

## Milk Makers – Second Grade

### Purpose

Students will gain and apply information from the text, *Milk Makers* written by Gail Gibbons to create commercials that will influence a consumer's choice of milk flavors.

### Subject Area(s)

English Language Arts, Math, Science, and Social Studies

### Common Core/Essential Standards

#### ELA

- **CCSS.ELA- Literacy RL.2.7** Use information gained from the illustrations and words in a print or digital text to demonstrate understanding of its characters, setting, or plot.
- **CCSS.ELA- Literacy RI.2.1** Ask and answer such questions as who, what, where, when, why, and how to demonstrate an understanding of key details in a text.

#### Math

- **CCSS.Math.Measurement and Data 2MD.D.10** Draw a picture graph and bar graph to represent data set with up to four categories. Solve simple put-together, take-apart, and compute problems using information presented in the bar graph.

#### Science

- **NC Essential Standard 2.P.2 Matter: Properties and Change** Understand properties of solids and liquids and the changes they undergo.
- **2.P.2.1** Give examples of matter that change from a solid to a liquid and from a liquid to a solid by heating and cooling.

#### Social Studies

- **NC Essential Standard 2.E.1 Economics and Financial Literacy** Understand basic economic concepts.
- **2.E.1.1** Give examples of ways that businesses in the community meet the needs and wants of consumers.
- **2.E.1.2** Explain the roles and impact producers and consumers have on the economy.

### Agricultural Literacy Outcomes

#### Plants and Animals for Food, Fiber and Energy Outcomes

- Explain how farmers/ranchers work with the lifecycle of plants and animals (planting/breeding) to harvest a crop.
- Identify animals involved in agriculture production and their uses (work, meat, dairy, eggs).

### **Food, Health, and Lifestyle Outcomes**

- Recognize that agriculture provides out most basic necessities: food, fiber (fabric or clothing), energy, and shelter.
- Identify healthy food options.
- Understand where different types of food should be safely stored at home.

### **Culture, Society, Economy and Geography Outcomes**

- Trace the sources of agricultural products (plant or animal) used daily.
- Discuss what a farmer does.
- Explain why farming is important to communities.

### **Essential Questions**

1. What is the purpose of a dairy cow?
2. What types of products can be made from milk?
3. What makes a dairy cow different from a beef cow?
4. Why would a farmer choose one breed of cow over another breed?
5. What role do consumers play in the production of dairy products?
6. How does heating and cooling change the properties and physical state of milk?
7. What is the purpose of a bar graph?
8. What role do dairy products play in nutrition?
9. What process does milk go through to ensure that it is safe for consumers?
10. What makes a cow's digestive system different from humans?

### **Vocabulary**

**Graze:** feeding on land covered by grass.

**Breed:** animals within a species that have distinctive characteristics.

**Cow:** female cow that is capable of having a baby calf.

**Dry:** period of time when a cow does not produce milk.

**Rumen and Reticulum:** first of two parts of a cow's stomach.

**Cud:** ball of food that a cow coughs up.

**Omasum and Abomasum:** third and fourth parts of a cow's stomach.

**Udder:** cow body part that produces milk.

**Butterfat:** part of the cream.

**Clarifier:** machine that cleans the milk.

**Standardizing:** blending milk until it has equal amounts of butterfat.

**Pasteurized:** heating milk to kill any disease-causing bacteria.

**Homogenized:** forcing milk through tiny holes that break up the fatty globules into cream.

**Bar graph:** data that is represented by the height or length of a line.

**Consumer:** individual who purchases or trades for a commodity.

**Producer:** person who makes, grows, or manufacturers a product to be bought, sold, or traded.

**Commodity:** raw material or agriculture product that can be bought, sold, or traded.

**Solid:** maintains its shape, they have a texture, they take up space and their volume does not change.

**Liquid:** changes to the shape of the container, takes up space and has volume that does not change unless it changes state of matter.

**Property:** characteristics that allow us to identify the differences in the states of matter.

**Matter:** something that occupies space, has properties, and can be in different states of matter.

**Heating:** to increase the temperature of an object.

**Cooling:** to decrease the temperature of an object.

### **Student Motivator**

Prior to beginning the student motivator, check with the school nurse for any food allergies.

Start the lesson by asking the students *What kind of milk do you have at home in your refrigerator?*

Students might respond with white, whole, 2%, 1%, skim, chocolate, or even soy or almond milk. Ask students *What is your favorite type of milk and why?* Give students an opportunity to explain why they drink that type of milk. Explain to students that they are going to be taste testing different types of milk (1%, 2%, skim, whole, chocolate, strawberry and buttermilk). Once all of the milks have been tasted they will have to choose which one they liked the best. Using one milk sample at a time give each student a small tasting of each type. Once they have sampled the milk have them write one observation on their paper. Continue this process until all of the milk has been sampled. Sample the buttermilk, chocolate and strawberry milk last. After the sampling is complete have each student vote on which was their most favorite and least favorite. They can only choose one for each category.

Discuss what factors influenced their choice. Ask questions: *Was it because it didn't taste like milk? Did the texture of the milk have anything to do with your choice? Is it because that is what you always drink?* Tell students these are factors that dairy producers have to consider when they are marketing their milk and dairy products. People buy food because it taste good and it's what they are used to drinking or eating.

### **Background Knowledge**

The book, *Milk Makers* written by Gail Gibbons focuses on dairy cows, their breeds, purpose, and

production. It also provides the sequence of events for milk production from farm to store. Students learn about the lifecycle of a dairy cow and how this impacts a cow able to provide milk for production. Gibbons details the process of milking, collection, storage, pasteurization, and the role butterfat plays in the taste and nutrition of milk. Students will use the information from the book to develop marketing strategies that will impact a consumers choice of milk. Using these marketing strategies students will receive a better understanding of the role that consumers and producers play.

As you read the book and focus on the vocabulary draw attention to the role of the farmer in the milk production process. Using the *NC Department of Agriculture Interactive Dairy Map* show students where dairies can be found in North Carolina. Ask students: *Do all of the dairies produce milk for milk consumption or other dairy products? Is there another livestock animal that provides us with dairy products such as cheese or milk? Why is it important that we have dairies in NC? Where are most of the dairies in NC found? How many steps are there in the production of milk from farm to store? How does the number of steps impact the economics behind the dairy industry? Why does the number of milkings per day impact the production of milk as well as the well being of the cow?*

The number of Dairy farmers in North Carolina is decreasing. Due to the number of steps from farm to store the profit margin for farmers is decreasing. Cost of feed for cows as well as lack of land to farm on also discourages farmers from remaining in the industry. Students need to understand that milk being produced locally improves the economics of North Carolina. Many of the farms are owned by families instead of large corporations directly impacting county economics as well as the state. The Southeast United Dairy Industry Association, Inc-Dedicated to Dairy North Carolina (found in the **Essential Links**) has multiple videos of family operated dairies. Showing students one or more of these clips will help students make connections to how dairy farms influence their daily lives, why dairy farmers choose to raise dairy cows, and the role that dairies play in their communities and state.

## Procedures

### Activity 1

1. Read the book *Milk Makers* written by Gail Gibbons.
2. As you read stop and highlight key vocabulary terms.
3. When you finish the book have the students brainstorm different types of dairy products they may have eaten. Record their answers on chart paper or the board.
4. Ask the question *Why is it important that we consume dairy products? What are the benefits to our bodies?*
5. Create groups with a maximum of three children per group.

6. Prior to the lesson create some new flavors of milk and write the flavors on small slips of paper and place into a container. New flavor milk slips can be found in **Essential Files**.
7. Explain to the class that they are going to create commercials that would influence other consumers to choose their unique flavor of milk.
8. Each group will then choose one person to draw a slip of paper from the container. The slip they draw will be the assigned flavor for promoting.
9. Inform students they must include the name of the dairy the milk came from, the breed of cow, and the percent fat that is in their milk. Students may include additional information to encourage the consumer to choose their flavored milk.
10. Students will research to find different dairies in North Carolina as well as the importance of the percentage of fat in milk. Use the *Southeast United Dairy Industry Association, Inc* to research different dairies in North Carolina. See **Essential Links**.
11. Once the groups have completed their research and created the commercials they will use technology to video the commercial.
12. Once the commercials have been videoed bring the class back together and question the class about their milk choices. *What makes your milk flavor a better choice than others? Why would you use 1%, 2%, skim, or whole milk? What are the advantages or disadvantages to using a smaller percentage of fat in your milk? What are the benefits of using milk that comes from a local dairy?*
13. Videos will be used later to collect data for the Math and Social Studies activity.

## Activity 2

1. Prior to this activity make arrangements with a colleague (more than one if possible) to show the student made commercials and make ballots that list the name of each flavor.
2. Share the videos with your colleague's class and have them vote for their favorite flavor. This should be done prior to the activity being taught.
3. Once the ballots have been returned place students back into their groups from the activity one. Each group will need to create a tally chart to record how many students chose each flavor.
4. Groups will then use this data to create a bar graph showing the number of votes each flavor received.
5. Provide each group with sticky notes. Each group will need to create at least 2 problems per student that are simple put-together, take-apart, and compare problems using information presented in the bar graph. Directions can be found [here](#).
6. Students will record their problems on the sticky notes and place them on the graph.

7. When all groups are finished have them rotate once to a new group's graph and solve the problems that have been created and left on each bar graph.
8. Ask students *Why is a bar graph better than a pictograph for this data? What kind of statements can we make about the data that was collected? Why do you think consumers chose \_\_\_\_\_ flavor over the others? Based on the data collected, as a marketer, what changes should be made to your product to increase the number of consumers that choose your product?*

### Activity 3

1. Begin this activity with a discussion about the states of matter. *What are the three states of matter? What are the properties of a solid? What are the properties of a liquid?* For the purpose of this activity you will only focus on solids and liquids.
2. Once you have discussed solids and liquids ask *How does heating a solid change its properties? Does it change its state? How does cooling a liquid change its properties and does it change states?* The idea behind the experiment is that objects can change state of matter when they are heated or cooled. Water is the typical example of this change when we show ice to water and them back to ice. Ensure that students know the properties of a liquid; it takes the shape of the container that it is in; the shape can change but the volume does not as long as it stays in the liquid state; and molecules are less tightly packed than a solid but more packed than a gas. Solids keep their shape; the volume stays the same as long as it is in the solid state; and molecules are the most tightly packed.
3. Inform students that they will be conducting an experiment with milk. Have students written a prediction for the question; *What will happen to milk when it is placed in a plastic bag and then placed into another plastic bag with ice?* Once students finish with their predictions have them turn and talk to a partner and share their predictions.
4. Prior to the activity set up an assembly line for the ice cream ingredients. See **Essential Files** for an assembly line diagram.
5. Separate your class into pairs. Walk students through the directions for making ice cream; a student direction sheet is located in the **Essential Files**.
6. Take two quart plastic storage bags and open both of them.
7. While one partner holds one bag open the other partner will need to measure and pour in  $\frac{1}{2}$  cup milk, 1 tablespoon of sugar, and  $\frac{1}{2}$  teaspoon of vanilla to the milk.
8. Seal the bag making sure to squeeze out as much air as possible (this is to prevent the bag from popping).
9. Place the sealed quart bag into the other quart bag and squeeze out the air and seal the bag. Set the bags to the side.

10. Take one -1 gallon size plastic bag and open it.
11. Place 4 cups of ice (smaller cubes are better) into the bag.
12. Measure and add 4 tablespoons of rock salt to the ice in the bag.
13. Place the sealed quart bags into the galloon bag with the ice.
14. Squeeze out as much air as possible and seal.
15. Wrap the bag in a towel and shake the bag for 8-10 minutes. Students can take turns shaking the bag. As they are shaking the bag students should record their observations on their paper about what is happening.
16. Once the milk mixture has changed states of matter, remove the quart bag from the gallon bag. Discard the gallon bag.
17. Remove the inner plastic quart bag from the outer bag. Using scissors cut the corner of the bag off and squeeze the ice cream into individual serving containers.
18. When students have finished eating their ice cream lead them into a discussion about what they observed. Some questions you may want to ask are: *What did you notice when you added the vanilla to the milk? What state of matter was the sugar prior to adding it to the milk? What did you notice about the ice when you added the rock salt? After shaking the milk solution for a few minutes what did you observe happening? What caused the milk to change states? What would happen if we left some of the ice cream in a cup on a table? What could cause this change?*

## **Materials**

- Chocolate, strawberry milk flavoring
- Cups
- Milk
- Spoons for mixing
- Chart paper
- Graph paper
- Markers/crayons/color pencils
- Technology for research and videos
- Sticky notes
- *Milk Makers* written by Gail Gibbons
- Milk
- Sugar
- Vanilla Extract
- Ice
- Rock/Ice Cream Salt

- Quart plastic storage bags
- Gallon plastic storage bags
- Measuring Spoons and Measuring Cups
- Towels
- Small bowls or cups (1/student) and plastic spoons
- Scissors

### **Suggested Companion Resources**

- *Experiments With Liquids* written by Christine Taylor-Butler
- *Hooray for dairy Farming* written by Bobbie Kalman
- *Clarabelle Making Milk and So Much More* written by Cris Peterson
- *Cows A True Book* written by Sara Swam Miller
- Perdue University Food Animal Education Network  
<http://www.ansc.purdue.edu/faen/dairy%20facts.html>
- NC Department of Agriculture Dairy Cow County Estimate Sheet  
<http://www.ncagr.gov/stats/coest/MilkCoest.pdf>
- Dairy Farming Today  
<http://www.dairyfarmingtoday.org/Pages/Home.aspx>
- Barnyard Palace Dairy Cows  
<http://www.ncagr.gov/cyber/kidswrld/general/barnyard/dairybn.htm>
- Southeast Dairy Organization  
<http://www.southeastdairy.org/wp-content/flagallery/dairy-farm-fact-sheets/north-carolina-state-fact-sheet.jpg>

### **Essential Files**

- [\*North Carolina Map with County Names\*](#)
- [\*Ice Cream Assembly Line\*](#)
- [\*Ice Cream Student Direction Sheet\*](#)
- [\*Unique Flavor Milk Cards\*](#)
- [\*North Carolina 2014 Dairy Statistics\*](#)

### **Essential Links**

- NC Department of Agriculture Interactive Dairy Map  
<http://www.ncagr.gov/markets/commodit/dairy/>
- Printable Paper  
<http://www.printablepaper.net/>

- Kids Zone Learning with NCES  
<http://nces.ed.gov/nceskids/graphing/classic/bar.asp>
- The Southeast United Dairy Industry Association, Inc. Dedicated to Dairy North Carolina  
<http://www.southeastdairy.org/dedicated-to-dairy/farm-families/north-carolina/>

### Ag Facts

- There are 60,000 dairy farms in the United States.
- Family owned dairies make up 99% of farms in the United States.
- The United States produces 21 billion gallons of milk each year.
- One gallon of milk weighs 8.6 pounds.
- A cow produces on average 350,000 glasses of milk a year.
- Cows are typically milked two times per day.
- It takes 3 gallons of milk to make one gallon of ice cream.
- It takes 30 cups of milk to make one pound of butter.
- There is 3.5% milk fat in whole milk.
- In 1967 plastic jugs were introduced in the United States for storing milk.
- Dairy products are ranked #13 in North Carolina commodities.
- Dairy makes up 1.6% of farm cash receipts in North Carolina.
- See North Carolina 2014 Dairy Statistics in **Essential Files**.

### Extension Activities

- Students will research the different breeds of dairy cows and make a brochure.
- Students can use heavy whipping cream and churn to make butter. This allows students to observe changes in state due to heat.
- Students can choose other dairy products to collect consumer information from and create double bar graphs. They can also increase the number of students polled and create pictographs with larger sets of numbers.

### Sources & Credits

- Kids Zone Learning with NCES  
<http://nces.ed.gov/nceskids/graphing/classic/bar.asp>
- Printable Paper  
<http://www.printablepaper.net/>
- North Carolina Department of Agriculture and Consumer Resources  
<http://www.ncagr.gov/index.htm>
- Southeast United Dairy Industry Association, Inc  
<http://www.southeastdairy.org/>