

Discover Dairy Science!

Dear Educator,

When children savor the creamy texture of a refreshing smoothie or load their taco with a healthy helping of cheese, they aren't likely to consider the source of these tasty treats — fresh, nutritious milk from your local dairy farmers.

Milk and milk products like cheese and yogurt are important components of a balanced, healthy diet for children. The Dairy Council of Florida and the curriculum specialists at Young Minds Inspired (YMI) are pleased to bring you this free educational program that will help students discover the science behind dairy production. The *Dairy Science* curriculum also provides a chance to introduce students to Florida industry.

As they complete these activities, your students will learn how milk from your local dairy farmers provides the basis for cheese and yogurt, tasty favorites that embrace and expand the nutritional benefits provided by milk itself.

We hope you will share this program with other teachers in your school. Although the materials are copyrighted, you may make as many copies as needed for educational purposes.

Please visit ymiclassroom.com/fdf to provide feedback. We look forward to hearing from you.

Sincerely,



Michele Cooper
CEO
Florida Dairy Farmers



Dr. Dominic Kinsley
Editor in Chief
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For questions, contact us toll-free at 1-800-859-8005 or by email at feedback@ymiclassroom.com.



Adapted from a program developed by American Dairy Association North East

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Target Audience

Students in grades 2-5 and their parents

Program Objectives

- Build student awareness of the science involved in milk, cheese, and yogurt production
- Foster an appreciation for the role of local dairy farmers in providing nutritious dairy products
- Spotlight the nutrition offered by consuming dairy foods as part of a balanced diet
- Introduce students to the Florida dairy industry

Program Components

- This one-page teacher's guide
- Three reproducible activity sheets
- A colorful classroom wall poster

How to Use This Program

Photocopy the teacher's guide and distribute the activity sheets for class and take-home use. Refer to the poster for each activity, having students read the processing steps aloud if you wish. Visit ymiclassroom.com/fdf to review the program's alignment with Florida Standards (FL NGSSS).

Activity 1 It's in the Process

Part A: Ask students what they know about where milk comes from (visit ymiclassroom.com/fdf for background on Florida dairy farmers and dairy production). Then use the poster and the following information to help students track the process of producing milk, cheese, and yogurt. After reviewing the process, have students record their learning in the table on their activity sheet. Have students draw a labeled image, model, or flow chart of the process.

Raw milk is trucked from dairy farms to different processing plants, depending on the final dairy product. At the milk processing plant, the dairy lab tests a milk sample to evaluate the farm's sanitation and dairy cow health. The milk is then:

- separated into skim, low fat, and whole categories.
- homogenized to mix the cream evenly throughout the milk.
- pasteurized to kill any potentially harmful bacteria and also to prevent spoilage.
- packaged and delivered to your grocery shelf.

Answers: A. pasteurization, 3; B. homogenization, 2; C. packaging, 4; D. separator, 1.

Part B: After reading the paragraph about the nutrients in milk, use the More Than a Mustache website at https://www.floridamilk.com/_resources/pdf/educational-materials/milk-more-than-mustache-rev-3-5-21.pdf to help students explore why each nutrient is important. Ask students to draw a "gingerbread" style person on the back of their activity sheet and label the body part impacted by each milk nutrient. Discuss as a class what may happen if the body does not get the nutrients it needs.

Use the *There's Science in My Milk* box on the activity sheet to discuss the impact Louis Pasteur made. Have students highlight the section of the image/model or flowchart that reflects his contributions. For more about Pasteur, see *Easy Science for Kids* (easyscienceforkids.com/all-about-louis-pasteur/) and *Encyclopedia of World Biography* (notablebiographies.com/Ni-Pel/Pasteur-Louis.html), plus library books.

Activity 2 Curds and What?

Prepare the items for the experiment ahead of time. **For younger students:** Work as a class, with individual students assigned to do specific set-up and procedural tasks. **For older students:** Rotate small groups through an experiment station where each group can independently conduct the experiment.

Part A: Review the cheese processing steps on the poster, pointing out how the addition of the acid-based enzyme, rennet, helps the "good" bacteria that is added to milk cause a chemical reaction that separates milk proteins into liquids (whey) and solids (curds).

Now conduct the experiment, using vinegar to "stand in" for rennet. Explain that milk contains molecules consisting of tiny droplets of fat and particles of protein mixed together. The acid in vinegar (and rennet) acts to lower the natural balance of the acids in milk, forcing the protein particles to stick together while trapping the fat droplets which then coagulate to become a mass.

Student sketches should illustrate the separation of curds and whey, including:

1. mixture of milk and vinegar before

2. curds on top of filter; and
3. whey inside jar. Prompt students to think about any change in the state of matter of the milk.

Part B: Ask students to make a tally mark on the table next to any cheese they have tried. Inquire if there are popular cheeses not on the list. Select one as a class to add to the empty box. Poll the class to see how many students have tried each type of cheese and record it on a class chart. Discuss with students the best way to represent their data.

Students should complete the cooking activity at home with parents. Suggest that they share their choice of favorite add-ins with classmates.

Activity 3 It's All Greek to Me!

Part A: Review the yogurt processing steps on the poster. Have students write a quick summary of the yogurt-making process. Remind them to share the Yogurt Quick Bites with parents.

Part B: Encourage students to think about what they already know about keeping things cold. Ask them what they think happens to the temperature in their lunch box throughout the day.

Consider setting up a quick experiment with a lunch box and thermometer in class. Have students take turns checking the temperature and recording it on a class chart. Students can simply draw their prototype or they can use simple supplies (felt, aluminum foil, fabric, empty yogurt containers) to make their prototype.

Extension: Invite your school's cafeteria manager to visit with students to talk about the role dairy plays in school meals. They may also be able to share information about how they keep their dairy products cold to help students with their design challenge. A visit to the school kitchen may also be possible.

Resources

- ymiclassroom.com/fdf
- Florida Dairy Farmers: www.FloridaMilk.com
- Mess With Your Milk, Dairy Science: www.floridamilk.com/in-the-schools/education-materials.shtml
- USDA MyPlate: www.myplate.gov

Activity

1

It's in the Process



Did you ever wonder how that glass of milk got to you? Sure, you know it comes from cows, but *how*? A lot of hard-working dairy farmers were part of the process. Learn about what happens once the milk leaves their farms.

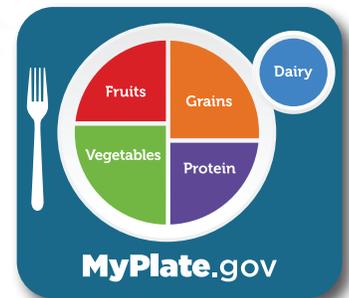
Part A: Write the milk processing term in the second column of the chart next to the step it describes. Then number each step in the correct order in the third column.

Milk Processing Terms

Packaging Separator Homogenization Pasteurization

Milk Processing Step	Milk Processing Term	Correct Order
A. This process heats milk to a high temperature to kill any potentially harmful bacteria that might be present.		
B. This process breaks down fat so it stays suspended in the milk.		
C. Milk is packaged into bottles and cartons and delivered to your local grocery store.		
D. This machine helps remove the cream and then reblends the milk into skim, low fat, and whole milk.		

Part B: Milk is part of the **MyPlate** dairy group guidelines for healthy eating. Milk contains important nutrients your body needs to build strong bones and muscles and provide energy, like calcium, Vitamin D, and potassium. Some other essential nutrients in milk are riboflavin, phosphorus, protein, Vitamin A, and Vitamin B12.



Milk Nutrition By the Numbers

The number of daily servings of milk or milk products recommended for kids ages 9 and older is 3 cups daily. How many cups of milk should a child have in a week? In two weeks? In a month? Make a chart to solve your work and explain your answer.



Challenge: Work with a partner to try to determine how much milk your entire class would consume in a week. In two weeks? In a month? Be prepared to share your solution and strategy.

Parents! Remember, whether it's whole, reduced-fat, or flavored, milk is an equal opportunity source for great nutrition for your child. The Florida dairy farmers are pleased to provide fresh quality milk and milk products to help you meet your family's dairy needs.

There's Science in My Milk!



The process of pasteurization is named for Louis Pasteur, a French scientist who discovered that harmful bacteria can be killed with heat. *Pasteurization* heats milk to a minimum of 145° F for 30 minutes to kill any potentially harmful bacteria present. Pasteurization does not affect the nutrition or taste of milk — and it also helps to keep milk from spoiling too quickly!

Activity

2

Curds and Whey?

Part A: Remember the nursery rhyme about Little Miss Muffet eating her curds and whey? You might be surprised to learn that curds and whey is a dish similar to cottage cheese! The separation of milk solids (curds) and liquids (whey) is the first step in making all kinds of cheese. And the process begins with milk.

With a grown-up, try this experiment to observe the separation of curds and whey (but don't eat the results!):

Materials Needed

- Whole milk
- Apple cider vinegar
- Small clear glass bowl
- Paper coffee filter
- Jar wide enough for filter to fit inside the top of it to make a small "basket," with the filter overlapping the edges of the jar
- Rubber band to secure the outside edges of the filter around the jar
- Small mixing spoon
- Measuring spoons

Directions

1. Measure $\frac{1}{4}$ cup milk into clear glass bowl.
2. Measure 2 tablespoons of vinegar and add to milk. Stir with spoon.
3. Place coffee filter inside top of jar and secure in place with rubber band.
4. Pour milk and vinegar mixture into the filter and allow liquid to fully strain.

On the back of this sheet, record your observations after steps #2 and #4 and include sketches of what you saw. For more dairy science activities, visit Mess With Your Milk at www.floridamilk.com/in-the-schools/education-materials.stml.

Part B: Cheese makes a tasty meal ingredient, and there are several varieties from which you can choose. What types of cheeses have you tried? Put a tally mark in the table below next to any cheese you have tried.

Cheeses	Cheeses I Have Tried	Cheeses My Classmates Have Tried
American		
Cheddar		
Swiss		
Monterey Jack		

Parents! Try this fun recipe to help boost your family's dairy nutrition! Use the chef-inspired add-ins below and/or your child's own ideas for other fresh, seasonal produce to personalize this favorite.

My Style Grilled Cheese Sandwich



Ingredients

- Two slices of bread, each buttered lightly on one side
- 1 tablespoon butter
- Your favorite cheese (choose one or more from the list above)
- Your favorite savory or sweet add-ins from list below (or use your own ideas)

Directions

1. Place butter in skillet, and melt at medium high setting.
2. Place one slice of bread in skillet, buttered side down.
3. Place cheese on bread. Don't forget — you can combine different cheeses if you like!
4. Place your add-ins on top of cheese after it starts to melt. (If using jam or marmalade, spread onto the unbuttered side of the second piece of bread.)
5. Top the cheese with the other bread slice, buttered side up.
6. Flip the sandwich in the skillet and cook until it is toasted on both sides.
7. Serve and enjoy!

Savory Add-Ins

Finely chopped kale or spinach
 Turkey or ham
 Tomato
 Chopped herbs (rosemary, dill, or tarragon)
 Sliced pickles

Sweet Add-Ins

Thinly sliced pears or apples
 Strawberry jam
 Orange marmalade
 Chopped pineapple
 Chopped herbs (mint or basil)

Milk and milk products like cheese are important (and delicious!) sources of calcium and protein for your growing child. Some Florida dairy farmers provide the milk used to produce cheese varieties found in your supermarket. **MyPlate** guidelines recommend 2 $\frac{1}{2}$ cups of dairy for children ages 3-8 each day and 3 cups for ages 9 and up.

Activity

3

It's All Greek to Me!



Part A: Do you speak Greek? Greek yogurt, that is. Creamy, smooth Greek yogurt is a favorite with kids everywhere, but where does it come from? Yes, it starts with milk from local farmers, but then it goes through quite a process. Can you use what you learned from the poster to summarize the steps in the process below?

Part B: Can you design a better way to keep a container of yogurt cold in your lunch box? Work with a partner to think about what you already know about keeping yogurt cold. Draw a prototype of your idea in the box below.

Design Challenge

Yogurt Quick Bites

Choose from among these many different ways to enjoy Greek yogurt throughout the day:

- Layer it with granola and fresh fruit for a breakfast, lunch, or snack parfait.
- Try it in soups, salad dressings, dips, quesadillas, and sandwich wraps.
- Add fresh, juiced fruits to whip up a tasty breakfast smoothie.
- Use it to make tuna, chicken, and egg salads.
- Serve it with your favorite fresh fruits and a drizzle of chocolate sauce for a healthier dessert.
- Add yogurt for a higher protein pancake option.
- Mix it with your favorite seasonings for a tangy marinade for meats and poultry.

Parents! The creamy goodness and quality nutrition of Greek yogurt starts with the freshest milk. Packed with calcium and other nutrients for strong bones and teeth, Greek yogurt's creamy, tangy goodness generally contains at least twice the protein of regular yogurt thanks to the straining process that is part of the production process. Young children especially need protein to help them stay focused at school.

