

Making Cottage Cheese

Grade Level: 4-8

Lesson Overview

Little Miss Muffet sat on her tuffet eating her cottage cheese...wait, what? The cheesemaking process involves the by-products of curds and whey. This activity will result in a snack for students to taste!

Student Objectives

1. Observe the action of rennin on milk to make cottage cheese.

Materials

- ✓ hot plate
- ✓ 2-quart aluminum pan
- ✓ Junket rennet tablet (this contains the enzyme rennin)
- ✓ 1 quart 2% milk
- ✓ lemon juice
- ✓ vinegar (optional)
- ✓ water
- ✓ candy thermometer
- ✓ cheesecloth
- ✓ clear gallon container
- ✓ rubber band
- ✓ measuring cup
- ✓ Making Cottage Cheese worksheet
- ✓ measuring spoon
- ✓ wooden spoon
- ✓ 2 hot/cold mitts
- ✓ paper towels
- ✓ plastic bowl
- ✓ salt
- ✓ 30 small paper plates
- ✓ 30 plastic spoons
- ✓ crackers (optional)

Vocabulary

- **curds** – the thickened or solid parts that form in soured milk and are the beginning of cheese.
- **enzyme** – the catalyst that speeds up the digestive process.

- **rennet** – a liquid containing enzymes from a calf’s stomach that is used to curdle milk.
- **whey** – the watery part of milk that separates after the milk has soured and thickened; water by-product of the cheese making process.

Background Information

Cultured milk foods such as buttermilk, yogurt, sour cream and cottage cheese involve microbial conversion of the milk sugar (lactose) to lactic acid. This lactic fermentation process is accomplished by adding different lactic bacteria and providing the appropriate incubation temperatures. Most of these products can be made in the home by inoculating (introducing appropriate bacteria) fresh pasteurized milk with a spoonful or two of the desired product purchased from the store.

Cottage cheese differs from the other sour milk products in that the fermentation process causes the casein to curdle. The “clumps” of coagulated casein separate from the rest of the original milk. To improve the structure of cottage cheese, an enzyme called rennin, in the form of rennet, is added to induce milk-clotting.

Cheese making is among the oldest food processing practices. There are countless variations of processing steps that account for the diversity of cheese varieties. As with the fermented milks, lactic acid bacteria are used to produce acidity and flavor for cheese by fermenting the lactose. Other bacteria, molds and yeasts may be used during the ripening stage.

The enzyme rennin is also used in early steps of the cheese making process. It is added to the milk 30 to 60 minutes after the initial step and causes the milk to develop an elastic gel consistency. This gel is cut into small cubes causing the whey (water by-product) to separate from the curds. The curds, which are comprised of protein and fat, float in the whey until the whey can be drained. All cheeses are then salted to provide flavor, control the microbiological growth during the ripening process, and further whey expulsion.

The curds are formed or pressed into blocks before ripening. All the steps up to ripening may take about 7 hours. Curing or ripening may last anywhere from a few days to more than a year depending on the variety of cheese. The humidity and temperature of the ripening rooms will also vary with the variety of cheese, contrary to what many people think. The basic ingredient for processed cheese is natural cheeses that have been mechanically damaged, have improper pH, or have other minor defects – although still eatable. The processed cheese is made by adding flavorings to the

ingredients and melting them into a homogenous mass. The heating provides a plastic product but does not damage the milk vitamins.

Procedure

1. Observe the action of rennin on milk to make cottage cheese.

Place 1 quart of milk in the aluminum pan and heat to 32 degrees Celsius (90 degrees Fahrenheit). Then remove from heat.

2. Crush the rennet tablet and dissolve it in 1/4 cup of lukewarm water in the measuring cup.
3. Stir the rennet tablet solution into the milk until well mixed using the wooden spoon. During this step allow students to see that very little change is taking place. Add lemon juice or vinegar 1 tablespoon at a time until the curd has clearly separated from the whey. Again, allow students to see the changes that took place after adding the lemon juice or vinegar. Lemon juice produces a much more desirable flavor than vinegar. Do not add more than 6 tablespoons of lemon juice or vinegar.
4. Place one piece of fine cheesecloth over the clear gallon container and secure with a rubber band. The cheesecloth should be draped like a funnel – not stretched tight.
5. Pour the mixture through the cheesecloth and drain it thoroughly, squeezing out the moisture. Hold the curds contained within the cheesecloth under running water to rinse. Then remove from the running water and squeeze out the excess moisture again. (Note: If running water is not available, you can pour water over the curds while the cheesecloth is secured to the container. Use the spoon to press out the liquid.)
6. Place the curds in a bowl and cut them if necessary.
7. Add salt to taste. You may season with dill, chives, or parsley. A small amount of milk may be added to increase the creaminess of the cottage cheese.
8. Students may use the small paper plates and plastic spoons for tasting the cottage cheese. (Crackers may also be used.)

Caution: Students who are allergic to milk or milk products should not taste the cottage cheese.

Extension Activities

1. The lesson Cud to Curd correlates well with this lesson.

Additional Resources

- The Art of Cheesemaking <https://www.youtube.com/watch?v=dQ6LZ6MgSek>
- What is Cottage Cheese and How is it Made? <https://www.usdairy.com/news-articles/what-is-cottage-cheese>
- Why is Cottage Cheese Called That and Who Invented It? <https://www.youtube.com/watch?v=WbG8raMCgpo>
- Utah Education Network – Cheese Science <https://www.uen.org/tv/cheese/>
- Illinois Agriculture in the Classroom Dairy Ag Mag: <http://www.agintheclassroom.org/TeacherResources/AgMags.shtml>
- Illinois Agriculture in the Classroom Dairy Reader http://www.agintheclassroom.org/TeacherResources/terra_nova.shtml
- Extra Cheese, Please!: Mozzarella’s Journey from Cow to Pizza by Cris Peterson
- Cow to Cud lesson
- How It’s Made: Cheese <https://www.youtube.com/watch?v=FHmXAb3G0ek>
- cheese <https://www.stldairyCouncil.org/uploads/FamilyResources/Cheese.pdf>
- nutrition of cheese [https://www.stldairyCouncil.org/uploads/pdfs/STLDDC_Cheese_Sell_Sheet_v2\[1\].pdf](https://www.stldairyCouncil.org/uploads/pdfs/STLDDC_Cheese_Sell_Sheet_v2[1].pdf)

Standards

Illinois Science Standard

MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Illinois English Language Arts Standard

RST1 Cite specific textual evidence to support analysis of science and technical texts.

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Dairy mAGic project update writers/reviewers: Rhodora Collins – Dekalb County; Suzi Myers – Kane County; Connie Niemann – Montgomery County; Debbie Ruff – Livingston County; Jennifer Waters – Sangamon County; and Dawn Weinberg – Hancock County.

Making Cottage Cheese ANSWER KEY

1. What happened to the milk after the rennin was added?

No visible change occurs. However, the enzyme rennin is causing the casein to curdle.

2. What happened to the mixture after the lemon juice or vinegar was added?

The acidic nature of the lemon juice or vinegar causes the casein that curdled to separate from the rest of the original milk.