

## *How much is produced in Australia?*



### **Grains**

- Wheat, barley and oats are the major grain crops produced in Australia.
- Australia is the seventh largest producer of wheat in the world, producing around 3% of the total world wheat production (591 million tonnes).
- China is the largest producer of wheat, followed by the European Union, producing 100 million tonnes of wheat per year.
- Rice and maize production in Australia accounts for 2% and 0.6% of world production respectively. Asia is responsible for more than 90% of world rice production and the USA for 43% of world maize production in 2000.

### **Pulses**

- Lupins, field peas and chickpeas are the major pulses produced in Australia. Australian production of pulses represents 3% of total world production. India is the largest producer of pulses in the world, producing 14 million tonnes a year. Pulse production in Australia has increased about thirty-fold in the past 20 years.

Production of grains and pulses in Australia (kt)

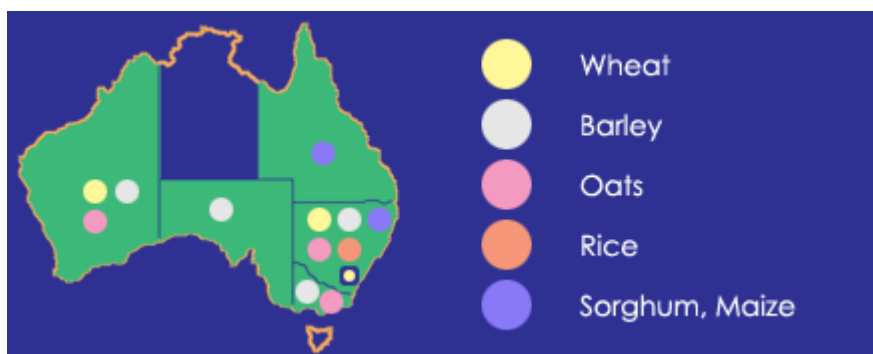
CROP	YEAR					
	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
Wheat	8,903	16,506	23,702	19,417	22,108	24,058
Barley	2,913	5,823	6,696	6,482	5,680	4,280
Oats	924	1,875	1,653	1,634	1,874	1,473
Triticale	182	496	674	633	483	551
Maize	242	325	398	271	322	322
Sorghum	1,272	1,591	1,425	1,081	1,664	1,329
Rice	1,137	951	1,388	1,331	1,390	1,084
Lupins	1,076	1,559	1,560	1,380	1,421	1,542
Field peas	240	530	466	305	298	357
Chickpeas	69	287	178	191	160	187
Faba beans	50	119	123	135	133	166
Lentils	2	17	38	36	46	103
Mung beans	13	17	45	32	50	44
Navy beans	8	6	5	5	6	6

## ***Where are grains and pulses produced in Australia?***

The 45 000 farms in Australia which grow one or more types of grains and pulses are scattered in a thin band just in from the coast of Queensland, NSW, ACT, SA and WA. This area is often called the "Australian Grain Belt". Few farms produce grain alone with many involved in livestock enterprises.

### **Grains**

- Most wheat is produced in WA, NSW and ACT.
- Wheat consumed in Australia comes mainly from NSW and ACT.
- Barley is mainly produced in SA, but also in WA, NSW and Victoria.
- Oats are grown in NSW, WA and Victoria.
- Rice is produced mainly in NSW.
- Sorghum and maize are produced mainly in NSW and Queensland.



### **Pulses**

- Most pulses are grown in WA.
- Lupins are mainly produced in WA, field peas in SA and Victoria and chickpeas in NSW, WA and Queensland.
- Mung beans and navy beans are produced in NSW and Queensland.
- Lentils are grown in regions with a Mediterranean climate (SA, WA, Victoria and south western NSW).

## Supply and use of Australian grains and pulses



### Grains

- Around 80% of wheat, barley and rice produced in Australia is exported.
- More than 75% of wheat is exported to more than 40 countries, making it the third largest exporter of wheat in the world, after the USA and Canada.
- Australian wheat has a reputation in export markets for being clean (free from pests and contamination), white-grained, dry and suited to many end products.
- More than one million tonnes of wheat a year is exported to countries such as Egypt, Indonesia, Iraq, Korea, Pakistan and Japan where 40% of exports end up in flat breads such as pita bread and lavash, around 24% is used in yellow alkaline noodles, 9% in white salted noodles, 11% in pan bread and about 5% in steamed buns.
- About 23% of wheat produced in Australia is for domestic use - 10% for human and industrial uses, 10% for animal feed and 3% is used for seed. A third of wheat is used for pan bread and the rest for the manufacture of noodles, cakes, pasta, starch and gluten.
- About 80% of barley is exported (more than 50% for animal feed and the rest for malting barley).
- Domestic use of barley is mainly as stock feed, with only about 8% used as malt for human consumption.
- Oats, maize, sorghum and triticale are mostly used by domestic markets, particularly as stock feed.
- Although oats are mainly fed to livestock as a supplement to pasture in times of seasonal feed shortage, an increasing amount of oats are being grown for human consumption (mainly in breakfast foods) due to consumer interest in the cholesterol-lowering benefits of oat bran (for both domestic and export markets).
- A small amount of maize is also used for human consumption (breakfast foods, starch and cornflour).

### Pulses

- More than 70% of the Australian pulse crop is exported to over 35 countries.
- The largest buyers of Australian pulses are India, Pakistan and Bangladesh. These large pulse producing countries import Australian pulses to fill shortfalls in local production, either because their crops are not ready for harvest or because their stocks are low.
- Australia is a leading exporter of lupins, the second largest exporter of chickpeas and the third largest of field peas.
- More than 50% of lupins is exported to the Middle East and Europe for human consumption, but it is also exported worldwide as animal feed.
- 90% of field peas are exported as animal feed, but also for human consumption to countries such as Malaysia and India.
- Lupins and field peas are widely used as stock feed for poultry and pigs in Australia.
- 75% of chickpeas are exported for human consumption to India, Pakistan and Bangladesh. The pale and creamy Kabuli chickpea is exported to the Middle East, Sri Lanka, India and Mediterranean countries.
- India imports large amounts of chickpeas, lentils and field peas for human consumption.

## ***Economic impact of Australian grains and pulses***

- On average, grain production is worth about \$A3.56 billion per year, mainly from wheat production.
- Wheat and barley production were worth \$4 233 million and \$723 million respectively in 1999-2000, representing about 79% of the total value of grain production in Australia.
- Pulse crops were worth 6% of total grain production in 1999-2000, with the production of lupins, field peas and chickpeas worth \$256 million, \$87 million and \$91 million respectively.
- In the 1970s, production of pulses in Australia increased in response to demand from feedlot industries. The value of the pulse industry grew from \$74 million in 1984-5 to \$519 million in 1999.



## ***Factors that influence grain and pulse production***



Yield is a measure of the amount of grain or pulse produced per hectare of land cultivated. It can vary substantially from year to year. For instance, barley yield ranges between 1.12 and 1.95 tonnes per hectare and can be as high as 4 tonnes per hectare. It differs from grain to grain where average rice yields in Australia are 9 tonnes per hectare compared to average wheat yields of around 1.7 tonnes per hectare.

The following factors determine grain yield and protein content:

### **i. Climatic factors**

Rainfall and temperature can affect grain yield. Drought in 1994 reduced wheat yield to 1.13 tonnes per hectare in 1994-5. Too much rain increases the yield, but the protein content of the grain is often low. At higher temperatures, the development of protein is more rapid.

### **ii. Soil quality and fertility**

In the 1980s, concern about the sustainability of Australian farming systems grew and resulted in the establishment of the Landcare movement which encourages conservation farming practices.

In 1990-91, the Australian Wheat Board began to pay growers according to the protein content of their wheat. This resulted in an increased use of nitrogen fertiliser. Grains grown in rich soils are higher in protein than those grown in light sandy soil or land exhausted by continuous cropping. In Australia, farmers increase soil fertility by rotating the type of crops grown on the same area of soil. Legumes, such as lupins and field peas, are used because of their ability to add nitrogen to the soil. Field peas can raise soil nitrogen content and have a major role in improving yield and protein content of the next wheat crop, as well as reducing the need for nitrogen fertiliser.

Organic farming differs from conventional farming in that fertilisers and herbicides are not used. Organic farmers rely on biological pest control and natural fertilisers such as rock phosphate and animal manure. This difference does not make a significant impact on the nutritional value of grains and pulses produced.

### **iii. Grain variety or cultivar**

Grain variety determines hardness of the grain, milling quality and dough properties.

### **iv. Location of crop**

Wheat yields vary from 6 tonnes per hectare in Tasmania to 1.68 tonnes per hectare in Victoria.

#### **v. Economic factors**

World grain prices are determined by production, consumption and stocks. For example, the price of wheat rises with reduced production (due to unfavourable weather), higher consumption and a decline in stocks. When wheat prices are high, more wheat is used for human consumption than for animal feed. Grain production is also affected by the price of other commodities that may be substitutes for land use. For instance, in 1989-90, as the price of wool decreased, the number of specialist grain farms increased by 104% while the number of specialist sheep farms fell by 51%.

## **Factors that determine the quality of grains and pulses for human consumption**

### **Wheat**

Once wheat has been harvested, it is usually sent to a central bulk handling system where grain quality is determined by:

- Protein content
- Grain hardness
- Dough properties
- Milling quality.



Wheat is graded into nine major products:

- Milling wheat for human food production is segregated according to grain hardness and protein content (% of total crop in 1998-99):

*Hard grain, high protein varieties:* Prime hard (5%) and Australian Hard (14%)

*Medium grain, moderate protein varieties:* Premium White (31%) and Australian Standard White (32%)

*Varieties for speciality products:* Durum and Noodle

*Soft grained, low protein varieties:* Soft and General Purpose.

- Feed wheat used for livestock consumption.

### **Rice**

Rice quality is determined by appearance, particularly grain size and shape, milling quality, cooking and eating quality.

Australia produces a wide range of varieties including long grain (e.g. Indica), short and medium grain (e.g. Japonica) varieties.

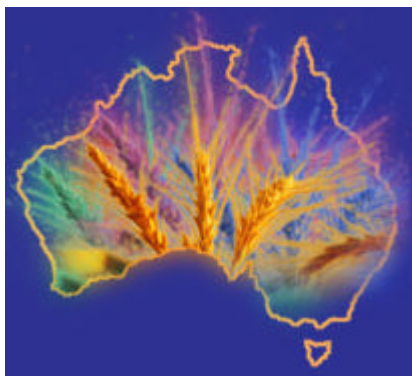
### **Pulses**

Pulses for human consumption must have the following qualities:

- Large and uniform seed sizes
- Minimal discolouration in seeds
- Minimal split, chipped or broken seeds
- No foreign seeds
- Little insect damage

The industry has in place quality control programs to ensure that these criteria are met.

## ***Innovation in grain production***



### **Plant breeding**

Cross breeding different varieties of plants can bring the desirable properties from different varieties into one new variety. It takes many years to slowly alter and improve the genetic material of domesticated plants to successfully achieve a new grain variety.

Desirable properties include:

- High yield
- Grain quality, i.e. protein content, grain hardness, seed size and colour
- Resistance to disease
- Varieties with specific characteristics, e.g. varieties of barley that are "hull-less" making them similar to wheat in that the husk is removed in the harvesting operation. These varieties have become more popular due to their high soluble fibre (beta-glucan) content.

### **Genetic modification**

The use of genetic modification is gaining importance as a way to increase food production, improve nutrient content and provide better processing and storage characteristics.

Genetic modification uses new technology, based on a better understanding of genetics at a molecular level, to achieve the same goals as traditional plant breeding more quickly and more precisely. Instead of cross-breeding plants for several years to acquire a desired trait, scientists can insert a single gene responsible for a particular trait into a plant relative. The main difference between the two approaches is that genetic modification allows the introduction of desirable properties from one organism into another completely unrelated organism which would not occur readily in nature.

Genetically modified (GM) varieties of field peas, wheat, barley and lupins have been trialled in Australia but they have not been released.