

## CHAPTER 6

# Cereals and grains

### ACCESS PRIOR KNOWLEDGE

- 1 List the different types of cereal grains eaten throughout the world.
- 2 Identify the staple grains of China, Indonesia and Japan.
- 3 Explain where and when the first cereal grain was cultivated.
- 4 Compare the bran, the endosperm and the germ.
- 5 Suggest how rice and wheat can be used in the preparation of different food items.
- 6 Discuss the reasons why cereal grains are so important in our Australian diet.

## 6.1 Cereals: The basics

**Cereals** or cereal grains are grasses cultivated (grown) for their edible parts or seeds. Grain foods, which include cereals, are the dietary staples for many cultures. For us in Australia, wheat is the most important cereal.

**cereals** Grains used for food, such as wheat and maize.

### History of cereals

The word 'cereal' is derived from Ceres, the name of the pre-Roman goddess of harvest and agriculture. People have enjoyed grain foods for at least the past 10 500 years. It is believed that people started to **cultivate** weeds and grasses in fertile regions in the Middle East.

**cultivate** To prepare the land and soil for the growing of crops and cereal grains.

In China, 1000 years later, rice and millet were cultivated from wild grasses and corn was the main grain being cultivated in America.

### 6.1 LET'S COLLABORATE

With a partner, name the countries that are well known for their use of wheat, rice and corn (maize). Can you think of any recipes that use each of these? Name the country or culture from which these recipes/dishes originate.

#### Tasty Trivia

Many myths and legends are associated with grains. The goddess Demeter gave wheat to the Greeks; in Egypt, the god Ra gave his people grains; and the Aztecs gave thanks to their corn goddess with amaranth grain products.



**Figure 6.1** A variety of cereal grains

#### Tasty Trivia

Sago comes from the sago palm, which grows in South-East Asia. When it is processed, it looks like little balls or pearls. To collect the sago, the bark from the trees is peeled back from the trunk and the inner section is cut into pieces. The pith is scooped out and ground into powder, which is then washed and dried into flour. The pearls are made by washing the wet starchy paste through a sieve, which is on a hotplate drying the paste quickly into small balls.

*Sago gula melaka* is a sago pudding made in Malaysia by first boiling sago in water and then adding palm sugar syrup and coconut milk.



# Sago pudding



## Main tools and equipment

Saucepan, strainer, zester, measuring spoons, measuring jug

## Production skills

Combining

## Cooking processes

Boiling

## Ingredients

			
1 litre water	200 g sago	30 ml coconut cream	1 teaspoon vanilla
			
1 tablespoon honey	150 ml cream	Zest of half a lemon	

## Method

- 1 In a saucepan, bring the water to the boil and cook the sago until it is transparent.
- 2 Strain and rinse with cold water to remove some of the starch.
- 3 In a saucepan, combine the coconut cream, vanilla, honey, cream and lemon zest.
- 4 Bring to the boil.
- 5 Cook until liquid has reduced by a third. Remove from heat and add to cooked sago.
- 6 Transfer to serving glasses and either serve warm or place in the fridge to chill and serve cold.

## SERVES 2



Preparation time: 10 minutes



Cooking time: 40 minutes



Serving and presentation time: 5 minutes



Total time: 55–60 minutes



## 6.2 LET'S COLLABORATE

### Sustainable practice

Examine Figure 6.2. With the class, discuss the way in which rice is harvested and estimate the hours required to harvest just 1 square metre of land.

Discuss with a partner why rice is such a difficult crop to grow. Much of the rice we eat is grown overseas. How does this impact on the number of global miles that a rice grain has to travel before we eat it?

During a meal that includes rice, how much becomes waste or rubbish? Consider the impact of this in terms of harvest time and food waste.



Figure 6.2 Rice fields in China

## 6.3 INVESTIGATE IT

### Countries of origin

Conduct an internet search to find out where one of the cereal grains listed below originated. (Be sure that the class covers all the grains listed.) Prepare a visual display (poster or PowerPoint presentation) to explain your findings. Be sure to include a map that shows where the grain was first cultivated:

- wheat
- rice
- corn
- oats
- rye
- barley
- spelt
- millet
- quinoa
- amaranth
- kamut.

## REFLECT ON LEARNING

- 1 Explain how a cereal grain is cultivated.
- 2 Identify the staple grain in the Australian diet.
- 3 Make a list of the different types of cereal grains. Place a tick next to those that you have eaten.
- 4 Cereal grains have been cultivated for many years. Evaluate the reason why they are so important to so many cultures.
- 5 Copy out the list below into your workbook or on to your computer and underline the six cereal or cereal products:
  - bread
  - salami
  - tomato juice
  - spaghetti
  - olives
  - cornflakes
  - brown rice
  - cheese
  - porridge
  - yoghurt
  - cornflour
  - beans.

## 6.2 Structure of cereals: Physical properties

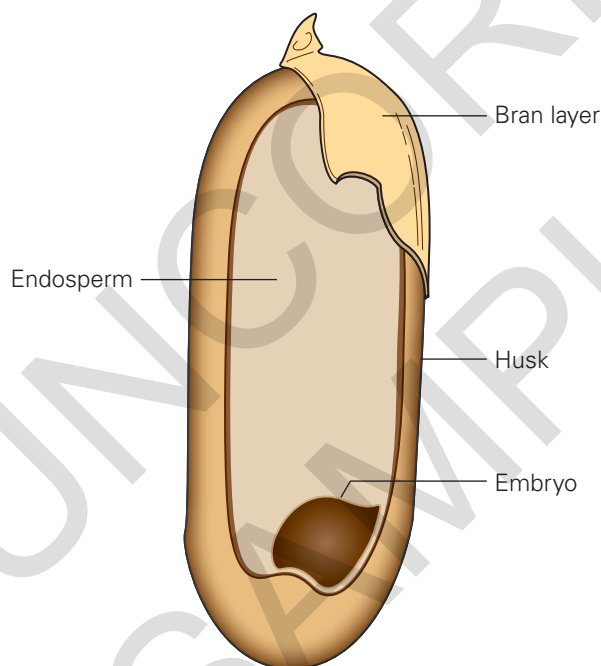
Grains consist of three main parts:

- 1 The **bran** – the protective outer layer of the grain. This outer husk is often removed during processing. The bran is high in dietary fibre and B group vitamins.
- 2 The **endosperm** – the main part of the grain. The endosperm contains starch: carbohydrates, protein and some vitamins and minerals.
- 3 The **germ** – the smallest part of the grain and the seed for a new plant. This part of the grain contains B group vitamins, some proteins, minerals and **essential fatty acids**.

**bran** The protective outer layer of the grain.

**endosperm** The main part of the grain.

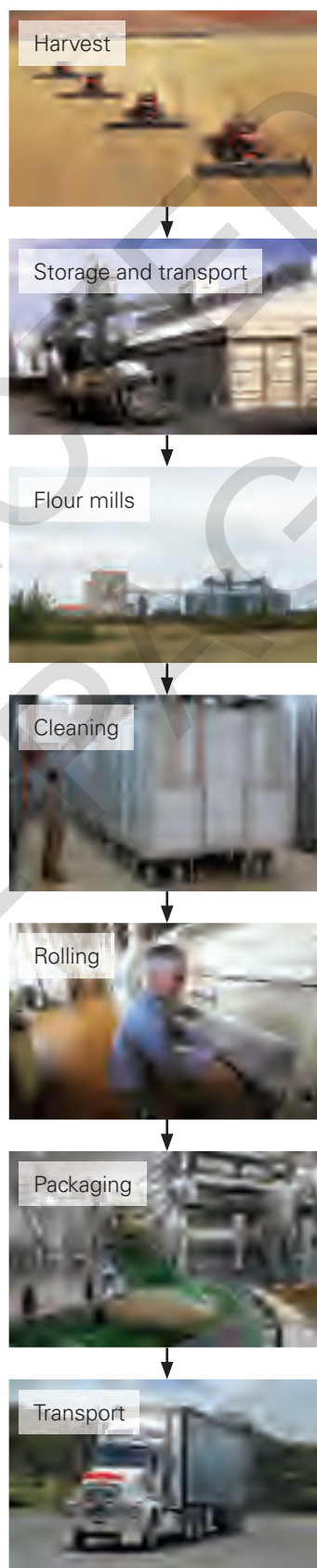
**essential fatty acids (EFA)** 'Good' fats; the body does not produce these, so they must be consumed from food. Examples of foods that supply EFA are nuts, avocado and fish.



- Starchy endosperm – the centre part of the rice grain where starch is stored.
- Bran layer – outer bran layer, which is high in dietary fibre; this is removed from brown rice to produce white rice.
- Husk – the dry outer covering.
- Embryo – sometimes called the germ.

**Figure 6.3** Cross-section of a cereal grain

## Primary production: Wheat into flour



**Figure 6.4** The stages of processing wheat into flour

## 6.3 Health claims: A focus on folate

In Australia, **nutrition content claims** are allowed to be printed on food labels and used in product advertising, but the law prohibits the use of **health claims**. An

**nutrition content claims** Statements made by a manufacturer about the amount of a nutrient, energy or a biologically active substance in the food.

**health claims** General health claims describe a relationship between the consumption of a food, or a component in the food, and a health benefit. High-level health claims describe the function of a food, nutrient or other substance in relation to a serious disease – for example, heart disease. High-level health claims must have approval from Food Standards Australia and New Zealand.

example of a nutrient claim is ‘dietary fibre helps keep you regular’. Nutrient claims also refer to the absence or low levels of a nutrient – for example, when a product is labelled ‘low in cholesterol’.

A product needs to meet specific criteria in order to make this claim. For example, a food that is described as ‘low in cholesterol’ must contain no more cholesterol than 20 milligrams per 100 grams of solid food. There is also a list of criteria that examine the energy, saturated fat, sodium, sugar, fibre and amount of fruit that is in the food. If a product does not meet these criteria, the claim cannot be made.

Despite legislation regulating nutrient claims on food products, products are often labelled simply to appeal to consumers and encourage people to buy them because of their perceived health benefits.

Health claims make a direct connection between consuming a food product or nutrient found in the food and the decreased risk of a specific disease. An example of a health claim would be that eating the product will prevent the development of bowel cancer. To have the right to display a health claim, it must be proven that the foods are completely safe, effective and able to perform what has been promised.

The only health claim permitted in Australia is regarding folate. This is allowed because there is conclusive evidence demonstrating the benefit of folate before and during pregnancy in the prevention of neural tube defects such as spina bifida in babies. In

**mandatory** Something that is compulsory.

2007, **mandatory** minimum and maximum levels of folate were introduced for bread to reduce the risk of neural tube defects.

## 6.4 LET'S COLLABORATE

- 1 You have probably eaten the bran layer of the cereal grain. Bran is often eaten for breakfast. Can you think of any breakfast cereals that contain bran? Perhaps you have seen some advertised on television. Discuss with a classmate.
- 2 Visit the supermarket and find five breakfast cereals that contain bran.
- 3 Bran contains important B group vitamins. List some of the B group vitamins.
- 4 Do you know the function or food sources of any of these vitamins? Compare your knowledge with that of a partner.
- 5 Find out about the nutritional content of the endosperm and the germ.
- 6 Develop a list of food products that contain the endosperm and the germ.

## There are so many types of cereals!

A number of different cereal grains are eaten throughout the world. They include wheat, rice, barley, oats, rye and corn. They can be eaten as wholegrain cereals and are often processed or made into refined cereals. Both wholegrain and refined cereals play a significant part in the diet of most Australians.

### Tasty Trivia

Research carried out in 2000 showed that eating one serve of wholegrain cereal every day can reduce the risk of developing type 2 diabetes.

## 6.5 INVESTIGATE IT

Log on to the Better Health Channel and identify the other health benefits associated with wholegrain cereals.





## 6.6 ACTIVITY

### Cereal grain or cereal product?

Rearrange the following words and then write them out in your workbook or on your computer to discover the many different types of cereal grains and cereal products:

- |              |                   |
|--------------|-------------------|
| • osta       | • rncoroulf       |
| • wteha      | • astpa           |
| • yer        | • yelbar          |
| • nroc       | • bnar            |
| • icer       | • imzea           |
| • draeb      | • sekalfnrco      |
| • olelrdaots | • alemurofleohwl. |



## 6.7 INVESTIGATE IT

- Using the list of cereal grains that you have unjumbled above, find out which cereal grain gives us which food. Use your own knowledge, food labels and books in your school library or the internet to find out which foods come from which cereal grain.
- For more information on how to include wholegrains in your daily diet, visit the Cancer Council Australia website (via the link at [www.cambridge.edu.au/foodyou1weblinks](http://www.cambridge.edu.au/foodyou1weblinks)).

## Cereals and wholegrain foods

According to the Better Health Channel:

High-fibre foods such as wholegrain cereal products increase movement of food through the digestive tract. The result is increased stool (faeces or poo) bulk, softer and larger stools and more frequent bowel actions. This provides a good environment for beneficial bacteria, while decreasing levels of destructive bacteria and the build-up of carcinogenic compounds. Wheat fibre can bind certain toxins and remove them from the large bowel.

A high-fibre diet, especially one high in insoluble fibre, has been associated with decreased risk of developing colon cancer and diverticular disease (a condition where 'pouches' form in the wall of the intestine).



## 6.8 LET'S COLLABORATE



- List the wholegrains that you have eaten in the last month.
- Discuss with the class the importance of wholegrain cereals in our diet.



**Figure 6.5** Have you ever looked at the product label on your favourite breakfast cereal? Which grain is it made from?



## 6.9 ACTIVITY

### Classify the grains

Copy and complete the table below by looking at the list of cereal products and classify them according to the grain from which they originate: rice noodles, wholemeal bread, sweet biscuits, sponge cake, popcorn, corn chips, rice crackers, custard powder, Corn Flakes, Rice Bubbles, Weet-Bix, puffed wheat, cornflour, ground rice, pasta, burghul, corn oil, wholemeal flour, sweet corn, couscous, tortilla wraps, corn bread, taco shells, wheat.

Rice	Wheat	Corn (maize)



## 6.10 ACTIVITY

### Popcorn cooking processes

Popcorn is a wholegrain that can be cooked quite easily, either on the stove top or in the microwave. Work as a class group and follow the instructions on the pack to prepare one quantity of popcorn on the stove top and one quantity of popcorn in the microwave, then answer the following questions.

- 1 Make a list of the 'other' ingredients required to prepare both types of popcorn.
- 2 List the safety precautions that should be followed when preparing popcorn on the stove top and in the microwave.
- 3 Identify the more time-efficient method of preparing popcorn.
- 4 Explain how the microwave popcorn has been changed or processed compared with the original corn grain for the stove-top popcorn.
- 5 Develop a list of other ingredients that could be added to the popcorn to change the flavour.
- 6 Taste-test each type of popcorn and complete a sensory analysis:
  - a Indicate the popcorn with the taste that you preferred.
  - b Compare the texture of the two popcorns.
  - c Explain how the popcorn cooked on the stove top could be prepared differently to enhance its flavour.





## Wholegrain cereals

**wholegrain** The fibre-rich outer coating of bran, the central endosperm and the nutrient-packed inner germ of the grain.

**phytochemicals** Chemicals found in plants that can help to prevent disease.

**Wholegrain** cereals contain all three layers of the grain and are a rich source of many essential vitamins, minerals and **phytochemicals**.

The beneficial nutrients and phytochemicals found in cereals occur in the outer layers of grains

such as wheat, rice, corn, millet, sorghum, barley, oats and rye.

Wholemeal foods are made from wholegrains that have been milled to a finer texture rather than being left whole in the final product. Nutritionally, wholegrain and wholemeal foods are similar.

Wholegrain cereal products include wholemeal or wholegrain breads or crispbreads, dark seedy breads, wholegrain breakfast cereals, wheatgerm, brown rice, puffed wholegrains, bulgar, popcorn and oatmeal.



### 6.11 ACTIVITY

#### Understanding dietary fibre

#### Wholegrain cereals and healthy eating

Eating wholegrain cereals, which include the outer layers, can make an important contribution to preventing diseases. The outer layers are rich in dietary fibre and have a number of other components that may help to prevent cancer and heart disease as well as other health problems. Fruit and vegetables are very valuable as part of a healthy diet, but it is important not to forget wholegrain cereals.

It is suggested that we substitute wholegrain or wholemeal cereals for at least half of the cereals eaten daily (bread, rice, breakfast cereals, etc.) instead of consuming whiter products.



*Source: G. McIntosh, 'Cereal foods, fibre and the prevention of cancers', Australian Journal of Nutrition and Dietetics, (2001), 58: 35–48.*

Read the information from this article and complete the following questions:

- 1 Use the knowledge that you have gained from this chapter and Chapter 4 to explain the function of dietary fibre in the body.
- 2 The outer layers of the wholegrain cereal are most beneficial in terms of health. Identify the nutrients that these layers contain.
- 3 It is suggested that we substitute wholegrain cereals for white and refined cereals. Make a list of 10 wholegrain products that you could consume instead of white and refined cereals.
- 4 Conduct some further investigating and find out how wholegrains can decrease the risk of heart disease and type 2 diabetes.

## Refined cereals

When grains are **refined**, milled or ground – for example, to produce white flour – the bran and germ

**refined** When the composition of the cereal grain is altered, the bran is often removed to make the cereal grain easier to use.

**glycaemic index (GI)** The ranking of carbohydrates according to their effect on our blood glucose levels.

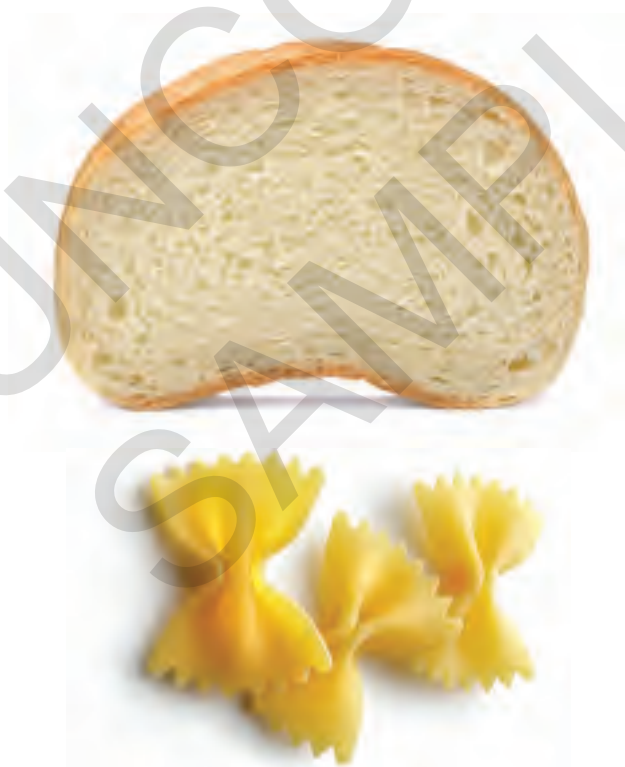
layers generally are removed, leaving only the endosperm. This refining process results in the loss of many nutrients, including dietary fibre, vitamins, minerals and important phytochemicals. Refined cereals generally have a higher **glycaemic index (GI)** than wholegrain cereals. This means that eating refined cereals causes a sharp rise in blood

sugars, demanding a strong response from the pancreas. Ultimately, excessive consumption of these food products can result in many diet-related health issues.

Refined cereals include cakes, desserts, white bread, pasta, muffins, sweet or savoury biscuits, refined breakfast cereals, white rice, pancakes, waffles and pizza.

### 6.12 LET'S COLLABORATE

People who eat too many refined cereals often have health-related illnesses. Work with a group of two or three others to develop a list of these health issues.



### 6.13 LET'S COLLABORATE

With a partner, list 10 refined cereal products that you can think of. This is any food product that is made from a processed cereal grain.

#### Tasty Trivia

Sometimes the fibre that is added back into refined cereal products is from vegetable fibre. Some breads contain hi-maize, which is a resistant starch that comes from corn.

### 6.14 INVESTIGATE IT

Find out more about hi-maize by going to the Ingredion website. Use the internet to develop a list of food items that contain hi-maize.



**Figure 6.6** Tip Top 'The One' bread, produced with resistant starch.



## 6.15 ACTIVITY

### Be a supermarket sleuth

- 1 Visit the supermarket or a supermarket website, then copy and complete the table below. Identify 10 different refined cereal products. Remember that ingredients had to be added to these products to make them nutritionally beneficial.
- 2 For each food item that you find, list any additives or preservatives that they contain.
- 3 Find out what additives and preservatives are. Explain the reason why they are added to foods.

	Food product	Ingredients added	Additives or preservatives found in this food product
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

- 1 Discuss whether or not it was hard to find these products in the supermarket. Explain why.
- 2 Of the 10 products that you listed:
  - a Do you currently eat any of them?
  - b Would you consider eating any of them? Explain why/why not.
- 3 Provide an outline of the different ingredients that are added to the cereal products. In your response, discuss the reasons why these ingredients are added.
- 4 Suggest why you think food manufacturers develop these products. (Is it really just to make us healthier?)

## DESIGN BRIEF: AFTERNOON TEA BISCUITS

Your grandmother and other family members are coming for afternoon tea and you have been given the job of making biscuits that can be eaten with a cup of tea or coffee. Be aware when creating your solution that your aunt is allergic to any type of tree nut.

The recipe for Biscuits with a Crunch on p.151 is your starting point. Alter the recipe by adding ingredients or changing ingredients to produce your own Biscuits with a Crunch.



# Biscuits with a crunch

## Main tools and equipment

Saucepan, measuring spoon, measuring cups, oven tray, tablespoon, fork, wire rack

## Production skills

Combining, rolling

## Cooking processes

Simmering to melt, baking

## Ingredients

 75 g butter	 1 tablespoon golden syrup	 ½ cup brown sugar	 ¼ cup coconut
 1 cup rolled oats	 1 tablespoon flaked almonds, toasted	 ¼ cup flour	

## Method

- 1 Melt butter, golden syrup and brown sugar in a saucepan.
- 2 Remove saucepan from the stove. Add the coconut, rolled oats, almonds and flour to the saucepan and mix until combined.
- 3 Lightly grease an oven tray.
- 4 Using a tablespoon, roll tablespoon-size balls of mixture.
- 5 Place each ball of mixture onto the oven tray, allowing room for the biscuits to spread.
- 6 Flatten balls with a fork.
- 7 Place the tray in the oven and bake at 180°C for 10 to 15 minutes or until lightly browned.
- 8 Cool on a wire rack.

## MAKES 16



Preparation time: 40 minutes



Cooking time: 5 minutes on the stove top, 10–15 minutes baking



Serving and presentation time: 5 minutes



Total time: 60–65 minutes



# Biscuits with a crunch – continued

## Evaluating

- 1 Provide the reasons why it is important to include cereals in your diet.
- 2 Explain the condition known as anaphylaxis. In your response, explain how this relates to tree nuts.
- 3 Discuss the function of the oats in digestion in the Biscuits with a Crunch recipe.
- 4 List the ingredients that you changed. Explain why you changed these ingredients.
- 5 Discuss how this would change the nutritional content of the biscuit.
- 6 Sensory activity: Complete a sensory analysis by describing the taste or flavour, texture, aroma and appearance of your biscuit.
- 7 Ask a fellow class member to taste-test your biscuit. Detail their sensory analysis.
- 8 Based on your sensory analysis and that of your fellow class members, critically evaluate your Biscuits with a Crunch.

## REFLECT ON LEARNING

- 1 Name the three sections of a cereal grain.
- 2 Identify and explain the function of the three parts of the cereal grain that provide the greatest benefit to the body nutritionally.
- 3 Complete the table below to compare the wholegrain cereals and the refined cereals.

Wholegrain cereals	Refined cereals

- 4 Explain how refined cereal products can be made more nutritionally beneficial. Provide an example of a refined cereal product that has had its nutritional content improved.

## 6.4 A focus on nutrition: Chemical properties

Cereal grains are an excellent source of energy; they provide the body with large amounts of carbohydrates, starch, dietary fibre and protein. Wholegrains are also excellent sources of dietary fibre, essential fatty acids and B group vitamins.

Cereal grains supply the average person in Australia with about 20 per cent of their daily nutritional requirements.

Starch is the main carbohydrate found in cereals. Starch is a polysaccharide, a natural substance found in

the cereal grain; when digested, it produces **glucose units**.

The nutrients found in cereal products depend on how they are processed and the amount of processing they undergo. If a cereal grain is milled, both the bran and the germ are removed. This leaves only the endosperm, which is the least nutritional part of the grain. Milling reduces the vitamin, mineral and dietary fibre content of cereal grains.

Wholegrain cereals contain many different phytochemicals that have been linked to significant health benefits. Lignans, for example, can lower the risk of coronary heart disease.

**glucose unit** A sugar energy source produced in plant products.



**Figure 6.7** Have you tried wholegrain pasta yet? It is much healthier than pasta made from refined flour.



**Figure 6.8** Wholemeal flour is more nutritious than white flour, which has been through many processes.



## 6.16 ACTIVITY

### All cereals are healthy, aren't they?

This activity requires you to find out just how healthy the breakfast cereals available in the supermarket really are.

Choose four breakfast cereals that are available at the supermarket. Perhaps you will need to visit the supermarket or you may just be able to use your pantry at home.

Record information from the back of the pack of four breakfast cereals, using the nutritional information panel. Copy and complete the table below for each of the breakfast cereals. Make a valid judgement about which breakfast cereal would give you the best start to the day. Explain the reasons for your choice.



#### Cereal 1:

Price:	Total carbohydrate:
Servings per package:	Dietary fibre:
Serving size:	Sugars:
Energy:	Thiamin:
Protein:	Riboflavin:
Total fat:	Niacin:
Saturated fat:	Iron:
Sodium:	Folate:





## 6.16 ACTIVITY continued

- 1 Suggest the cereal that provides the best value for money.
- 2 Identify the cereal that is lowest in:
  - a fat
  - b sodium
  - c sugars.
- 3 Identify the cereal that is highest in fibre.
- 4 List the cereal that has the largest quantity of vitamins and minerals per serve.
- 5 Discuss the cereal that you would rank as the most nutritious overall. Explain the reason for your answer.
- 6 Thinking about sensory properties, which cereal would you rather eat? Explain the reason for your answer.
- 7 Think about the average serving size. Explain the serving size that you would have of this cereal. (You may need to use measuring cups to complete this question.) Explain how realistic the average serving size is.
- 8 Explain how this portion size should affect your evaluation of nutrition label information. Would you need to multiply the nutritional information by two or divide it? Prepare a new list of the nutritional information, taking the serving size that you would eat into consideration.
- 9 Identify the type of milk that you pour on your cereal.
- 10 Explain how this type of milk affects the nutritional value of the cereal.
- 11 Explain how much (if any) sugar you add to your cereal before eating it.
- 12 Explain the way in which added sugar affects the nutritional value of the cereal.
- 13 Discuss the following statement: 'Ready-to-eat breakfast cereals are a great way to break the overnight fast, but the choice of breakfast cereal, the processing it has been through, extra ingredients added and what we add to this cereal ourselves have a huge impact on its nutritional value.'

## 6.5 Cooking: The functional properties of cereals

Raw cereals cannot be taken in by the body – they are not very tasty and the body is unable to digest them. The cooking of cereal grains softens the outer bran layer of the grain and breaks this down in order to make it more digestible.

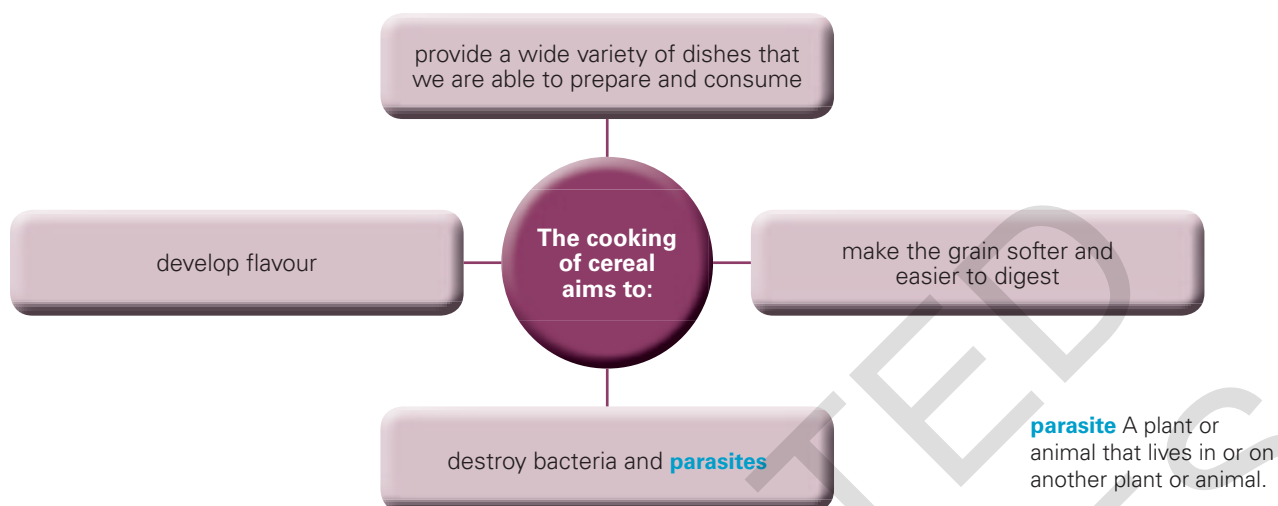
When cooking cereals using any method, except browning or toasting, it is always necessary to use liquid of some kind. The quantity used, however, varies with the kind of cereal that is to be cooked. Whole and coarsely ground cereals require more liquid than those that are finely crushed.

Cooking time also varies with the kind or form of cereal to be prepared. The coarse cereals require more time than the fine cereals. A good rule to remember when cooking cereals is that they should always be allowed to cook until they can readily be crushed between the fingers, but not until they are mushy in consistency.



## 6.17 LET'S COLLABORATE

- 1 Think quickly and list the dishes that can be made using rice. Compare your list with that of your partner and add those they have thought of that you didn't.
- 2 Have a class competition to see which partnership can develop the longest list.



**Figure 6.9** The purpose of cooking cereal.



**Figure 6.10** Compare the difference between the uncooked and the cooked grain – what do you observe?

## REFLECT ON LEARNING

- 1 Explain the reason why raw cereals can't be digested by the body.
- 2 Identify how cooking alters cereal grains.
- 3 \_\_\_\_\_ is always required when cooking cereals (fill in the gap).
- 4 Identify the type of cereal grain – fine or coarse – that requires more cooking time. Discuss the reason for this.
- 5 Explain how we know when a cereal is cooked. In your response, detail what has occurred during the cooking process.

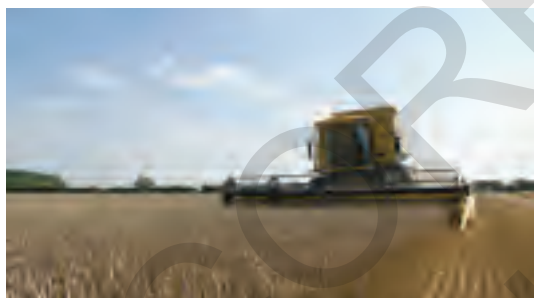
## Check out wheat

Wheat is the most commonly grown cereal in the Western world. The wheat grain is milled to provide flour and can be processed to make many other products, including breakfast cereals.

Wheat originated in the Middle East, in an area called Mesopotamia, now part of Iraq. People have been growing wheat for thousands of years. Australia's first wheat was grown in the area that is now the Botanic Gardens in Sydney. The first farmer of wheat was a convict by the name of James Ruse. During the nineteenth century, wheat farms were established in all the Australian colonies.

### Tasty Trivia

About 25 000 farms in Australia grow wheat as a major crop. Depending on the variety, sowing starts in mid- to late April and ends in May/June. If the soil is moist, the wheat seeds will sprout in five to seven days and take five to seven months to mature. Discuss the impact that weather or other climate-related factors can have on wheat production.



## Uses for wheat

Wheat is **milled** into flour and other products, and these are used to make many types of food. Bread is one of the oldest and most diverse foods that is made from wheat. Biscuits, cakes, pastry dough made for biscuits, Middle Eastern flat or pocket breads, pasta and noodles are all produced from wheat.

**milling** The process that makes cereal grains into flour or meal.

### Tasty Trivia

**Gluten** and **starch** are the two main components of flour. They are found in an amazing number of commercial products. Gluten is found naturally in flour and is used to make better breads and buns. It is also used in pet food, smallgoods, glues and other chemicals. Starch has many uses, including in confectionery, soft drinks, cordials, food thickeners, glue and paper making.

**gluten** A mixture of two different types of protein found in cereal grains.

**starch** A carbohydrate made in plants that provides energy to the human body.

## Flour

Flour that is used in baking comes mainly from wheat, although it can be milled from corn, rice, nuts, legumes and some fruits and vegetables. The type of flour used is vital for getting the product you are making right. Different types of flour are suited to different recipes and all flours are different. You cannot switch from one type



**Figure 6.11** Australian wheat was first grown on the site of what is now the Botanic Gardens in Sydney.





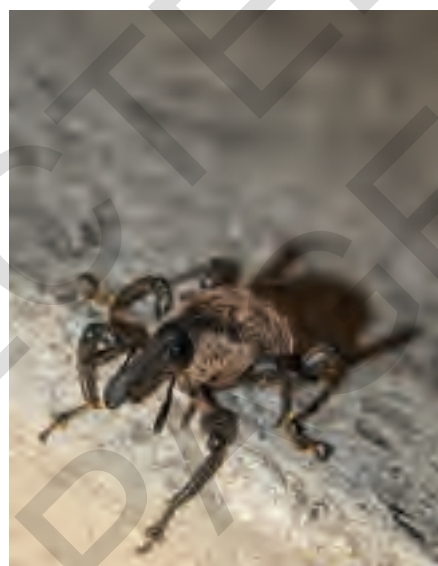
**Figure 6.12** General-purpose wheat-growing areas of Australia.

of flour to another without consequences that could ruin the recipe. To achieve success in baking, it is important to know what the right flour is for the job.

The different types of flour products are outlined in Figure 6.13.



The wheat weevil (also known as the grain or granary weevil, *Sitophilus granarius*) damages stored cereal grains. Weevils are often found in cereal and grain products. They can sometimes be seen when opening a bag of flour, although they will also infest most other types of grain, including oats, barley and breakfast cereals. If ingested, *E. coli* infection and various other diseases can be contracted from weevils, depending on their diet.



**Figure 6.14** Weevils damage stored cereal grains.

Flour product	How is it produced?	Uses in cooking
Plain flour (all-purpose flour)	All-purpose flour is a blend of hard and soft wheat; it may be bleached or unbleached. All-purpose flour is one of the most commonly used and readily accessible flours in Australia.	Cakes, biscuits, scones, batters, food thickeners and coatings
Self-raising flour	Self-raising flour is low-protein flour with salt and a <b>leavening</b> agent already added. <i>Remember:</i> if a recipe requires self-raising flour, do not add extra salt or leavening agents.	Biscuits, quick breads, muffins
Wholemeal flour	This type of flour is made from the whole kernel of wheat and is higher in dietary fibre and overall nutritional content than white flours. It does not have such a high gluten level, so often it is mixed with all-purpose or bread flour when making yeast breads.	Bread, biscuits, scones
Bread flour	Bread flour is white flour made from hard, high-protein wheat. It has more gluten strength and protein content than all-purpose flour. It is unbleached and sometimes conditioned; this increases volume and creates better texture.	All types of bread products
Semolina flour	Semolina is made from durum wheat, the hardest type of wheat grown. This type of flour has the highest gluten content.	Pasta, Italian puddings

**Figure 6.13** A range of different flour products

**leavening** A raising agent that is added to cereal products like bread to make them rise.

## CREATE A SOLUTION

There are many different types of flour. Each can make a wide variety of food products.

1 Choose one of the flour types from the list below:

- arrowroot flour
- banana flour
- barley flour
- buckwheat flour
- cassava flour
- chickpea flour
- cornflour
- gluten-free flour
- potato flour
- rice flour
- rye flour
- tapioca flour
- taro flour.

2 Investigate the flour and then create a final food item that you can share with your class. Identify the cereal grain or other plant food from which the flour type originates and the country that makes the most use of this flour type.

3 List five dishes/recipes that can be prepared using this flour. Explain the reason why this type of flour is most suitable for these dishes/recipes.

4 Choose one recipe using this flour type and then explain the decision-making process you used. Justify why you chose this recipe.

5 Produce this recipe in class and share your final food item with your fellow students.

6 Reflect on your decision-making process and critically evaluate how you could change or adapt this recipe if you were to produce it again.



## DESIGN BRIEF: BREAD AROUND THE WORLD

There are many different types of breads consumed throughout the world. Think about the different types of bread that you have eaten – damper, quick bread, cornbread, naan, tortilla and flatbread, just to name a few.

The Turkish Bread recipe on p.159 is quick and easy. Your task is to prepare the Turkish Bread and then work with a partner to find a dip recipe for it that could be eaten with your Turkish Bread, then prepare it. You should complete a food order for your teacher so that the correct ingredients can be purchased for your dip.

*Hint:* if time does not allow you to search for a dip recipe, have a go at preparing the Hummus dip in Chapter 9.

# Turkish bread



TURKEY

## Main tools and equipment

Food processor, measuring cups, measuring jug, measuring spoons, bowl, plastic wrap, oven tray, pastry brush

## Production skills

Greasing, processing

## Cooking processes

Dry method – baking

## Ingredients

 1 3/4 cups plain flour	 1 teaspoon salt	 1 teaspoon dried yeast	 1 cup warm water
 1/4 cup rice flour	 1/4 cup milk	 1 tablespoon sesame seeds	

## Method

- 1 Preheat the oven to 220°C.
- 2 Place flour, salt, yeast and water into a food processor and mix for 10 minutes.
- 3 Cover bowl with plastic wrap and allow it to sit for 20 minutes in a warm kitchen. This mixture will look very sticky, like glue.
- 4 Lightly grease an oven tray.
- 5 Pour the mixture very gently to make an oval shape on the oven tray. It is important to be very gentle here as you do not want to pop all the gas bubbles that have formed.
- 6 Sprinkle with the rice flour.
- 7 Brush very gently with milk.

## MAKES 1



Preparation time: 40 minutes



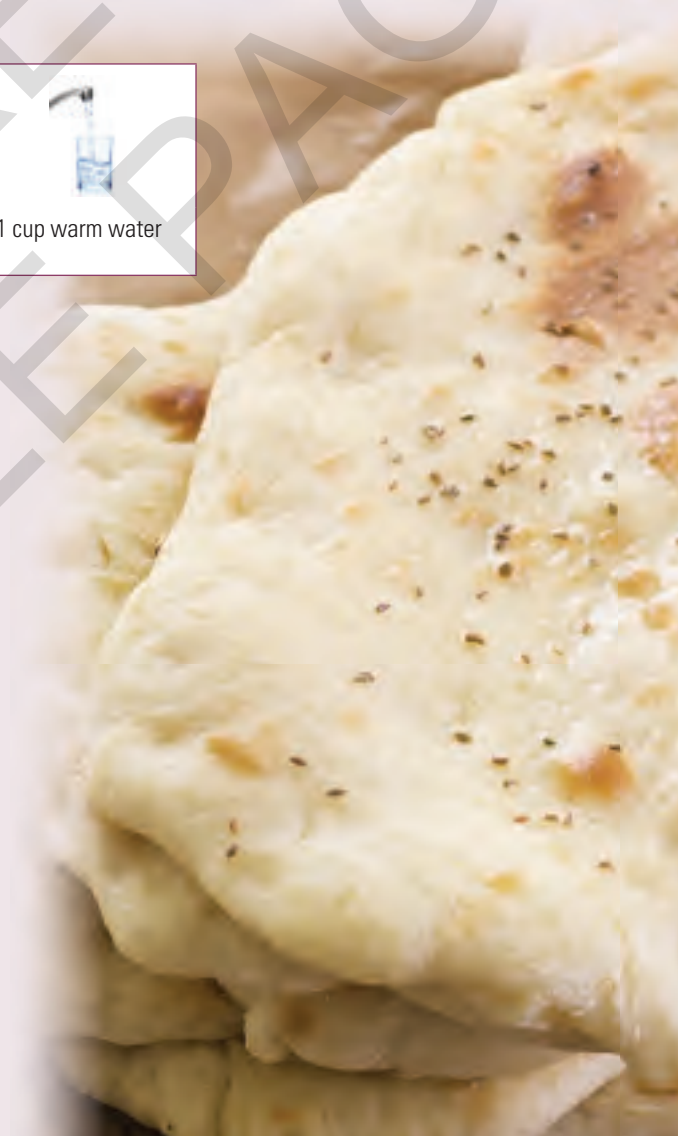
Cooking time: 15 minutes



Serving and presentation time: 5 minutes



Total time: 60 minutes





# Turkish bread – continued

- 8 Sprinkle lightly with sesame seeds.
- 9 Bake in the oven for 12 to 15 minutes.

## Evaluating

- 1 Working with yeast can sometimes be tricky. Thinking about the method used for this recipe, explain the condition that yeast needs to grow.
- 2 Describe what happened when you left the bread mixture to sit or rest. Why is this important?

- 3 Analyse the sensory properties of your bread. Provide a discussion of taste, texture, aroma and appearance.
- 4 Discuss the type of dip you used as an accompaniment for your Turkish Bread.
- 5 Reflect on the decisions that you made and your level of skill, and explain how you could improve your skills if you were to repeat this production.

## Let's cook pasta

Did you know pasta originally came from Asia? The Chinese were the first real inventors and owners of pasta; history tells us that they have been eating pasta since 5000 BCE. Their egg noodles were the first type of pasta to be consumed. Today, it is the Italians who are best known for the pasta they make.

### Tasty Trivia

The word 'pasta' comes from the Italian word for 'paste', meaning a combination of flour and water.

Pasta should be cooked **al dente**. This means 'to the tooth' – in other words, not too soft, but chewy with some bite or texture to it.

**al dente** Cooked 'to the tooth' – not too soft, but chewy with some bite or texture to it.

### 6.18 LET'S COLLABORATE

With a partner, list as many different pasta types as you can think of.

Pasta is made from durum wheat. This is a wheat variety that is extremely hard and has a yellow endosperm. The wheat is coarsely milled, mixed to a stiff dough, extruded into shapes and dried to form the different pasta varieties that we know. The dough can also include cooked vegetables such as spinach or tomato to add extra variety. Wholegrain pasta is made from whole wheat.

### Tasty Trivia

This illustration, of two women making pasta, first appeared in a 15th century health handbook which was the Latin translation of an 11th century medical text in Arabic, written by Ibn Butlan of Baghdad. The methods used to make pasta have not changed for many centuries.



## Making pasta

Making pasta is very easy. Fresh pasta can be made quickly with very few ingredients. To make fresh pasta, all that is required is durum wheat flour and eggs, which are formed into dough. The dough is kneaded until it is very firm and is then rolled into sheets before it is cut into the desired shape.



**Figure 6.15** Kneading the dough to the right consistency is crucial to making pasta.



### 6.19 ACTIVITY

#### Pasta varieties

Look at the picture of the pasta varieties in this photograph. See whether you can name the varieties.



## DESIGN BRIEF: SPAGHETTI BOLOGNESE

Spaghetti Bolognese is a favourite Italian dish for many people. The main ingredient in this dish, as you will see from the recipe on p.162, is minced meat. This task requires you to alter the recipe to create a dish that is suitable for someone who does not eat red meat.

# Spaghetti Bolognese



ITALY

## Main tools and equipment

Knife, measuring spoons, measuring jug, saucepan, wooden spoon

## Production skills

Stirring, straining, dicing, grating

## Cooking processes

Boiling, simmering, sautéing, browning, reducing

## Ingredients

					
¼ tablespoon olive oil	½ clove garlic, crushed	½ small onion, diced	150 g steak mince	¼ teaspoon dried oregano	100 g crushed tomatoes
					
½ cup water	2 tablespoons tomato paste	¼ teaspoon beef stock powder	¼ teaspoon black pepper	125 g spaghetti	25 g parmesan cheese, grated

## Method

- 1 Heat olive oil in a saucepan.
- 2 Add garlic and onion. Sauté for two minutes, stirring occasionally.
- 3 Add the mince, cook until browned.
- 4 Add the oregano, tomatoes, water, tomato paste, stock powder and black pepper. Stir to combine all ingredients.
- 5 Bring to the boil, reduce heat and simmer for 15 minutes until the sauce is reduced.
- 6 While the Bolognese sauce is simmering, half fill a medium saucepan with water. Bring the water to the boil.
- 7 Once the water is boiling, add the spaghetti and cook until *al dente*.

## SERVES 2



Preparation time: 30 minutes



Cooking time: 30–40 minutes



Serving and presentation time: 5 minutes



Total time: 65–75 minutes



- 8 Strain the water from the spaghetti and serve with Bolognese sauce and grated parmesan cheese. Garnish with basil.



## REFLECT ON LEARNING

- 1 Discuss how widespread the cultivation of wheat is in Australia.
- 2 List some of the products made from wheat.
- 3 Define the terms 'gluten' and 'starch'. Explain why these are so important in bread making.
- 4 Explain the reason why the right flour type is so important when following a recipe.
- 5 Identify the type of flour used to make pasta.

## Check out rice

Rice has been a staple food in Asian countries for many centuries, and there are thousands of varieties grown. Two major types of rice are long-grain rice, which separates easily after cooking, and short-grain rice, which produces firm grains that tend to stick together.



## 6.20 ACTIVITY

## Rice dishes around the world



Figure 6.16 The rice plant

Using the internet, develop a list of the types of dishes that are prepared using rice. For each rice dish, state the country where the dish originated.



Figure 6.17 A rice field in Asia.

## Tasty Trivia

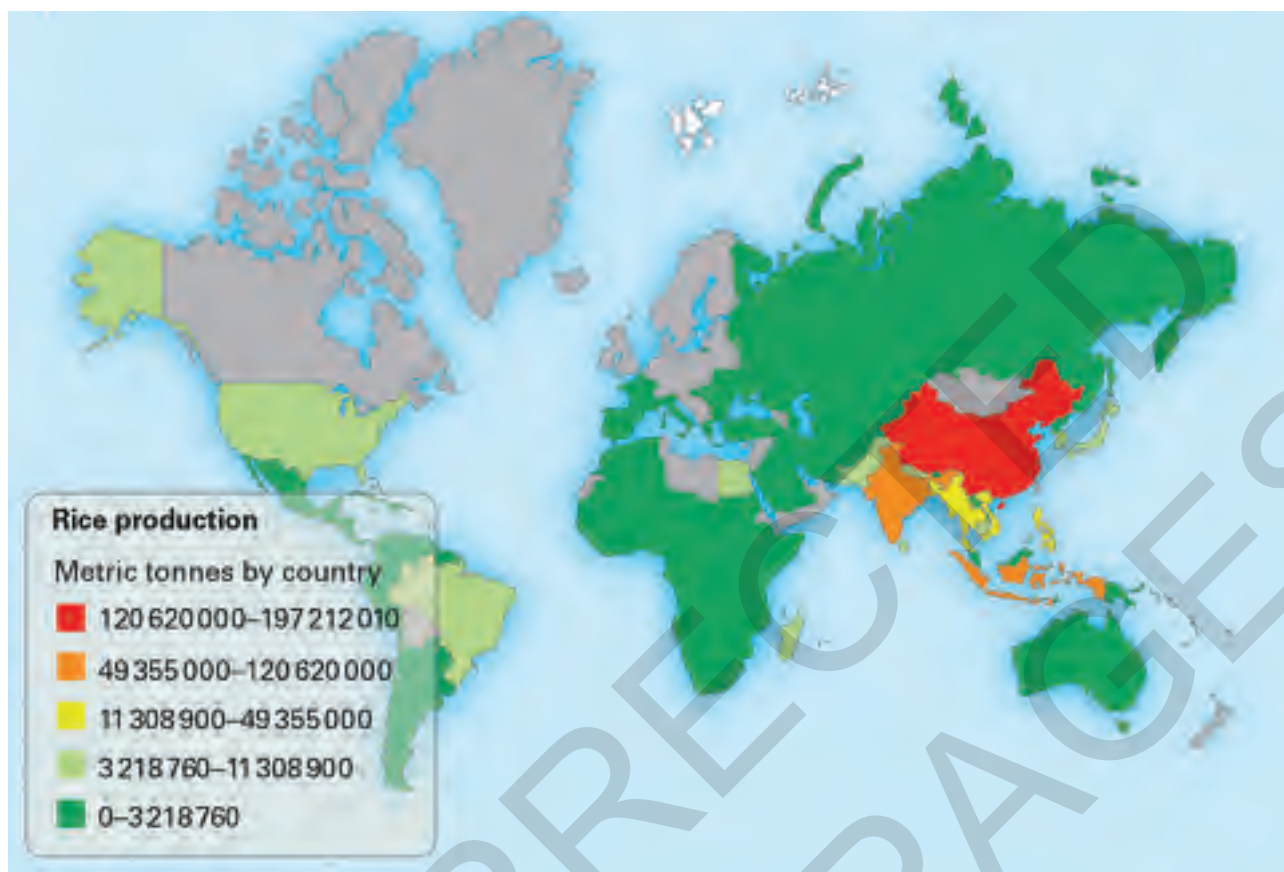
The botanical name of the rice plant is *Oryza sativa*. There are two major sub-species: *Japonica* (the sticky, short-grained variety) and *Indica* (the non-sticky, long-grained variety).

Rice remains a staple food for the majority of the world's population. More than two-thirds of the world's people rely on the nutritional benefits of rice. Rice is naturally free of any fat, **cholesterol** and sodium, and it contains large quantities of carbohydrates, which are essential for energy.

**cholesterol** A waxy, fat-like substance used by the body to build cell walls. It is either produced in the liver or absorbed from animal fats eaten. It is necessary for good health; however, excess levels are detrimental.

## REFLECT ON LEARNING

- 1 List two rice types used in Asian cooking.
- 2 List the nutritional benefits of rice.
- 3 Draw and label a rice grain.
- 4 List some other uses for rice throughout the world.
- 5 Use a Venn diagram to compare and contrast brown rice and white rice.



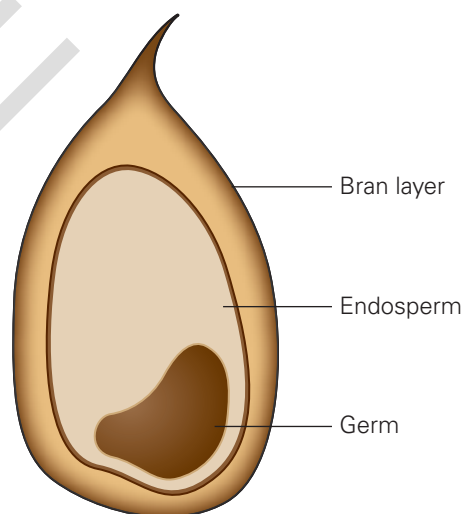
**Figure 6.18** Rice is produced in many different countries all around the world.

## 6.21 ACTIVITY

### Growing rice

The way in which rice is grown, the labour required and the equipment used are very different in Australia compared with other parts of the world. Compare how rice is grown in Australia with the way it is traditionally grown in many parts of Asia. In your response, include a comparison of:

- 1 traditional versus modern means of rice growing
- 2 use of water
- 3 land used to grow the rice
- 4 use of labour
- 5 environmental sustainability
- 6 cost of production – consider labour in your response.



**Figure 6.19** The rice grain

## Best quality: Check out the grain

When purchasing grain products, look to see whether:

- the package is well sealed and undamaged
- the product has a long use-by date – never buy a cereal or grain product that is out of date. If stored properly in a cool, dry place, cereal products can last for up to two years.
- the product and package are free from weevils and other insects
- the product inside is dry – there should be no moisture evident.



### 6.22 ACTIVITY

#### Rice dish origins

Look at the list of rice dishes in the table below and match the country with the dish.

Rice dish	Country of origin
Fried rice	China
Sushi	India
Congee	Spain
Pilaus (Dhosas)	China
Paella	Persia
Kedgerree	Africa
Jambalaya	China
Risotto	India
Eight treasures rice	Iran
Pilavi	Japan
Sabsi pilau	Italy
Arroz doce	France
Gateau au riz	Portugal

#### Tasty Trivia

#### Adding value to the rice crop

- Sake is wine made from rice.
- Clothing, including shoes and hats, is made from rice straw in many rice-production areas of the world.
- Rice paper is not actually made from rice; it comes from the pith of the rice paper tree, which is grown in Asia.
- Rice glue is still made in many countries by boiling ground rice.



### 6.23 ACTIVITY

#### Sensory analysis: Brown rice, white rice, wild rice

Investigate and conduct a sensory analysis of three different types of rice: brown, white and wild rice.

- 1 Explain how each type of rice is grown.
- 2 Develop a list of recipes/dishes that use the three different varieties of rice.
- 3 List the nutritional benefits of each type of rice.
- 4 Cook each type of rice in class. Complete a sensory analysis. Consider appearance, aroma, taste/flavour and texture. When completing your sensory analysis, remember that you should highlight the differences between the rice varieties.







## 6.24 INVESTIGATE IT

Sunrice is one of the major rice companies in Australia. Browse the Sunrice website to find out about all things rice.

- 1 Develop a list of the rice products that have been developed and then sold by Sunrice.
- 2 Use the tab 'Journey of rice' on the Sunrice page to investigate the journey that two different types of rice have taken before arriving on our plates. Draw a flow chart to summarise this journey.

Rice product	What is it?
	<p>This has only the husk or hull removed. Due to the limited processing, brown rice is more nutritional than other varieties. Brown rice does not get milled, so it retains its darker colour. Brown rice contains carbohydrates, protein and dietary fibre, and is a good source of thiamin, niacin, riboflavin, iron and calcium. Traditionally, brown rice is the least favourite of all the rices, because of its much harder texture.</p>
	<p>White rice is by far the most common type of rice, consumed in all countries of the world. White rice is de-hulled and has all bran and germ layers removed. The two types are:</p> <ul style="list-style-type: none"> <li>• long grain white rice: long slender kernels that produce light, fluffy rice</li> <li>• short grain white rice: short, round kernels that are soft and cling together when boiled.</li> </ul>
	<p>A long-grain, aromatic rice traditionally from Pakistan.</p>
	<p>Has a fragrant perfume and is most often used in Thai cooking.</p>
	<p>Large tan grains with white dots in the centre. This rice is most often used in risotto because of its creamy, chewy texture and its ability to absorb four to five times its weight in liquid.</p>

**Figure 6.20** The different rice varieties

Rice product	What is it?
<p>Waxy rice</p> 	Also known as 'sweet' rice. Kernels are short and plump, and produce a thick, starchy product when cooked. Waxy rice is most often used as a binder for gravy, sauces or fillings.
<p>Rice flour</p> 	A ground rice product made into flour. It is used in biscuits and also as a thickener.
<p>Quick cooking (parboiled) rice</p> 	This rice has been precooked and then dried, and has a much shorter cooking time than other rices.
<p>Rice bran</p> 	The ground husk of the rice grain. This product is naturally sweet and very high in dietary fibre.
<p>Wild rice</p> 	Wild rice is a coarse grass (and not really a true rice) and is considered a delicacy in many parts of the world. North American Indians are attributed with the introduction of wild rice into mainstream society. Grown in shallow waters, the wild rice plant is 1–10 metres tall, holding the traditional rice flower at its peak.

**Figure 6.20** The different rice varieties (continued)

## DESIGN BRIEF: FRIED RICE

Fried Rice can include many different ingredients, which often depend on the culture of the person preparing it. Design and create your own Fried Rice using the recipe on p.168 as a starting point.

# Fried rice



CHINA

## Main tools and equipment

Knife, measuring spoon, measuring cups, fork, frying pan, wooden spoon

## Production skills

Cutting, slicing, beating

## Cooking processes

Stir-frying





## Ingredients

					
1 tablespoon canola oil	1 tablespoon peanut oil	1 egg, lightly beaten	Salt and pepper	1 small white onion, cut into wedges	125 g ham, diced
					
2 cups cooked rice	¼ cup frozen peas	1 tablespoon soy sauce	2 spring onions, sliced	50 g tofu, diced	¼ cup bean sprouts

## Method

- 1 Heat half of the oils (combined) in a wok or large frying pan.
- 2 Season the beaten egg with salt and pepper, pour into wok and cook until set.
- 3 When it has set, use a wooden spoon to break up the egg so that it looks like scrambled eggs, then remove from wok.
- 4 Heat the remaining peanut and canola oils in the wok, add the white onion and stir-fry over a high heat until transparent.
- 5 Add the ham and tofu and stir-fry for 1 minute.
- 6 Add the rice and peas, stir-fry for 3 minutes until the rice is heated through.

## SERVES 2

-  Preparation time: 30 minutes
-  Cooking time: 15–20 minutes
-  Serving and presentation time: 5 minutes
-  Total time: 50–55 minutes



- 7 Add the egg, soy sauce and spring onions. Mix and heat through.
- 8 Serve with bean sprouts sprinkled over the top.



## LOOKING BACK

- 1 Cereals are the edible grains or seeds of the grass family and are dietary staples in many countries throughout the world.
- 2 There are three main parts of a cereal grain: the bran, the endosperm and the germ. Wholegrain cereals contain all three layers of the grain, while refined cereals have the bran and germ layers removed.
- 3 Cereal grains are an excellent source of energy with no saturated fat. The nutritional benefit of cereals depends on the number of processes to which they have been subjected.
- 4 Cereals must be cooked. Cooking time varies, depending on the type of cereal grain.
- 5 Wheat and rice are two very versatile examples of cereal grains eaten worldwide. Wheat is important to the Australian diet and economy; it is processed into flour, which has many uses in cookery. Rice, whether it has a long or short grain, is also used in a wide range of dishes/recipes throughout the world.

## TEST YOUR KNOWLEDGE

### Multiple choice

- 1 All cereal grains can be:
  - a cooked in liquid
  - b cooked in the microwave
  - c toasted
  - d eaten without being cooked.
- 2 Rice provides large quantities of carbohydrates. It is also naturally free of:
  - a fat, cholesterol and sodium
  - b dietary fibre
  - c starch
  - d all of the above.

### True/false

- 1 Rice and amaranth are both examples of cereal grains.
- 2 Refined cereals are more nutritionally sound than wholegrain cereals.
- 3 Protein is the main carbohydrate found in cereals.

### Short answer

- 1 Flour is a versatile ingredient that can be used in many different ways. Choose one type of flour and explain how it is produced.
- 2 A large number of different types of rice exist. They are all cooked in their own special ways and combined with many different ingredients. If you were to make a risotto, what type of rice would you choose? Suggest why this is the most suitable type of rice.
- 3 Explain why you should not eat raw grains.

### Extended response

Cereal grains are refined into many other products.

- 1 Explain what it means to refine a cereal grain.
- 2 List the processes through which a refined cereal may go.
- 3 Explain why this is not the best way to consume a cereal grain.
- 4 List five refined cereal products.
- 5 Explain the way in which one of these cereal products has been altered from the original cereal grain.