GoGrains EveryDay

A Teaching Resource for Upper Primary

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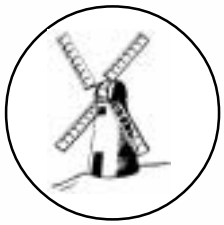


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BRI Australia
The Grains Research Centre

GRDC
Grains Research & Development Corporation

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Introduction

Foods made from grains are essential components of a healthy Australian diet. This resource has been created for the Go Grains* campaign to provide you with interesting classroom activities that familiarise students with these important foods. It is divided into three lessons which cover: 1) grains and their production 2) grain processing and 3) grain nutrition and incorporation into the diet.

Each lesson includes an introduction, teacher background notes and two activities. All of the pages are provided as PDF files which can be downloaded and printed. The activities can be photocopied and handed out to students in the classroom.

The lessons provide complementary information and the activities encourage different skills (Table 1) and address different learning outcomes (listed in the introduction for each lesson). Each activity is designed to stand alone. You can use one activity on its own or use all six to provide a comprehensive unit.

The activities of the three lessons address learning outcomes in various learning areas including Studies of Society & Environment / Human Society & Its Environment, Science, English, Technology & Enterprise and Health & Physical Education.

We hope you enjoy using this resource. Any feedback would be gratefully received. There is an evaluation form which we encourage you to download, fill out and return to the Go Grains Manager at BRI Australia.

*Go Grains provides user-friendly, scientifically based nutrition information about grains and pulses. Go Grains is developed and managed by BRI Australia and funded by grain growers and the Commonwealth government through the Grains Research and Development Corporation (GRDC).

Table 1: Different skills or areas developed in the student activities. In most activities, it is optional for students to use the internet to find information.

Skill	**Activity**					
	1.1	**1.2**	**2.1**	**2.2**	**3.1**	**3.2**
reading	•		•		•	•
writing	•		•			
communication			•			•
arts	•	•	•			•
design and technology			•	•		
scientific design		•				
observation and recording		•		•		
researching information	•		•		•	•
team work	•			•		
internet skills	•	•	•		•	•
cooking		•		•	•	
geography	•					•

Evaluation Sheet

Your feedback is valued and we would appreciate if you can to tell us what aspects of this resource work for you and how it could be improved. Please send your evaluation to:

Go Grains Manager
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E-mail: pjgriff@bri.com.au

Please answer the following questions using the rating scale of one to five, with 1= not useful/ appropriate and 5 = very useful/ appropriate.

Lesson 1: What are grains? Where, how and why are they grown in Australia?

Was this section useful to you?	**1**	**2**	**3**	**4**	**5**
Teacher Background Notes					
Activity 1.1: Go Grains Go!					
Activity 1.2: What's That in My Soup?					
Was the language appropriate?	**1**	**2**	**3**	**4**	**5**
Teacher Background Notes					
Activity 1.1: Go Grains Go!					
Activity 1.2: What's That in My Soup?					
Did the students benefit?	**1**	**2**	**3**	**4**	**5**
Activity 1.1: Go Grains Go!					
Activity 1.2: What's That in My Soup?					

Lesson 2: How do grains become foods we eat and what are examples of grain foods?

Was this section useful to you?	**1**	**2**	**3**	**4**	**5**
Teacher Background Notes					
Activity 2.1: The Grain Food Challenge.					
Activity 2.2: Pancakes Anyone?					
Was the language appropriate?	**1**	**2**	**3**	**4**	**5**
Teacher Background Notes					
Activity 2.1: The Grain Food Challenge.					
Activity 2.2: Pancakes Anyone?					
Did the students benefit?	**1**	**2**	**3**	**4**	**5**

Evaluation Sheet cont.

Activity 2.1: The Grain Food Challenge.
Activity 2.2: Pancakes Anyone?

Lesson 3: Why are grains important and how can they be incorporated into an Australian diet?

Was this section useful to you?	**1**	**2**	**3**	**4**	**5**
Teacher Background Notes					
Activity 3.1: Favourite Foods					
Activity 3.2: International Grains					
Was the language appropriate?	**1**	**2**	**3**	**4**	**5**
Teacher Background Notes					
Activity 3.1: Favourite Foods					
Activity 3.2: International Grains					
Did the students benefit?	**1**	**2**	**3**	**4**	**5**
Activity 3.1: Favourite Foods					
Activity 3.2: International Grains					

Any other comments, suggestions:

Teacher Background Notes - Lesson 1

What are grains? Where, how and why are they grown in Australia?

Humanity has depended on grains as the main source of food since the beginnings of agriculture or the 'Neolithic Revolution' which began about 10,000 BC.

What Are Grains?

Grains are dried seeds of plants which are grown for humans to eat. 'Grain' usually refers to seeds of cereal plants such as wheat, barley, rice, rye, triticale, millet and maize (corn) which belong to the grass plant family. The term can also refer to the pulses (grain legumes) such as the beans (e.g. kidney beans, haricot beans, etc.) pea, lentil, chickpea and lupin. In these lessons, 'grain' is used to refer to seeds from both the cereal and legume plant families.

Table 1: Winter and summer grown grain crops produced in Australia.

	winter crops	summer crops
cereals	wheat, barley, rye, triticale	rice, millet, maize
pulses	pea, lentil, chickpea, lupin	beans, soybeans

Where Are Grains Grown in Australia?

Grain is grown in every Australian state but is mainly produced in the 'grain belts'. The winter crops are grown in the grain belts across southern Australia and into southern Queensland. The summer crops are grown in Queensland, northern New South Wales and northern Western Australia**.**

How Are Grains Grown in Australia?

Grain is grown on Australian farms. Most Australian farms are run by a family.

The grains listed above are not native Australian plants. They were mainly brought to Australia by European settlers and were originally grown to feed the colonists. Since early European settlement, Australian plant breeders have worked hard to produce crop varieties which are suited to Australian conditions. The contribution of one wheat breeder, William Farrer, was so important to the early development of the country that his likeness was put on the old $2 notes.

Even with good varieties, grain crops require a lot of assistance to grow well in Australian conditions. Farmers need to ensure their crops have enough nutrients and water and to control weeds, pests and diseases. It is also important to plant and harvest at the right times.

Teacher Background Notes - Lesson 1

The winter-grown crops can only grow in areas where rainfall is adequate during the growing season (usually falling between May and October). Because of the shortage of water in much of the southern Australian grain belts, it is important to plant the seed as quickly as possible once the rain starts. This gives the plants more time to grow and produce seed. Planting is one of the busiest times of the year on the farm and many farmers will work day and night to get their crops in. The summer-grown crops are restricted to areas with adequate rainfall during the summer growing season, hence their growth in northern Australia.

At the end of the growing season, farmers use a harvester to cut off the heads of the cereal plants or legume pods. The harvester also separates the grain from the unwanted plant parts (eg wheat chaff). The grain can be stored on the farm but is frequently taken by truck directly to a receival point where it is weighed and grain quality is measured. With wheat, the protein is measured. Protein content and wheat variety will determine whether the wheat can be used for bread, pastries or noodles. Both grain yield and quality will affect the payment made to the farmer. While most people get paid regularly throughout the year for their work, farmers are often paid after the harvest.

Cereal crops are frequently grown in rotation with legumes or other crops. An example of a common crop rotation is when wheat is grown for a number of years on a given paddock and then lupins or peas or another crop might be grown on that same paddock. Crop rotation benefits the farm by providing diversity of income and benefits the soil by preventing build up of disease and weeds which can occur when the same crop is grown year after year. Rotation with legumes also benefits the soil because of the legumes' symbiotic relationship with rhizobia bacteria which can fix nitrogen (i.e. turn nitrogen from the air into nitrogen fertilizer for the plant).

Why Are Grains Grown in Australia?

Australian farmers produce some of the highest quality grain in the world. Some of the grain grown on Australian farms is used for domestic human food or animal feed but 85% of it is exported.

The grain industry earns Australia $5.6 billion per year in export income, making it one of Australia's largest export industries. Australia is one of the largest grain exporting countries in the world.

Wheat is Australia's biggest grain crop, followed by barley, lupin, sorghum and rice. Australian farmers produce about 21 million tonnes of wheat every year, 5.5 million tonnes of barley, 1.4 million tonnes of lupin, 1.3 million tonnes each of rice and sorghum, 1.1 million tonnes of oats and less than 0.5 million tonnes of each of the other grains (1998/99 ABARE). Australian grains are sold to more than 70 countries with major buyers being the Middle East, Europe and Asia.

One reason that pulse crops are grown on Australian farms is to provide an economically viable crop rotation. In addition to the benefits to soil health and sustainability, Australian pulses are a cash crop. Australia is one of the top pulse exporting countries. They are sold to more than 40 countries, many being in the Middle East, the Indian subcontinent and Europe. India, Spain, Bangladesh and Pakistan are the biggest buyers of Australian chickpeas.

About three quarters of the grain grown in Australia is used to feed people in other countries. With the world's population continuing to grow, Australian farmers make an important contribution to global well-being.

Teacher Background Notes - Lesson 1

Useful References:

Maquarie Atlas of the World.

Wheat: The Story of Wheat on Australian Farms. 1994. Kondinin Workboot Series. Available in most school libraries.

The Nodule Module: A Teaching Resource for Years 8-10. 1999. CLIMA, UWA, Nedlands, Western Australia.

The Bean Files - an internet based teaching resource for years 5 to 7
www.clima.uwa.edu.au/beanfiles

Other internet sites:

- Australian Wheat Board: www.awb.com.au
- Wheat Foods Council: www.wheatfoods.org
- Grains Research & Development Corporation: www.grdc.com.au
- BRI Australia: www.bri.com.au
- Grain Pool: www.gpwa.com.au/
- ABARE: www.abare.gov.au/
- Wheat by Caitlin: www.rochedaless.qld.edu.au/wheat.htm
- Kondinin Group: www.kondinin.com.au/workboot/
- farmindex: www.farmindex.com.au/

Lesson 1 - Student Activity 1.1; 1.2

What are grains? Where, how and why are they grown in Australia?

Student Activity 1.1 Go Grains Go!

Materials needed:

map of Australia
materials for making & attaching grain symbols (eg felt, paint, tape)
library or internet for research
useful internet sites:
Australian Wheat Board: www.awb.com.au
Wheat Food Council: www.wheatfoods.org
Grains Research & Development Corporation: www.grdc.com.au
BRI Australia: www.bri.com.au
Bean Files: www.clima.uwa.edu.au/beanfiles
Grain Pool: www.gpwa.com.au/
ABARE: www.abare.gov.au/
Wheat by Caitlin: www.rochedaless.qld.edu.au/wheat.htm
Kondinin Group: www.kondinin.com.au/workboot/
farmindex: www.farmindex.com.au/

Learning Areas:

1. Studies of Society and Environment / Human Society and Its Environment
Strands and Student Outcomes
Investigation, Communication and Participation - plan and conduct investigations, process and interpret information, evaluate and apply findings
Natural and Social Systems - structures for production, distribution and exchange determine the nature of economic systems.
2. English
Student Outcome
Develop the ability to write with purpose and understanding.

Student Activity 1.2 What's That in My Soup?

Materials needed:

bag of Italian-type soup mix from grocery store (one with lots of whole grains; remember that split seeds will not germinate well) or a variety of whole grains from a health food store.
apparatus for sprouting seeds (eg saucer and cotton wool or wide-mouthed glass jar and cheesecloth or petri dishes)
notebook for recording information and sketching sprouted plants
saucepan, vegetable stock and hot plate for cooking soup
bowls and spoons for eating soup (bread would complement the soup and is a grain food)

Learning Areas:

1. Science
Strand and Student Outcome
Investigating Scientifically - planning and conducting an investigation, processing data and evaluating investigation.

What are grains? How, where and why are they grown in Australia?

Student Activity 1.1 Go Grains Go!

Introduction

Humanity has depended on grains as the main source of food since the beginnings of agriculture or the 'Neolithic Revolution' which began about 10,000 BC.

Materials needed

- map of Australia
- materials for making and attaching grain symbols (eg felt, paint, tape)
- library and/or internet for research. As a start, try:
  The Story of Wheat on Australian Farms by the Kondinin Group which is probably in your library
  The Bean Files - http://www.clima.edu.au/beanfiles
  "Wheat by Caitlin" website - http://www.rochedaless.qld.edu.au/wheat.htm

Activity

1. Brainstorm and make a list of all grains you think are grown in Australia. (There are more than 10 grains.)

2. Divide into teams; each team will research 2 grains.

3. Develop a symbol to represent the grains your team is researching.

4. Find out where your grain is produced in Australia. Attach symbols to a map of Australia to show where the grain is produced.

5. Find out where the grain you researched is processed and consumed. Is its final destination Australia or another country? To which countries does Australia export this grain?

6. List 5 Australian foods that contain your grain.

7. List 5 foods from countries outside Australia that contain your grain.

8. Discuss reasons why the same grain is used to make different foods in different countries.

9. Find a product (food or other product) that contains the grain you have researched. Where was the product made?

10. Do Australians eat or use only Australian grown grains? If not, what are some reasons Australians might eat imported grains?

11. With your team, write a short story about one of your grains' lives, showing how and where it is grown and where it ends up.

What are grains? How, where and why are they grown in Australia?

Student Activity 1.2 What's That in My Soup?

Introduction

Plants and the sun work hard to feed the world. Actually they work hard to build a nutritious seed to get the next generation of plants off to a healthy start in their growth cycle. We humans take advantage of this. Over thousands of years, we have selected the largest, tastiest and most nutritious seeds and bred them to produce modern day grain crops.

Plants that grow our grains belong to one of two main plant families - cereals from the grass family and pulses from the legume family. Plants in these two families are quite different from each other in many ways. One way they differ is in the sorts of protein building blocks they contain. When eaten together, cereals and pulses provide a good balance of proteins for the human diet.

Cereals are members of the grass plant family. Pulses are members of the legume plant family. Here is a list of some cereals and some pulses;
Cereals - wheat, barley, rice, oats, corn, rye, triticale, millet, sorghum
Pulses - peas, navy beans, broad beans, lentils, chickpeas, soyabeans, lupins, mungbeans

In this activity you will investigate other differences between cereals and pulses.

Materials needed

- **packet of Italian-type soup mix** which has many types of grains or a range of grains including cereals and pulses (available form health food stores).
- **apparatus for sprouting seeds** (eg saucer and cotton wool or wide-mouthed glass jar and cheesecloth or petri dishes)
- **notebook** for recording information and sketching sprouted seed
- **saucepan, vegetable stock and hot plate** for cooking soup
- **bowls and spoons** for eating soup (bread would complement the soup and is a grain food)

What are grains? How, where and why are they grown in Australia?

Activity

1. Use the information above to sort the seeds into 3 categories - cereals, pulses and a pile for seeds you're unsure about.

2. Design an experiment to test whether the seeds have been placed in the correct category, and to sort out the "don't know" category.

a. Take 10 seeds from each of your categories for sprouting. Sprout seeds from each category in a separate container.

b. Soak seeds for a few hours or overnight in water. Drain and put into seed sprouter. Keep moist!

c. Check seeds every day.

d. Record how many seeds are sprouted on each day, and draw a graph to show how fast the cereal seeds and pulse seeds sprout (germinate).

e. Draw a typical first shoot of sprouts in the cereal group.

f. Draw a typical first shoot of sprouts in the pulse group.

g. Use this information to check your categories and to sort out the seeds from your "don't know" group.

h. Compare your results with those of your classmates.

i. Did sprouting the seeds help you classify the soup mix grains correctly? How else could you improve your classification?

j. Are there still some seeds you are unsure about? What other steps could you take to classify these seeds correctly?

(One idea is to grow the seeds into larger plants, and try and identify the plants using library resources. Plants are most easily identified when they flower. To do this, you'll need pots with soil or potting mix.)

What are grains? How, where and why are they grown in Australia?

Extension Activity

Now that you know something about the plants that make the grains in a "soup mix", find out how the grains taste.

1. Boil the soup mix in a light vegetable stock to add a bit of flavour, without masking the taste of the grains.

2. Taste the different grains separately.

3. Are the tastes different? What is your favourite grain? Did you make this decision on the basis of taste or texture?

4. From a nutrition point of view it is good to eat pulses and cereals together. Do you think that pulses and cereals taste better when eaten together than when eaten alone? (There is no right or wrong answer).

5. Make a list of the factors you consider when choosing the foods you eat.

Teacher Background Notes - Lesson 2

How do grains become foods we eat and what are examples of grain foods?

Although grains can be eaten whole (as in the soup mix activity in Lesson 1), much of the grain food we consume is transformed from whole grain into a final product through processing. In this lesson, students explore methods of processing and discover that things are not always what they seem.

How do grains become foods we eat?

There are many methods of processing grains into materials for making various foods. We frequently relate processing to reduced nutritional value but that is not necessarily the case. Some methods of processing increase the nutritional quality of certain grains, as described below.

Process	Examples of Food Products
milling	flour, flour containing products (bread, biscuits, muffins, crumpets, pizza crust)
extrusion	pasta, snack foods, breakfast cereals
puffing and flaking	breakfast cereals
cooking whole	rice, baked beans
dehulling & splitting	split peas, red lentils
sprouting	bean sprouts
fermenting	alcoholic, spirits, soya sauce
malting	beer, malted milk

Milling is the process of grinding grain into flour. It is possible to buy many different types of grain flours, including the obvious wheat flour but also less familiar ones like besan (chickpea flour). Milling wheat involves a number of steps – crushing, sifting and grinding. Standard white flour is made by separating the inside of the wheat seed (endosperm) from the outside seed coat (bran) and removing the bran. Bran is high in fibre and many minerals. Thus, wholemeal flour which still has the bran has higher fibre and mineral content than white flour. Historically white flour was very desirable; in the Middle Ages only the wealthy could afford it because of the extra processing required to remove the bran. In one of the last steps of milling, the wheat germ is separated from the flour. Wheat germ – the embryo and scutellum – is that part of the wheat seed which becomes a new plant if the seed is sprouted. Wheat germ is a good source of Vitamin E and the B group vitamins and is often added to breakfast cereal.

Stiff dough formed from flour and water can be **extruded** (pushed through a machine) and dried. This is the most common process for making pasta, some breakfast cereals and many snack foods such as the rice noodle-shaped snacks frequently found in supermarkets.

Puffing and **flaking** result in some of the most popular breakfast cereals available.

Rice and many of the grain legumes (pulses) are frequently **cooked whole**. One of the most common pulse examples with which most students will be familiar is the baked bean (navy bean). Kidney beans and soybeans provide excellent examples of processing which increases nutritional value. In their raw state, dry kidney beans contain lectins and soybeans contain trypsin inhibitor; these 'antinutritional factors' can cause gastroenteritis, diarrhoea or nausea. Soaking and cooking for at least 10 minutes makes them completely safe to eat and highly nutritious.

Teacher Background Notes - Lesson 2

The **fermentation** of rye, rice and corn has been perfected over the centuries to produce various alcoholic spirits**.** Other grains are fermented to produce sauces such as soy sauce.

Malting involves germinating seeds, usually barley, and grinding and drying the sprouted seed to make malt flour. Most malt in Australia is used in beer making, but malt is also used for powdered drink mixes and for breakfast cereals.

Plant breeders have worked for centuries to improve various grain properties and develop the grain crops we have today. For example, there are different types of wheat which have specified protein contents in order to be used for different purposes. For example, bread wheat has high protein content while wheat used for pastries and cakes has low protein. Pulses have also been bred for improved cooking and nutritional qualities - modern chickpeas are superior and much quicker to cook than ancient chickpeas.

Most plant breeding programs take years to produce small improvements and some scientists believe that modern genetic engineering methods should be used to ensure an adequate food supply and to improve food quality for consumers. There is great and important public debate about the ethics of the methodolgy and acceptance of the end product.

What are examples of grain foods?

Many students will be surprised to learn that some of their favourite foods are made from grains. Pasta, noodles and bread – especially wholegrain types – are healthy, delicious and non-fattening foods if the right toppings are used. Wheat and soybean are the two grains used in the widest variety of foods in Australia.

GRAIN	FOOD USE
Wheat	bread, scones, pasta, noodles, breakfast cereals, cakes, biscuits, pastries, extruded snack food, burghal, semolina, couscous, pizza crust, muffins, crumpets
Barley	pearled barley for soup, malt, beer, spirits
Rice	cooked grain, breakfast cereals, extruded snack food, spirits
Maize (corn)	tortillas, polenta, popcorn, hominy, cooked grains, extruded snack food, corn syrup, cornbread, breakfast cereals, taco shells
Oats	rolled oats, oatmeal, muesli, snack bars
Rye	bread, crispbread, spirits
Millet/ sorghum	cooked grain, flat bread, beer, porridge
Lentils	cooked grain
Chickpeas	flatbread, cooked grain, spreads (hommos), patties (felafel), extruded snack food
Peas	cooked as a vegetable, extruded snack food
Beans	cooked as a vegetable
Soybeans	tofu, tempeh, soy sauce, miso, soy milk, cooked grain, protein extract and food additive used in many processed foods

Teacher Background Notes - Lesson 2

Useful References:

A Baker's Dozen – A compehensive manual supporting the teaching of science and technology, Years 3-8. 1992. Jeanne-Marie Bernier. The Bread Research Institute of Australia. North Ryde, NSW.

Wheat: The Story of Wheat on Australian Farms. 1994. Kondinin Workboot Series. Available in most school libraries.

The Bean Files - an internet based teaching resource for years 5 to 7.
www.clima.uwa.edu.au/beanfiles

Passion for Pulses: A Feast of Beans, Peas and Lentils from Around the World. 1999. Nancy Longnecker. Tuart House of UWA Press.

Nature, composition and utilization of food legumes. J.H. Hulse. 1994. *In:* Expanding the Production and Use of Cool Season Food Legumes. (ed: FJ Muehlbauer and WJ Kaiser). Kluwer Academic Publishers. pp. 77- 97.

Lesson 2 - Student Activity 2.1; 2.2

How do grains become foods we eat and what are examples of grain foods?

Student Activity 2.1 The Grain Food Challenge. Design and make a new grain food.

Materials needed:

library and/or internet for research
materials for making packaging for the new food item
Optional: tape or video recorder for producing advertisement
Alternatives:
You can have students do this independently or group them into teams to work together.

Learning Areas:

1. Technology and Enterprise
Strands- and Student Outcomes
Technology Process - Students generate ideas and prepare design and production proposals in response to the specification developed from the design challenge.
Materials- students use appropriate technology skills when selecting and using materials which are appropriate to achieving intended solutions to meet a technology need.
Information - Students use appropriate technology skills when designing, adapting, using and presenting information to meet a technology need.
2. English
Strand and Student Outcome
Media - knowledge of how language varies according to purpose, audience and context.

Student Activity 2.2 Pancakes Anyone? Mill seeds and use flour to make pancakes.

Materials needed:

wheat seeds (grains)
a variety of other grains (available from health food stores)
wheat flour (wholemeal and white)
a range of flour types from grains other than wheat (chickpea flour, rice flour, pea flour are available from Asian grocery shops. Health food stores have rye and other cereal flours.)
equipment for milling grains into flour (brainstorm ideas)
bowl and spoon for mixing pancake batter

For each **1 cup of flour**, you will need:
pinch of salt
1 large egg
300 ml (1 1/4 cup) milk
butter or oil
pan and hot plate for making pancakes
plates and forks
blindfolds for blind taste testing

NB: each cup of flour will make 20 to 25 pancakes (eight cm diameter).

Learning Areas:

1. Science
Strand and Student Outcomes
Natural and Processed Materials - Students understand that the processing of raw materials results in new materials with different properties and uses.

How do grains become foods we eat and what are examples of grain foods?

Student Activity 2.1 The Grain Food Challenge

Materials needed

- library and/or internet for research
- materials for making the packaging for the new food item
- a creative mind
- Optional: a tape or video recorder for producing your advertisement

Activity

The Big Seed Grain Food Corporation
4 Wheatie Rd
Lentil Town 9005
Australia

Dear Creative Genius,

Congratulations, you've got the job! The competition was really tough, but you were the best candidate. You are now the new grain food designer for "The Big Seed Grain Food Corporation". Your task is to design and make a new grain food product to be marketed in Australia and for export. Your food must meet the following criteria:
appealing, easy to eat, easy to digest, nutritious

"The Big Seed Grain Food Corporation" has supplies of all types of grain, and you can choose any combination for your product.

Write out a plan for your new grain food that you can show me. Your plan must answer the following questions:

Who will eat this food?
What will the food look like?
What grains will you use?
How will the grains be processed?
Do you need to use more than one process to achieve the result you want? Describe them.
Will you add non-grain ingredients to your product? List the ingredients. Will these make the process more expensive?
How will you make sure the product is nutritious as well as appealing and easy to eat?
What will you call it?

Once your plan is complete, design and make a package for the new grain food.
When your product is finalised write an advertisement for the product. Your advertisement can be for newspapers, magazines, radio and/or television.

Please be prepared to present your plan, packaging and advertisement at the next management meeting.
Welcome to the team.

Sincerely
The Big Boss

How do grains become foods we eat and what are examples of grain foods?

Activity 2.2 Pancakes Anyone?

Milling is the most common method for processing grain and involves making it into flour. Flour is then processed to make many foods we love to eat. In this activity you will investigate the processes involved in turning grain to flour and then to pancakes.

Materials needed

- Wheat seeds (grains)
- Wheat flour (wholemeal and white)
- A variety of other grains
- Equipment for turning the grains into flour (brainstorm ideas)
  bowl and spoon for mixing pancake batter
- A range of flour types, made from grains other than wheat. (Rice, chickpea and pea flour are available from Asian grocery stores. Health food stores have rye and other cereal flours.)

Activity

1. Compare a handful of wheat seeds with a handful of flour.
2. What do you think has happened to the wheat seeds to turn them into wholemeal flour?
3. What do you think has happened to the wheat seeds to turn them into white flour?
4. Brainstorm milling methods – how could you turn seeds into flour in your classroom?
5. Prepare a 'design brief' for your milling method.
6. Test some of the milling methods.
7. Compare the quality of flour you have made using each method.
8. Rank the methods from best to worst according to the quality of flour produced.
9. Rank the methods from best to worst according to how easy they were to use.
10. Choose your favourite milling method to make flour from 2 grains other than wheat.
11. What differences do you see between your wheat flour and the flour of the other grains?
12. Discuss how you could improve your milling method to improve flour quality.

Challenge Question: What makes good quality flour? Does it depend on what you will make with the flour?

Materials needed

For each 1 cup of flour you will need:
- pinch of salt
- 1 large egg
- 300ml (1 1/4 cup) milk
- butter or oil
- pan and hot plate for making pancakes
- plate, knife and fork
- sugar and lemon juice to put on pancakes

Note: One cup of flour will make about 20 small pancakes·

Method:
Lightly beat the egg and add milk. Sift flour and salt in separate bowl. Slowly pour liquid into the flour bowl, stirring constantly until well combined and the batter is smooth.

How do grains become foods we eat and what are examples of grain foods?

Extension Activity

You will need 1 cup of flour from each grain you have tested - it's time to make pancakes!

13. Use the recipe above to make pancake batter using each of the three flour types.
14. Cook the pancakes.
15. Are there any taste differences between the different types of pancakes? (Try tasting them while blindfolded and see if you can taste any differences).
16. Are there differences in texture between the different types of pancakes?
17. Which flour do you think made the best pancakes?

Challenge Question: List some foods commonly made using the flour types you tested.

Teacher Background Notes - Lesson 3

Why are grains important for an Australian diet and how can they be incorporated?

Because seeds are a plant's way of storing nutrients for its next generation, they are a powerhouse of nutrition. Grains are in the 'eat more' category at the base of the Healthy Eating Pyramid for good reason. Grains supply protein, energy, minerals such as potassium, zinc, phosphorus and iron as well as vitamins, especially the B group.

Grains have been the main source of protein throughout the history of humanity. Cereal grains provide the basis of the diet in most societies around the world. Grain legumes or pulses provide a complementary protein type. Cereals are low in the amino acid lysine but are relatively rich in methionine and cysteine. Pulses have higher levels of lysine but are deficient in methionine and cysteine. Therefore combinations of pulses and cereals provide a complete, balanced protein.

Grains, and foods made from them, are high in carbohydrates (mostly starch and fibre). Carbohydrates are an essential source of energy for the body. During digestion, carbohydrates are broken down to glucose which provides energy for activity and fuel for the brain.

Foods made from grains are major sources of energy, nutrients and dietary fibre in the Australian diet. They account for around 45% of the average dietary fibre intake (National Nutrition Survey, 1995). It is recommended that we eat about 30g of fibre a day for good health. A slice of white bread provides about 1g of fibre, a slice of wholemeal bread about 2g, a bowl of porridge about about 2.5g, a bowl of bran breakfast cereal about 5g and a serving (120g) of baked beans about 6g.

Grains are generally low in fat (oats have a little more than other grains and soybeans are higher than other pulses). The small amount of fats present is mostly of the healthy unsaturated variety.

A common misconception is that bread and pasta are fattening. This is not true. Grain foods are healthy, high energy, low fat, high fibre and high in minerals and vitamins. This is not necessarily true of what is put on the bread and pasta! Butter, cheese or spreads high in fat added to bread can dramatically increase the kilojoules per slice and care should be taken to eat moderate amounts of these high fat foods. Spreads with a lower fat content, such as reduced fat margarine, are a good alternative.

Australian farmers produce some of the highest quality grains in the world and Australians eat large amounts of wheat-based foods. On average, we eat around 51 kg of bread per person per year (ABS, 1996/97), or approximately 4 slices each day. In other cultures, different grains are popular: Latin Americans eat many corn-based products such as tortillas and tacos, Asians eat rice at most meals and in northern Europe rye is commonly used in breads.

As well as being highly nutritious, diets which include foods made from grains (especially whole grains) can help protect against diseases such as heart disease, some cancers, diabetes and obesity. These beneficial effects come from the high fibre and low fat content as well as the wide variety of protective factors such as antioxidants and phytoestrogens which grains contain.

Teacher Background Notes - Lesson 3

How can grains be incorporated into an Australian diet?

The Australian Guide to Healthy Eating recommends that 8-11 year old children eat a minimum of three serves each day of grain-based foods like bread, breakfast cereals, rice, pasta or noodles. Adults need at least 4 serves each day. (1 serve = 2 slices of bread; 1 medium bread roll; 1 cup cooked rice/pasta/noodles; 1 cup cooked porridge; 1 1/3 cups flaked breakfast cereal).

It is easy to incorporate these foods into our diets - cereal and/or toast for breakfast, a sandwich or bread roll for lunch, soup containing pulses and rice/pasta/noodles and/or bread with the evening meal. Grain-based snack foods such as English muffins, plain popcorn, nutritious snack bars, breakfast cereal or low fat instant noodles are healthy ways to replenish energy reserves between meals.

In addition to their healthy attributes, foods made from grains are economical and versatile. Bread, pasta, breakfast cereals, soups and pulses are easy, inexpensive options when compared to pre-prepared meals or takeaways.

If you are not sure what a food is made from, you can find out by reading the label. All foods in Australia are required by law to have an ingredient list - the ingredients are listed from highest to lowest based on weight. If flour is the first ingredient, this means it is present in the product in the highest amount. Some products also provide information about the nutritional value of the food. A nutrition information panel is compulsory only if the manufacturer makes a nutrition claim (eg 'low in fat') about the food.

Cereals and pulses are natural partners because their proteins complement each other (ie amino acids low in one are higher in the other). Many food patterns around the world demonstrate that combining these foods is not only practical and healthy, but also very tasty. Some examples are hommos and pita bread (Middle East) dahl and naan bread (Indian subcontinent), tempeh and rice (Asia) and beans and tortillas (Latin America).

Useful References:

Nutrition for Your Life. 1986. Catherine Saxelby. Reed Books.

What Food Is That and How Healthy Is It? 1990. J. Rogers. Weldon Publishers.

Passion for Pulses: A Feast of Beans, Peas and Lentils from Around the World. 1999. Nancy Longnecker. Tuart House of UWA Press.

A Baker's Dozen – A compehensive manual supporting the teaching of science and technology, Years 3-8. 1992. Jeanne-Marie Bernier. The Bread Research Institute of Australia. North Ryde, NSW.

Wheat: The Story of Wheat on Australian Farms. 1994. Kondinin Workboot Series. Available in most school libraries.

The Bean Files - an internet based teaching resource for years 5 to 7
www.clima.uwa.edu.au/beanfiles

Lesson 3 - Student Activity 3.1; 3.2

Why are grains important and how can they be incorporated into an Australian diet?

Student Activity 3.1 Favourite Foods. Identifying and using grain foods.

Materials needed to make pasta:

- **wheat flour (2 cup)**
- **3 large eggs (beaten)**
- **rolling pin**
- **knife**
- **boiling water**

Materials needed to make lentil sauce:

- **electric fry pan**
- **1 cup of dried red lentils**
- **2 tablespoons of olive oil**
- **1 large onion, chopped**
- **2 cloves garlic, crushed**
- **2 tbsp tomato paste**
- **1/2 tsp cinnamon powder**
- **6 tomatoes, chopped**
- **2 1/2 cups of water or stock**
- **1 tsp oregano**
- **1 tsp thyme**
- **salt and ground black pepper**

Learning Areas:

1. Studies of Society and Environment / Human Society and Its Environment

Strand and Student Outcomes

Investigation , Communication and Participation - process and interpret information, evaluate and apply findings.

2. Technology and Enterprise

Strand and Student Outcome

Technology Process - students engage in critical and analytical thinking when generating creative and innovative ideas.

3. Health and Physical Education

Strand and Student Outcome

Concepts for a Healthy Lifestyle - students distingiush between food and non-food substances, and contribute to activities involving food and its preparation.

Student Activity 3.2 International Grains

Materials needed:

- **library or internet for research**
- **information from friends / family with a multicultural background**
- **information from cooking shows on TV**

Learning Areas:

1. Studies of Society and Environment / Human Society and Its Environment

Strand and Student Outcome

Beliefs and culture - students develop understanding that people's beliefs shape their cultural practices.

Why are grains important for an Australian diet and how can they be incorporated?

Student Activity 3.1 Favourite Foods

Introduction

We all know that a healthy diet includes grains. What are the foods that contain grains and which are the grains you eat?

Materials needed

library and or internet for research
information from food packaging (available in grocery stores)
information from friends / family with a multicultural background

Activity

1. Make a list of your 10 favourite foods.
2. Tick the foods on your list that contain grains, and name the grain or grains they contain.
3. Find out the ingredients in each of the processed foods you've listed (this may require some serious research).
4. Revise your list of grain-containing foods if necessary.
5. Were you surprised to find grains as an ingredient in any of your favourite foods? (Check out the ingredients on a can of Milo - is this a grain food?)
6. Make a list of 10 foods you like that originated outside Australia.
7. List the grains contained in these foods
8. Are these different to the grains in your 'ten favourite foods' list?
9. Discuss reasons why different grains are used in foods of different countries.
10. Use the food lists you have made to design a 3 course meal. Each course should contain grain foods.

Grains are rich in fibre and fibre is an important part of a healthy diet. Some types of processing decrease fibre content. Which of your favourite grain foods are rich in fibre?

Why are grains important for an Australian diet and how can they be incorporated?

Extension Activity

There are many yummy ways to increase the number of fibre-rich grain servings in our daily diet. Pasta and meat sauce is a very popular Australian meal. Pasta is made from wheat and is a grain food. Pasta made from wholemeal flour has a higher fibre content. Adding a lentil sauce to pasta makes a nutritious, yummy, fibre-rich food - so make, eat and enjoy!

Making Pasta with Lentil Sauce (these ingredients make enough for 4 large dinner-sized servings)

Materials needed to make pasta:
wheat flour (2 cup)
3 large eggs (beaten)
rolling pin
knife
boiling water

1. Make a well in the centre of the flour and add the beaten egg.
2. Mix the flour into the egg with a fork.
3.With your hands, knead the dough until smooth.
4. Cover the dough with clean tea towel, leave at room temperature for 1 hour.

Make the lentil sauce, then finish the pasta.

After the dough has rested:
1. Put some flour on the surface where you will roll out the pasta dough.
2. Divide the dough into 2 or 3 smaller balls.
3. Roll out the dough, one ball at a time, with a rolling pin, turning it over occasionally and keeping the work surface dusted lightly with flour.
4. When pasta is thin, cut into strips with a knife.
5. Add strips to boiling water. Boil for 5 minutes, drain and serve.

Materials needed to make lentil sauce*:
1 cup of dried red lentils
2 tablespoons of olive oil
1 large onion, chopped
2 cloves garlic, crushed
2 tbsp tomato paste
1/2 tsp cinnamon powder
6 tomatoes, chopped
2 1/2 cups of water or stock
1 tsp oregano
1 tsp thyme
salt and ground black pepper

Instructions:
1. Rinse the lentils and soak in hot water while preparing other ingredients.
2. Saute onion and garlic in oil until transparent.
3. Drain lentils; add with tomato paste. Cook for 2-3 minutes.
4. Add cinnamon, tomatoes, water and herbs.
5. Bring to the boil; reduce heat. Cover and simmer for 15 minutes until lentils are tender.
6. Season with salt and pepper.
7. Serve on top of freshly cooked pasta.

* Recipe modified from Passion For Pulses - a feast of beans, peas and lentils from around the world. 1999. UWA Press.

Challenge Question: Collect and review food packages containing nutritional information or do library research on nutritional information.

Grain products such as flour are added to processed foods for a number of reasons. One reason is the nutritional value of grains.
Use the library and information from food packages to research the answers to the following questions:
1. What are some other reasons grains are added to processed foods?
2. Do grains retain their nutritional value in most processed foods?

Why are grains important for an Australian diet and how can they be incorporated?

Student Activity 3.2 International Grains

Materials needed

library and/or internet for research
information from friends/ family with a multicultural background
information from cooking shows on TV

Grains are an important part of the human diet, and all cultures have their own special ways with grains. In Australia, bread is the most commonly eaten grain food, and bread is most commonly used to make sandwiches. In this activity you will find out about the huge range of grain foods eaten all over the world.

Activity

1. Choose a country to research (perhaps your family's country of origin).
2. Find out what grains are used in your chosen country. Are there traditional foods which use particular types of grains? Are these grain foods eaten at special times of the year or for special occasions? What are some examples?
3. Are there particular combinations of grains that make up traditional foods in the country you have researched?
4. Why are these grains combined? Are there nutritional or other reasons (such as appearance or taste) for these grain combinations? If so list these reasons.
5. Make a poster showing the traditional foods from your country .
6. Compare the foods from your chosen country with the foods from other groups your class has researched.

It would be great to finish this lesson with a sample of some traditional grain foods from other countries. You could make them in class or make them at home and possibly bring some into the classroom for everyone to taste.