

**Name:**

## **Bacteria for Breakfast**

### **Procedure:**

1. Your teacher will heat the milk to 185–195°F in a double boiler, stirring frequently to prevent the milk from sticking to the bottom.
  2. Once the milk is hot enough your teacher will remove it from the heat and place the covered pot in a pan of clean, cool water until the milk is very close to 130°F.
  3. While you are waiting your group can prepare your yogurt starters. First choose your group's two starters. Which of the starters do you think will make the best yogurt? Use a craft stick to taste them. Look for characteristics such as which has the most flavor, firmest consistency, least runny, and good color.
  4. Then make predictions. Fill in the first two columns of the Yogurt Predictions and Observations Table and write about the two kinds of yogurt your group chose as starters.
  5. Decide who will do each of the following steps and put their initials in the boxes. Now prepare your experiment following those steps.
- You should have two lids and two empty jars. Use a marker to label each jar lid with the name of the starter you will put inside. You may also want to put your group members' initials on the lid so you can identify your jars later.
  - Now add your starters. Each jar needs 1 tablespoon of starter.
  - Measure 6 oz. of cooled milk into your liquid measuring cup. Add the measured milk to one of your jars. Stir it with your spoon and put the correctly labeled lid on.
  - Fill your second jar with 6 oz. of cooled milk, stir it and put the correctly labeled lid on.
  - Set your filled jars inside the cooler to incubate. Your teacher will add hot water to keep the jars warm for three hours. As long as they stay warmer than 104 degrees, good bacteria will begin to grow inside! Then the finished yogurt will need to be put in the refrigerator overnight.

## Yogurt Predictions and Observations Table

Before incubation	Before incubation	After incubation	After incubation
Your Starters (look on the label for brand and details)	Your Predictions (after tasting and studying your starters)	What does your homemade yogurt look like? (color, consistency, did it gel?)	What does your homemade yogurt tastes and smells like?
Example:  <i>Sunny Fresh brand -has live cultures -no preservatives</i>	<i>Our yogurt will be really thick with an orange look and flavor. It will be tart but not sweet.</i>	<i>Our yogurt is too runny and almost clear looking. It doesn't look like yogurt at all.</i>	<i>Our yogurt starter made it taste like plain milk with a little bit of lemon in it. It smells sweet.</i>
Starter #1:			
Starter #2:			

### What do you think?

Which yogurt starter grew the most bacteria? How do you know?

How could you make your yogurt better (use the Yogurt Problem Solver Table!)

Would you eat homemade yogurt again? Why?

## Yogurt Problem Solver Table

Below each listed problem you observe is are possible reasons and solutions for that problem.

<b>Problem: water separation of curds and whey</b>	
<b>Incubation time too long, forms too much acid</b>	Shorten incubation time and refrigerate yogurt as soon as it becomes firm.
<b>Insufficient heat treatment of milk</b>	Either milk was not heated to 200°F or it was not held at 200°F as directed for thin or firm yogurt. Heat treatment changes the milk proteins so that the yogurt is firmer and whey does not separate so easily from curds.
<b>Problem: yogurt does not become firm</b>	
<b>Culture inactive</b>	Commercial, unflavored yogurt used for starter must be fresh and contain live culture.
<b>Incubation temperature too high or low</b>	Temperature must be between 108 -112° F for yogurt culture to grow properly. Temperatures above 115° F cause separation or curdling and can destroy the active yogurt culture, while temperatures below 100°F stop the growth.
<b>Other substances may interfere (such as detergent)</b>	Wash and thoroughly rinse all yogurt-making equipment and container(s) before making yogurt.
<b>Problem: off flavors</b>	
<b>Milk that is off-flavored</b>	Use fresh milk with a good flavor and fresh dry milk powder.
<b>Bacteria that cause off-flavors can grow along with the yogurt culture.</b>	To prevent the presence of unwanted bacteria, use a fresh, active yogurt culture, thoroughly wash and rinse all yogurt-making equipment and container(s), hold container(s) in hot water while preparing yogurt and keep container covered during incubation.