

**LEGEN-DAIRY!**

On average, a cow produces 28 litres of milk a day.

**WARNING!**  
This experiment is NOT edible.

# Turn milk into plastic

Plastic is mostly manufactured using chemicals extracted from oil, a fossil fuel. However, there are other ways of making plastic – here's how you can create your own.

**What you need**

- 300ml whole milk
- Small pan
- Jug
- Spoon
- 2tsp white vinegar
- Sieve
- Bowl
- Tea towel
- Food colouring
- Clear nail varnish
- Paintbrush

**How does it work?**

Milk contains a protein (an important chemical for building and running the body) called casein. When vinegar is added to the milk, its acidity causes the casein to unfold into long chains. These casein chains begin to get tangled together. This process is called denaturing, and it is similar to what happens when an egg cooks and the runny egg white turns solid. The long tangled chains of casein create small white chunks, called curds. This new material is a plastic polymer – casein plastic. Polymers are made of very long-chain molecules. A long-chain molecule is a group of atoms joined together (an atom is the smallest complete unit of a chemical compound). They are often formed when shorter molecules join together end-to-end.

**MILKY BUTTONS**

Until about 1945, casein plastic was often used to make beads, buckles, buttons and other ornaments.



**WARNING!**

This experiment involves heating milk in a saucepan on a hob. Ask an adult to help you.



**1** Heat the milk gently in a pan. When the milk is warm (but not boiling), pour it into the jug. Add the vinegar to the milk and leave for one minute.



**2** Put the sieve over the bowl and line it with a tea towel. Pour the mixture into the sieve and leave to cool. Gather up the towel and squeeze out excess liquid.



**3** Add food colouring to the lumpy mixture, mould it into shapes (or use cookie cutters) and leave to harden. Varnish the shapes once they are dry.