7 Australian Wheat

AWB Global Technical Services group

7.1 The Australian Wheat Industry

7.1.1 The Beginning

Wheat has been grown since the beginning of European settlement more than 200 years ago. The first crop was sown by convicts at a Government farm on a site now in the heart of Sydney, New South Wales (NSW). The farming environment proved too harsh for the new settlers, with infertile soil, plant diseases, low and unreliable rainfall, lack of farm implements, labour shortages, land clearing and imported seed developed for a different climate.

Australia's wheat output increased dramatically from 1830 to 1840 with the establishment of the states of Victoria (Vic), South Australia (SA) and Western Australia (WA). The expansion of production to the inland areas of NSW was also a particularly important step. This growth was aided by a gold rush in 1850 and later, the construction of inland railways. Australian wheat exports commenced in 1845 and have continued on a regular basis since 1870.

The development of wheat growing in Australia continued in subsequent decades, with the adoption of clover-ley farming, the introduction of mixed farming, the application of fertilizers and improvements in cultivation techniques. The introduction of bulk grain handling systems in the 1930*s* and 1940*s* and the widespread use of tractors on farms from the war years onwards were significant factors which helped to bring the industry to where it stands today.

The area planted to wheat has increased significantly in recent years, as has the average wheat yield per hectare. Over the past 20 years Australian wheat yields, on average, have risen by around 2.3% per year.

Breeding high yielding, better quality and more disease resistant varieties of wheat and the development of agricultural products to combat weeds, pests and wheat diseases continue to have a major positive impact on productivity.

7.1.2 Today

Australia produces approximately 20 mio t of wheat a year, accounting for around 3% of annual world production. About 80% of our wheat is exported with a relatively small domestic demand. Australia is one of the top three exporting countries with consistently more than 15% share of the global wheat trade.

Wheat is a significant contributor to the Australian economy, generating more than AUD 4 billion (USD 3 billion) in export revenue annually. It is the largest enterprise in the Australian grain industry and amounts to around 90% of the total value of grain production. It accounts for 3% of the total value of Australia's exports and 16% of Australia's total farm exports.

The wheat industry is particularly important to rural communities. It is a major source of employment and income, with approximately 35,000 wheat farms, involving more than 150,000 farm family members throughout Australia.

Australian States

Qld	=	*Queensland*
NSW	=	*New South Wales*
Vic	=	*Victoria*
SA	=	*South Australia*
WA	=	*Western Australia*

7.1.3 AWB Limited (AWB) and the Australian Grain Industry

AWB is Australia's major national grain asset manager and one of the world's largest wheat managers and marketers. AWB evolved from the Australian Wheat Board, which was established in 1939, and operated as a government statutory marketing authority for 60 years. It is now a grower controlled, publicly listed company. AWB is the sole bulk exporter of Australian wheat and is responsible for marketing Australia's wheat crop around the world under legislation known as the Single Desk marketing system.

7.1.4 A Brief History

An overwhelming number of wheat growers fought for a long time to establish Single Desk marketing and implement a national wheat pooling system. This grew out of growers' concern that they had little or no control over the wheat market. They were susceptible to price and production instability, sensitive to rising costs and reliant on the middlemen – grain merchants.

1937 • Wheat prices began a sharp decline

1939 • By mid year, prices fell to levels prevailing in 1931 and assistance to the wheat industry was urgent.
• The Australian Wheat Board was finally formed – initially under security legislation by the Commonwealth Government – as the Statutory Marketing Authority (SMA) for all wheat produced in Australia.
• This was organised in time to assist and allocate output and exports during World War II.

1945 • The commercial strength and stability of this arrangement was widely acknowledged and growers realised that they were much better off under the national pooling system, rather than the previous "free market" situation. This secured the future of the Australian Wheat Board after the war.

1989 • The Government established the Wheat Industry Fund through compulsory levies on wheat sales. This fund was held and managed by the Australian Wheat Board.

1998 • The business activities of the Australian Wheat Board were corporatised and transferred to a new corporation, AWB Limited. The assets and liabilities of the statutory authority (other than the Wheat Industry Fund) were transferred to AWB.

1999 • Wheat Industry Fund is worth approximately AUD 600 million (USD 372 million).
• The Wheat Industry Fund was transferred to AWB and "B" class shares were issued to the holders of units in that fund. "A" class shares were issued to growers. By issuing A class and B class shares, AWB became a grower owned and controlled corporation.

2001 • B class shares were listed on the Australian Stock Exchange. This made shares available to financial institutions and retail investors in addition to wheat growers.

7.1.5 AWB Today

AWB continues as the sole exporter of bulk wheat from Australia and the major wheat manager on the deregulated domestic market. It continues to market wheat and other grains to more than 40 countries.
AWB is actively involved in all facets of the grain value chain, from breeding through to end-use, wheat based consumer products. It researches and develops new wheat varieties for Australian farmers, shapes and tailors the national wheat crop to meet international customer requirements and provides finance and risk management for growers.
AWB has strong presence in the bulk storage and handling market in eastern Australia, an expanding sea chartering business and is further developing its international milling and processing capability to secure end-user demand.

7.2 Marketing Wheat to the World

AWB markets millions of tonnes of Australian wheat all over the world, every year. It operates under a legislated Single Desk marketing system, which is designed to provide growers with consistent returns from international markets for their wheat by having a single supplier of bulk Australian wheat for export. The Single Desk responsibilities are conducted under Federal Government legislation, known as the Wheat Marketing Act 1989. AWB is formally committed through its corporate constitution to use the Single Desk to maximise returns for Australian growers delivering to AWB National Pool.

Wheat is received by the AWB National Pool under strict receival standards and segregated according to grade classification and quality attributes. The specific qualities and attributes of pool wheat are then matched to meet the requirements of and contractual arrangements for international customers.

The Single Desk system is managed as an integrated wheat management system. This means that AWB is involved in the whole marketing process, from developing new wheat varieties right through to shipping our end product to international customers. It involves crop shaping and setting receival standards, driving efficiencies in storage, handling and transport and, ultimately, delivering a unique product, demanded by and made to order for international customers.

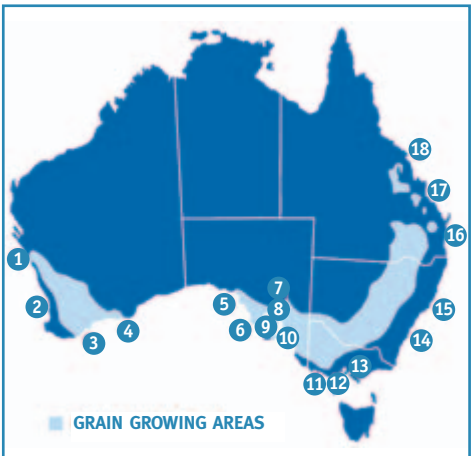
"Crop shaping" is a process for AWB to direct and manage Australian wheat quality profile, by communicating important market information from the customer back to breeding programmes and grain growers. AWB sets receival and quality requirements to reflect the needs of international customers. This information then encourages Australian growers to produce precisely the type and quality of wheat customers are seeking and puts growers in a position to receive better returns.

7.2.1 AWB Customers

Australia exports to more than 100 customers in more than 40 countries around the globe, principally in the Middle East and Asia regions. All markets have specific varietal, volume and timing requirements that must be met to ensure the customer is satisfied, which in turn forms lasting business relationships.

7.3 Moving Wheat from Paddock to Plate

Grain is grown throughout Australia, but primarily in a narrow crescent running through the mainland states. This area is generally known as the wheat belt (Fig. 24).



GRAIN EXPORT TERMINALS

1 Geraldton
2 Fremantle (Kwinana)
3 Albany
4 Esperance
5 Thevenard
6 Port Lincoln
7 Port Pirie
8 Wallaroo
9 Port Giles
10 Port Adelaide
11 Portland
12 Geelong
13 Melbourne
14 Port Kembla
15 Newcastle
16 Brisbane (Fisherman Island)
17 Gladstone
18 Mackay

Fig. 24: Australian wheat growing regions and export terminals

7.4 Australian Wheat Grades

AWB has developed six main wheat grades - Prime Hard, Hard, Premium White, Standard White, Soft and Durum (Tab. 28). These main wheat grades can be further segregated in order to supply specific qualities that match customers specifications.

Australian growers produce clean and dry, white wheat with varying protein levels. A wide variety of wheats are grown across Australia due to the diverse cropping conditions across the wheat belt. Growers are provided with incentives and rewards for producing wheat with specific qualities that attract higher market returns.

7.5 Australian Wheat Varieties

There are hundreds of different wheat varieties available to Australian wheat farmers. Wheat breeders are continually developing new varieties so that farmers can choose wheat seeds suited to their specific production environment.

Some different variety characteristics include:
- Adaptation to different rainfall regions i.e. low, medium or high rainfall
- Resistant to particular diseases i.e. rust, Septoria
- Quick growing
- High yielding
- High protein (good protein accumulation)
- Improved grain milling characteristics to suit end-users

7.6 The Growth Cycle

7.6.1 Planting

Australian wheat is planted in autumn and early winter and grows during winter and spring. Planting or sowing times depend on region and weather conditions, but generally begins early in May and ends in July, with most farmers waiting for a good rain or "break" to the season before starting.

Farming practices have changed considerably over the past twenty years and the type of machinery and seeding equipment used varies greatly. An increasing number of farmers now plant their crops using large scale seeding machinery, with minimum cultivation or ploughing of the soil. This type of seeding is referred to as minimum tillage. Pulled by large tractors, the seeding equipment creates a furrow for the seed and fertilizer, which are generally placed in the soil simultaneously.

7.6.2 Growth

Once planted, the wheat plant grows during winter and spring and needs rain to ensure high production. The growing process involves a number of stages (Fig. 3, page 4) with the wheat plant ripening and ready for harvest around November and December, depending on the region and type of season.

During the growing period, farmers monitor and manage their crops closely for signs of malnutrition, pests, disease or weeds to maximise yield potential.

Tab. 28: Indicative protein specifications and regional availability

AWB Wheat	Protein, %	Queensland	New South Wales	Victoria	South Australia	Western Australia
Prime Hard wheat	min. 13	◆	◆			
Hard wheat	min. 11.5	◆	◆	◆	◆	◆
Premium White wheat	min. 10	◆	◆	◆	◆	◆
Standard White wheat			◆	◆	◆	◆
Soft wheat	max. 9.5					◆
Durum	min. 13		◆		◆	

7.6.3 Harvest

The wheat plant takes approximately five to six months to reach full maturity and turn a golden colour. At this point, the crop is harvested quickly to avoid exposure to adverse weather such as rain and hail, which can adversely impact yield or grain quality.
The harvest period in Australia goes from the end of spring through to the middle of summer. Large and sophisticated harvesters are used for this job, with the self-propelled machines cutting the heads of wheat, threshing and sieving the wheat heads to remove and hold the grain while separating the chaff. Once the grain is separated, it is emptied from the harvester into storage or directly into trucks, which deliver to a grain receival point.
The stubble, i.e. the stalks of the wheat plant, remains standing in the paddock. It is used for stock feed and as protection against soil erosion.

7.6.4 Weather Conditions

Weather is a major determinant for final wheat yield and quality. The plant grows slowly during winter when temperatures are cooler and moves faster through the growth phase in spring with the warmer weather conditions.
All wheat-growing states experience different climatic conditions and therefore plant and harvest their crops at slightly different times of the year to achieve the best yields (Tab. 29).

7.7 Irrigation

Irrigated crops (not just wheat) account for about 11% of total crop production. Irrigation is conducted throughout small pockets of SA, Vic, NSW and Qld, predominantly in areas located near rivers or channel sources.

7.8 Improved Farming Trends

The following farming trends have become popular over the past 20 years and help produce of better quality crops, higher yields and lower farming costs.

- Improved **crop rotation** involves planting different crop species. Employing crop rotation, with crops like lupins and clover every second or third year, deposits nutrients back into the soil and provides a disease and pest "break". This ensures cleaner conditions for wheat crops and reduces the need for pesticides and chemicals.
- Use of **nitrogenous fertilizers** coupled with improved management with more soil testing and better formulations of fertilizers.
- **Minimum till farming** uses herbicides to control weeds pre planting rather than relying on cultivation of the soil to kill weeds. This technology has considerably aided moisture retention and soil conservation.
- **Improved varieties** have had an influence on increasing yields. New varieties have been produced that are higher yielding, as well as being resistant to disease, meaning higher production and reduced input costs.

7.9 Wheat Productivity Trends

The area of wheat planted has increased from 9.2 million hectares in 1990/91 to 11.5 mio ha in 2001/02. During this time, production has grown from 15 mio t to 24.8 mio t. Similarly, the average yield has increased over this 10-year period, from 1.6 to 2.1 t per hectare.

Tab. 29: Sowing and harvesting periods

Region	Sowing period	Harvesting period
Queensland	Early April — July	Early August — late December
New South Wales	Early may — end of June	Early November — late December
Victoria	Mid May — late June	Early October — mid February
South Australia	Early May — late June	End of October — mid-late January
Western Australia	Late April — June	Mid October — early January

These values are relatively low when compared to other wheat producing nations, however, Australian agricultural scientists and farmers have achieved outstanding results in both profitability and sustainability in a country with relatively low and variable rainfall, inherently low soil fertility and persistently declining terms of trade.

7.10 From Paddock to Port

7.10.1 Delivery to Silo

After the wheat is harvested, the grain is either stored on the farm in small silos or taken by truck to a designated grain receival centre. There are more than 900 receival sites in the Australian wheat belt. At these sites, grain is first tested for quality and graded accordingly into specific segregations. It is then stored until it is ready to be moved to port for shipping.

The first step is the grain sample, which is tested for physical attributes such as protein, screenings and moisture. After sampling, the truck is weighed (to determine how much grain the farmer is delivering) and then unloaded into a specific silo or bunker depending on the quality of the grain in the truck.

7.10.2 Storage and Handling

Grain storage and handling in Australia is undertaken by regional Bulk Handling Companies (BHCs). The storage and handling system in each state must be capable of accepting the annual crop quantity within the relatively short harvest period of some six to eight weeks.

On-farm storage and private commercial storage is also available and is becoming increasingly important in providing some buffer capacity in the delivery system.

The types of storage facilities provided by the BHCs vary within and between states. This reflects regional differences in the types and quantities of grain produced, as well as changes in storage construction policy and technology through time. There are four basic storage types in common use - horizontal storage sheds, circular storage bins, vertical storage and temporary bunkers.

Each BHC has a network of country receival facilities connected by road and or rail transport links to several seaboard export terminals. In some cases, the network includes a number of regional or central subterminals which provide greater flexibility to the system. In particular, they enable the accumulation of larger volumes of grain for more efficient transport and provide overflow capacity to other local silos, usually having faster receival and outloading capacities.

7.10.3 Movement to Port

The majority of Australian receival centres are located on railway lines, so once the grain has been allocated to a customer it is usually transported by train to one of Australia's 18 port terminals to be loaded onto a vessel.

The grain transported to port matches the quality contracted by the customer. Grain may be sourced from a number of receival sites and blended to meet the precise customer quality and quantity requirements.

7.10.4 Loading the Vessel

The grain is tested again at the vessel loading point for any traces of insects or damaged grain. Strict quality assurance testing occurs at the port so that certification can be provided to the customers while the vessel is on course for the chosen destination.
Ships vary in size and can hold various amounts of grain, but the largest boat shipped from Australia to customers – a Panamax vessel – is approx. 64,000 t.

Australian Wheat Grades

APH	=	*AWB Prime Hard wheat*
AH	=	*AWB Hard wheat*
APW	=	*AWB Premium White wheat*
ASW	=	*AWB Standard White wheat*
AS	=	*AWB Soft wheat*
ADR	=	*AWB Durum wheat*

7.11 Australian Grades of Wheat and End Use Products[10]

The six main Australian wheat grades developed by AWB are suitable for many different types of wheat based products, summarized in Tab. 30.

AWB Prime Hard wheat (APH) is ideally suited for European bread, yellow alkaline noodles and *wonton* skins. It can be blended with lower protein wheats to produce high quality flours suitable for a wide range of baked products and noodles. APH is grown in Qld and NSW.

AWB Hard wheat (AH) flour is suitable for European pan and hearth breads, Middle Eastern-style flat breads, yellow alkaline noodles and steamed products. AH is grown in all wheat states.

AWB Premium White wheat (APW) is used to produce Middle Eastern flat and pocket breads such as *baladi, tanoor, barbari, taftoon* and Indian specialty breads and is also well suited for many types of Asian baked products and noodles. APW is produced across the entire Australian wheat belt.

AWB Standard White wheat (ASW) is ideal for Middle Eastern, Iranian and Indian style breads such as *lavish* and *naan*. It is also suitable for Asian steamed bread products and instant noodles. ASW is cropped in Southern NSW, South Australia and Western Australia.

AWB Soft wheat (AS) is suitable for a wide range of confectionery and baked products including sweet biscuits, cookies, pastries, cakes, steamed buns and extruded snack foods. Soft wheat is only grown in a small area of Western Australia, where the environmental factors are suitable.

AWB Durum wheat (ADR) is ideal for producing a wide range of wet and dry pasta products, as well as many types of North African and Middle Eastern products such as *couscous*. The production of Durum wheat is limited to Northern NSW and SA.

[10] *Wheat samples from AWB Ltd., Melbourne, Australia; photographs by L. Popper*

Tab. 30: Typical applications of Australian wheat grades

Application	Wheat Type					
	APH	AH	APW	ASW	AS	ADR
European pan bread	X	X	X			
Hearth bread	X	X	X			X
Middle Eastern bread				X		
Flat bread		X	X			X
Indian bread			X	X		
Confectionery					X	
Extruded Snacks					X	
Steamed bread		X			X	
Udon noodles				X		
Alkaline noodles	X	X	X	X		
Asian instant noodles	X	X	X	X		
Couscous						X
Pasta						X

7.12 Where Australian Wheat Goes Internationally

7.12.1 Importing Countries for Australian Wheat

AWB exports wheat to more than 100 customers in more than 40 different countries, with major markets in the Middle East and Asian regions. AWB works hard to secure end-user demand for AWB wheat from Australia. AWB is continually broadening its services to international customers with value added products and services, such as risk management services, grain finance, chartering, technical support, professional development and wheat processing expertise.

All international markets have different needs and AWB continuously explores improvements with its customers and Australian grain growers to manage expectations and supply quality grain made to order.

Other Abbreviations

SMA = *Statutory Marketing Authority*
AWB = *AWB Limited, formerly Australian Wheat Board*
BHC = *Bulk Handling Company*