



BUTTER IN A JAR

Grade Level

K-8

Length of Lesson

45 minutes

Objective

By the end of this lesson, students will have a better understanding of the process of milk being turned into butter.

Materials

- 2 oz. plastic portion cups with lids
- Heavy whipping cream
- Crackers or bread
- Child safe knife or spreading tool

Standards

NGSS

2-PS1-1; 2-PS1-2; 5-PS1-1; 5-PS1-3-4

Lesson Summary

This lesson is designed to help students learn how milk turns into butter by making, or shaking, their own.

Suggested Sequence of Events:

1. Read [The Milk Makers](#) by Gail Gibbons to capture student interest.
2. Read through the one of the IAITC [dairy-themed non-fiction text resources](#) to learn about dairy cows and milk products. Interactive online versions can be found on our website.
3. Complete the activity following the procedures:
 - Set out enough 2 oz. plastic portion cups for each student to have one of their own. If you would rather students work in small groups, or make this a whole class activity, just adjust the size of the container and the amount of cream. Then students can take turns shaking as they pass the container around the room.
 - Fill each portion cup halfway full with heavy whipping cream and then put the lids on each cup.
 - Explain to students that milk has a lot of fat molecules all throughout it, and when those molecules are agitated, they start clumping together. When they are agitated enough, they form a clump. That clump is butter.
 - Give each student a portion cup with the whipping cream. Tell them to hold the cups with their pointer finger and middle finger on the lid and their thumb on the bottom of the cup.
 - Tell them to keep a firm grip, but not too firm, on their cups and start shaking.
 - Shake, shake, shake! You'll shake for 3-5 minutes depending on how cold the whipping cream is.
 - You will be ready to stop shaking once there is a large clump in the cup. There will still be some liquid left, which is called buttermilk. Many people keep their buttermilk to use in a variety of recipes.
 - Pass out crackers and spreading tools and let students enjoy their butter!
4. Whole class discussion and reflection of activity.

TEACHER RESOURCES

Background Information

An emulsion is a (homogenous) mixture of two or more liquids that normally aren't able to mix (immiscible liquids). The two liquids that make milk an emulsion are water and fat. The fat is in the form of globules that are dispersed throughout the water. Think of the globules like little microscopic water balloons. When the milk is vigorously shaken, all of the molecules slam into each other. The force causes those fat globules to burst (like a water balloon hitting when it's popped) and the fat within the globule is free. The continued shaking causes the freed fat molecules to separate from the water and bond together, forming a clump which we call butter, and leaving behind the excess liquid which we call buttermilk.

STEM/Scientific Inquiry

Help students deepen their understanding of science processes by testing different variables:

- What type of milk forms the most butter? There are different types of milk ranging from heavy whipping cream, which has a higher fat content, to skim milk, which has a low fat content.
- Does the temperature of the milk affect the butter-making process? Warmer temperatures cause molecules to move quicker than cold molecules. How can this idea apply to other processes? (Think about how water changes states, or the role temperature plays in weather patterns.)
- Can we make a non-dairy butter using non-dairy milks, such as almond milk, using this same shaking technique?

Extension Ideas

- Bring in other ingredients like salt, cinnamon, sugar, honey, dried cranberries, etc. for students to add to their butter to add a sweet or savory flavor!
- Read a book about dairy farming and dairy products from the book recommendations list on the IAITC website. Look at the pictures and have students analyze the images.
- Take a field trip to a dairy farm and learn about dairy farming or invite a dairy farmer into the classroom.
 - Can't make it to the farm? Go on a virtual field trip to a dairy farm and let 10 year old Jenna take you on a tour through her family's dairy farm: [Jenna, a Dairy Farmer | Citizen Kid by Disney](#). This video can be accessed at: <https://www.youtube.com/watch?v=EOAavg4ftFk>.
- Talk about how milk gets from the farm to your fridge after watching this video: [Glass Is In Session](#). Video can be accessed at: <https://www.youtube.com/watch?v=ztmRrwe0ITA&feature=youtu.be>
- Have students color a picture of a dairy cow.
- Introduce or teach about pasteurization and homogenization.
- Talk more about different products that come from dairy cows. How are yogurt and ice cream made? Is it a similar process to how butter is made? Use the IAITC Ice Cream in a Bag recipe and compare the process.
- Go to agintheclassroom.org to contact your County Ag Literacy Coordinator for free classroom sets of the IAITC Ag Mags.