By-products

Lesson Plan for Grade 4, Science/Math

Prepared by NAITC

Modified Mississippi State University, School of Human Sciences

for Mississippi Farm Bureau Federation - AITC

# OVERVIEW & PURPOSE

Students will identify the differences between beef and dairy cattle and determine the by-products produced by each type of cattle while practicing reducing fractions and multiplication.

# EDUCATION STANDARDS

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

L.4.2.2 Develop and use models to explain the unique and diverse life cycles of organisms other than humans (e.g., flowering plants, frogs, or butterflies) including commonalities (e.g., birth, growth, reproduction, or death).

4.NF.3 b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model (including, but not limited to: concrete models, illustrations, tape diagram, number line, area model, etc.). Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.

4.NF.3 c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.

ELA-W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources.

**NALOs**

T1.3-5 e Recognize the natural resources used in agricultural practices to produce food, feed, clothing, landscaping plants, and fuel (e.g. soil, water, air, plants, animals, and minerals).

T2. 3-5 d Provide examples of specific ways farmers/ranchers meet the needs of animals.

# OBJECTIVES

* Students will analyze what farmers manage in order to produce food and fiber
* Students will determine why farmers have to use science and inherited traits for their cows
* Students will determine where protein comes from
* Students will discuss what would happen if farmers stop farming
* Students will discuss why people eat different foods around the world.

# MATERIALS NEEDED

Activity 1:

* Beef and Dairy [KWL chart](https://drive.google.com/drive/u/0/folders/1HL4-O6jOWonUYoROIUHjsb0hConRU4Sl)
* Flip Chart paper (optional)
* *Cows on the Farm* written by Marci C. Schuh
* [Beef and Dairy Commodity Fact Cards](https://drive.google.com/drive/u/0/folders/1HL4-O6jOWonUYoROIUHjsb0hConRU4Sl)
* [Beef and Dairy Quiz](https://drive.google.com/drive/u/0/folders/1HL4-O6jOWonUYoROIUHjsb0hConRU4Sl)
* Glue or tape (1 per student)
* Scissors (1 set per student)
* Plain white paper (two sheets per group)
* [Reflection sheet](https://docs.google.com/document/d/1RI2xXXG5MrjaaZF5TvripWjMAFy7p2Bp/edit?usp=sharing&ouid=109918902593538910659&rtpof=true&sd=true)

Activity 2:

* Milk (1 cup per student)
* Small sized ziploc baggies (1 per student)
* Large sized ziploc baggies (1 per student)
* Ice (Enough to fill a large Ziploc baggies
* Rock Salt ( 1 box per 20 students)
* Vanilla extract (½ tsp per student)

Measuring cup

Essential Links/Files:

* [Beef and Dairy KWL chart](https://drive.google.com/file/d/1nKw0U8-SxbVFbLGtj7_GbX8fVADWP-7b/view?usp=sharing)
* [Beef and Dairy Commodity Fact Cards](https://docs.google.com/document/d/1CnwtmbgVVtzf32xqGpod6nrABgj5T32J/edit?usp=sharing&ouid=109918902593538910659&rtpof=true&sd=true)
* [Beef and Dairy Quiz](https://drive.google.com/file/d/1dwtEaBtg7O-a8_Ml4lHTmlReKswXXSyg/view?usp=sharing)
* [Reflection sheet](https://docs.google.com/document/d/1RI2xXXG5MrjaaZF5TvripWjMAFy7p2Bp/edit?usp=sharing&ouid=109918902593538910659&rtpof=true&sd=true)

# Lesson Set Up:

Activity 1:

1. The teacher will need to make a [KWL chart](https://drive.google.com/file/d/1nKw0U8-SxbVFbLGtj7_GbX8fVADWP-7b/view?usp=sharing) (the K stands for what the students already know, the W stands for what the students want to know, and the L is what students ultimately want to learn), before the class starts and display it in an easy to access location in the classroom. To do this the teacher will need to either on the board or on a large piece of flip chart paper create three columns and label them separately as K,W,L.
2. Before the lesson the teacher will need to separate students into groups of 3-4 students.
3. The teacher will need to print the sets of Beef & Dairy Commodity Cards , (enough for one set for every group, or 3-4 students).
4. The teacher will also need 2 sheets of plain white paper per group, as well as enough glue or tape, and scissors for each group to share. You can have these items ready to pass out or already have them separated into groups on each desk.
5. The teacher will also need to print the [Beef and Dairy Quiz](https://drive.google.com/file/d/1dwtEaBtg7O-a8_Ml4lHTmlReKswXXSyg/view?usp=sharing), one for every student.

Activity 2:

1. Before class the teacher will need to obtain a bucket of ice, and the rest of the ice cream ingredients.
2. The teacher will then need to set up an assembly line of the ice cream ingredients.
3. The order should be the following: Small Ziploc baggies, milk, sugar, vanilla extract, large Ziploc baggies, ice, rock salt.
4. The teacher will need to set up a hand washing station
5. The teacher will also need to print one copy

# Vocabulary

**beef cattle:** cattle, both female and male, with muscular bodies primarily raised for meat

**cattle:** bovine animals consisting of different breeds, domesticated for producing beef and milk

**dairy cattle:** cattle bred for the ability to produce large quantities of milk (females only), from which dairy products are made

**milking parlor:** building where dairy cows are milked

# Ag Facts:

* One beef cow can produce about 475 pounds of beef, which is almost equal to 2000 hamburgers.
* Beef is a good source of ZIP (zinc, iron, and protein) along with other vitamins and minerals that we need to be strong and healthy.
* Did you know it takes 3,000 cow hides to supply the NFL enough footballs for 1 year?
* One dairy cow's daily milk production (about 70 pounds) can produce 8 gallons of milk or 3.3 pounds of butter or 7 pounds of cheese.
* A Holstein's spots are like a snowflake or human fingerprint; no two cows have exactly the same pattern of spots.
* With today's technology, some dairy farms have robots that operate their milking machines.
* Mississippi is home to around 8,000 milk cows in 2019.
* The top milk producing counties in Mississippi are: 1) Marion 2) Tate 3) Walthall 4) Pike 5) Copiah

# Background Information for Teacher:

In the United States, **cattle** are typically raised to produce beef and milk for our food supply. The term *cattle* can refer to any breed or gender of the bovine species. All breeds of cattle produce meat and all female cattle produce milk after they give birth. However, within the cattle industry, specific breeds of cattle are classified as either "beef" or "dairy" cattle due to their efficiency in producing either meat or milk.

Female cattle, or *cows*, produce milk. They begin producing milk after giving birth to their first baby, which is called a *calf*. Cows that are able to produce large quantities of milk are called **dairy cows***.* Such breeds of dairy cows raised in the United States include the Holstein, Ayrshire, Brown Swiss, Guernsey, Jersey, and Milking Shorthorn. Can any breed or type of male cow be used for milk production? No, male cows do not produce milk.

Cattle breeds that are more muscular are raised as **beef cattle**. There are many different breeds of *beef cattle* raised in the United States such as Angus, the most popular, along with other common breeds such as Hereford, Shorthorn, Charolais, Simmental, and Limousin. Female beef cows produce milk after giving birth, but in much smaller quantities than a typical dairy cow. Female beef cows produce enough milk to raise their own calf.

Beef and dairy cow production in the United States are two distinct industries because of the trait differences mentioned above; milk production in large quantities vs. more muscular cattle raised for meat. As of January 1, 2015 the beef cattle inventory was up by 1% from the previous year at 89.9 million. The top five states that raise all cattle both beef and dairy include Texas, Nebraska, Kansas, California, and Oklahoma. In 2012, there were 915,000 cattle and calf operations to include 29.7 million beef cows and 9.3 million milk cows. The total beef consumed in the United States was 25.5 billion pounds for 2014. Milk production was calculated in 2014 to be 206,046 million pounds. These stats prove that both beef and dairy are a large component of the human diet.

The cow that produced 1,500 quarts of milk per year a hundred years ago can produce 7,812 quarts per year today. One first grade student would have to drink 85 plus cartons of milk a day for an entire year to equal this amount. The dairy cows are normally milked twice a day, depending on the farm in a building called a **milking parlor**. Automatic milking machines are used today and help the dairy farmer keep accurate records regarding milk production from each cow.

# LESSON PROCEDURES

# Day 1:

Print the [KWL chart provided](https://drive.google.com/drive/u/0/folders/1HL4-O6jOWonUYoROIUHjsb0hConRU4Sl) or make your own similar to the one linked. This should be kept on chart paper or on the board so that it can be used and posted throughout the entire lesson. Ask students the following questions and place their answers in the first two columns. The third column will be filled in at the conclusion of the lesson.

**What I Know** (K)

What do you know about beef cattle?

What do you know about dairy cattle?

Do beef and dairy cattle look the same or different?

Which group of cattle produce milk? beef? ice cream? hamburger?

**What I Want to Know** (W)

What do you want to learn about beef cattle?

What do you want to learn about dairy cattle?

What foods do I eat that are produced by beef cattle?

What foods do I eat or drink that are produced by dairy cattle?

Next, read the book, Cows on the Farm written by Mari C. Schuh and point out the differences indicated in the book between beef and dairy cattle. Tell the students they will be learning about the products that both beef and dairy cattle produce that are included in their diets.

2. **Activity 1:**

1. The teacher should lead the following discussion:

**“By a show of hands, ask students if they like milk, cheese, ice cream, hamburgers, and steaks.”**

**"Where do you think these products come from?"**

Answer: These products come from cows.

**"Do these products come from the same type of cows or different?" (Students might say the same type of cows)**

Answer: There are two types of cows. One specifically produces meat. These are known as beef cows. The other type of cow is a dairy cow. Through science and inherited traits (like those you get from your mom and dad), farmers make their cows the best they can be at their jobs whether it's producing beef or milk.

**“What do our bodies get from beef and dairy products?” (Students might say vitamins)**

Answer: Beef and dairy products provide our bodies with the essential nutrients, vitamins and minerals we need. One of those nutrients is called protein. We get protein from many different foods like beans and dairy, however we get the most from meat like beef from a cow.

**"Which products are produced by a dairy cow?” (Students might say milk)**

Answer: A female dairy cow will produce milk over her lifetime. From this milk, cheese, butter, ice cream, yogurt, and many more things will be made. However, if a male type of cow is born, he cannot produce milk, so he will be used to produce beef.

**"Which products are produced by a beef cow?"** **(Students might say steak)**

Answer: Steaks, hamburgers, and roasts are some products produced by a beef cow.

Allow students time to explore their positions. Refer back to the KWL chart and remind students of their previous responses. Add any changes or different responses not mentioned prior to the beginning of the lesson.

**“In which ways are cows different from one another?” (Students might say they look different)**

Answer: Coat color, gender, weight, size.

If needed, prompt by asking them to consider some of the physical differences noticed between themselves and their classmates. Explain to students that just like we get different traits from our parents, so do cows.

3. Next, divide students into groups of 3 - 4 students. Distribute one set of the Beef & Dairy Commodity Cards per group, glue or tape, and 2 pieces of plain white paper per group.

Give students the following instructions:

**“First, in your groups Label 1 sheet of paper Dairy Cattle and the other sheet of paper Beef Cattle. Then, as a group, you should solve all of the addition problems and write the answer directly behind the "=" sign. Next, students will pair the cards with the same sum. For example, a card with the equation 4+1=5 will match with the card 3+2=5. Last, tape or glue matching boxes together to form a complete sentence strip. Keep like colors together, red with red and blue with blue.”**

**“Note that the 2nd line of the cards is in black text and will be matched to make a fact statement. The third line of the cards lists a commodity that is produced by cattle. Blue text indicates a dairy product. Red text indicates a beef product.**

**“As a group should glue or tape the fact strips in chronological order to the sheets of paper they labeled in step 4. All of the blue sentence strips should be taped to the paper labeled Dairy Cattle. All of the red sentence strips should be taped to the paper labeled Beef Cattle. All 8 strips for each beef and dairy cows should fit on one piece of paper. When finished, students will have two fact sheets, one for beef cows and the other for dairy cows.”**

4. Ask each group of students to stand and read one sentence strip from both beef and dairy fact sheets.

5. Ask and discuss with students the following questions after they have read their beef and dairy fact:

**"Why do you think it's important for farmers to care for their cows?” (Students might say so that they stay alive)**

Answer: So that they are happy and healthy for us to eat.

**“What would happen if farmers didn't raise beef or dairy cows?” (Students might say there would not be any food)**

Answer: Food prices would increase because there was not enough to go around. People would demand changes, because they would want beef and dairy products, and beef or dairy products might have to be imported from other countries so that we would have them.

**“What products that come from beef and dairy cows do you think are the most important?" (Students might say all of them)**

Answer: They are all important. Every part of the cow is used to make something. We eat hamburgers and drink milk, but we also get leather from their hide (skin) and many more other products.

**"Do farmers raise food like crops only to feed their beef and dairy cows?" (Students might say they raise enough to feed everyone)**

Answer: Most of the time farmers raise enough crops to feed their beef and dairy cows, but also enough to sell to feed us too.

**"Are some crops grown for both humans and animals to eat?" (Students might say no)**

Answer: Yes. Cows and humans can both eat the same thing, however we eat them in different forms. As an example, cows might eat soybean hulls (the outside shell of a soybean) in their feed, while we as humans can drink soy milk made from soybeans.

**“What do farmers have to manage in order to give us food, clothing and shelter?” (Students might say water and soil)**

Answer: Farmers have to manage irrigating (watering) crops and managing soil nutrients so that their crops are getting everything they need to grow. With cows they have to manage animal waste, and their life cycles to make sure the cows are clean and comfortable and growing and producing the way they should.

6. Next. have each group work collaboratively to read and answer the 10 questions on the Beef and Dairy Quiz. Discuss responses once each group has completed the quiz.

7. Conclude this day by saying to the students:

**“Today we learned the difference between a dairy cow and a beef cow. In the next class session we will be discussing different products that come from each.”**

# Day 2:

8. **Activity Two:**

1. The teacher should lead with the following discussion:

**“By a show of hands, who in this class likes ice cream?”**

Answer: (Give students enough time to raise their hands)

**“Did you know that some people cannot eat ice cream or beef from cows, what would be some reasons why do you think?”**

Answer: People around the world have different religions. In some religions, eating beef is not allowed. Another reason because of religious reasons is on certain holidays, some people cannot eat certain foods like beef. Also, there are some people that live in places with different climates and soils than we have, so they grow and produce different types of animals and crops to eat. Another reason would be that some people are allergic to certain foods like beef or dairy.

Instruct students:

**“Today, we will be making ice-cream today out of milk. Yesterday, we talked about by-products from beef and dairy cows. Ice Cream is a by-product of milk from dairy cows. You will need to wash your hands or use hand sanitizer when instructed”**

2. Have the class wash their hands or distribute hand sanitizer. Once they are done, have a class discussion about food handling safety.

**“ Class, why did we make sure that our hands were clean before we started making our ice cream?” (Students might say so that they get rid of all of the germs)**

Answer: So that the class would not spread germs from their hands to their food. Germs in your food can make you sick.

3. Next, read the following instructions to the students.

**“Students, first you will receive a plastic Ziploc bag. You will get in line with your Ziploc bags, and go through the line to get all of your ingredients. First, you will get one cup of milk in your first Ziploc bag. You will then put your sugar and vanilla in the same bag as your milk. After you get those three ingredients in your first bag, I want you to seal it up so that no milk is leaking out of it. You will then get another Ziploc bag filled with ice and rock salt. You will place your first sealed up Ziploc bag into the second bag with ice and salt. Once you get your first bag into your second, you will then seal your second one up so that there are no leaks. You will then shake your bags from side to side until your ice cream starts to make. If your hands start to get cold, you can use a paper towel to cover your bag, or put your bag down until your hands start to warm up again. What questions are there?”**

INGREDIENTS

1 c. milk

2 tbsp. granulated sugar

1/2 tsp. pure vanilla extract

3 c. ice

1/3 c. rock salt

Toppings of your choice

**Concept Elaboration and Evaluation**

1. After completing activity 1 and 2, complete the (L) portion of the KWL chart. Ask the students what they learned and compare that with what they knew and wanted to learn. Make sure all questions on the (W) portion of the chart have been answered.
2. Lastly, have students complete the reflection worksheet. Once students have turned in their worksheet, go over the correct answers.

# Additional Learning Procedures

To help students review and elaborate more about by-products, try using the [“The Carousel”](https://drive.google.com/file/d/1Plj3_gjDxeQ3eQ5WT5EfQvy9gD_Fi0fx/view?usp=drive_link) method to allow students to think deeper and make new connections.

Additional Texts to Include:

[From Cow to Ice Cream](https://www.agfoundation.org/recommended-pubs/from-cow-to-ice-cream)

[The Delicious Dairy Group](https://www.agfoundation.org/recommended-pubs/the-delicious-dairy-group)

[Diary of a Farmer](https://www.agfoundation.org/recommended-pubs/diary-of-a-farmer)



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

*For more information and additional lessons visit*

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