

## Lactic fermentation experiment (Answer sheet)

### 1. What do you think lactic bacteria eat?

Bacteria are very simple living organisms. To stay alive, they need a source of energy, or food. For lactic bacteria, that food is sugar. The sugar found in milk is called lactose. Lactose is a combination of two simple sugars: glucose and galactose. To use glucose and galactose as food, bacteria must break the lactose down.

### 2. What environmental conditions do lactic bacteria need to be active and multiply?

To be active and multiply, lactic bacteria need heat and humidity. Unlike more complex living organisms, they do not need oxygen. This is why these bacteria can survive in our digestive system.

### 3. In your experiment, why is it important to heat the milk?

We heat the milk for two reasons. First, the shape of the milk proteins needs to change so that they come together and form chains. This change occurs when the proteins are exposed to heat. The second reason relates to food safety. Today, only pasteurized milk is sold.

Pasteurization involves bringing the milk to a high temperature for a few seconds and then quickly cooling it. This process kills most of the microorganisms that could be in the milk and



might make us sick. Since milk can easily become contaminated after the milk carton or bag has been opened, we need to pasteurize it a second time before turning it into yogurt.

4. What do you think would have happened if you had added the bacterial culture (yogurt) to the hot milk before letting the milk cool?

If you had added the culture to the milk when it was still hot, the bacteria would have been killed and the milk would not have been changed into yogurt. The high heat required for pasteurizing the milk would kill all bacteria, good or bad.

5. For people who are lactase-deficient, why do you think yogurt is easier to digest than other dairy products?

The lactic bacteria that change milk into yogurt feed on lactose. Fermented dairy products like yogurt contain much less lactose than unfermented dairy products like milk and ice cream. For this reason, lactase-deficient people find yogurt easier to digest. In addition, once the lactic bacteria are in our intestines, they keep on releasing lactase enzymes that continue to help us digest lactose.

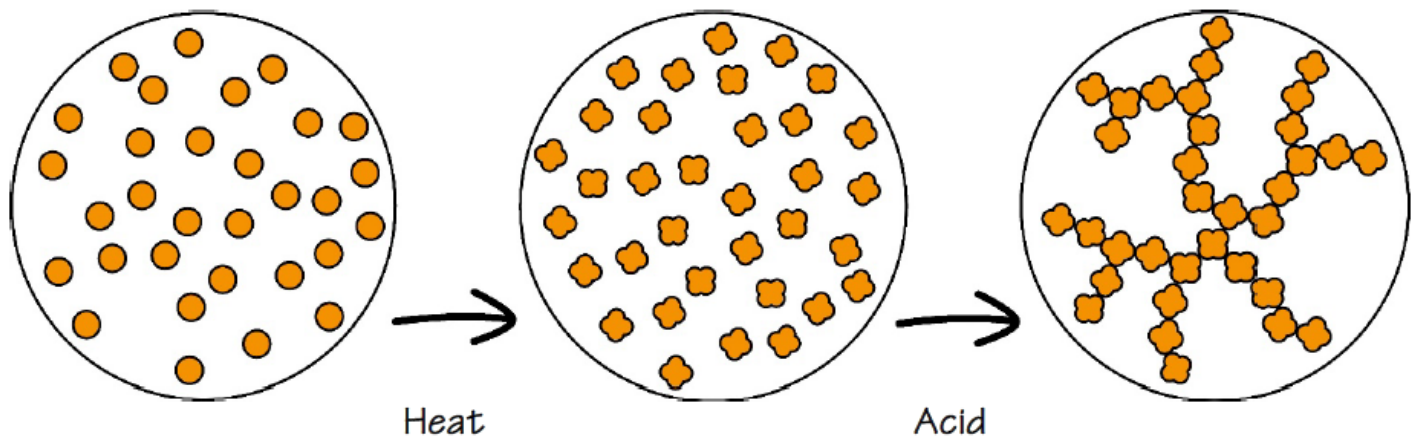
## Now you know

To the naked eye, milk looks like a plain white liquid. But milk is actually a combination of various particles suspended in water. This type of mixture is called a colloid. Milk contains proteins called caseins. It also contains fat globules, sugar (in the form of lactose), vitamins, minerals, enzymes, and sometimes even microorganisms.

Caseins form small spheres that bump up against each other and bounce off each other again. But in the presence of acid, when these spheres meet, they begin to stick together instead of pushing apart. This process is called coagulation. In unheated milk, casein spheres that come together form short chains. The resulting curdled, granular mass cannot retain liquid.



For yogurt to have a smooth texture, the milk must first be heated. Heat changes the shape of the casein spheres. In the presence of heat, then acid, casein spheres that come together form long chains. The resulting mass is like a sponge. The components of yogurt — fat, sugars, uncoagulated proteins, enzymes, vitamins, minerals and live bacteria — are imprisoned in the holes of the casein sponge.



**This lesson plan was produced by the Canada Agriculture and Food Museum.**

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