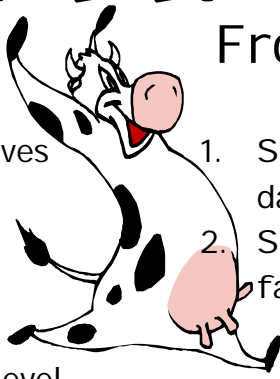


From Moo to Milk and More!

Objectives



1. Students will learn that milk and other dairy products come from dairy cows.
2. Students will learn the steps in getting dairy products from the farm to our home.

Grade Level

1-3

4-6

TEKS:

R- 1.1B,D,E;1.11A,B;1.17G,1.21B
 R- 2.1B,D,E;2.7B;2.8A,B;2.10B;
 2.12D,E,G;2.15C;2.17B
 R- 3.1B,D,E;3.7B;3.8A; 3.16E;3.17C
 S- K.5A;K.6C;K.9A
 S- 1.5A;1.6A,B;1.9A,B
 S- 2.5A;2.9A,B;
 S- 3.1A;3.2A-E;3.9A
 SS- 1.9A,B,1.18B
 SS- 2.8A,C;2.10A,C;2.17C,D,E;2.18B
 SS- 3.6A,3.16C,D,E,F
 H- K.6C;1.7C;2.4A,D;3.3A

R- 4.10K;4.13C,D,E;4.16B
 R- 5.9A,E;5.10K;5.13C,D,E;
 5.16B;5.21C
 R- 6.9A,E;6.10K;6.13C,D,E;
 6.16B;6.20C,D
 S- 4.1A; 4.2A-E;4.8A,
 S- 5.1A;5.2A-E;5.9A
 SS- 4.6B;4.9B;4.13A,B;4.14B;4.22C,F
 SS- 5.9B;5.13B;5.25C
 SS- 6.21A,C

TAKS:

GRADE

OBJECTIVES

Reading	3, 4, 5, 6	1, 4
Writing	4	1, 4, 5, 6
Science	5	1, 2
Math	3, 4, 5, 6	4, 5

Assessment Summary:

Objective 1: Complete poster in activity 7.

Objective 2: Complete activity 2. Read information and answer questions.

Writing: Pretend you are visiting on a dairy farm. Write a letter to your parents telling them all you have learned about dairy cattle, or about milking cows, or about how milk gets to the grocery store.

Internet

Research: Write a paragraph about Louis Pasteur, Clarence Birdseye, or the Kruse Brothers telling why they are important to the dairy industry.

Background

Information: Included in lesson

Materials: rubber gloves heavy cream
 rubber bands plastic utensils
 baby food jars crackers

Equipment: Computer with Internet connection

From Moo to Milk!

Procedure

1. Introduce new vocabulary:

pasteurize	milking machine
homogenize	heifer
milking parlor	yearling
udder	2% milk
teats	1% milk

Activities

2. Grades 1-3: Have students read the information and answer the questions on "Dairy Cattle", "The Dairy Farm", and "The Processing Plant."

Grade 4-6: Have students read the information and answer the questions on "From Moo to Milk!"
3. Complete "Talk Like a Dairy Farmer." Make a memory game with the words and definitions.
4. Complete "What Kind of Dairy Cow Am I ?" and "Life of a Dairy Cow."
5. For younger students, discuss the lunch menu each day and have them identify which menu items are dairy products.

For older students, copy the week's lunch menu and have them highlight the menu items that are dairy products.
6. Have students complete the activity "What's Your Favorite?". As a whole class activity, make a bar graph on the chalkboard based on the students' preferences.

Extension activity for Grades 4-6:

Have each child survey five adults using the same form.
Compile their information and make a bar graph on the chalkboard based on their findings.
They could also survey people to find their favorite cheese or flavor of ice cream.

7. In groups, using magazines and newspapers, have students make a poster of products that come from milk.
8. Teacher demonstration of experiment: "Colorful Fireworks"
9. Perform experiment: "The Spoiler." Why milk spoils without refrigeration
10. Have students "milk a cow" using a rubber glove.
11. Have students make and taste butter.
12. Have students make ice cream using the "Freezer Bag Ice Cream" activity.

DAIRY CATTLE

We get milk, butter, cheese, and other dairy products from dairy cattle. Dairy cows look different from beef cows. In fact, you might even say they look skinny. Dairy cows don't have the heavy muscles that beef cows do. Dairy cows have larger udders than beef cattle. The udder is located between the cow's back legs. Milk is stored in the cow's udder until a baby calf drinks it or until the dairy farmer milks the cow. Some dairy cows can give as much as eight to ten gallons of milk every day. Most of the dairy cows in the United States are Holstein cows.



Dairy Cow

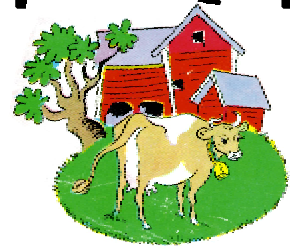


Beef Cow

1. List 2 ways beef cattle and dairy cattle look different.

2. What is the purpose of the udder on a dairy cow?

3. How much milk does a dairy cow give each day?

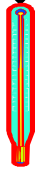


THE DAIRY FARM

A dairy farm raises cows for milk. The dairy farmer used to milk the cows by hand. He would sit on a stool beside the cow, place a bucket under her udder and squeeze each of the four teats so that milk would go into the bucket. Now farmers use milking machines. The milking machines milk the cows faster because many cows can be milked at one time. Dairy cows are usually milked twice every day, in the early morning and in the late afternoon. The cows walk into the milking parlor into stalls. Eight or more cows can be milked at one time. Each cow gets some grain to eat while she is being milked. Workers wash and dry each cow's udder. This is so no dirt or water gets in the milk. The workers then attach a milking machine to each cow. The milk goes into a big tank where it is cooled very quickly. Every day a tanker truck takes the milk to a processing plant.

1. How often are cows milked? ☐ once a day ☐ twice a day
2. Why do the workers wash and dry the cow's udder?
 ☐ to keep the milk cool ☐ to keep the milk clean
3. Which paragraph shows the steps in the correct order?
 ☐ Workers wash and dry each cow's udder. The workers then attach a milking machine to each cow. The milk goes into a big tank where it is cooled very quickly. Every day a tanker truck takes the milk to a processing plant.

 ☐ The workers attach a milking machine to each cow. Workers wash and dry each cow's udder. The milk goes into a big tank where it is cooled very quickly. Every day a tanker truck takes the milk to a processing plant.



The Processing Plant



At the dairy farm, the milk is stored in huge tanks until a large tanker truck comes to the dairy farm and picks it up. The truck takes the milk to the processing plant. At the processing plant the milk is pasteurized. That means it is heated to 160 degrees for 15 seconds to kill any bacteria that it might have in it. The milk is also homogenized to keep the fat in the milk from rising to the top. After the milk has been pasteurized and homogenized, it is put into cartons or plastic jugs and taken to the grocery store. Butter, cheese, yogurt, ice cream, and sour cream are all dairy products that are made from milk.

1. Which step kills the bacteria in milk?
☐ pasteurizing ☐ homogenizing
2. Which step keeps the fat from rising to the top?
☐ pasteurizing ☐ homogenizing
3. Which paragraph shows the steps in the correct order?

☐ The milk is brought from the dairy farm to the processing plant. The milk is put into jugs. The milk is pasteurized and homogenized. The milk is taken to the store.

☐ The milk is brought from the dairy farm to the processing plant. The milk is pasteurized and homogenized. The milk is put into jugs. The milk is taken to the store.
4. Name three dairy products.

From Moo to Milk!

Introduction

Years ago nearly everyone in Texas had at least one cow. They were mostly kept to provide the family with milk and butter. Usually there was some milk and butter left over that could be sold in town to buy flour, sugar, coffee and other things that couldn't be raised on the farm. Occasionally the family would butcher a calf for meat, but without refrigeration it was difficult to keep the meat from spoiling. Today, we depend on cattle ranchers and dairy farmers to provide our meat, milk, butter, and cheese that we purchase at the local super market.

Dairy Cattle

We get milk, butter, cheese and other dairy products from dairy cattle. Dairy cows look different from beef cows. In fact, you might even say they look skinny. Dairy cows don't have the heavy muscles that beef cows have. Dairy cows have larger udders than beef cattle. The udder is located between the cow's back legs. Milk is stored in the cow's udder until a baby calf drinks it or until the dairy farmer milks the cow. Some dairy cows can give as much as eight to ten gallons of milk every day. The major breeds of dairy cattle in the United States are Holstein, Jersey, Brown Swiss, Guernsey, Ayrshire and Milking Shorthorn.



Dairy Cow



Beef Cow

The Dairy Farm

A dairy farm raises cows for milk. The dairy farmer used to milk the cows by hand. He would sit on a stool beside the cow, place a bucket under her udder and squeeze each of the four teats so that milk would go into the bucket.

Now farmers use **milking machines**. The milking machines milk the cows faster, the milk stays cleaner, and more cows can be milked at one time.



Dairy cows are usually milked twice every day, in the early morning and in the late afternoon. The cows walk into the milking parlor where they each go to a separate stall. Depending on the size of the milking parlor, the dairy farmer can milk eight, sixteen or even thirty-two cows at one time. Each cow gets some grain to eat while she is being milked. Workers wash and dry each cow's udder. This is so no dirt or water gets in the milk. The workers then attach a milking machine to each cow. The machine is called a claw. It has four cups that attach to the four teats on each cow by suction. The cups gently squeeze the teats and the cow releases her milk. The milk travels through a pipeline to a big stainless steel tank that cools the milk very quickly. The milk is stored in the tank until a large, refrigerated tanker truck comes to the dairy farm and picks it up. The tanker truck hauls the milk to the processing plant. The truck picks up the dairy farmer's milk every day.

The Processing Plant

At the processing plant the milk is **pasteurized**. That means it is heated to 160 degrees for 15 seconds to kill any bacteria that it might contain. Whole milk contains fat droplets. If the whole milk sits without being stirred, it will separate and the cream will rise to the top. Cream is actually fat droplets that are contained in the milk. To keep the cream from separating and rising to the top, the milk is **homogenized**. The fat is broken down into very small droplets that stay mixed up in the milk.

After the milk has been pasteurized and homogenized it is put into cartons and taken to the grocery store. Other products that are made from the milk are butter, all kinds of cheese, yogurt, and ice cream. When you take the milk home you know that you are getting a safe, healthy product. In fact, when you drink that first glass of milk from a new carton, you are the first human to have touched it!



FROM MOO TO MILK



1-2. List 2 ways beef cattle and dairy cattle look different.

3. What is the purpose of the udder in a dairy cow?

4. How much milk does a dairy cow give each day?

5. How often are cows milked?

☐ once a day

☐ twice a day

6. Why do the workers wash and dry the cow's udder?

☐ to keep the milk cool

☐ to keep the milk clean

7. Which step kills the bacteria in milk?

☐ pasteurizing

☐ homogenizing

8. Which step keeps the fat from rising to the top?

☐ pasteurizing

☐ homogenizing

9. Which paragraph shows the steps in the correct order?

- ☐ Workers wash and dry each cow's udder. The workers then attach a milking machine to each cow. The milk goes into a big tank where it is cooled very quickly. Every day a tanker truck takes the milk to a processing plant.
- ☐ The workers attach a milking machine to each cow. Workers wash and dry each cow's udder. The milk goes into a big tank where it is cooled very quickly. Every day a tanker truck takes the milk to a processing plant.

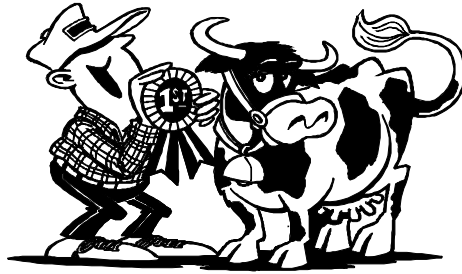
10. Which paragraph shows the steps in the correct order?

- ☐ The milk is brought from the dairy farm to the processing plant. The milk is put into jugs. The milk is pasteurized and homogenized. The milk is taken to the store.
- ☐ The milk is brought from the dairy farm to the processing plant. The milk is pasteurized and homogenized. The milk is put into jugs. The milk is taken to the store.

11. Name three dairy products.

Activity 3

Talk Like a Dairy Farmer



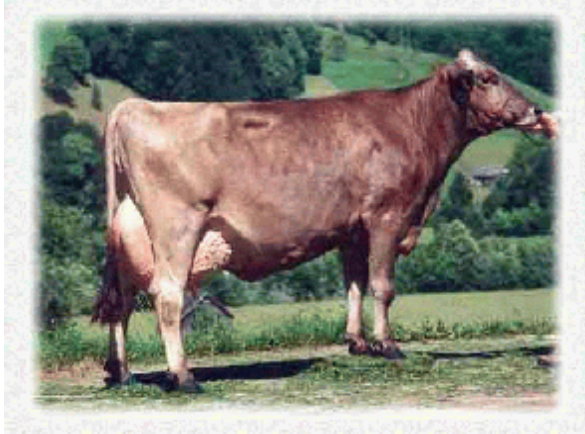
Match each word with its definition. Put the letter of the correct word in the blank.

- | | | |
|--------------------|---------------|-------------------|
| A. udder | C. teats | E. milking parlor |
| B. milking machine | D. pasteurize | F. homogenize |

- _____1. the building where cows are milked
- _____2. process that kills the bacteria in milk
- _____3. process that keeps the fat from rising to the top
- _____4. the part of the cow that holds the milk
- _____5. the part of the cow where the milk comes out
- _____6. the machine that makes the milk come out of the udder

On notebook paper, write a sentence using each word.

Major Breeds of Dairy Cattle in the United States



Brown Swiss



Jersey



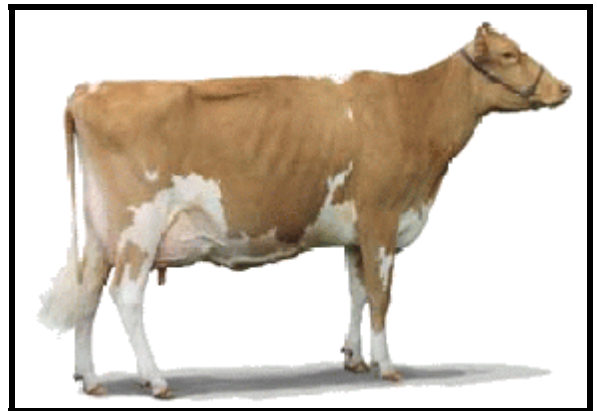
provided by Hoard's Dairyman
Holstein



provided by Hoard's Dairyman
Milking Shorthorn



provided by Hoard's Dairyman
Ayrshire



Guernsey

WHAT KIND OF DAIRY COW AM I ?

There are more than 10 million dairy cows in the United States. Most of them are in the states of Wisconsin, California, New York, Minnesota and Pennsylvania. Erath County is the top milk-producing county in Texas. There are 6 major breeds of dairy cows. Listed below are the characteristics of the 6 breeds. Match each breed with its picture. Write the name of the breed next to its description. For help, use an encyclopedia or the Internet.

1.

I am a light brown color. I have creamy-colored milk. My name might remind you of a type of shirt, but I am really named after an island where I came from. I am the smallest of the dairy breeds.

2.

I am dark brown with white shading. Some cows are nervous, but I am very calm. I am a very rugged breed which makes you think of the mountains in the country of Switzerland where I came from.

3.

I am white with reddish brown spots. I have been called the most beautiful breed. I come from the country of Ayr in Scotland. I like the rugged hills of my homeland.

4.

I am white with big black patches. I am the breed of cow that you probably think of when you think of dairy cows. In the U.S., there are more dairy cattle of my breed than any other. My breed produces more than 90% of all the milk in the U. S.

5.

I am mostly brown with white spots. My milk is a golden color. I am also a calm breed and am named for the island that I come from.

6.

I come in many different colors. I have a very thick body and look much like a beef cow. You might think all of my breed have horns because of my name.

Activity 4

Life of a Dairy Cow

Dairy cattle have to grow up just like people do. A dairy cow doesn't produce milk until she has a calf. She is about two years old when she has her first calf. Dairy farmers like cows to have a calf every 12 to 14 months.

Newborn Calf

The average Holstein calf weighs from 90 to 100 pounds at birth. A newborn calf is fed colostrum milk for the first three days of life. Colostrum is special because it gives the calf extra nutrients to help the calf get off to a good, healthy start. Calves are 4 to 8 weeks old when they are weaned from milk.



Newborn Calf

Six-Month-Old Heifer

The six-month-old heifer is usually fed hay and grain. These heifers may also graze (eat grass) in a pasture. Holstein heifers weigh about 400 pounds at this age. Dairy farmers want their Holstein heifers to gain about 1 ½ pounds each day.



Six-Month-Old Heifer

Yearling

This heifer is called a yearling because she is over one year old. She weighs about 700 pounds and still has quite a bit of growing to do before she enters the milking herd in another year.



Yearling

Mature Cow

This adult dairy cow weighs over 1,500 pounds! She is five years old and just had her fourth calf. She can eat over 100 pounds of feed a day and can produce over 12 gallons of milk a day during the early part of her lactation. A mature cow produces about 25 percent more milk than a first calf heifer.



Mature Cow

On average, a cow gives birth to a calf every 13 or 14 months. A cow is normally milked for about 11 or 12 months and then the "mother in waiting" has a period of about 2 months before her new calf is born during which she is not milked. This gives her body a time of rest to prepare itself for the next milking cycle, which starts as soon as the calf is born.

taken from <www.ext.vt.edu/resources/4h/virtualfarm/>

Activity 4

Life of a Dairy Cow

1. How much does a calf weigh when it is born?
☐ 4-8 pounds
☐ 90-100 pounds
2. A calf is _____when it is weaned.
☐ 4-8 weeks old
☐ 4-8 days old
3. How much weight does the dairy farmer want 6-month-old heifers to gain each day?
☐ 4 pounds ☐ 8 pounds ☐ 1½ pounds
4. If a heifer gained 2 pounds a day, how long would it take her to gain 20 pounds?
☐ 10 days ☐ 40 days
5. How old is a yearling heifer?
☐ 5 years old ☐ one year old

6. How old is a heifer when she has her first calf?

- ☐ one year old
- ☐ 2 years old
- ☐ 5 years old

7. How often does a cow have a calf?

- ☐ every 13 to 14 months
- ☐ every 11 to 12 months

8. Which of these lists the stages in the correct order?

- ☐ newborn, yearling, six-month-old heifer, mature cow
- ☐ newborn, six-month-old heifer, yearling, mature cow

9. How old is the calf when it no longer drinks milk?

- ☐ one year old
- ☐ 4 to 8 weeks old

10. In this story, what is the meaning of colostrum?

- ☐ a mixture of grass and milk
- ☐ a special milk with extra nutrients

Activity 6

WHAT'S YOUR FAVORITE?



Place a check next to each kind of dairy product that you have enjoyed. In the blank space, name your favorite dairy product.

_____ regular milk

_____ American cheese

_____ 2% milk

_____ Swiss cheese

_____ 1% milk

_____ Mozzarella cheese

_____ chocolate milk

_____ Cheddar cheese

_____ cottage cheese

_____ vanilla ice cream

_____ sour cream

_____ chocolate ice cream

_____ yogurt

_____ banana split ice cream

_____ frozen yogurt

_____ ice cream sandwich

What is your favorite dairy product?

Activity 8



COLORFUL FIREWORKS



Here's how to make colorful fireworks in milk:

Materials:

¼ cup milk

a small bowl

3 colors of food coloring

liquid dishwashing detergent

3 toothpicks

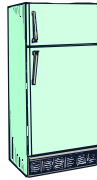
Procedure:

1. Pour milk into bowl.
2. Carefully add a drop of each color to the milk. Keep the drops far away from each other.
3. Put a drop of detergent on the tip of each toothpick. Have three students touch their toothpick to the milk all at the same time.
4. Watch the colorful fireworks.

How this works:

When the detergent touches the milk, it weakens the surface tension at that spot, causing a ripple to explode outward and spread out the food coloring.

Activity 9



The Spoiler

Question: Is refrigeration really necessary to keep milk from spoiling?

Hypothesis: I think refrigeration _____ (is or is not) necessary to keep milk from spoiling.

Materials: 2 clear glasses, milk

Procedure: Pour 125 mL of milk into each cup and label one Control and the other one Experiment. Put the Control cup in the refrigerator and leave the Experiment cup at room temperature. Leave overnight. Smell the milk in each cup. Observe each closely. Check again after 12 more hours.

Observations: The milk in the refrigerator was _____.

The milk at room temperature was _____.

Conclusion: Refrigeration is _____ (necessary or not necessary) because without it milk will _____.

Activity 10

Milking Cows in the Classroom

We can't really milk a cow in the classroom, but we can demonstrate what it might be like to milk a cow by hand like they used to.

Partially fill a rubber glove with milk (you can use water if you would prefer). Seal the cuff of the glove with a rubber band. This will be the cow's udder and the fingers will be the teats. Using a pin or needle poke a small hole in the end of each finger of the glove. You might need two or three small holes to make it work right. Have the children milk the "udders" into a bucket.

Activity 11

Making Butter

Fill a baby food jar about half full of heavy cream. Have the students take turns shaking the jar. If desired, mix in a pinch of salt for taste. Continue to shake the jar, letting students observe the changes in the cream. Continue shaking until the butter has solidified. Let students spread butter on crackers and taste.



Freezer Bag Ice Cream



Ice cream freezes at -6 degrees C (21 degrees F). Ice cream can be made in the classroom with the understanding that the freezing point of water is actually lowered by adding salt to the ice between the bag walls. Heat energy is transferred easily from the milk through the plastic bag to the salty ice water causing the ice to melt. As it does so, the water in the milk freezes, resulting in ice cream.

Materials:

- 1/4 cup sugar
- 1/2 teaspoon vanilla extract
- 1 cup milk
- 1 cup whipping cream, half & half or Milnot
- crushed ice (1 bag of ice will freeze 3 bags of ice cream)
- 1 cup rock salt (approximately 8 cups per 5 lbs.)
- 1 quart and 1 gallon size Ziploc freezer bags
- Duct tape
- Bath towel

Procedure:

1. Put the milk, whipping cream, sugar, and vanilla in a 1 quart freezer bag and seal. For security, fold a piece of duct tape over the seal.
2. Place the bag with the ingredients inside a gallon freezer bag.
3. Pack the larger bag with crushed ice around the smaller bag. Pour 3/4 to 1 cup of salt evenly over the ice.
4. Wrap in a bath towel and shake for 10 minutes. Open the outer bag and remove the inner bag with the ingredients. Wipe off the bag to be sure salt water doesn't get into the ice cream.
5. Cut the top off and spoon into cups.
6. Makes about 3 cups. (1 bag will serve 4 students)
7. Serve plain or top with nuts, coconut, or fruit. ENJOY!

As presented by: Jean Barron, Manager
Schuyler County Farm Bureau ®
P.O. Box 20
Rushville, Illinois 62681

ANSWER KEY

ACTIVITY 2

Dairy Cattle (1-3)

1. Beef cattle have heavier muscles than dairy cows. Dairy cows have bigger udders.
2. The udder stores the milk.
3. 8-10 gallons

The Dairy Farm (1-3)

1. twice a day
2. to keep the milk clean
3. 1st choice

The Processing Plant (1-3)

1. pasteurizing
2. homogenizing
3. 2nd choice
4. answers will vary

From Moo to Milk (4-6)

- 1.-2. Beef cattle have heavier muscles than dairy cows. Dairy cows have bigger udders.
3. The udder stores the milk.
4. 8-10 gallons
5. twice a day
6. to keep the milk clean
7. 1st choice
8. pasteurizing
9. homogenizing
10. 2nd choice
11. answers will vary

ACTIVITY 3

Talk Like a Dairy Farmer

1. E
2. D
3. F
4. A
5. C
6. B

ACTIVITY 4

What Kind of Dairy Cow Am I?

1. Jersey
2. Brown Swiss
3. Ayrshire
4. Holstein
5. Guernsey
6. Milking Shorthorn

Life of a Dairy Cow

1. 90-100 pounds
2. 4-8 weeks old
3. 1 ½ pounds
4. 10 days
5. one year old
6. 2 years old
7. every 13 to 14 months
8. 2nd choice
9. 4 to 8 weeks old
10. a special milk with extra nutrients