

## Using biotechnology to make yoghurt

People have used traditional biotechnology to make bread, yoghurt and cheese for thousands of years. Bacteria such as *Streptococcus* and *Lactobacillus* are used in controlled fermentation to change milk into yoghurt.

You can do this as a class activity or in small groups.

### You will need:

- 2 x 250 ml milk (or skim milk powder in the same volume of water)
- saucepan
- 2 jars with lids or covers, each large enough to hold about 300 ml of liquid
- thermometer
- 1 tablespoon of plain, unflavoured, yoghurt from the supermarket
- bowls and spoons for mixing

### What to do:

1. Sterilise the jars by placing them in boiling water for five minutes and let them dry.
2. Label the jars '1: yoghurt' and '2: control'.
3. Warm the milk over medium heat in a saucepan to 43-46°C (avoid burning the milk).
4. Place 250 ml milk in both of the jars.
5. Add a tablespoon of yoghurt as a starter culture to jar 1 and mix well.
6. Seal both jars and place in an incubator at 43-46°C overnight. If an incubator is not available, you can place the jars in a warm spot such as a water heater cupboard, an oven with a 40 watt light bulb turned on. Alternatively, transfer the milk mixtures into two thermos flasks for 4–5 days.
7. Check your milk mixtures and record what happens in the two jars.

*Note: do not eat the control mixture.*

**What to do with your information:**

1. Record any differences between the contents of your two jars – what might have caused differences between them?
2. Think about the purpose of the control. Why do scientists use controls in their experiments?
3. Write a brief report summarising:
  - the procedure to make your yoghurt
  - what happened in the control and yoghurt jars
  - the cause of any differences.

**For further investigation**

1. Why was it important to sterilise the jars?
2. What are 'good' bacteria? Why do people think they are a good thing?
3. Why are some people who can't drink milk (as it upsets their stomachs) still able to eat yoghurt?
4. Do some research to find out what chemical reactions are happening in your yoghurt mixture. For example:
  - What types of bacteria are used to make yoghurt?
  - Why might the yoghurt taste slightly sour?
  - What is happening to the sugars in the milk?
5. Investigate commercial yoghurt production:
  - What kinds of starter cultures are used? How important are the balances of bacteria?
  - Do their processes differ from the one you used above?
  - What is pasteurisation? What role does it play?
  - How do large producers ensure there is no contamination by other bacteria and moulds? Why is it important?
  - What is the difference between stirred and set yoghurt?