Key message: Use practical experimentation to investigate and evaluate the working characteristics, functional and chemical properties of cereal and other grains.

Objectives:

- Investigate how yeast in used in bread making and explain the optimum conditions required.
- Test the conditions required for optimum production of carbon dioxide in bread making.
- Record the scientific principles demonstrated through preparing and cooking a bread-based recipe.

Resources

- The science of baking PowerPoint presentation
- Yeast experiment sheet
- Bread investigation sheet
- What went wrong? Bread video
- Food science recipe worksheet
- Bread-based recipes [www.grainchain.com/recipes](http://www.grainchain.com/recipes)

Introduction

- What makes bread rise? What ingredient is critical to help the dough rise, achieving its open texture? (Yeast.) How does the yeast enable the bread to rise? (Yeast is mixed with water and provided food [flour, and sometime sugars], which leads to fermentation - producing carbon dioxide [gas] and alcohol [which is destroyed by heat]. The gas raises the dough.) Use The science of baking PowerPoint presentation to support.

Activity ideas

- Set up an investigation into the effects of different conditions on yeast fermentation. The experiment looks at the effects of food, heat and water. You may wish to demonstrate the experiment to the class – with pupils guessing the outcomes for each sample, while the yeast is fermenting. See the Yeast experiment sheet for details.

You will need: 5 test tubes (or small plastic bottles), 5 balloons, 5 beakers (or glasses), 5 x 5ml spoons fresh or dried yeast, Kettle, Sugar, Ice cubes and 5 labels.
Bread science

- Explain to the class that they will be investigating the use of different ingredients in bread making. Divide the class into small groups, each making a bread sample using slightly different ingredients. Use the Bread investigation sheet, allocating each group a variation – ensure that all groups use the same size loaf tin. Ask pupils to follow the instructions. After baking, get each group to share their findings with the other groups – allowing all groups to have the complete set of data. Ask pupils to examine all samples and note shape, volume, surface features, colour, texture and flavour. Challenge them to comment on their findings with reference to the function of ingredients in bread making, as well as healthy eating guidelines.

- Show pupils the 'What went wrong? Bread' video. Ask pupils to record the ‘top tips’ being discussed throughout.

- Challenge pupils to make a bread-based recipe, such as a loaf of bread, fruit plait or Hot cross buns. While the pupils make the dish, ask them to record the different scientific principles being demonstrated, such as mixing (hydrating proteins), kneading (stretching gluten), proving (action of yeast, producing carbon dioxide), baking (coagulation and dextrinization). Use the Food science recipe worksheet to help recording. A collection of suitable recipes are available at www.grainchain.com/recipes (The Science of baking PowerPoint presentation may be helpful to consolidate different scientific principles.)

Round up
Recap the learning by questioning the pupils:

- What ingredient helps bread rise? Explain how it works.
- Name the conditions needed for optimum yeast fermentation. (Food, water and heat.)
- Ask pupils to bring their baked bread-based recipes to one area. Talk through the different scientific principles they have recorded. Use this plenary session to reinforce specific scientific principles, as well as correct any misunderstanding.