield Grade 1 cattle have a high percentage of lean meat. In general, leaner and lighter weight cattle with more muscling are closer to Yield Grade 1.

- **Yield Grade 5** indicates a fatter animal requiring more fat to be trimmed for the retail cuts. Yield Grade 5 animals produce carcasses that have low yields of retail boneless cuts. In general, cattle that are heavier and lightly muscled are closer to Yield Grade 5.

- Cattle qualifying for the various Yield Grades can appear quite different in their appearance because of inherent differences in the development of their muscling and skeletal systems and related differences in fatness. Animals that qualify for a specific Yield Grade will have differences in distribution of finish and firmness of muscling that will affect their Quality Grade.

**EXAMPLE:** An animal that qualifies for a Yield Grade 3 but has higher quality than normal for this grade, such as very firm muscling and deposits of fat in the brisket, flanks, twist, and cod or udder, may qualify for the Prime or Choice Grade.

- Fat thickness accounts for variations in yield grade. To evaluate yield grade, determine a preliminary yield grade by evaluating fat thickness. After making a preliminary yield grade then determine adjustments for kidney, pelvic, and heart fat and also for muscling.

OBJECTIVE 13
Identify the effect of yield grade factors on yield grade.

- **Thickness of fat over ribeye** — When thickness of fat over the ribeye increases, the yield grade decreases.

- **Percentage of kidney, pelvic and heart fat** — When the percent of kidney, pelvic and heart fat increases, the yield grade decreases.
Carcass weight — An increase in carcass weight will decrease yield grade. In general, an increase in weight will decrease retail cuts slightly because of a slightly higher fat amount.

Area of Ribeye — Ribeye area is an indication of carcass muscling. An increase in the ribeye area will increase the yield grade.

**OBJECTIVE 14**

Choose correct responses about the primary desired traits for the ideal market steer.

<table>
<thead>
<tr>
<th>WORDS YOU SHOULD KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>dressing percent</td>
</tr>
<tr>
<td>stocker cattle</td>
</tr>
<tr>
<td><em>dressing percent</em> (chilled carcass weight/live weight) X 100</td>
</tr>
<tr>
<td><em>stocker cattle</em> cattle that are not large enough to be considered feeder or slaughter cattle</td>
</tr>
</tbody>
</table>

Market classes of cattle are divided into feeder cattle and slaughter cattle. The division is based on the intended use of the cattle. Cattle that are not adequate size for market classes may be sold as stocker cattle.

- The ideal market steer has changed over time. Consumers ultimately determine the ideal market animal. Today's consumers want meat that is healthy, lean, muscular, and retains its palatability. Most consumers want cattle that grade Choice. As a general rule when there is increased muscle and increased finish, there will be an increased dressing percentage. Increased fill results in a decrease in dressing percentage. Beef cattle for slaughter should meet USDA age requirements for the different grades.

- When evaluating the ideal market animal you should determine: muscling, correctness of finish, balance, and correctness of weight. Animals that have these attributes will have higher yield and quality grades.

  - **Muscling** — To evaluate muscling, one area to look at is the muscle through the stifle area. The area should have a round, muscular shape, and you should see the muscle working when the animal moves. Four important cuts to examine when evaluating muscling are the rib, loin, round, and chuck (shoulder).

  - **Correctness of finish** — Correctness of finish relates to the uniformity and degree of finish. The minimum fat cover at the twelfth rib is 0.3 inches. The maximum fat cover at the twelfth rib is 0.5 inches.
Balance — The ideal animal will be structurally correct and uniform in body depth. The animal should have eye appeal, and the shoulder angle should be 45 degrees.

Correctness of weight — The animal should have an acceptable market weight. The ideal steer should weigh between 1150 and 1250 lbs.

- Other factors that indicate an ideal market steer are given below.

  - Maximum age — eighteen months
  - Desired average daily gain (120 days) — 3 pounds per day
  - Minimum average daily gain (120 days) — 2 pounds per day
  - Minimum hip height — 52 inches
  - Maximum hip height — 55 inches
  - Desired rib eye area — 2 square inches per 100 pounds carcass weight
  - Maximum yield grade — 2.9

**OBJECTIVE 15**
Complete Assignment Sheet 2.

**OBJECTIVE 16**
Choose correct responses about criteria used for grading feeder cattle.

**WORDS YOU SHOULD KNOW**

| double-muscled | cattle that have muscular hypertrophy and cannot be expected to deposit intramuscular fat normally |

- The USDA feeder cattle grades provide a standard means of describing cattle for buyers and sellers. The grades are used to report market prices of feeder cattle. The standards apply to cattle that have not reached 36 months of age. Feeder cattle grades are based on three factors: frame size, thickness, and thriftiness.
Frame size — Frame size indicates the animals size at maturity as well as the size of the animal’s skeleton, both in height and body length, in relation to its age. Frame size is directly related to differences in mature size. Cattle with larger frames will be taller at the withers and the hips and longer bodied than cattle with smaller frames at the same age. The frame sizes are Large (L), Medium (M), and Small (S).

Thickness — Thickness is an indication of the development of the muscle system in relation to the size of the animal’s skeleton. For feeder cattle that are the same age and frame size the differences in thickness are because of differences in bone structure, muscling, and degree of fatness. When evaluating thickness a standard degree of fatness (slightly thin) is used. Thickness grades are rated Number 1 through Number 4.

Thriftiness — Thriftiness refers to the apparent health of an animal and indicates its potential to grow and fatten normally. Unthrifty cattle are those that are not expected to perform normally because of poor health. Unthriftiness can be caused by factors such as disease, parasitism, emaciation, or any other condition that must be corrected in order for the animal to perform normally.

**NOTE:** Unthrifty feeder cattle can have any combination of thickness and frame size.

- There are 12 resulting grades of feeder cattle for thrifty cattle. The 12 grades include three separate groupings for the frame size and four separate groupings for thickness.

**EXAMPLES:** Large Frame, No. 1; Large Frame, No. 2; Medium Frame, No. 3; Small Frame, No. 4.

- The Inferior grade includes feeder cattle that are not expected to perform normally in their current state or that are “double-muscled.” Cattle in this grade may have any combination of thickness and frame size.

**OBJECTIVE 17**

**Distinguish among USDA frame size standards for feeder cattle.**

- **Large Frame (L)** — Cattle that possess the typical minimum qualifications for this grade are thrifty, have large frames, and are tall and long bodied for their age. Steers and heifers would not be expected to produce U.S. Choice carcasses (about 0.50 inch fat at twelfth rib) until their live weights exceed 1250 pounds and 1150 pounds, respectively.
- **Medium Frame (M)** — Cattle that possess the typical minimum qualifications for this grade are thrifty, have slightly large frames, and are slightly tall and slightly long bodied for their age. Steers and heifers would be expected to produce U.S. Choice carcasses (about 0.50 inch fat at twelfth rib) at live weights of 1100 to 1250 pounds and 1000 to 1150 pounds, respectively.

- **Small Frame (S)** — Feeder cattle included in this grade are thrifty, have small frames and are shorter bodied and not as tall as specified as the minimum for the Medium Frame grade. Steers and heifers should produce U.S. Choice carcasses (about 0.50 inch fat at twelfth rib) at live weights of less than 1100 pounds and 1000 pounds, respectively.

**OBJECTIVE 18**

**Distinguish among USDA thickness standards for feeder cattle.**

- **No. 1** — Feeder cattle that have the minimum qualifications for this grade usually display predominate beef breeding. They are thrifty and moderately thick throughout. No. 1 feeder cattle are moderately thick and full in the forearm and gaskin, showing a rounded appearance through the back and loin with moderate width between the legs, both front and rear. No. 1 feeder cattle show this thickness with a thin covering of fat. However, cattle eligible for this grade may carry varying degrees of fat.

- **No. 2** — Feeder cattle that have the minimum qualifications for this grade usually show a high proportion of beef breeding, and dairy breeding may be detected. They must be thrifty and tend to be slightly thick throughout. No. 2 feeder cattle are slightly thick and full in the forearm and gaskin, showing a rounded appearance through the back and loin with slight width between both front and rear legs. Cattle show this thickness with a slightly thin covering of fat. However, cattle eligible for this grade may carry varying degrees of fat.

- **No. 3** — Feeder cattle that have the minimum qualifications for this grade are thrifty and thin through the forequarter and the middle part of the rounds. The forearm and gaskin are thin and the back and loin have a sunken appearance. In No. 3 feeder cattle the legs and rear legs are set close together. Cattle show this narrowness with a slightly thin covering of fat. However, cattle eligible for this grade may carry varying degrees of fat.

- **No. 4.** — Feeder cattle are thrifty animals that have less thickness than the minimum qualifications specified for the No. 3 grade. These cattle have a very thin covering of fat.
**OBJECTIVE SHEET 19**
Complete Assignment Sheet 3.

**OBJECTIVE SHEET 20**
Distinguish among common performance data used to calculate EPDs.

<table>
<thead>
<tr>
<th>WORDS YOU SHOULD KNOW</th>
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</thead>
<tbody>
<tr>
<td>accuracy</td>
</tr>
<tr>
<td>contempory groups</td>
</tr>
<tr>
<td>expected progeny</td>
</tr>
<tr>
<td>performance data</td>
</tr>
<tr>
<td>progeny</td>
</tr>
</tbody>
</table>

An expected progeny difference (EPD) is used to compare animals within a breed and should not be used across breeds. An EPD is calculated from information on the progeny of a bull. EPDs can be direct, pertaining to a parent’s own progeny or maternal, meaning that the EPD is influenced by factors related to mothering ability.

The major breeds of cattle have programs and report data used to calculate EPDs. EPDs given in the units of measurement for the trait, are generally reported as a plus or minus value. Certain computer programs will store and analyze performance data. Across breed EPD adjustments have also been developed to help cattle producers compare animals of different breeds. The performance data gathered varies among breeds, but some of the common data included in sire summaries includes:

- **Birth weight** — Birth weight is the weight (in pounds) of a calf at birth. It should be taken within 24 hours after birth. Birth weight is an important determinant of calving ease. High birth weights can lead to calving difficulty.
Weaning weight — The weight (in pounds) of a calf at 205 days of age. The weaning weight is adjusted to a 205-day weight so that comparisons can be made. The adjustment factors include the age of the calf and the age of the dam.

✓ NOTE: Weaning weights can be used to help evaluate growth potential differences in calves and milking production of dams.

Yearling weight — The weight (in pounds) of a calf at either 365, 452, or 550 days of age. The yearling weights should be adjusted to reflect a standard age of the animal and age of the dam.

✓ NOTE: Yearling weights are important figures since the yearling weight has a high association with the genetics of the animal and the gain efficiency of the animal. Both weaning weights and yearling weights should only be compared for animals in contemporary management groups.

Milk — The milk EPD evaluates the milking ability and is the expected difference in weaning weights of calves from daughters of a particular sire. Milk EPD is given in pounds of calf weaned because of milk production. Milk EPD is not the actual milk produced by the dam.

✓ NOTE: Another EPD that is often used is referred to as Maternal Weaning Weight (or combined maternal EPD) that takes into account both the weaning weight and maternal milk EPDs.

**OBJECTIVE 21**
Complete Assignment Sheet 4.

**OBJECTIVE 22**
Choose correct responses about the primary desired traits when evaluating beef cattle for production.

- **Conformation** — Conformation refers to the overall shape and form of an animal. Conformation is based on an ideal for the animal.

- **Weight for age** — Beef cattle for production should be the appropriate weight for their age. Animals that are at the correct weight will be better able to gain efficiently.

- **Structural correctness** — Animals used for breeding must be structurally correct. Defects such as incorrect hind legs are not acceptable for breeding animals.
• **Breed character** — Production animals should meet the criteria for their breed.

  **EXAMPLE:** Charolais cattle are white to light straw with pink skin and are large framed and heavily muscled.

• **Sex character** — Production animals should exhibit appropriate sex characteristics such as femininity for cows.

  ✓ **NOTE:** See objectives 8 and 9 for desirable characteristics of a cow and a bull.

• **Condition** — Animals should be in good overall health and have a pleasing appearance.

• **Records/data** — Production records, performance data, and EPDs should be considered when selecting animals for breeding.

**OBJECTIVE 23**

**Distinguish between genotype and phenotype.**

• The genotype is the genetic makeup of an animal. It is the combination of genes that an individual possesses.

• The phenotype is the animal’s physical appearance.

The genotype and the environment determine the phenotype. Environment includes such things as management, nutrition, and climate. Environmental factors are not passed on to an animal’s progeny. For example, the genotype of an individual animal will determine the range in which gain will fall but the specific feed received will determine where the animal will fall within that range.

A producer is concerned with both genotype and phenotype. In the selection and breeding of animals the producer can influence the genotype of an animal. The manner in which the producer then manages the animal helps determine the phenotype.

**EXAMPLE:** An animal with an outstanding genotype may not develop into its potential because of poor management and nutrition (environment).
OBJECTIVE 24
Select correct responses about choosing replacement animals.

WORDS YOU SHOULD KNOW

| Calving Intervals | The length of time in between successful calvings |

Replacement heifers are necessary because a percentage of cattle from a herd must be replaced each year. The percentage of cattle from a herd that must be replaced will vary from one operation to another but will generally be about 15%. Replacement heifers are expensive to produce and proper selection and management of these heifers will increase overall productivity of an operation. You should select more heifers than you need to allow for culling because of factors such as inadequate growth, small pelvic area, or failure to conceive. When evaluating heifers you should consider phenotype, performance data, and the projected performance of the offspring.

- **Structural Soundness** — Structural soundness is a critical factor in evaluating whether or not to keep an animal. An animal must be sound in order to be a viable part of a breeding operation.
  
  **Example:** The angle of the shoulder should be 45 degrees and there should be no visible defects in the legs.

- **Volume** — Volume is an indication of fleshing ability. Volume encompasses chest width, depth of body, and shape of rib. Volume should be evaluated from the side, rear, top, and front views of an animal.

- **Balance** — Balance should also be evaluated when choosing replacement heifers. The neck should be approximately the same length as the length of the hip, and the depth of body should be at least half of the height.

- **Femininity** — Replacement heifers should appear feminine. They should be long and refined through the head and neck. Replacement heifers should have adequate width through the pelvic region.

  **Note:** The size of the pelvic region is a partial factor in calving ease.

- **Performance Data** — Performance records and EPDs should be used along with visual appraisal to determine heifers to keep. As a general rule, you should keep only those heifers that are in the top half of weaning weight. Information such as calving intervals, age at first calving, calving difficulty, calf survival, and temperament will also affect evaluation.
OBJECTIVE 25
Complete Assignment Sheet 5.

OBJECTIVE 26
Complete Assignment Sheet 6.
INTRODUCTION
There are many different breeds of beef cattle. No one breed is best for all purposes. Factors such as environment, marketing, and personal preference all influence the choice of breed. The strengths of each breed may make them better suited to certain production situations. The more you know about breeds of cattle, the better able you will be to make informed and educated decisions about cattle production.

EQUIPMENT AND SUPPLIES
- Pen or pencil (or computer)
- Paper
- Resources on breeds

EXAMPLE: Breed association websites

INSTRUCTIONS
Write a short answer to each of the following questions.

1. A producer in the western region of the United States wants cattle that will do well on range land. What breed would you suggest and why?

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2. A producer wants to increase frame size on cattle and is considering crossbreeding. What breed would you suggest for crossbreeding and why?

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3. A producer who is just entering the cattle business wants a breed that is common and will be easy to market. What breed would you suggest and why?

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4. A producer who lives in a climate that has very high temperatures wants a breed that will tolerate the heat. What breed would you suggest and why?

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5. A producer who plans to run a cow-calf operation wants a breed that is known for strong maternal traits. What breed would you suggest and why?

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6. A producer wants a breed that will make a good beef production operation but the producer is also looking for something different that will “stand out.” What breed would you suggest and why?

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7. What breed of cattle would you suggest for the environment that you live in and why?

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8. How do most producers in your area market their cattle?

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Object 15
Evaluate a class of slaughter cattle.

Introduction
Properly evaluating slaughter cattle takes practice. It is important to know what to look for and to evaluate animals accurately. This assignment sheet will help give you an opportunity to practice evaluating slaughter cattle.

Equipment and Supplies
- Pen or pencil
- Video Practice Slaughter Cattle Evaluation I
- Television and video player

Instructions
Part 1: Watch the video Practice Slaughter Cattle Evaluation I. The video will show you 15 animals for evaluation. Write your answers in the spaces provided. After you have written your answers, the video will review the correct answers. Write the correct answers next to your answer.

Part 2: Determine where your evaluations differed from the actual scores. What area(s) do you need to work on and why?

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<th>Yield Grade</th>
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**OBJECTIVE 19**
Evaluate a class of feeder cattle.

**INTRODUCTION**
Properly evaluating feeder cattle takes practice. It is important to know what to look for and to evaluate animals accurately. This assignment sheet will give you an opportunity to practice evaluating feeder cattle.

**EQUIPMENT AND SUPPLIES**
- Pen or pencil
- Video *Practice Feeder Cattle Evaluation*
- Television and video player

**INSTRUCTIONS**
Part 1: Watch the video *Practice Feeder Cattle Evaluation*. The video will show you four classes of feeder cattle with five animals in each class for evaluation. Write your answers in the spaces provided. After you have written your answers, the video will review the correct answers. Write the correct answers next to your answer.
<table>
<thead>
<tr>
<th>Animal</th>
<th>Frame Score</th>
<th>(Answer)</th>
<th>Muscling Score</th>
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<td>Class #1</td>
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Part 2: Determine where your evaluations differed from the actual scores. What area(s) do you need to work on and why?

_______________________________________________________________

_______________________________________________________________

_______________________________________________________________
Introduction to Career Development Events: Animal Science

Student Workbook
Assignment Sheet 3
INTRODUCTION
Knowing how to interpret an EPD is important when determining animals to keep or purchase. EPDs are used along with visual appraisal to determine the potential of an animal. Refer to objective 20 for information about performance data used to calculate EPDs.

EQUIPMENT AND SUPPLIES
- Pen or pencil

INSTRUCTIONS
Look at the following EPD information and answer the questions that follow.

<table>
<thead>
<tr>
<th>#</th>
<th>Birth Date</th>
<th>Birth Weight</th>
<th>Weaning Weight</th>
<th>Yearling Weight</th>
<th>Maternal Milk</th>
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<tbody>
<tr>
<td>1</td>
<td>2/16</td>
<td>+2.3</td>
<td>+16.4</td>
<td>+20.3</td>
<td>+3.0</td>
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<td>2</td>
<td>3/3</td>
<td>+0.4</td>
<td>+1.3</td>
<td>+8.8</td>
<td>+0.3</td>
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<td>3</td>
<td>3/18</td>
<td>+2.1</td>
<td>+4.6</td>
<td>+24.6</td>
<td>-1.8</td>
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<td>4</td>
<td>3/3</td>
<td>+4.2</td>
<td>+15.6</td>
<td>+16.3</td>
<td>+6.0</td>
</tr>
</tbody>
</table>

1. What is the weaning weight of heifer #3?

2. What is the maternal milk of heifer #4?

3. What is the birth weight of heifer #1?

4. What is the yearling weight of heifer #2?
5. What is the weaning weight of heifer #2?
_______________________________________________________________

6. What is the maternal milk of heifer #1?
_______________________________________________________________

7. What is the birth weight of heifer #3?
_______________________________________________________________

8. What is the yearling weight of heifer #4?
_______________________________________________________________
**OBJECTIVE 25**
Respond to keep/cull scenarios.

**INTRODUCTION**
Determining what animals to keep and cull is an important task in a beef production operation. Every year a certain percentage of cows will have to be replaced. Knowing which heifers will make the best replacement animals takes practice. To determine what animals to keep and cull you should use both visual appraisal and performance data.

**EQUIPMENT AND SUPPLIES**
- Pen or pencil
- Video *Livestock Judging: Breeding Heifers VideoActive*
- Television and video player

**INSTRUCTIONS**
Your instructor will show the video *Livestock Judging: Breeding Heifers VideoActive*. This assignment sheet covers section 6 of the video.

**Part 1:** Evaluate the practice class of heifers. Write notes in the blanks provided and then place the class.

*Heifer #1*
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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________________________________________________________________________
Introduction to Career Development Events: Animal Science

Student Workbook
Assignment Sheet 5

Heifer #2

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Heifer #3

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Heifer #4

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________________________________________________________________________
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________________________________________________________________________
1. How would you place the class?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

2. How does this compare with the actual placement?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

3. How did your placement differ from the actual placement?

_________________________________________________________________
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Part 2: Respond to the scenario given in the video.

SCENARIO

Rank these shorthorn heifers as they will be retained in a purebred operation that generates income from the sale of yearling bulls to commercial breeders. All non-replacement heifers and steers are sold at weaning.

Write notes in the blanks provided.

Heifer #1

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<tr>
<th>Student Workbook</th>
<th>Assignment Sheet 5</th>
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<th><strong>Heifer #2</strong></th>
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Unit 1 – 46
1. How would you place the class?

_________________________________________________________________

2. How does this compare with the actual placement?

_________________________________________________________________
_________________________________________________________________

3. How did your placement differ from the actual placement?

_________________________________________________________________
_________________________________________________________________

Respond to the short answer questions on the video.

1. _______________________________________________________________

2. _______________________________________________________________

3. _______________________________________________________________

4. _______________________________________________________________

5. _______________________________________________________________
OBJECTIVE 26
Research industry and consumer trends in livestock production.

INTRODUCTION
The beef cattle industry has changed dramatically over the past decades. Part of the change has come about because of a better understanding of genetics, technological advancements, and a determined effort on the part of beef producers to keep their product viable in the marketplace. Every product or service has a demand side that helps drive and shape the product and the manner in which it is marketed. For the beef producer, the consumer determines the demand. Consumer consumption trends impact the prices and, consequently, the eventual supply of beef. Having an understanding of livestock trends will better prepare you to take advantage of trends as they occur, and to be prepared for changes that occur in the industry.

EQUIPMENT AND SUPPLIES
- Pen or pencil
- Paper
- Resources on industry and consumer trends in livestock production

EXAMPLES:
Market Journal
http://marketjournal.unl.edu/markets/data.shtml

The Financials (commodity analysis)
www.thefinancials.com

Agricultural Marketing Service: USDA
www.ams.usda.gov

Beef Board
www.beefboard.org

Beeflinks
www.beeflinks.com

My Cattle
www.mycattle.com
INSTRUCTIONS
Choose one topic related to industry and consumer trends in livestock production. Examples include the consumer preference for healthy, lean, and also prepackaged food items; the continued emergence of large corporate beef production operations; or the regional price trends of feeder cattle over a specific period of time. Your report can encompass a variety of topics related to beef production. Ask your instructor if you need assistance in deciding upon a topic. Write a report on your topic following the guidelines given below.

- The length of your report will vary but should be at least two pages
- Include the address of at least one association connected with your topic
- Use at least one visual component with your report
  EXAMPLES: Charts, posters, models
- List references used for your report
- Check your report for proper grammar and spelling