Where food comes from

Key message: Explore the characteristics of flour, and how these are used and applied when preparing and cooking a range of dishes.

Objectives

- Investigate what happens to flour based dishes when dry heat is applied (dextrinisation).
- Explore the science of bread making (yeast and gluten formation).
- Investigate the use of flour in thickening, e.g. sauce making (gelatinisation).

Resources

- Bread slices, toaster/grill.
- The Science of Bread making PowerPoint
- Bread Science worksheet
- Bread making ingredients, equipment and recipe
- Tuna and broccoli bake recipe and video
- Gelatinisation experiment sheet (and ingredients: flour, hard fat)

Introduction

- Explain to the pupils that flour has a number of special characteristics when it is cooked. For example, ask pupils what happens to bread when it is toasted. What changes do they notice? (You may wish to toast some bread to demonstrate the change.) Where else have they seen this colour change? For example, the crust of bread, pastry and cakes. This is colour and texture change is called dextrinisation.
- What other characteristics can the pupils name? The formation of gluten (a protein in flour) during bread making and flour being used to thicken a sauce.

Activity ideas

- Go through the science of bread making with the pupils. If possible, arrange a practical cooking session so that pupils can see the changes at first hand. Alternatively, use The Science of Bread making PowerPoint presentation. You may wish to use the presentation in the practical session.
- Ask pupils to keep a record of the scientific principles involved – use the Bread Science worksheet. You may wish to ask pupils to record this type of information when cooking other dishes too.
Grain Science: Lesson Plan

- Explain to pupils that flour can also be used to thicken a sauce – the process is known as gelatinisation. (On heating, the starch granules in the flour swell, rupture and release starch which absorbs the liquid causing the mixture to gelatinise.) Ask pupils to name a range of dishes that use a sauce which is thickened with flour, e.g. cheese sauce, macaroni cheese. Why would ‘thickening’ be a useful function when cooking a dish?
- To bring gelatinisation to life, allow pupils to cook a dish – such as a Tuna and broccoli bake, which uses flour to thicken the cheese sauce. A recipe sheet and video is available.
- Alternatively, set up an experiment to show how the amount of flour affects the thickness of the sauce. Ask pupils to work in small groups to make three different sauces. Use the Gelatinisation experiment sheet to help.

Round up
Recap the learning by questioning the pupils:
- What is the name given to toast or the crust of bread turning brown in heat? Dextrinisation
- Name the basic ingredients used to make bread. Flour, yeast, salt, fat and water.
- What is the name of the important protein in wheat flour? Gluten
- What gas does yeast produce when bread is being cooked? Carbon dioxide
- Name the different scientific principles used during bread making.
- What is the scientific name for thickening with flour? Gelatinisation.

Extension ideas
- Use different types of flour to make a soft, stretchy dough. Examine the characteristics of each noting the differences in the pliability and ‘stretchiness’ of the dough.
- Challenge the pupils to create a story board showing how bread is made. Include information of the type of flour, gluten production and the conditions needed for yeast to grow.
- Make a batch of scones using a variety of different types of flour. Carry out a sensory evaluation of the scones and evaluate the results.
- Investigate why white flour is fortified in the UK.

Fun facts
As well as being made from wheat, flour can be ground from other crops such as maize or rice.

Did you know…. soft grain bread is made from white flour with extra grains of softened rye and wheat to increase the fibre content by 30% compared with standard white bread.