

Yogurt: How Bacteria Produce Lactic Acid

Bacteria are one-celled organisms. They typically produce one or more kinds of acid as by-products of their metabolism. Some bacteria are used in making fermented foods; most of these bacteria produce lactic acid. It is this lactic acid which gives most fermented foods their characteristic taste.

One example of a fermented food is yogurt. If lactic acid producing bacteria are added to milk, they use the sugar in milk for food and make lactic acid as a by-product of their metabolism. The lactic acid accumulates in the milk, making it taste sour and causing it to become thicker. It gets thicker because the proteins in milk denature and coagulate, giving a custardy texture to the milk. When this occurs, the product is called yogurt.

MATERIALS AND EQUIPMENT

- 1/2 cup commercially prepared yogurt that has an active culture
- 1 quart skim milk

- a measuring cup
- a candy thermometer
- a saucepan
- 1 1-quart glass jar
- a paper towel
- a towel
- pH paper

PROCEDURE

1. Heat milk in saucepan to 160 degrees (a skin will form on the top). This will kill any bacteria which may make the milk spoil before the yogurt is made. Cool the milk to 110 degrees.
2. Mix about 1/2 cup yogurt with about 1/2 cup warm milk. When this is mixed, add it to the warm milk and mix well.
3. Pour the entire mixture into the glass jar. Cover the jar with a paper towel and wrap it in the towel to keep in the heat. Let the milk stand at room temperature for 8-12 hours. Measure the pH of the milk every 3-4 hours. When the pH is about 3 or 4, the yogurt is

finished. It should be thick, although it will not be as thick as commercial yogurt.

4. Refrigerate the finished yogurt to stop the growth of the bacteria. This yogurt can be used as a "starter" for the next batch of yogurt.
5. How did the pH change over time? What happens if sugar is added to the milk? What happens if you use powdered milk, condensed milk, evaporated milk, or whole milk?

From: "Science Experiments You Can Eat," Vickie Cobb, J.B. Lippincott Company, 1972.

