

Let's Make Cottage Cheese

Science

Materials

1 pint 2% Milk	Lemon juice or vinegar
1 tablet rennet – found in the pudding/pie aisle of grocery Store	Glass measuring cup
Strong rubberband	Hot plate
Clear gallon jar or Container	Thermometer
	Cheesecloth
	Spoon
	Small bowl
	Small Dixie cups or spoons

Grade Level: 3-4

Time: 45 minutes

Standards:
Science

Optional items

Flavorings for cottage cheese: salt, chives, garlic, ranch dressing powder
Wafer crackers

Overview

This lesson is designed for students to understand the connection between food and themselves. Where does cheese and butter come from? What is the scientific process for creating cheese? A further discussion of jobs linked to agriculture can be a part of this lesson.

Objective

1. Students will watch the action of a catalyst (rennet) on milk during the cheese-making process.

Background Information

Cottage cheese is a fresh cheese with a mild, slightly acidic flavor and small curds. Cottage cheese is part of the family of fresh cheeses that are rindless and not intended to be ripened or aged in order to develop flavor.

Cottage cheese is thought to be the first cheese made in America. For centuries, farmers in Europe made fresh farmhouse cheeses with naturally soured milk, after separating the curds from the whey. Immigrants to America brought the tradition of fresh cheese-making with them and by the mid-1800s the term cottage cheese entered the American vocabulary. Cottage cheese is sold both plain and with added flavorings such as fruit and herbs.

Cottage cheese is made by adding an acid to pasteurized milk which causes a separation of the milk solids from the whey. This can be done by adding a bacterial culture that produces lactic acid or a food-grade acid such as vinegar. After the curd is formed, it is gently cut into pieces

Let's Make Cottage Cheese

that allow additional whey to drain from the curds. The curds are further cooked and pressed gently to expel more whey. The curds are rinsed and salt is added.

Cottage cheese is high in protein and is a good source of riboflavin. Although it contains calcium, much of it is lost in the separation of whey. Some cottage cheese products are fortified with calcium.

Information from the California Milk Advisory Board (2009). Cottage cheese. http://californiadairyroom.com/Products/Cottage_Cheese

Vocabulary

Animal rennin is the coagulating enzyme (rennin or chymosin) that is harvested from the stomachs of calves.

Curds are the thickened or large solid parts that form in soured milk. They are the foundation or beginning of the cheese.

Enzyme is a catalyst that speeds up the digestive process.

Whey is the watery part of milk that separates after the milk has soured and thickened, and it is a by-product of the cheese-making process.

Preparation

Plug in hot plate prior to starting the lesson so that it is hot.

Instructional Format

1. Share background information and vocabulary words with students.
2. This lesson will be a class demonstration with student participation.
3. Upon completing the lesson, students will answer conclusion questions and discuss the activity.

Procedures

1. Heat 1 quart of 2% milk in the glass measuring cup on the hot plate. Heat to 32 degrees C (90 degrees F), and then remove milk from the heat.
2. Crush a rennet tablet and dissolve it in 1/3 cup of lukewarm water in the measuring cup.
3. Stir the rennet and water solution into the warmed milk using a spoon. Add lemon juice or vinegar 1 Tablespoon at a time until you clearly see the fat (curd) separating from the whey. Make sure the students look at the changes they can observe before and after adding the vinegar or lemon juice. *Do not add more than 3 tablespoons of lemon juice or vinegar.*
4. Prepare a large clear container by placing one piece of fine cheesecloth over the container and securing it with a rubberband. The cheesecloth should be shaped like a funnel – not stretched tight.
5. Have an extra person hold the cheesecloth in place. Pour the milk mixture through the cheesecloth. Drain it thoroughly. Hold the cheese in the cheesecloth and rinse with fresh water,

Let's Make Cottage Cheese

- several times. Squeeze the cheese curds dry.
- Place the curds in a bowl and cut them if necessary.
 - Season to taste with salt, dill, chives, garlic, ranch dressing powder, etc.
 - Students can taste the cottage cheese they made by putting cheese in Dixie cups or by spreading it on crackers.

Conclusion Questions (Assessments)

- What is an enzyme?
A catalyst that speeds up the digestive process.
- What is the difference between curds and whey?
Curds are the thickened or large solid parts that form in soured milk, and they are the foundation or beginning of the cheese. Whey is the watery part of milk that separates after the milk has soured and thickened. It is a by-product of the cheese-making process.
- What did the milk look like before the lemon juice or vinegar was added? How about after?
Before: the milk was a smooth, easy-to-stir liquid. After: the milk curdled and became chunky and thick.

Resource

California Milk Advisory Board (2009). Cottage cheese. http://californiadairyroom.com/Products/Cottage_Cheese

Want More? Extensions

What to do with the whey? Whey is highly nutritious due to its protein content. If you don't want this liquid to go to waste, do the following:

Make ricotta cheese – ricotta means “re-cooked.” You'll need leftover whey, a large bowl, fine cheesecloth or reusable coffee filter, a large strainer, and a small bowl. Pour the whey back into your pot and heat it to boiling. The temperature here is not critical, and you don't have to do it slow. Just be VERY careful. Once the whey has cooled down to 140 degrees or less, either use a ladle or pour your whey through the coffee filter. Once you pour it all back into the filter, let it drain for a while until all the liquid is removed. This may take a while depending on the size of the holes in the filter. <http://www.instructables.com/id/Great-Ricotta-Cheese-From-Whey/>

Save it and use it to “water” the classroom plants. Leftover whey can be nutrient-rich plant food. You may to check whether the plant can tolerate acidic solutions since vinegar was used in the whey-making process. Roses do well with acidic solutions.

To further make the connection between agriculture and food on the table, plan a visit to a local dairy farm, where the farmer can show students the dairy operation, explain how milk is transported, and answer any questions students may have.