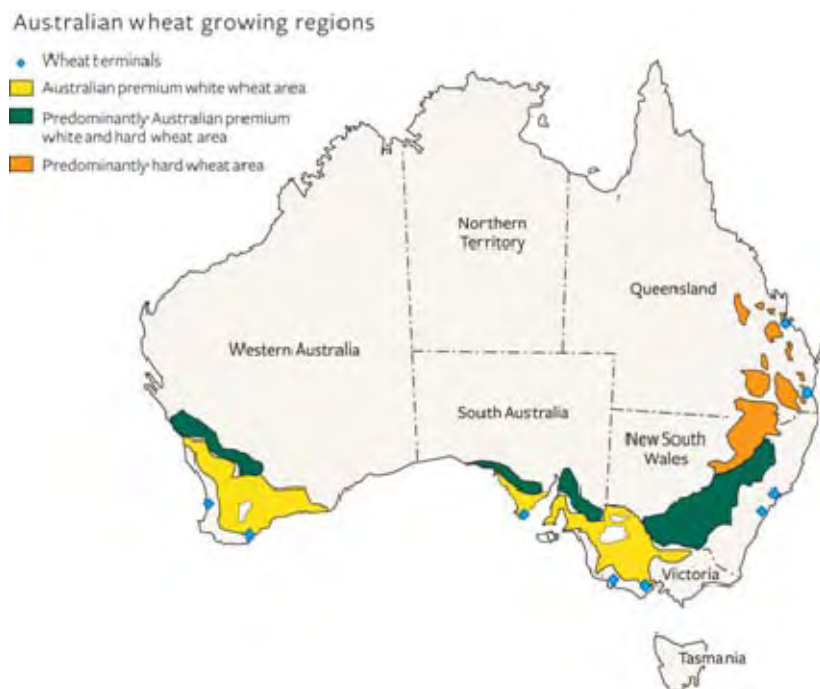


# Wheat quality and markets in Queensland

## Fact Sheet

Australia produces on average 24 million tonnes of wheat per year; 75-80% of this production is destined for export markets—primarily in the Middle East and Asia. Australian wheat has a high level of versatility on the world market and this sees it blended with other wheats to provide a range of flours for use in noodles, bread and bakery products. Compared to its competitors on the global market, only a small proportion of Australia's wheat exports (Australian Prime Hard (APH)) rates as high-protein wheat. Queensland and northern New South Wales are the main regions for the production of Australian Prime Hard (APH) quality wheat.

In Queensland, on average 800,000 hectares of wheat is sown annually in the southern and central regions, producing around 1.2 million tonnes of grain. About half of Queensland's production is destined for export and a quarter each for domestic milling and for the domestic feed grains market.



**Figure 1**

Source: ABARE, 2008

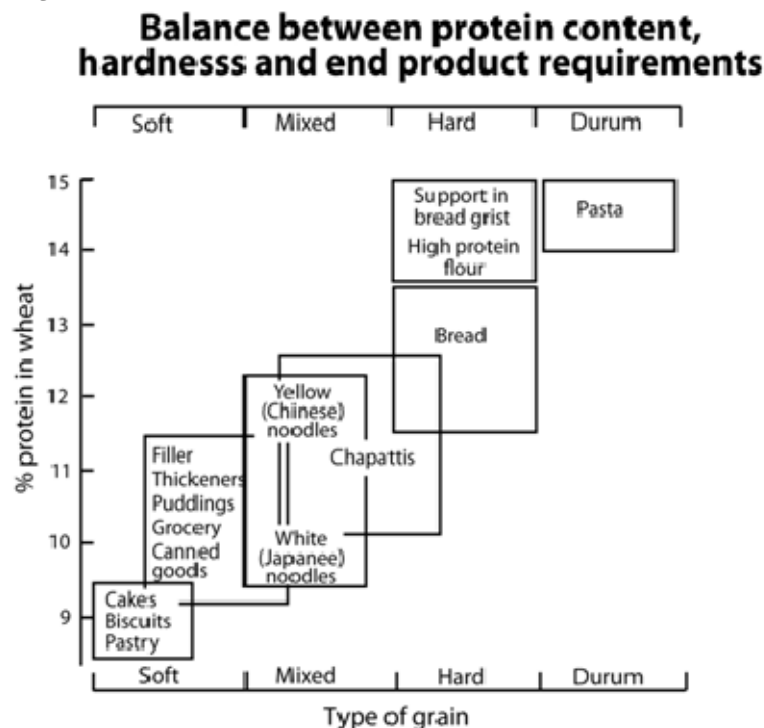
## Facts and figures

- Approximately 24 million tonnes of wheat are produced in Australia annually, of which Queensland will contribute 1.2 million tonnes
- Of the 19 million tonnes of wheat exported out of Australia, about 650,000 tonnes come from Queensland.
- Domestic milling in Australia requires around 2.2 million tonnes per annum, of which 320,000 tonnes is used by Queensland millers.
- Around 440,000 tonnes of durum wheat are produced in Australia each year—70% is exported and 30% is used domestically. About 60% of national production comes from Queensland and northern NSW
- The domestic feed grains (intensive livestock) industry requires around 3 million tonnes of wheat and this is likely to increase to 5 million within the next 5 years. In 2006–07, the demand for wheat from the domestic feed grains industry in Queensland was 1.2 million tonnes, but only 229,000 tonnes could be supplied.

## Wheat grades and markets

Over the last few years, there has been increasing emphasis placed on supplying wheat of specific qualities as flour milling and processing industries overseas have become more sophisticated. Current markets require wheat grades in which there is a balance between grain hardness and protein content for different end uses. Figure 2 shows the relevant protein hardness values for each grade, and the different end uses to which wheat from each grade is put.

**Figure 2**



Source: Weston Milling, 2008

For current world markets and the balance required between grain hardness and protein content to meet different end uses, wheat in Australia is marketed and classified into 6 major grades. These grades are based on variety, general cleanliness and soundness, and protein content. In Queensland, the main focus is the production of hard-grained wheats for the Middle East, Japan and China.



## Australian wheat grades

### Australian Prime Hard (APH)

Australian Prime Hard is Australia's top-quality high-protein milling wheat. It consists of specially selected white, hard-grained wheat varieties of exceptional milling quality. It is normally segregated and sold at guaranteed minimum protein levels of 13%. Flour milled from Australian Prime Hard wheat is used to produce high-protein Chinese-style yellow alkaline noodles and Japanese Ramen noodles of superior brightness, colour and eating quality. Australian Prime Hard flour is also suitable for the production of high-protein, high-volume breads and wonton dumpling skins. Australian Prime Hard wheat can also be blended with lower protein wheats to produce flours suitable for a wide range of baked products.

### Australian Hard (AH)

Australian Hard is a white wheat comprising specific hard-grained varieties with the No.1 grade segregated at a minimum protein level of 11.5 %. Australian Hard is clean, dry and sound, ensuring the production of high-quality flours at high extraction rates. The flour derived from Australian Hard is suitable for the production of a wide range of breads including European-style pan, hearth and a variety of bread products. It is also particularly suited to the production of Middle Eastern flat breads, Chinese steamed bread and Chinese-style alkaline noodles.

### Australian Premium White (APW)

Australian Premium White is a blend of white hard-grained wheat varieties selected to ensure high milling performance and consistent flour quality. The minimum 10% protein level and hard grain characteristic of Australian Premium White ensures free milling and excellent extraction rates. Australian Premium White flour is suitable for a wide range of products including varieties of Asian noodles such as Hokkien, instant and fresh noodles. It is also ideally suitable for the production of Middle Eastern and Indian-style breads and Chinese steamed bread. Note. All Australian Prime Hard and Australian Hard varieties are acceptable as Australian Premium White.

### Australian Standard White (ASW)

Australian Standard White is a highly versatile medium- to low-protein white wheat representing excellent value for straight milling or blending purposes. All multi-purpose wheat is used in the production of a wide range of products including Middle Eastern, Indian and Iranian-style flat breads, European-style breads and rolls, and Chinese steamed bread. This versatility ensures its popularity as a consistent and genuine value for money product.

### General Purpose (AGP)

The General Purpose grade comprises wheat that has failed to meet minimum receival standards for milling wheat grades, either on account of low test weights (68 kg/hl or below), presence of screenings, foreign material or a mild degree of sprouting. Falling number counts are generally at 200 or above. This product is general used in the feed grains industry.

### Feed wheat

The Feed wheat grade in general consists of severely sprouted wheat deliveries with falling number tests is below 200 and test weights at or below 62 kg/hl. Low falling number tests generally indicate high levels of alpha-amylase activity making them unsuitable to the milling industry. The increased enzyme levels do not detract from the nutritional value of these wheats and are therefore suitable for animal feed purposes.

### Australian Durum (ADR)

ADR1 consists of selected wheat varieties with vitreous, amber-coloured kernels with a minimum protein of 13%. Durum wheat differs from the other wheats in having endosperm that does not break into fine

flour when milled but into coarse semolina, ideal for pasta making. The free-milling grain is capable of achieving high yields of superior quality semolina with minimal residual flour production.

The semolina produced from this specialised wheat exhibits high levels of stable yellow pigment and high water absorption, making it ideally suited to the production of a wide range of high-quality wet and dry pasta products with excellent colour and shelf life. Durum is produced primarily in northern New South Wales, South Australia, Queensland and areas where hard and prime hard wheat are grown. Tonnages produced are sufficient to satisfy domestic requirements and, increasingly, international market demands.

Table 1 shows Australia's wheat grades, their share of production, states where they are grown and their export markets.

Table 1. Australian Wheat Grades, Varieties and Share of Production					
Grade	States Grown	Production	Protein	Markets	Export Uses
APH Australian Prime Hard	QLD	<5%	13– 14%	Japan, Korea, Thailand, Malaysia, Italy	Primarily used for Japanese style ramen noodles
	NSW				
AH Australian Hard	QLD	15–20%	11.50%	Japan, Indonesia, Iraq, Malaysia, Middle East	Suitable for a wide range of baked products including European pan breads, Middle Eastern flat breads, Chinese steamed products and Chinese yellow alkaline noodles
	northern NSW				
	southern NSW				
	Victoria				
	South Australia				
Western Australia					
APW Australian Premium White	QLD	30–35%	10%	Indonesia, Iraq/Iran, Malaysia, Other Asian and Middle Eastern countries, Japan/Korea	Suitable for production of a variety of Asian noodles. It is also suitable for Middle Eastern and Indian style breads and Chinese steamed bread.
	northern NSW				
	southern NSW				
	Victoria				
	South Australia				
	Western Australia				
ASW Australian Standard White	southern NSW	20–30%	9–10%	Indonesia, Iraq/Iran, Malaysia, Other Asian and Middle Eastern countries, Japan/Korea	Suitable for straight milling and blending purposes - typically in less discerning markets such as Egypt and Iran for Middle Eastern, Indian and Iranian style flat breads
	South Australia				
	Western Australia				
ASWN Australian Standard Wheat Noodle	Western Australia		10.50%	Japan/Korea	Developed for use in noodle manufacture. Outside of this use, wheat is too soft so loses value, but can be blended into cargoes to the Middle East



Table 1. Australian Wheat Grades, Varieties and Share of Production					
Grade	States Grown	Production	Protein	Markets	Export Uses
ADR Australian Durum Wheat	QLD	<5%	Min. 13%	Italy, Morocco and Algeria	Pasta
	northern NSW				
	South Australia		11.5% & 10%		

Source: Grain Growers Association, 2003

## Grain receival testing in Queensland

In Queensland, wheat delivered into the market place must meet certain grain quality specifications to be classified into the aforementioned grades. These testing procedures are important benchmarks for end users in determining flour yield and quality for different bread, bakery, pasta and noodle products. The following grain tests are applied at receival points to measure quality and ensure the high standards of Australian wheat grade classification are maintained.

### Protein

#### Protein content

- Protein content is one of the important factors in influencing the end uses of wheat, and as a consequence wheat is graded according to protein content. Protein content is assessed using near infra red (NIR) technology on delivery at the silo, and payment is based on protein content as this determines the end product and market. Wheat with 11–13% protein is used for pan bread, 10.5% for Udon noodles and 8.5–9.5% for biscuits and cakes.

#### Protein quality

- Protein (gluten) quality differs between wheat varieties and so influences the selection of wheat varieties for production applications. For example, bread makers may require a wheat type with strong protein whilst a steam bun manufacturer may seek moderate protein strength. For millers, this is an extremely important quality characteristic as it affects flour water absorption and dough mixing characteristics. Protein quality is accounted for at the receival point by variety declaration.

#### Falling number

- The falling number test is an indication of rain damage at harvest. Rain causes mature wheat grains to sprout and activates the alpha-amylase enzyme which breaks the starchy endosperm into sugars. In this test, wheat is ground, mixed with water and heated to form a gelatinous suspension. The time taken for a plunger to fall through the suspension is measured. Wheat that has been weather-damaged forms a more viscous suspension and so has a lower falling number. End products are sensitive to flour with low falling numbers as it can result in dough stickiness, excessively dark bread or poor crumb texture and poor slicing ability.

#### Screenings

- Impurities such as white heads, chaff, weed seeds, and shrivelled and broken grains may need to be removed before milling. Payment is based on screening levels as extensive grading adversely affects mill profit. Whilst some grain varieties are more susceptible to high levels of screenings, the environment in which the wheat is grown is a major contributor.

#### Stained grains

- Enzymic discolouration such as Black point and staining caused by fungal infection such as Fusarium, Eppicoccum or Drechslera spp. adversely affects grain quality. In particular, black specks detract from the appearance of noodles.

## Hardness

- Wheat can be physically hard or soft. Hardness affects milling properties. Hard wheats are used to make pan breads, yellow alkaline noodles and flat breads. Soft wheats are used for biscuits and cakes. The soft wheat flour is much smaller than that for hard wheat flour. Variety declaration is used to segregate hard from soft wheat at receival.

## Moisture content

- When wheat is delivered into a silo, moisture content is assessed at receival using NIR technology—payment is based on moisture content. Water content impacts on the value of grain (water versus flour) and affects the maintenance of quality during handling and storage.

## Test weight

- Test weight is also known as hectolitre weight and assessed by weighing a fixed volume of grain. Hectolitre weight informs the miller of the wheat's cleanness, plumpness and packing density, and guides the miller in predicting flour yield. The test weight varies between varieties due to their difference in size and shape. Shrivelled and rain-damaged grains reduce test weight.

To view the latest grain receival standards, click on the links below. Each of these links provide information on receival standards which are in accordance with the National Agricultural Commodities Marketing Association (NACMA) national grain receival standards.

Graincorp 08/09 harvest receival standards

Bread and noodle wheat receival standards:

<http://www.graincorp.com.au/prodserv/SL/Receival%20Standards/Wheat%20Receival%20Standards%202008-09.pdf>

Durum wheat receival standards:

<http://www.graincorp.com.au/prodserv/SL/Receival%20Standards/Durum%20Receival%20Standards%202008-09.pdf>

Soft wheat receival standards:

<http://www.graincorp.com.au/prodserv/SL/Receival%20Standards/Soft%20Wheat%20Receival%20Standards%202008-09%20Allied.pdf>

NACMA (National Agricultural Commodities Marketing Association) grain receival standards 08/09

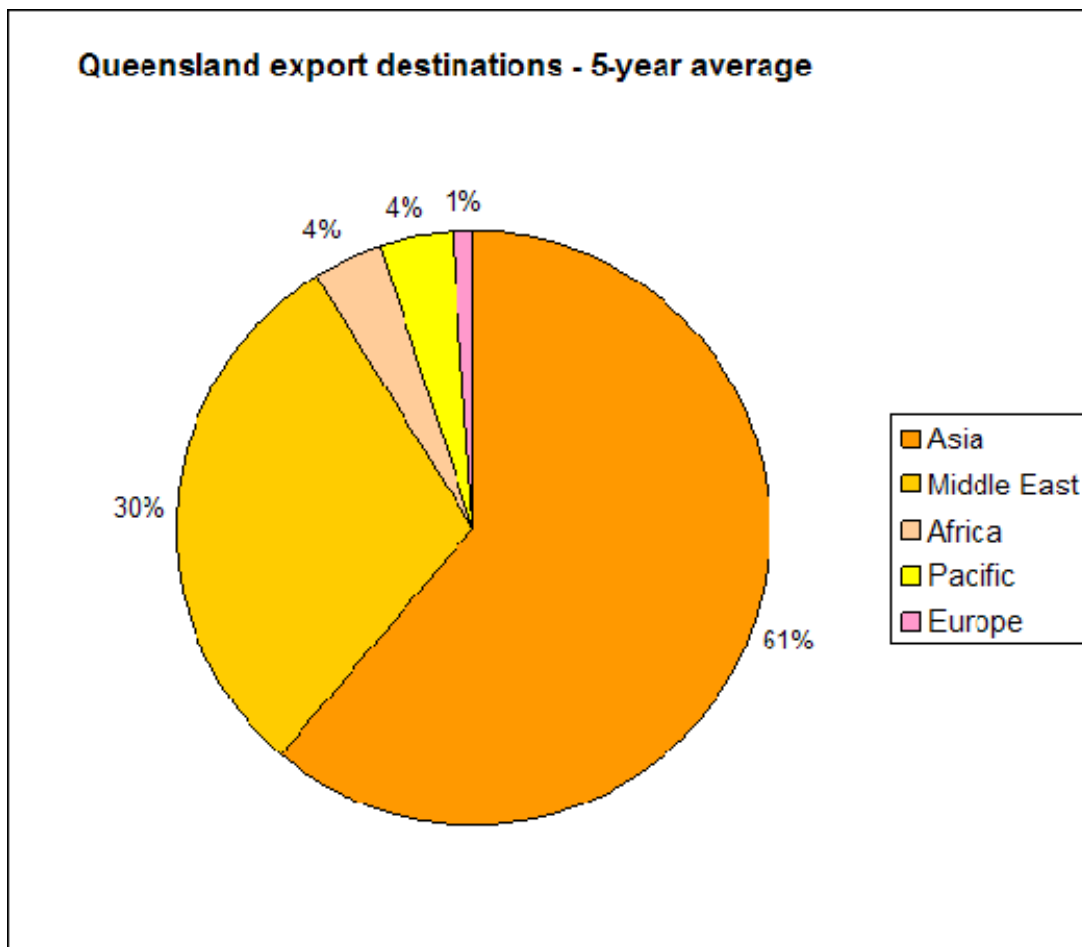
NACMA: [http://www.nacma.com.au/grain\\_specifications/section\\_2\\_\\_grains](http://www.nacma.com.au/grain_specifications/section_2__grains)

## End uses for Queensland wheat on global markets

The demand for higher wheat quality and product consistency is increasing both domestically and in our export markets. By understanding the wheat quality requirements of our markets, we are better equipped to ensure market share, to stay ahead of our competitors and to achieve price premiums. Many overseas customers want highly specific wheat quality characteristics, and we need to understand the changing requirements of wheat markets throughout the world to be able to respond effectively. To continue to build and strengthen a differentiated position for Queensland wheat we need to deepen our understanding of the quality requirements of our customers.

In addition to the manufacture of European-style pan bread (loaf bread), Queensland wheat has been used for many years in the Middle East for making a wide variety of flat breads. Japan, China and many south-east Asian countries source Australian wheat for use in various noodle types from Queensland and northern New South Wales production areas.

Figure 3 below shows the percentage share of wheat export destinations for Queensland over a 5-year average and illustrates dominance in the Asian and Middle Eastern markets for noodle and flat bread manufacture.



**Figure 3**

Source: AWB Limited, 2008

## Noodles

Noodles have been a major growth area for wheat as consumers across Asia have substantially increased consumption of wheat-based noodles, particularly instant noodles. About one third of Australian export wheat is consumed in the form of noodles of one type or another. Australian Prime Hard (APH) and Australian Hard (AH) wheat grades are preferred for making various types of yellow alkaline and instant noodles. These wheat grades especially APH demand a high market share in the marketplace because the noodles exhibit a high level of brightness and are superior at maintaining their colour stability. Noodles are widely consumed in Asian countries and are growing in popularity in Australia. There are many different kinds of noodles manufactured on export markets; Australian wheat is used predominately for the manufacture of the following types:

- Yellow alkaline noodles (Hokkien, Ramen)
- Instant noodles (form of alkaline noodle)
- White salted noodles (Udon)



Of Australian wheat exports, 34 percent is used for noodle production—24 percent for yellow alkaline noodles consumed in Japan and South East Asia, and 10 percent for white salted exported to Japan, China and South Korea.


## Bread and bakery products

Bread is the dominant sector of the bakery market. Pan or loaf bread accounts for 45% of the domestic market in Australia; however, wheat exported for pan production only accounts for 10% of total exports.

The domestic milling and baking industry remains an important end user of Australian wheat as the largest single customer at 1.3Mt per annum. In Queensland, the bread industry uses about 320 000 tonnes of wheat each year to provide \$1.2 billion worth of bread and bread rolls. Domestic requirements are largely driven by the large automated plant bakeries. Over 60% of the volume and value of bread production is with the large plant bakeries with the remainder in the franchise and traditional hot bread shops and supermarket in-store bakeries. However the domestic bread market is changing dramatically with increased sales of wholegrain, wholemeal and artisan type breads associated with an increased awareness of health and nutritional benefits.

A substantial growth area on export markets in the bread and baking industry over the last 10–15 years has been wheat milled for flat bread production. In the Middle East, flat bread is the predominant form consumed. Up to 40 percent of Australia's wheat exports are processed for flat bread production with the major markets being Egypt, Iran, Iraq and the Gulf countries. Flours that produce the best flat breads are those milled from white wheats that are not excessively soft, and AH and ASW varieties satisfy these requirements well. Wheat that is milled for flat bread production should have protein content no less than 10% and dough properties that are extensible rather than stable characteristics.





Across Asia, the bread sector is growing, reflecting the move to more westernised consumption patterns; there is a greater emphasis on convenience and increased consumption of fast foods. In Asia, the 'Sponge and Dough' method tends to be the most common method of making bread. This process produces a very soft Asian-style bread and the taste created through the fermentation process is preferred. In contrast this process is not commonly used in Australia where most bread is produced using the 'Rapid Dough' method. In the sponge and dough method a sponge is prepared containing most of the flour, water and yeast, allowed to ferment for 3 to 4 hours and then remixed with the rest of the ingredients and processed in the traditional manner. In Australia the sponge and dough bread making process is used to make bread rolls for the fast food industry. Sponge and dough bread in Asia is a key export market goal in the development of more targeted wheats to make specific end products. This \$1B Asian sponge and dough wheat market is being targeted by DPI&F and CSIRO Food Futures National Research Flagship in a collaborative project with support from the Grains Research and Development Corporation. This project is working with each of the Australian wheat breeding programs to identify wheat lines and varieties with superior sponge and dough bread quality. In 2008, the variety EGA Kidman was released in Queensland specifically for the sponge and dough bread market.

## **Pasta**

Some 440,000 tonnes of durum are produced per annum in Australian, with 60% from Queensland and northern New South Wales, and the rest from parts of South Australia. Around 70% of the total Australian production is delivered to export markets in Italy, Africa, the Middle East and Asia. However, Australia is only a small exporter of durum (less than 2% of global trade) and even less so of pasta (<0.5%) on the world markets. Our major export competitors in durum markets are Canada (70% of global trade) and the European Union. Compared to the others wheats, durum commands a price premium; over 2007–2008, this averaged higher than normal premiums over Prime Hard of \$178/tonne (AGA market reports). Australian durum wheat is preferred on export markets for pasta production because of its golden yellow colour, colour stability, hardness and the granular texture of semolina (coarse, gritty flours) produced on milling. The semolina produced from this specialised wheat exhibits high levels of stable yellow pigment and high water absorption, making it ideally suited to the production of a wide range of high-quality wet and dry pasta products with excellent colour and shelf life. The higher protein content of durum wheats produced in Australia combined with better quality gives Australian pasta products better ability to hold shape when cooking and stops it from sticking together.

More information on end user quality requirements in the noodle, bread and baking industry are shown in Table 2:

**Table 2. End user quality requirements**

### End User Quality Requirements

Bread Plant Bakeries	A <sub>H</sub> /APW (wheat protein 11.5 – 12.5%)	<ul style="list-style-type: none"> <li>•Mellow dough properties</li> <li>•High water absorption</li> <li>•Low development time</li> <li>•Low Minolta “b” value</li> </ul>
Bakers Flours	A <sub>H</sub> /APW (prot 11 – 13%)	<ul style="list-style-type: none"> <li>•General purpose bakery, hot bread shops, pizza</li> <li>•High water absorption</li> <li>•Mellow dough properties</li> </ul>
Biscuit	Soft biscuit (prot 7.5 – 9.5%)	<ul style="list-style-type: none"> <li>•Low water absorption</li> <li>•Weak but extensible doughs</li> </ul>
Cracke <sub>r</sub>	A <sub>SW</sub> /SASW (prot 10 – 12%)	<ul style="list-style-type: none"> <li>•Low water absorption moderate strength and good extensibility</li> </ul>
Cakes (High Ratio Sponge)	SASW (Rosella)	High starch paste viscosity
Hot Plate (Crumpets/Pikelets)	SASW (Rosella)	High starch paste viscosity
Udon Noodle (Export mixes)	SASW (Rosella) (protein max 9.5 -10%)	<ul style="list-style-type: none"> <li>•High starch paste viscosity/FSV</li> <li>•Colour stability</li> <li>•Low Black Point</li> </ul>

Source: Weston Milling, 2008

### Functional foods

The functional food market in one of the fastest growing food sectors. A functional food is a product that is considered to be similar to conventional food and consumed as part of the normal diet but has demonstrated to have health benefits beyond basic nutritional functions. Increasing consumer health awareness is influencing the bakery products market. There is a growing demand for whole-grain products, products with added functional ingredients such as soluble fibre. Typically breads in this premium end of the market have an increased degree of functionality, such as high fibre, low GI or omega 3 DHA. White bread once made up about 70% of bread sales in Australia, but sales of mixed-grain breads now equal those of white bread. The functional food market presents a small but high value market segment for wheat exports.

## Market trends in end uses of wheat on global markets

Wheat export markets are changing as countries become wealthier and more westernised. The Grain Growers Association study, 'What the world wants from Australia wheat growers' lists key trends:

- Pan breads will become a more significant part of the export market and the preference for sponge and dough breads is likely to remain in the medium term
- The flat bread markets are likely to demand high-protein, more stable wheat as they become more quality conscious
- Millers' purchasing dollar is now allocated between quality specific products and commodity wheat for blending, with millers seeking to reduce raw material costs and suppliers to provide maximum flexibility for end product output.
- Grain suppliers face choices and competition in the various market segments. i.e. commodity price-based markets versus differentiated quality focused market segments where the purchase decision is quality/functionality based. As suppliers move between these segments, a number of issues increase in importance including quality specification, reliability, technical/market support, relationships, traceability and identity preservation.
- Specialty wheat quality markets will increase bagged and containerised trade out of Australia.
- It is increasingly more important for exporters to understand varieties and how they perform in end use applications.

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