

Chapter 5

Milk and Cheese

Milk, cheese, yogurt and ice cream are all part of the dairy group. Drinking milk helps build strong bones! Kids, ages 2 to 8, need to eat or drink 2 cups from the dairy group a day. Older kids need 3 cups from the dairy group every day. Sadly, most Americans do not drink or eat enough foods from the dairy group. In this chapter, your students will taste test milks, learn how to read food labels and make cheese.

Enjoy exploring magnificent milk!

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Virtual Lessons:

(See *Virtual FoodMASTER CD*)

Chocolate Milk

Heating Milk

How Cheesy is That?

Macaroni and Cheese

Many Milks

Summary

Students will taste test four different milks comparing color, texture, taste and cost. In addition, students will read the four milk food labels and complete a table comparing calories, fat and calcium in the milks.

Objectives

1. Students will be able to locate calories, fat and calcium on food labels.
2. Students will be able to communicate how the four milks are different.
3. Students will use food labels to complete a table.
4. Students will use tables to draw reasonable conclusions.

Academic Content Standards

MATHEMATICS COMMON CORE

Grade 3

- 3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.

NEXT GENERATION SCIENCE STANDARDS

Grade 5

- 5-LS1.C- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.

SCIENTIFIC INQUIRY:

Comparing Milk

Materials

For the teacher: 4 “type of milk” signs (“Whole,” “2%,” “Skim,” “Soy”), 4 trays (cafeteria style) or trash cans, 1/2 gallon whole milk, 1/2 gallon 2% milk, 1/2 gallon skim milk, 1/2 gallon soy milk, food labels for each milk.

For each student: 4 small cups.

Procedure

1. Read *Many Milks* and complete the Doodle Bugs.
2. Set up four stations, one for each type of milk. Each station should include a sign identifying the type of milk, one small cup per student with one to two ounces of the milk inside and a tray or trash can for discarding cups.
3. Students may predict which milk will taste the best and the worse and which milk will be the healthiest.
4. Divide the class into four groups. The groups will rotate to each of the four stations, taste testing the milk at each station and completing the *Milk Taste Test* table.
5. Next, students will explore milk food labels. Tell your class that most foods are required to have a food label with Nutrition Facts. Explain that you can compare the nutrition of two different foods or brands by reading the label. Then show the class where to find the serving size, total calories, fat and calcium on a food label. Point out that different units are used for different nutrients. The units include calories, grams and milligrams.
6. Give each group one food label to read (either a label directly from one of the milk containers or a copy from this manual). Ask the groups to complete the line on the *Milk Nutrition Facts* table for their specific milk. Remind them to include units of measurement.
7. Use each group’s answers to complete the rest of the *Milk Nutrition Facts* table as a class.
8. Finish up the lesson by instructing students to answer the final questions and holding a class discussion.

Teacher Tips:

- Be aware of students with cow’s milk allergies, lactose intolerances or soy allergies.
- Any student with a cow’s milk allergy should not taste regular milks. Soy milk may be served to these students.
- Any student with a lactose intolerance should not be given regular milk (unless their parents have chosen to provide lactase enzymes). These students may drink soy milk and lactose-free milk.
- If any student has a soy allergy, then substitute 1% chocolate milk for the soy milk.
- Note: Some brands use different names for skim milk and whole milk. Skim milk may be labeled “Fat-Free Milk” and whole milk may be labeled “Vitamin D Milk”.
- Extension: Set up a blind taste test. Students can compare “Super Skim” or “Skim Plus” to 2% milk. “Super Skim” and “Skim Plus” have vegetable gums added to make them feel thicker and more like 2% milk.

SCIENTIFIC INQUIRY: Comparing Milk (continued)

Classroom Discussion:

- Which milk do you think tastes the best? The worst?
- Which milk is the healthiest?
- Has anyone tasted skim milk before? Did you like it? Did it have more, less or the same amount of calcium as the other milks?
- Do you think you could switch to a lower fat milk, like skim milk?
- Did you know some people are allergic to cow's milk and cannot drink it without getting sick? Other people are lactose intolerant and can't drink cow's milk either. Soy milk is a good option for people who can't drink cow's milk. However, some people may be allergic to soy, so soy milk is not an option for everyone. (People with a lactose intolerance can drink Lactose Free milk or take lactase enzymes when they drink regular cow's milk.)
- Has anyone tasted soy milk before? Did you like it? Did it have more, less or the same amount of calcium as the other milks?
- Do you think you get more nutrients from drinking soda-pop or milk? Cool-aid or milk? Tea or milk?

Whole Milk

Nutrition Facts		
Serving Size: 1 cup		
Servings Per Container: 8		
Amount Per Servings		
Calories 150		
Calories from Fat 70		
		% Daily Value
Total Fat	8 g	12%
Saturated Fat	5 g	25%
Trans Fat	0 g	0%
Cholesterol	35 mg	11%
Sodium	125 mg	5%
Total Carbohydrate	12 g	4%
Dietary Fiber	0 g	0%
Sugars	12 g	
Protein	8 g	
Vitamin A		6%
Calcium		30%
Vitamin C		4%
Iron		0%
*Percent Daily Values are based on a 2,000 calorie diet		

2% Milk

Nutrition Facts		
Serving Size: 1 cup		
Servings Per Container: 8		
Amount Per Servings		
Calories 130		
Calories from Fat 45		
		% Daily Value
Total Fat	5 g	8%
Saturated Fat	3 g	15%
Trans Fat	0 g	0%
Cholesterol	20 mg	7%
Sodium	125 mg	5%
Total Carbohydrate	13 g	4%
Dietary Fiber	0 g	0%
Sugars	12 g	
Protein	8 g	
Vitamin A		10%
Calcium		30%
Vitamin C		4%
Iron		0%
*Percent Daily Values are based on a 2,000 calorie diet		

Skim Milk

Nutrition Facts		
Serving Size: 1 cup		
Servings Per Container: 8		
Amount Per Servings		
Calories 80		
Calories from Fat 0		
		% Daily Value
Total Fat	0 g	0%
Saturated Fat	0 g	0%
Trans Fat	0 g	0%
Cholesterol	<5 mg	0%
Sodium	130 mg	5%
Total Carbohydrate	12 g	4%
Dietary Fiber	0 g	0%
Sugars	12 g	
Protein	8 g	
Vitamin A		10%
Calcium		30%
Vitamin C		4%
Iron		0%
*Percent Daily Values are based on a 2,000 calorie diet		

Soy Milk

Nutrition Facts		
Serving Size: 1 cup		
Servings Per Container: 8		
Amount Per Servings		
Calories 100		
Calories from Fat 22		
		% Daily Value
Total Fat	2.5 g	4%
Saturated Fat	0 g	0%
Trans Fat	0 g	0%
Cholesterol	0 mg	0%
Sodium	90 mg	4%
Total Carbohydrate	16 g	5%
Dietary Fiber	2 g	0%
Sugars	8 g	
Protein	4 g	
Vitamin A		6%
Calcium		30%
Vitamin C		4%
Iron		0%
*Percent Daily Values are based on a 2,000 calorie diet		

Making Cheese

Summary

The class will make cottage cheese by heating milk to the proper temperature and adding an acid (vinegar) to speed up the separation of curds and whey.

Objectives

1. Students will select appropriate measurement tools for measuring temperature and volume.
2. Students will practice measurement skills using appropriate units for temperature and volume.
3. Students will be able to explain curds and whey to family/friends.
4. Students will make a prediction.
5. Students will complete a bar graph.

Academic Content Standards

MATHEMATICS

Measurement Standard

Apply appropriate techniques, tools, and formulas to determine measurements.

Expectation:

- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.

Data Analysis and Probability Standard

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Expectation:

- Collect data using observations, surveys, and experiments.
- Represent data using tables and graphs such as line plots, bar graphs, and line graphs.

SCIENCE

Science as Inquiry: Content Standard A

Develop abilities necessary to do scientific inquiry.

Expectation:

- Plan and conduct a simple investigation.

Physical Science: Content Standard B

Properties of objects and materials.

Expectation:

- Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.

Science and Technology:

Content Standard E

Abilities of technological design.

Expectation:

- Evaluate a product or design.

SCIENTIFIC INQUIRY: **Curds and Whey**

Materials

For the teacher: 1 single or double burner hot plate, 1 large stainless steel pot, bimetallic stemmed thermometer, 1 liquid measuring cup, strainer, 1 clear glass or jar, 1 large spoon, 1 medium bowl, 1 set measuring spoons, 1 table knife, 1 gallon 2% milk, 1/2 cup vinegar, 1 teaspoon salt. Optional: Cheese cloth.

For each student: 1 small paper plate, 2 crackers.

Procedure

1. Begin heating milk in a large stainless steel pot, over medium-high heat. It will take about 30-40 minutes to slowly heat the milk, so plan accordingly.
2. Read *Making Cheese* and complete the Doodle Bugs.
3. Follow the *Scientific Inquiry: Curds and Whey* instructions. Allow students to check the temperature and measure the vinegar. Be sure all students are given a chance to observe the separation of curds and whey.
4. While the curd is cooling, complete *While You Wait: Tasty Cheese*. Discuss low-fat cheese.
5. After the curd has cooled for about 30 minutes, drain the whey. If the curd is cool enough, students may help squeeze the whey from the curd using a cheese cloth. Or students can remove additional whey by pressing the curd down into the strainer with a large spoon.
6. Place drained curds in a bowl. Allow students to measure the salt, add the salt and stir the cheese.
7. Serve the fresh cheese on small plates with crackers.
8. Students will complete the *Cheese Facts* table. Remind students that this cheese is like cottage cheese. Ask students **“What additional steps are used to make hard cheeses like cheddar cheese?”** (Pressing the curd into chunks of cheese and aging the cheese).

Teacher Tips:

- Be very careful when using the hot plates. Discuss the dangers of touching the hot plate, hot pans and hot milk before beginning the lesson.
- Recruiting an extra adult to assist with lab management, setup and/or cleanup will help this activity to run smoothly.
- Begin heating the milk about 30-40 minutes prior to beginning the activity.
- Be sure to use a large stock pot (5 quarts or larger). Do not use an aluminum pot.
- An adult, not a student, should drain the whey. Be sure to pour away from yourself, so the steam rolls away from you.
- For additional cooling, run cold water over the curds. If the curds are cool enough, students can take a more active role in squeezing whey out of the curd. If the class is crunched for time and the curds are still warm, an adult should squeeze the whey out of the curds.
- Since the curds are not fully pressed, the cheese will look like cottage cheese.
- For a healthier option serve whole grain crackers with the cheese.
- Note: When making cottage cheese some of the calcium from milk is lost with the whey. Therefore, cottage cheese is not a high calcium food.
- Extension: Read *Little Miss Muffet*. Then students can write their own nursery rhyme about curds and whey.

WHILE YOU WAIT:

Tasty Cheese

Materials

For each student: 1 napkin or plate, 1 slice regular American cheese, 1 slice low-fat American cheese, food labels for each cheese.

Note: Before starting the lesson, remove and save original cheese package labels. Then label one kind of cheese A and the other kind B.

Procedure

1. Pass out a piece of cheese A and a piece of cheese B to each student. Students may place their cheeses on a plate or napkin. Remind them not to mix up Cheese A and B.
2. After students have tasted both cheeses and answered questions one to three, reveal the true low-fat cheese.
3. Count the number of students whose prediction was correct and the number of students whose prediction was incorrect. Use this information to complete the *Students' Correct/Incorrect Predictions for Low-fat Cheese* graph.
4. Discuss how well they liked/disliked the low-fat cheese. Be sure to mention that the low-fat cheese has fewer calories but the same amount of calcium. Ask “Does anyone already eat low-fat cheese at home?” Ask “Do you think you could ask your parents to buy low-fat cheese?”
5. Discuss how low-fat cheese and regular cheese are made.

Teacher Tips:

- Regular cheese is often made with whole milk. Low-fat cheese is usually made from 2% milk or part-skim milk. Fat-fat cheese is generally made from skim milk. Your students can find the ingredients used to make cheese on the Nutrition Facts panels.
- Extension: Explore the cheese labels.
 - Students may use food labels to compare the ingredients in regular American cheese and low-fat American cheese.
 - The class can identify the type of milk, salt and acid or enzyme used to make the cheese.
 - Students may compare the calories, fat and amount of calcium in the two cheeses.
 - Students may pick two different kinds of cheese and compare the ingredients and nutrients.
- You can print additional Nutrition Facts for cheeses from Kraft Foods: <http://www.kraftfoods.com/kf/Products/>

Answer Keys

Many Milks

Doodle Bugs

Circle: **Calcium**
Box: **Rice milk, soy milk**
Fill-in the blank: **Answers will vary.**

SCIENTIFIC INQUIRY:

Comparing Milk

Whole milk: **Creamy white; thick and creamy; sweet and creamy**
2% milk: **White; thick; sweet**
Skim milk: **Pale white or blue white; thin; sweet**
Soy milk: **Off white or light tan; medium thin; sweet and nutty**

Which milk did you like best? **Answers will vary.**

Note: Nutrition fact answers will vary depending upon brands.

Whole milk: **150 calories; 8 grams fat; 30% DV calcium**
2% milk: **120 Calories; 5 grams fat; 30% DV calcium**
Skim milk: **80 Calories; 0 grams fat; 30% DV calcium**
Soy milk: **100 Calories; 2.5 grams fat; 30% DV calcium**

Star: **Skim milk**

List least fat to most: **Skim, soy, 2%, whole**

Did any kind of milk have less than 30% DV of calcium? **Note, some soy milks may not be fortified with 30% DV of calcium.**

If you drink whole, 2% or 1%, can you switch to skim? **Answers will vary.**

Making Cheese

Doodle Bugs

Circle: **Pasteurize**
Box: **Cottage cheese**

Match the step number to description: **6** to age; **2** form curds; **3** drain the whey;
1 pasteurize; **5** to press into chunks; **4** to salt

SCIENTIFIC INQUIRY:

Curds and Whey

Homemade cheese: **Pictures will vary; mild taste, slightly salty and sweet; creamy, soft and chunky.**

What kind of cheese did you make: **Soft cheese**

What two extra steps are used to make other cheeses (like a block of cheddar cheese)?
Pressing into chunks and aging.

Answer Keys (continued)

WHILE YOU WAIT:

Tasty Cheese

All answers will vary.

Proficiency Questions (Workbook)

1. d 2. a 3. a 4. c

Proficiency Questions (Virtual CD)

1. d 2. a 3. c 4. d