Beef

*Lesson Plan for Grade 3, Science*

*Prepared by NAITC*

*Modified by Mississippi State University, School of Human Science*

*for Mississippi Farm Bureau Federation - AITC*

# OVERVIEW & PURPOSE

Students will explore concepts of heredity in beef cattle and identify dominant and recessive traits.

# EDUCATIONAL STANDARDS

**Mississippi College-and-Career Readiness Standards:**

L.3.2.1 Identify traits and describe how traits are passed from parent organism(s) to offspring in plants and animals.

L.3.2.3 Describe and provide examples of offspring from two parent organisms as containing a

combination of inherited traits from both parent organisms.

**NALOs:**

T4.3-5 c Identify examples of how the knowledge of inherited traits is applied to farmed plants and animals in order to meet specific objectives (i.e. increased yields, better nutrition, etc.).

# OBJECTIVES

* Students will identify examples of inherited traits
* Students will explore concepts of heredity in beef cattle
* Students will identify dominant and recessive traits

# MATERIALS NEEDED

# Flip Chart paper or post board for What you Know-What you Want to know- What you Learned (KWL) chart (1)

# Sticky notes for each student or index cards (3-4 per student)

# Basket or bucket (1)

* [My Family’s Beef Farm](https://issuu.com/myfamilysfarm/docs/beefbook_web_1_/7)
* [Build-A-Calf worksheet](https://naitc-api.usu.edu/media/uploads/2016/12/12/Build_a_Calf_Workshop.pdf) (1 per student)

Essential Files:

* [My Family’s Beef Farm](https://issuu.com/myfamilysfarm/docs/beefbook_web_1_/7)
* [Build-A-Calf worksheet](https://drive.google.com/file/d/1pQ61OGe1pCCJcx6gL1lTt-F-iEDXv5PU/view?usp=drive_link)

# Lesson Set Up:

1. Set up the KWL chart for the class by creating 3 sections on a white board or piece of flip chart paper. Label the sections separately as, What you know what you want to know, and then what you learned.
2. Have My Family’s Beef Farm pulled up for the class to follow along with.
3. Print the Build-A-Calf worksheet (1 per student)

# VOCABULARY

**Angus:** a Scottish breed of beef cattle known for their good meat quality

**Hereford:** an English breed of beef cattle with a red body and white face and stomach

**allele:** one of two or more alternative forms of a gene that arise by mutation and are found at the same place on a chromosome.

**dominant:** a trait that can be expressed only when two copies of the gene is present

**gene:** a unit of heredity that is transferred from a parent to offspring and is held to determine some characteristic of the offspring

**genotype:** the genetic makeup of an animal or plant

**heredity:** the passing on of physical or mental characteristics genetically from one generation to another

**heterogeneous:** trait produced by two different genes or a combination of genes

**homogeneous:** trait produced by two identical genes

**inherit(ed):** derive a quality or characteristic genetically from one's parents or ancestors

**linked genes:** genes that are inherited together or do not assort independently

**phenotype:** physical features of an animal

**recessive:** a trait that can be expressed only when two copies of the gene is present

**trait:** a genetically determined characteristics

# Ag Facts:

* There are over 60 breeds of beef cattle in the U.S.The most popular are Hereford, Angus, Brahman and Charolais.
* Texas is the top producer of beef in the U.S., followed by Oklahoma, Missouri, Nebraska, Missouri, and South Dakota.
* On average, Americans consume 1.7 ounces of beef daily in their diets. Today's leaner beef offers the flavor that consumers crave and the nutrition they need for a healthy diet.
* Using artificial insemination in beef cattle improves genetics within a herd such as the conception rate of calving, calving ease, and better carcass weights.

# Background information for teachers:

The average American consumes 55 pounds of beef each year. As a country, we devour nearly 50 billion hamburgers annually.2 Not only is beef an important part of the American diet, but it also plays a significant role in our economy. Beef cattle are raised in every state across the nation. Texas, Oklahoma, and Missouri rank as the states with the highest inventory of beef cattle.3

Why such a high demand for beef? In addition to being prized for its delicious taste, beef provides many nutrients essential to the human diet. Humans need complete proteins with balanced amino acids in order to build muscle, nerves, and organ tissue. Animal proteins are one way to fill this nutritional need. Beef is a good source of ZIP: zinc (a mineral that ensures proper functioning of the immune system), iron (a mineral that helps red blood cells carry oxygen to body cells and tissues), and protein (a nutrient that builds, maintains, and repairs body tissues); as well as B12 (a vitamin that promotes healthy skin, nerves, and red blood cells).

Cattle are **ruminant** animals. Their four-compartment stomach allows them to graze pastures and **rangelands**, eating grass and plants (that humans are unable to digest) in areas where it would be difficult or impossible to grow other food crops. These grazing animals convert plant **cellulose** into high-quality food for humans. Because of this ability, as well as their generally calm and manageable demeanor, people have relied on cattle as a food source for thousands of years.

In the United States, cattle were introduced in the early 1500s, coming from Mexico through Texas and California. The English later brought large numbers of cattle when they founded the Jamestown Colony.

Rangelands cover approximately 26 percent (about 587 million acres) of land across America. This land is generally too arid and mountainous to be suitable for cultivation but can sustain grazing of domesticated animals when well managed. The pasture or range is one of the most important resources to a beef producer because it provides the food and water that animals need at little cost and effort. Producers are allowed to use public lands for grazing and work with the U.S. Forest Service or the Bureau of Land Management (BLM) to ensure that the land remains healthy.

Typically, cattle are turned out to graze on their allotted land late in the spring. Mothers will raise their calves on the open range throughout the summer. The producers will keep a close eye on their cattle, monitoring their growth and health during this time period. Sometime in the fall, the cattle will be rounded up. At this point, the cattle that will be saved for breeding stock are separated from the cattle that will go into beef production. The breeding stock includes pregnant mothers who will give birth in the spring and then be returned to the range to complete the cycle all over again.

Some of the animals designated for beef production will be sold to stockers (also called backgrounder). Stockers are cattlemen who raise weaned steers and/or heifers until they are ready to be sent to market or to a feedlot. Most beef cattle will spend four to six months at a feedlot where they are fed a grain-based diet that helps them gain weight quickly. During this “finishing phase,” the cattle’s health is monitored on a daily basis. When market weight is reached, the animals are sent to a processing facility. The average beef animal weighs 1,200 pounds (544 kg) and yields approximately 520 pounds (236 kg) of meat. While beef cattle are primarily raised for meat, they also provide valuable **by-products** such as medicine, paint, adhesives, soap, cosmetics, detergents, and hundreds of other products. Including by-products, as much as 99% of the animal is used.

# LEARNING PROCEDURES

Interest Approach:

1. Begin a discussion with students by asking the following questions:

**Does chocolate milk come from a brown cow? If it doesn't, why not? *(Coat color doesn't reflect the color of milk. If we want chocolate milk, we have to add chocolate flavored powder or syrup to the milk.)* Explain that most of the characteristics of cattle (including coat color) are inherited from their dam (mother) and sire (father).**

**How are beef cattle different from dairy cattle?**

**What are some characteristics of humans that are inherited? Do all humans have identical inherited traits? How are they different or the same?**

**What are some characteristics in cattle that can be inherited? Do beef cattle and dairy cattle have the same or different inherited traits?**

**Why is inheritance important to a cattle rancher?**

1. Review what was learned in prior lessons - then introduce content and vocabulary necessary for today's lesson. (Can be written on board or carried out how teacher normally approaches vocabulary with class (Vocabulary Sheet included)
2. Activity 1: Beef Cattle K-W-L Chart

KWL Chart: This should be set up on the board or on a piece of flip chart paper prior to lesson either hanging up in the room or on the board. (K (What I already know) W (What I want to know) L (What I have learned)

1. Begin by passing around a post-it note or small piece of paper to every student. Ask the students to close their eyes. Have them visualize their response to the following question: "What comes to mind when I say the words b*eef cattle*?"
2. Have students jot down what came to their mind on the post-it note. Clarify to students that they can draw a picture or write down a word or phrase that came to their mind.
3. Next, have students place their post-it note into a bucket. Remove the post-it notes one by one and begin to add the student's responses to the K section of a KWL chart drawn on chart paper or the board. These responses reflect what the students ***K****now* about beef cattle. Discuss responses as they are revealed.
4. After the K section is completed, ask students what they would like to learn about beef cattle. Add their responses to the W section of the KWL chart. These responses will represent what the students ***W****ant to learn* about beef cattle.
5. Introduce the digital version of [My Family's Beef Farm](https://issuu.com/myfamilysfarm/docs/beefbook_web_1_/7?e=0/33565420) by Katie Olthoff to the class. Read the book aloud to the students, emphasizing the physical characteristics of the beef cattle.
6. Follow the same idea above and have students write on a second post-it note what they ***L****earned* about beef cattle from the book. Add these responses to the L section of the KWL chart.
7. Compare the W and L sections of the KWL chart to see if the students learned all they wanted to.
8. Next, determine any questions in the W section that were not answered by reading *My Family's Beef Farm*. Place students in small groups based on the number of sticky notes that still need to be researched.
9. Assign each group one sticky note from the W section that still needs to be researched and explored.

4. Activity 2: Build-a-Calf

1. Divide students into groups of four students or less. Give each student a *Build-a-Calf* activitysheet and each group a coin.
2. Instruct students to read the instructions and then play the game.
   * The students should flip a coin to determine if the dominant or recessive allele is being passed on from the dam (female) to the offspring. If the coin lands heads up, the dominant gene is passed on. If the coin lands heads down, the recessive gene is passed on. The students should record the gene on their activity sheet and then flip the coin again to see if the dominant or recessive allele is being passed on from the sire (male). Once they have determined the allele from each parent, they should select the correct homozygous or heterozygous pairing on the activity sheet which will tell them which phenotype will be inherited.
   * Repeat this process for all of the traits represented.
   * Have the students color the calf on the back side of their activity sheet to reflect the genes passed on from the parents to the offspring.
   * Have the students compare their offspring to the breed pictures. Does their calf look more like an Angus or Hereford? Does it look like a cross? What genes determined that?
   * In their groups, have the students calculate the percent of animals that look like Herefords, Angus, or crossbreds. Is there an even number of each? Why or why not?

**Concept Elaboration and Evaluation:**

* As a group, have students discuss:
  + **Are beef producers the only farmers that need to be concerned with genetics? Are there traits in crops or other livestock that are affected by heredity? What might some of those traits be?**
  + **If an animal lives in an arid desert, what traits might you select? What might help your animal be more successful in that environment?**
  + **Do the traits in the game directly affect the animal's use for consumers? What are some traits that might directly affect the animal's use for consumers? Is there a way to select for traits that would focus on nutrition or healthfulness?**

# Additional Learning Procedures

To help students review and elaborate more about beef try using the [“I used to think… Now I think..”](https://drive.google.com/file/d/1E3nTuowPmKN3WsKZFCKvbfRacPaet0F9/view?usp=drive_link) method to allow students to think deeper and make new connections.

Additional texts include:

[Beef Cattle in the Story of Agriculture](https://www.agfoundation.org/recommended-pubs/beef-cattle-in-the-story-of-agriculture)

[Can-Do Cowkids](https://www.agfoundation.org/recommended-pubs/can-do-cowkids)

[Beef Up Your Nutrition](https://www.agfoundation.org/recommended-pubs/beef-up-your-nutrition)



Source: <https://www.agclassroom.org/teacher/matrix/>

*For more information and additional lessons visit*

*https://msfb.org/ag-in-the-classroom/lesson-plans/.*