Family Learning Festival 2022
15-30 October

Square Eggs

In The Gingerbread Man story, the little old lady chose to mould her dough in the shape of a gingerbread man. There are lots of different shapes that people choose to make their biscuits or cakes into: circles, squares, stars… but have you ever thought about changing the shape of any other foods? And have you ever done it after they've already been cooked? In this experiment we're going to explore how to make square eggs!

Materials

- Cubed box measuring 3.8 cm on each side (download our template or draw your own)
    - Empty juice carton / cardboard
    - Scissors
    - Tape
    - Ruler
    - Pencil
- Cooking oil
- Two large eggs
- Saucepan and slotted spoon/spoon
- Water
- Timer
- Oven mitt
- Plate
- Paper towels
- Kitchen knife
- Rubber bands

Top tips

This experiment **can** be eaten at the end.

Preparation work:

Prepare your cubed box:

1. Wash the empty juice carton thoroughly and cut it open so that it lies flat
2. Draw the template of the open folded box on the carton (attached) and cut out
3. Place a ruler along the fold lines and trace over the fold lines with a pencil. This will create an indent in the carton and helps to create straight folds.
4. Fold on the indicated lines to form the box, as directed in the template.
5. Secure the newly created box with tape, leaving one side open as a lid.
6. Grease the inside of the box with oil

Instructions

1. Place two eggs in the saucepan. Add enough water so that there is a ½ inch of water covering the eggs. Put the saucepan on the stove.
2. Heat the water until it comes to a rapid boil and keep the water boiling for 10 minutes before turning off the heat.

3. Use the slotted spoon to take one egg out of the water and carefully place it on a plate to cool completely. This egg is Egg A.
4. Use the slotted spoon to take the second egg out of the water (don't discard the water, you'll need it later!). This egg is Egg B.
5. Place Egg B on several paper towels and carefully wrap them around the egg. Use an oven mitt to protect your hand whilst you handle the egg.
6. Whilst still covered to keep it hot, gently tap Egg B against the counter or a plate to crack the shell all over. Unwrap Egg B and carefully peel away the shell. Place Egg B back on the spoon and dip it into the hot water to wash away any small pieces of shell. This also helps keep Egg B hot.
7. Gently push Egg B into your cardboard box, pointed end first, taking care not to break the egg. The hot egg should fill the box- if it doesn't, add some folded paper towels on top to fill the box completely. Close the lid and secure with the rubber band.
8. Let both Egg A and Egg B cool down for at least 30 minutes. Once cool, open the box and let Egg B slide out onto a plate- what shape is it?
9. Carefully peel the remaining egg, Egg A and push into the box in the same manner as you did for Egg B- can you squeeze Egg A into the box without breaking it?
10. Cut both eggs in half using the knife- what shape are the yolks inside? Are they the same or different?

What's just happened?

You could probably feel the difference between the two eggs when you were putting them into the cardboard box. The hot egg feels wobbly, whilst the cold egg is much stiffer and rubberier.

Eggs are mainly made of two substances: water and proteins. Proteins are a type of molecule that normally exist all tangled up like balls of wool. When you heat them up, they unravel and bump into each other which causes them to tangle together in a process called coagulation. The water in the eggs is then trapped inside all the tangled proteins, resulting in the egg turning into a flexible gel-like solid.

Whilst the egg is still hot, the web of proteins can still be moulded into different shapes, but when the egg is cooled down, this web of proteins has been permanently set into a solid and can no longer be changed.

This is why you could shape the hot egg into a cube, but the cold egg couldn't be squeezed into the box.

In this experiment we moulded hard-boiled eggs. You can also investigate this process with soft-boiled eggs.

- Can they be moulded?
- How long do you need to keep the egg at a high temperature for it to keep its shape?