Chapter 5

The Australian Grain System

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Australia is the fourth largest wheat exporter, following the United States, Canada, and the European Community. Australia's market share in recent years has ranged between 11 and 18 percent. production is quite volatile compared to other exporters. Of particular importance is that a large proportion of Australian wheat is exported—up to 80 or 90 percent in recent years.

The wheat produced in Australia is exclusively white. It is generally considered a weaker wheat, with protein in the area of 9 to 11 percent, although some regions are capable of producing wheat with 14 to 15 percent protein. Wheat in Australia has a reputation for being very dry, with harvest moisture about 9.5 percent, and for having relatively superior "hygiene, " in terms of overall cleanliness and lack of infestation. Levels of impurities are generally less than 0.4 percent, and insect problems have been virtually eliminated despite a climate very conducive to insect proliferation.

A number of institutions and institutional relationships influence the quality of wheat produced, marketed, and exported in Australia. These include the Australian Wheat Board (AWB), monopoly grain handling authorities in each state, variety release and control procedures, and a set of receival standards applied at the point of first sale. These interrelated influences have important impacts on the quality of wheat exported.[1]

[1]This chapter draws on the OTA paper "A Comparison of Quality Factors of the Australian and United States Grain Systerns, " based on the findings of an OTA study team consisting of Dr. William W. Wilson, Mr. David M. Orr, Mr. Robert A. Zortman, and Dr. Michael J. Phillips that traveled to Australia in 1987. Dr. Wilson integrated the findings of the team into the OTA paper,

OVERVIEW OF MARKETING AND PRODUCTION

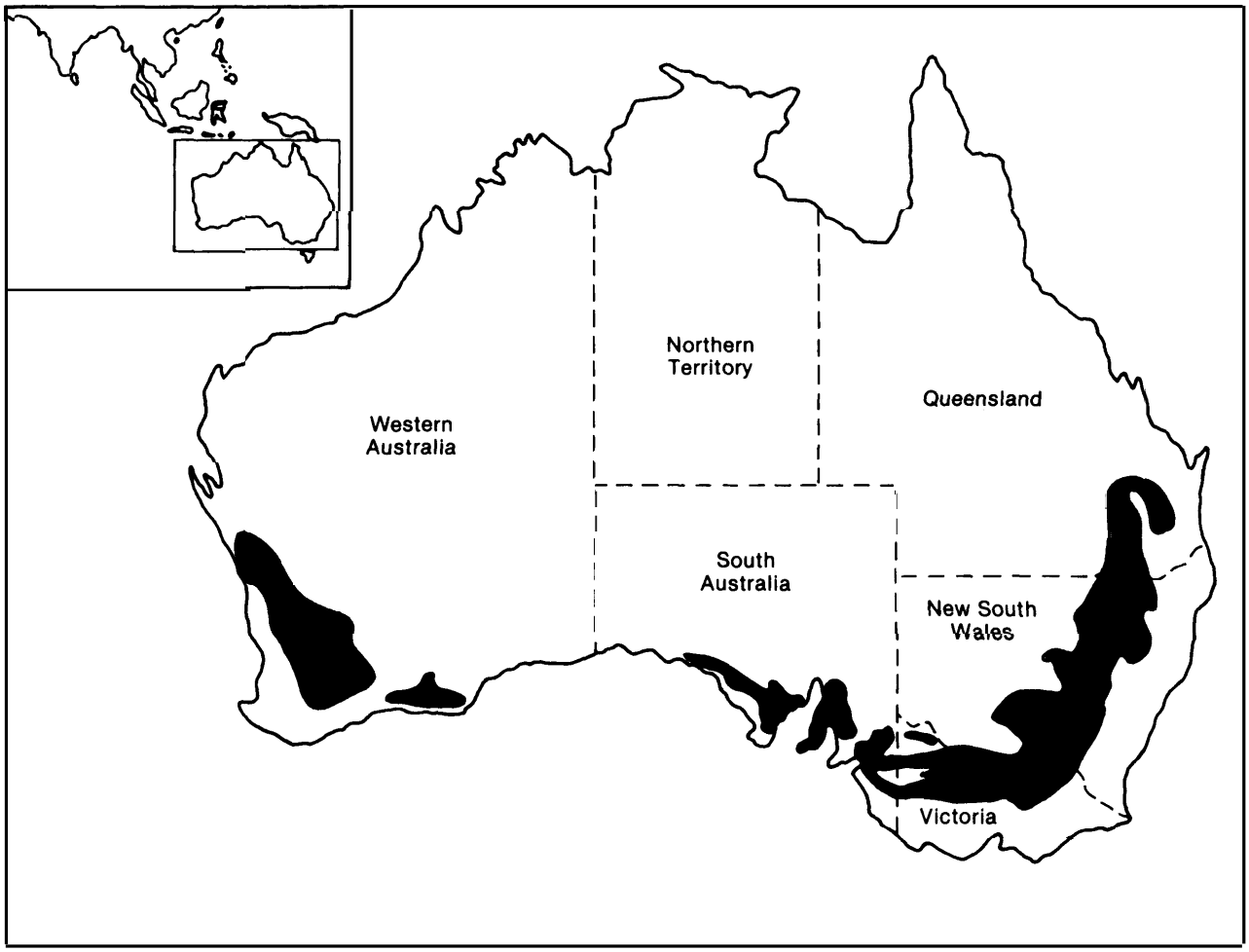
Wheat production in Australia is limited to the south and east coasts and to Western Australia (figure 5-1). The largest wheat-producing state is New South Wales, followed by Western Australia, Victoria, South Australia, and Queensland (table 5-1). Over the past 10 years production shares across the four largest wheat-producing states were: New South Wales, 35 percent; Western Australia, 29 percent; Victoria, 16 percent; and South Australia, 11 percent. The distribution of wheat production across states is relatively constant.

Production has been on a slightly increasing trend over the past 20 years (figure 5-2). However, of particular importance is that production is quite volatile through time. Substantial reductions in production were observed at least four times in the past 25 years, and several of these are directly attributable to drought conditions (e.g., in 1982/83). In each case these were followed by above-normal production in subsequent years.

The area planted in Australia has been increasing since the early 1960s. There was a sharp reduction in 1970, but since then it has increased gradually. After peaking at 12.9 million hectares in ***1983,*** the area planted dropped to an estimated 10.0 million hectares in 1987, This reduction has occurred because of the decreasing relative profitability of wheat—caused by the simultaneous occurrence of lower wheat prices and a rapid escalation in Wool prices, with pasture and sheep production providing an alternative use of the land.

In recent years domestic use has accounted for only about 15 percent of total demand, a decline from earlier years (table 5-2). The principal source of domestic demand is for human consumption. Wheat used for feed ranged from 35 to 48 percent of domestic use in 1979/80 to 1982/83, but declined to 9 percent in 1985/86 (4). Bread bakers use 45 percent of the flour produced in the domestic industry and the starch/gluten manufacturers use 22 percent

Figure 5=1.—Wheat-Growing Regions of Australia



● Each dot represents 500,000 metric tons.

SOURCE: Adapted from U.S. Department of Agriculture, *Major World Crop Areas and Climatic Profiles,* Agriculture Handbook 664, 19S7.

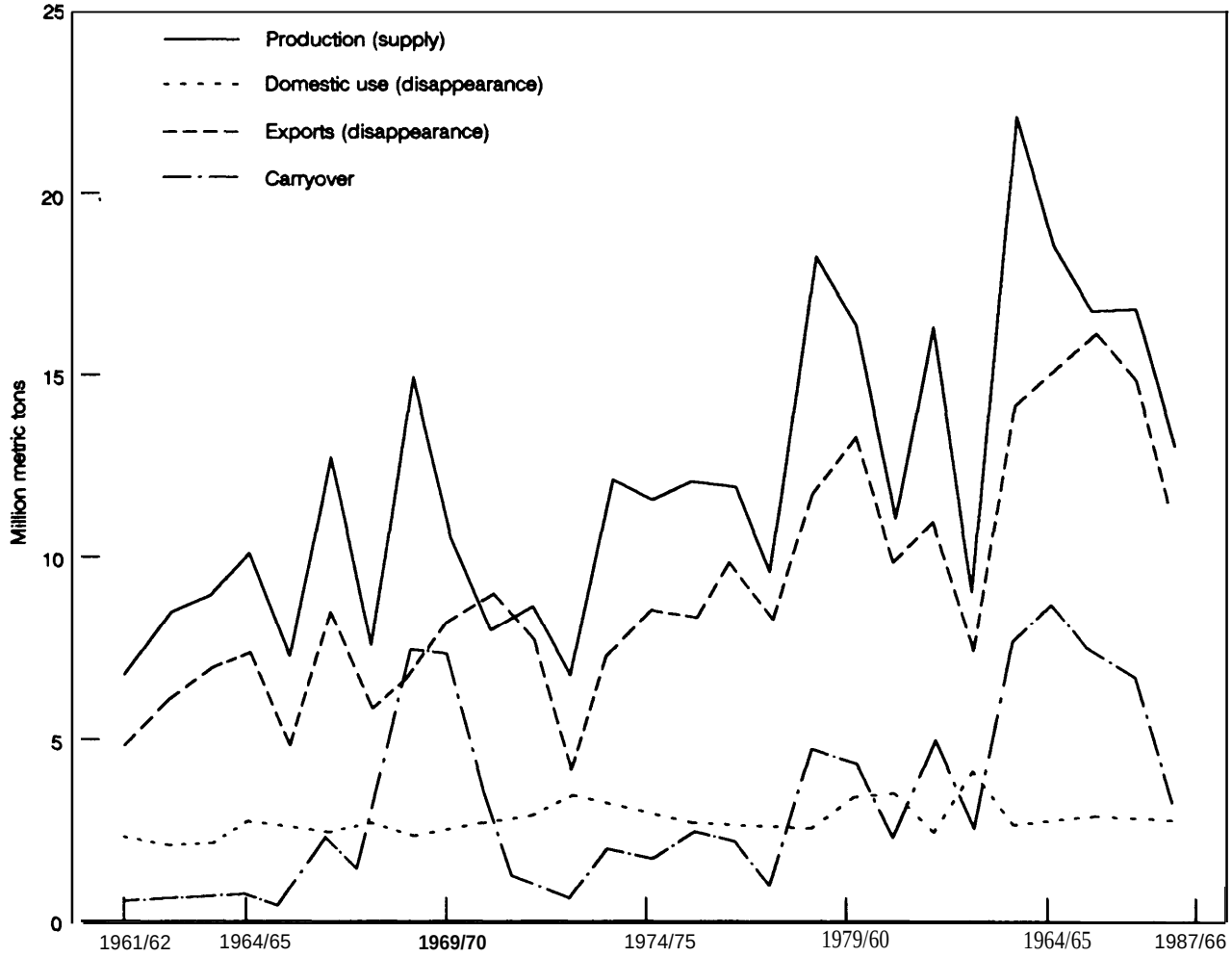
Table 5-1.-Production of Wheat in Australia (thousand metric tons)

Season[a]	New South Wales[b]	Victoria	South Australia	Western Australia	Queensland	Tasmania	Australia
1976-77	5,142	1,789	832	3,249	794	4	11,800
1977-78	3,946	1,497	511	2,945	569	2	9,370
1978-79	6,640	2,998	2,086	4,400	1,962	3	18,090
1979-80	6,001	3,250	2,349	3,739	846	4	16,188
1980-81	2,865	2,538	1,650	3,315	485	3	10,856
1981-82	5,910	2,467	1,695	4,803	1,482	3	16,360
1982-83	1,500		692	5,534	755		8,876
1983-84	8,981	3 , %	2,843	4,316	1,922	3	22,016
1984-85	5,805	2,666	2,031	6,580	1,579	4	18,666
1985-86	5,911	2,225	1,879	4,377	1,730	4	16,127
Ten-season average	5,258	2,380	1,657	4,326	1,212	3	14,835

[a]October 1 to September 30.
[b]Including A.C.T.

SOURCE: Australian Wheat Board, *Annual Report 1985/86.*

Figure 5-2. -Wheat Supply and Disappearance for Auatralia



SOURCE: International Wheat Council, *World Wheat Statistics* **(London: various issues).**

(table 5-3). Australia is a major manufacturer and exporter of gluten.

Exports reached a peak of 16.1 million metric tons (MMT) in 1985/86, but declined to a projected 11.0 MMT in 1987/88 as production dropped. In the mid-1980s, 80 to 90 percent of the wheat produced in Australia was exported. This is very high compared with other exporters (table 5-4), again indicating the relative importance of wheat exports in Australia. The decline in the recent year is largely due to the reduced production.

Traditionally, Australia carried minimal stocks between crop years. Beginning in the late 1970s, however, ending stocks began to increase. In the mid-1970s ending stocks were about 14 to 22 percent of production, but the percentage increased to 47 percent in 1984/85, reaching 8.6 MMT. Carryover stocks dropped thereafter, to less than 4 MMT in 1987/88. Compared with the United States and, traditionally, Canada, ending stocks as a percent of production are lower. This suggests that despite the variability in production, Australia is less willing or able to hold over stocks between years.

Table 5-2.—Australia Wheat Supplies and Disappearance for 1961162 to 1987188 (million metric tons)

Year	Beginning stocks	Production	Total	Domestic	Exports	Total	End-of-year carryover
	supply			Disappearance			
1961/62	**0.7**	6.7	**7.4**	2.1	4.8	**6.9**	**0.5**
1962/63	**0.5**	8.4		2.0	6.2	**8.2**	**0.6**
1963/64	**0.6**	8.9	**9.6**	2.1	6.9	**9.0**	**0.6**
1964/65	**0.6**	**10.0**	**10.6**	2.7	7.3	**9.9**	**0.7**
1965/66	**0.7**	7.1	**7.7**	2.5	4.8	**7.3**	**0.5**
1966/67	**0.5**	12.7	**13.2**	2.4	8.5	**11.0**	**2.2**
1967168	**2.2**	7.5	**9.7**	2.7	5.7	**8.3**	**1.4**
1968/69	**1.4**	14.8	**16.2**	2.3	6.7	**8.9**	**7.3**
1969/70	**7.3**	10.5	**17.8**	2.4	8.2	**10.6**	**7.2**
1970/71	**7.2**	7.9	**15.1**	2.7	**9.0**	**11.7**	**3.4**
1971/72	**3.4**	8.6	**12.0**	2.8	**7.8**	**10.6**	**1.5**
1972173	**1.5**	6.6	**8.0**	3.4	**4.1**	**7.6**	**0.5**
1973/74	**0.5**	12.0	**12.5**	3.2	**7.4**	**10.6**	**1.9**
1974/75	**1.9**	11.4	**13.2**	3.0	**8.5**	**11.6**	**1.7**
1975/76	**1.7**	12.0	**13.6**	2.7	**8.2**	**11.0**	**2.7**
1976177	**2.7**	11.8	**14.5**	2.6	**9.8**	**12.3**	**2.1**
1977178	**2.1**	9.4	**11.5**	2.6	8.1	10.7	**0.8**
1978/79	**0.8**	18.1	**18.9**	2.5	11.7	14.2	**4.6**
1979/80	**4.6**	16.2	**20.8**	3.4	13.2	16.6	**4.3**
1980181	**4.3**	10.9	**15.1**	3.5	9.6	13.1	**2.0**
1981/82	**2.0**	16.3	**18.4**	2.4	11.0	13.4	**4.9**
1982/83	**4.9**	8.8	**13.8**	4.2	7.3	11.5	**2.3**
1983184	**2.3**	22.0	**24.3**	2.6	14.2	16.7	**7.6**
1984/85		18.3	**25.9**	2.6	15.1	17.3	**8.6**
1985/86	**7.6**	16.6	**25.1**	2.9	16.1	17.9	**7.3**
1986/87	**7.3**	16,8	**24.1**	2.7	14.8	17.5	**6.6**
1987/88	**6.6**	12.4	**19.0**	2.7	12.2	14.9	**4.1**

NOTE: 1987/88 data are preliminary.

SOURCE: *1961/62 to 1985/86: World Wheat Statistics* (London: various years); *1986/87* and *1987/88:* IWC Market Report; and U.S. Department of Agriculture, Foreign Agricultural Service, "World Grain Situation Outlook," FG 9-88, Washington, DC.

Table 5.3.—Domestic Uses of Wheat by Type of Flour, Australia, 1982-87[a] (in percent)

Uses	1982	1983	1984	1985	1986	1987
Industrial:						
Starch/gluten manufacture	20.1	18.6	20.6	22.7	24.0	22.3
Other	1.3	0.8	0.3	0.2	0.1	0.2
Human consumption:						
Bread bakers	54.3	55.0	48.6	47.4	45.8	44.8
Pasta cooks	NA	NA	9.1	8.8	7.8	7.5
Biscuit	7.0	7.3	6.7	16.4	6.7	7.1
Pasta	3.3	3.1	3.3	3.1	3.3	3.4
Packeted flour and mixes	8.8	8.3	6.5	7.4	6.4	6.8
Food	4.2	5.8	5.0	4.0	5.9	7.9
Total (000 MT)	1,043	1,036	1,123	1,139	1,144	1,208
Export (000 MT)	102	91	63	61	61	73
Grand total (MMT)	1,145	1,126	1,187	1,200	1,205	1,281

[a]Crop year ending June 30.

SOURCE: Survey conducted by Bread Research Institute, Sydney, 1987.

Exports

Australia typically produces between 2.5 and 4.0 percent of the world's wheat. Argentina and Australia are the principal exporters that reduced exports in the past 2 years, offsetting increased U.S. exports (table 5-5). The market share for Australia was in the area of 10 to 12 percent in the late 1970s, and reached 18.5 percent in 1985/86 (figure 5-3). Again, it was primarily the market shares of Australia and Argentina that fell since 1986.

Table 5-4.—Wheat Exports as Percent of Production for Major Exporters

Year	EC10[a]	United States	Canada	Australia	Argentina
1961/62	13.7	58.4	126.3	72.0	47.7
1962/63	13.5	58.8	58.6	74.5	32.6
1963/64	15.4	74.7	82.2	77.3	39.0
1964/65	19.4	56.5	66.6	72.4	56.9
1965/66	19.1	65.9	90.1	67.3	91.1
1966/67	16.9	57.0	62.3	67.1	35.2
1967/68	15.3	50.5	56.7	75.0	30.7
1968/69	15.8	35.0	47.1	45.2	43.1
1969/70	20.5	42.0	51.6	77.7	32.6
1970/71	10.3	54.6	131,3	114.7	17.2
1971/72	13.2	39.1	95.1	90.2	28.5
1972/73	16.4	76.6	108.1	62.8	39.2
1973/74	13.0	67.4	70.6	61.9	22.8
1974/75	17.5	57.9	81.0	75.3	28.7
1975/76	25.2	55.3	72.2	68.7	36.1
1976177	12.4	44.4	57.0	82.7	53.0
1977/78	14.7	54.9	80.8	86.4	31.6
1978/79	19.0	67.2	61.9	64.6	49.3
1979180	23.6	64.4	92.4	81.5	58.3
1980/81	27.4	63.6	84.3	88.6	45.0
1981/82	29.1	63.6	74.4	67.4	45.8
1982183	25.4	54.6	79.9	82.5	65.3
1983/84	27.7	59.0	82.1	64.3	59.7
1984185	24.7	54.9	82.7	82.5	68.4
1985/86	24.1	37.5	75.3	97.3	50.6
1986/87	23.4	48.1	66.2	93.3	50.6
1987188	22.3	76.0	91.0	98.0	42.0

aggregated for first 10 members of the European Community. It excludes Spain and Portugal.

SOURCE: Intemationai Wheat Council, *World Wheat Statistics* (London: various issues); 1988/87 from U.S. Department of Agriculture, Foreign Agricultural Service, FG-9-88, Washington, DC.

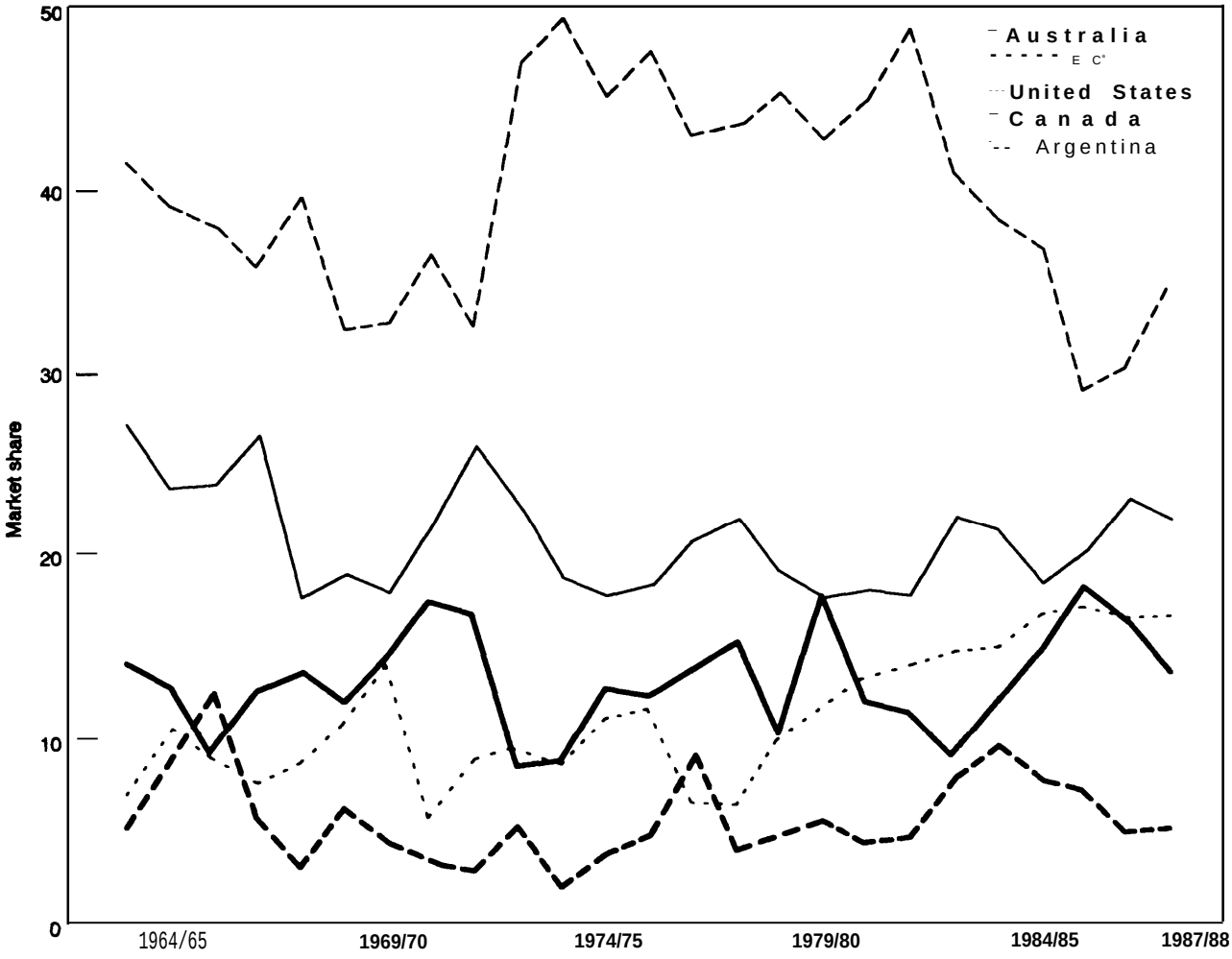
Table 5-5.—Total Wheat Exports by Major Exporters (million metric tons)

Year	EC[a]	United States	Canada	Australia	Argentina	Total
1963/64	3.8	23.1	15.1	7.8	2.8	55.8
1964/65	5.4	19.6	11.9	6.5	4.4	50.5
1965/66	5.5	23.4	14.8	5.7	7.9	62.0
1966/67	4.2	20.0	14.8	7.0	3.1	55.8
1967/68	4.4	20.2	8.9	7.0	1.4	51.2
1968/69	5.0	14.7	8.7	5.4	2.8	45.7
1969/70		16.5	9.0	7.3	2.1	50.7
1970/71	3.1	19.8	11.6	9.5	1.7	54.3
1971/72	4.7	16.9	13.7	8.7	1.3	52.5
1972/73	6.5	32.0	15.6	5.6	3.5	68.3
1973/74	5.5	31.1	11.7	5.5	1.1	63.1
1974175	7.1	28.3	11.2	8.0	2.2	63.4
1975/76		31.5	12.1	8.1	3.1	66.5
1976/77	3.9	26.4	12.9	8.4	5.6	61.8
1977178	4.5	31.5	15.9	11.1	2.7	72.4
1978179	7.4	32.4	13.5	7.2	3.3	71.7
1979/80	10.3	36.6	15.0	15.4	4.7	86.0
1980/81	12.7	42.1	17.0	11.1	3.9	94.0
1981/82	14.0	49.3	17.8	11.4	4.3	100.7
1982/83	14.1	39.3	21.1	8.5	7.5	96.1
1983/84	14.9	38.3	21.2	11.6	9.6	100.3
1984/85	17.2	38.2	19.1	15.1	8.0	104.1
1985186	15.0	25.1	17.6	16.1	6.3	87.0
1986187	15.0	27.3	20.8	14.9	4.3	90.1
1987188	16.0	43.4	23.6	12.2	3.8	95.8

[a]European Community comprised of original member states to 1987188, 9 member states to 1980/81, 10 member states to December 1985, thereafter 12 members.

SOURCE: international Wheat Council, *World Wheat* Statistics (London: various issues); 1988/87 from U.S. Department of Agriculture, Foreign Agricultural Service, FG-9-88, Washington, DC.

Figure 5-3. Market Share of Wheat Exports by Major Exporters



[a]Six original member states in 19S7/SS, 9 member states in 19S0/S1, 10 member States in December 1985, thereafter 12 members

SOURCE: International Wheat Council, *World Wheat* Statistics (London: various issues).

The largest six importers of Australia are the U. S. S. R., Egypt, China, Japan, Iran, and Bangladesh (in approximate rank over the past three market years). In 1985/86 these countries bought 70 percent of the wheat exported. The U.S.S.R. is now the single largest importer, purchasing 20 percent of Australia's wheat in 1985/86. This is a fairly recent change, with substantial Soviet increases in wheat purchases beginning in 1979/80.

Australia has the dominant position in two markets—Iran and Malaysia. However, in several markets Australian market shares have decreased substantially. In China, it dropped from 48.3 percent in 1969/70 to 19.6 percent in 1984/85. Decreases in market shares have also been observed in Egypt, in Indonesia since 1979/80, and in Malaysia since the mid-1970s. Market shares in the remaining countries do not illustrate trends, but are sporadic. Australia and the United States compete in most markets, with the exception of Iran. They are the principal competitors (defined as the largest two suppliers) in a number of markets, including China, Egypt, Iraq, and Indonesia.

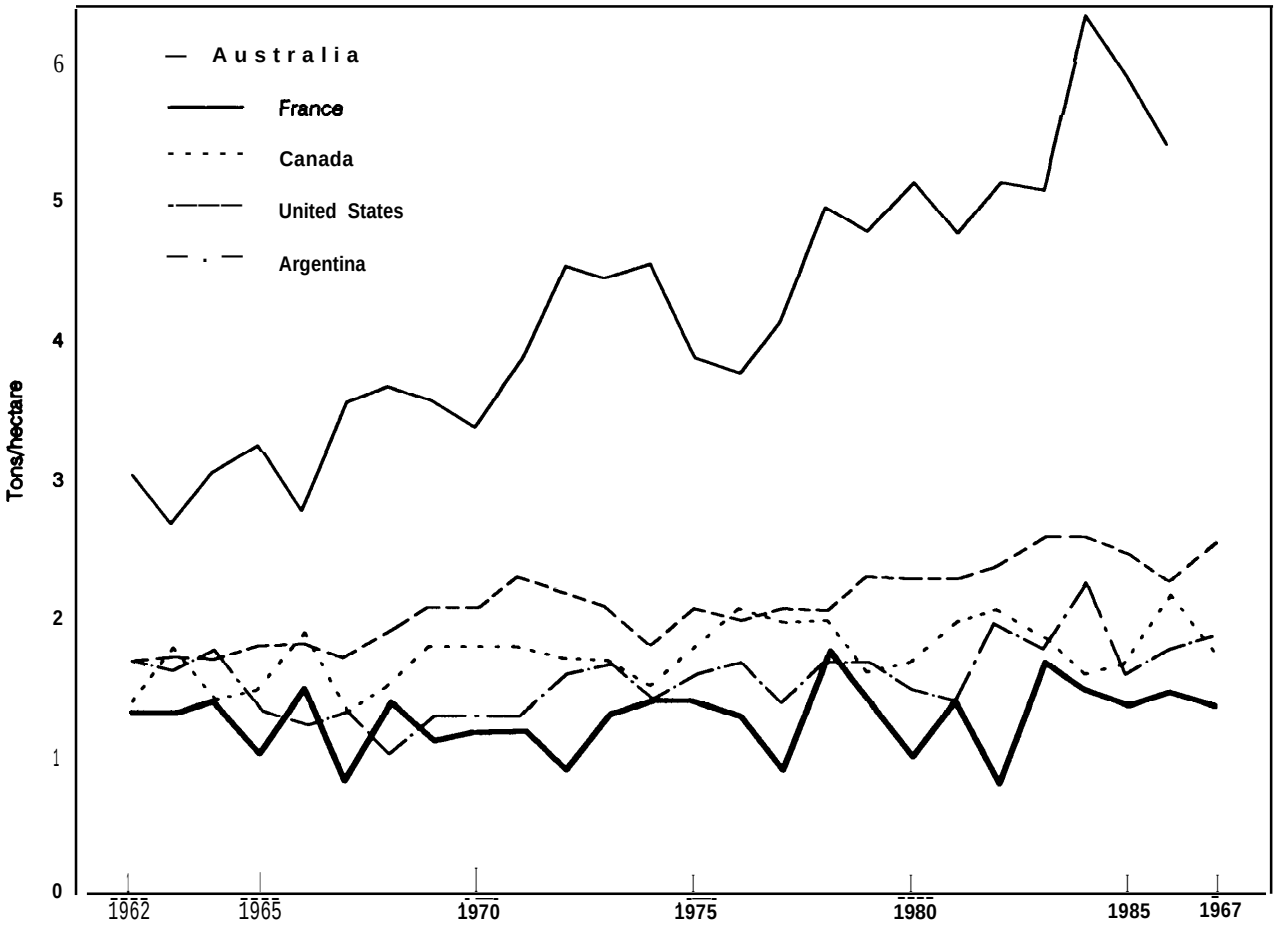
Australia exports are exclusively white wheat generally of medium protein level. Thus, it mainly competes with U.S. white and Hard Red Winter (HRW) wheats.

Productivity

Yields in Australia are nearly always the lowest among major exporters, ranging from 1.4 to 1.5 metric tons per hectare (MT/ha) in recent years (figure 5-4). This is in comparison to French wheat yields of up to 6.0 MT/ha and U.S. yields of 2.3 to 2.6 MT/ha. Another notable feature of yield behavior in Australia is sharp reductions in 1972, 1977, and 1982, generally consistent with drought conditions. Yield behavior is very erratic, as when it increased from 0.7 MT/ha in 1982 to 1.7 MT/ha in 1983. This has important implications for the grain-handling storage system and for export strategies.

To evaluate the productivity growth between countries, a semilog model was estimated over the time series 1962-86. The fastest growth rate was that of France, followed by the United States. No significant trend was registered for Australia, suggesting a nil growth rate in productivity. A number of reasons account for the low yields in Australia, including low prices, low rates of fertilization, and little rainfall.

Figure 54.-Wheat Yield by Major Exporters in Tons/Hectare



SOURCE: International Wheat Council, *World Wheat Statistics* (London: various issues).

Quality

Seven classes of wheat are produced and marketed in Australia: Prime Hard (APH), Hard (AH), Australian Standard White (ASW), Soft, Durum, General Purpose (GP), and Feed. Each to some extent is further segregated by protein level or by level of nonmillable materials. The Australian Wheat Board publishes crop quality data for wheat entering the marketing system for APH, AH, ASW, and GP.

Generally, about 68 percent of the wheat received is classed as ASW, 15 percent as AH, and the remainder split between the other two classes (table 5-6). In 1983/84 and 1985/86, the proportion classed as GP jumped. The magnitude of the increases would suggest a trend toward GP wheat, but this conclusion would be preliminary given only 2 years of data. In both 1983/84 and 1985/86 crop quality problems developed because of rains during harvest, resulting in an increase in weather damage. Also of interest is the apparent decrease in recent years of both APH and AH wheat,

The principal quality difference between classes is the protein level and the end-use performance associated with protein (e.g., water absorption) (table 5-7). ASW protein levels are generally about 10 percent. Compared with U.S. Hard Red Winter and Western White (WW), Australian wheats have higher test weight and extraction rates. Protein levels for HRW are similar to AH, and those of white are similar to ASW. Water absorption for AH is similar to HRW, but WW is substantially less absorptive than ASW.

Farm Sector

The farm sector in Australia, like that in most exporting countries, is going through a transition. The most important structural shift is toward fewer total farms. In addition, the number smaller than 500 hectares is dropping, while those greater than 500 hectares are increasing.

Wheat farming in Australia involves extended rotations with clover and sheep. The study team's casual conversations with producers indicated they used to plant 4 years of wheat and 2 years of pasture. Due to reduced wheat prices and increased sheep/wool prices, however, they are now following a 2-year rotation of wheat and 4 years pasture. One objective is to increase the soil nitrogen. Fertilizer use has dropped sharply since the peak in 1981/82, both in total and per hectare of cropland.

Table 5=6.—Percentage of Wheat Receivals by Class and State Averages, Australia

Years	Australia prime hard (APH)	Australia hard (AH)	Australia standard white[a] (ASW)	General purpose[b] (GP)
1976/77	**8.7**	**18.4**	**64.5**	**8.4**
1977178	**14.2**	**17.2**	**62.8**	**5.8**
1978179	**4.3**	**15.6**	**69.2**	**10.9**
1979180	**4.7**	**16.1**	**74.3**	**4.9**
1980181	**3.8**	**14.5**	**77.6**	**4.1**
1981182	**7.7**	**19.9**	**68.1**	**4.3**
1982183	**10.1**	**13.8**	**72.3**	**3.8**
1983184	**6.6**	**12.4**	**51.5**	**29.5**
1984185	**6.4**	**13.0**	**77.5**	**3.1**
1985186	**4.5**	**13.0**	**64.7**	**17.8**
Averages over 10 years:				
Australia	7.1	15.4	68.3	9.2
New South Wales	15.9	25,7	45.2	13.2
Victoria	—		90.7	
South Australia	—	24.1	72.7	3.2
Western Australia	—	5.1	87,3	7.6
Queensland	28.6	29.9	26.0	15.5
Tasmania	—	—	—	—

[a]Includes minor quantities of Durum and soft wheat.
[b]Includes Australian feed wheat.

SOURCE: Australian Wheat Board, *Annual Reports*.

Table 5-7.—Typical Analysis for the Australian Milling Wheat Classes

	Australian prime hard 14°/0	Australian hard	Australian standard white	Australian soft
Wheat:				
Test weight (kg/hl)	79.4	80.0	80.5	78.0
1000 kernel weight (g)	35.2	37.2	35.2	34.8
Grain hardness (P. S. I.)	15	14	17	27
Protein (11 0/0 moisture)	14.2	12.2	10.8	8.5
Ash 0/0	1.50	1.50	1.38	1.38
Falling number (see)	494	460	422	325
Flour extraction °/o	75	74	75	74
Screenings:				
Total screenings °/o (2mm screen)	2.5	2.6	3.1	3.2
Flour:				
Protein (3.50/0 moisture)	13.1	11.0	9.6	7.5
Wet gluten 0/0	40.0	33.7	28.8	2.2
Diastatic activity (mg)	192	237	195	116
Ash 0/0	0.50	0.48	0.47	0.45
Farinogram:				
Water absorption%	65.6	65.8	60.8	52.4
Development time (rein)	6.0	4.7	3.4	1.9
Extensograph:				
Extensibility (cm)	23.2	22.8	20.1	19.6
Maximum height (B. U.)	460	365	320	190
Area (cm^b)	140	112	95	43

SOURCE: Australian Wheat Board, *Australian Wheat Industry Guide*

THE AUSTRALIAN WHEAT BOARD

The single most important institution in the Australian wheat industry is the Australian Wheat Board. The AWB is involved in variety control, the establishment of grade standards, administration of producer price policy, and domestic and export sales. In addition, it has established procedures for resolving many potential problems associated with quality. One important function is setting receival standards, which essentially form the basis of the grading system in Australia. Government producer price policies (described in a subsequent section) are administered by the AWB.

Historical Background and Current Objectives

The AWB began in 1939 as a wartime defense organization. Prior to that wheat marketing was conducted by private traders and exporters. The 1939 legislation gave the AWB the authority to receive, handle, and market Australia's wheat crop. It became the sole buyer and seller of Australian wheat; storage, handling, and transportation were provided by each state's bulk handling authority (BHA).

Operation of the current AWB stems from 1948 legislation. From then on the AWB was subject to legislation with a sunset clause every 5 years. AWB performance was reviewed every 5 years. Legislation was under the auspices of the Wheat Industry Stabilization Acts of 1954, 1958,1963, 1968 and 1974, and the Wheat Marketing Acts of 1979 and 1984. The current legislation expires with the 1988/89 crop marketing year. An Industries Assistance Commission (IAC) is currently investigating the performance of the wheat industry. A new wheat marketing act will have to be passed prior to the 1989/90 marketing year. Complementary legislation in each state is also required for the AWB to operate nationally.

The current AWB has a broad objective and a number of statutory functions (AWB submission to IAC). The broad objective is to "perform its functions with the object of securing, developing, and maintaining markets for Aus-

tralian wheat and maximizing the return to growers from the marketing of Australian wheat." This objective should be attained in consultation with the Grains Council of Australia (an organization representing growers). Specific statutory functions of AWB are:

1. to control:
   —the marketing of Australian wheat within the States and Territories,
   —the interstate marketing of Australian wheat,
   —the overseas marketing of Australian wheat, and
   —the export of wheat from Australia;
2. in appropriate circumstances, to import and market overseas wheat within Australia;
3. to encourage and promote the sale and use of Australian wheat, both within Australia and overseas;
4. to cooperate, consult and enter into agreements with, and make recommendations to, the Bulk Handling Authorities (BHAs) authorized to receive wheat on behalf of the AWB;
5. after consulting the BHAs, to determine standards:
   —for the receival and classification into grades of wheat delivered to the AWB,
   —for categories of wheat containing one or more classes and grades of wheat, and
   –for the condition and quality of wheat outturned to buyers by the BHAs;
6. to encourage, fund, and arrange the conduct of research relevant to the marketing of wheat; and
7. to provide advice and recommendations to the Commonwealth and States relating to the marketing of wheat.

In meeting the above objective and functions the AWB has a number of powers. Selected powers of interest include:

1. to enter into tripartite barter arrangements;
2. to arrange for third parties to provide finance to wheat buyers;
3. to contract for or charter vessels for the carriage of wheat by sea;
4. to arrange for or establish, maintain, and operate facilities for overseas storage and handling of wheat;
5. subject to the approval of the Minister, borrow to raise moneys; and
6. subject to the guidelines determined by the Minister—enter into a deal with corn and wheat commodity futures contracts, currency futures contracts, forward exchange contracts, interest swaps and combined currency and interest swaps, for hedging purposes.

The Board consists of a full-time chairman, a part-time Commonwealth Government representative, five wheat growers, and four specialists (one of whom is a wheat grower). As first indicated, the AWB has the statutory objective to maximize returns for growers, the Board itself is controlled by growers, important functions are given to the AWB for purpose of meeting the objective, and a number of powers are given the AWB to facilitate its operation.

Operationally the AWB virtually controls all aspects of wheat marketing. With the exception of domestic stockfeed sales, all wheat must be delivered by growers to the AWB. The AWB authorizes a sole Bulk Handling Authority in each state for purposes of handling and storage, and negotiates rail rates. The BHAs essentially provide the physical functions of storage and handling at country and export terminals for the AWB. The AWB is the sole seller of wheat to both the processing industry (non-stockfeed), and to exporters. Most exports are made directly by the AWB, but in some years up to 30 percent maybe made to private traders for re-export. The AWB also operates a price pool to facilitate purchasing from producers.

Quality Control by AWB

One of the important functions of AWB is the establishment of standards for receival and classification of wheat into grades. Through the receival standards, variety control, and marketing arrangements, AWB virtually controls the quality of wheat throughout the marketing system. This control has an influence on variety development, release, and selection. Indeed, Australia has developed a reputation for wheat

that is dry, clean, insect-free, and uniform, and promotion materials exploit these points.

Although receival standards can be revised, in recent years there has been minimal change. Beyond the five dominant classes of wheat already described, Durum and soft wheats are grown, but due to limited production and export are not discussed further here. APH and AH are bread-making wheats segregated primarily by protein level—APH is 13 to 15 percent, and AH is 11 to 14 percent, depending on variety. ASW is a multipurpose wheat with intermediate hardness and protein—normally 9 to 11.5 percent. GP includes the same varieties as the other classes but is inadequate in terms of test weight, weather damage, or untillable material. GP wheats can be used as lower-grade milling wheats. Feed wheat is a default class and is only suited for feed purposes. In addition to classes, locations (by state) can be specified to account for the fact that the same class produced in different states may have different performance characteristics.

Receival Standards

The receival standard essentially equals what may be referred to as grade standards in other countries. A slight difference is that all wheat is inspected and an official grade determined at the point of first sale, which forms the basis of the financial transaction between the AWB and grower. The underlying rationale is that if tight standards are applied at the first sale, most problems associated with quality are mitigated. Having rigid untillable material standards at the point of first sale, for example, gives producers an incentive to harvest clean wheat and precludes problems further downstream in the marketing system.

The same receival standards apply to all states, but end-use performance of a class may vary by point of export. Thus, the state maybe referenced as a quality descriptor in export transactions. The receival standards for 1987/88 are shown in table 5-8. There are two categories each for AH and GP, depending on protein level, falling number, and level of defects. It is of interest to note, however, that the tolerance level for some factors are the same across classes. For example, the level of millable material is the same for the top four grades. The tolerances for moisture, insects, and contaminants match across all classes and categories. Important grade-determining factors include protein, variety, and the extent of damage (e.g., falling number or defects). In general, wheat with excessive damage is classed as GP or Feed. Given the classes listed in table 5-8, wheat is further segregated by protein within the class APH and AH (and there is a proposal to do so within ASW). These segregations include 13, 14, and 15 percent protein in APH, and 12 and 13 percent in AH.

A load of wheat that does not meet these standards cannot enter the marketing system. As a result, combined with wide price differentials, farmers have a tremendous incentive to minimize at least the level of untillable material. It is not uncommon for growers to have a "second" screen installed on their combines equal to that of the receival standards (2 millimeters) to avoid excessive levels of nonmillable materials.

The AWB has the ability and responsibility to make changes in the standards through time as deemed necessary by production and mar-

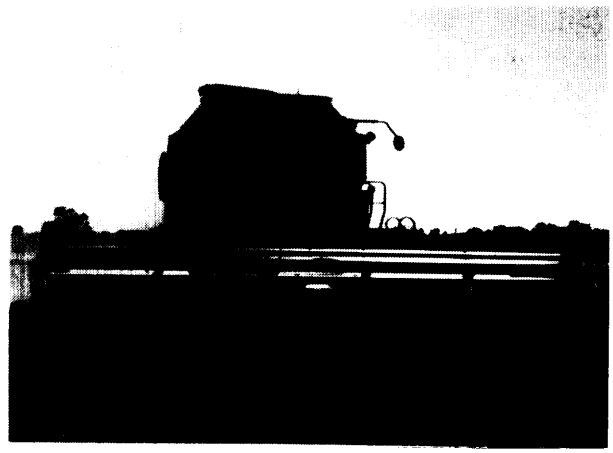


Photo credit: OTA Australia Study Team

Production technology used in Australia is very similar to that used in the United States. Emphasis, however, is placed on wheat being free of untillable materials. Australian farmers commonly install a second screen on their combines to avoid excessive levels of nonmillable materials.

Table 5-8.-Principal Class and Grade-Determining Factors for Australian Wheat, 1987/88

Factors	(APH)	Hard No. 1	Hard No. 2	ASW	General purpose No. 1	General purpose No. 2	Feed
Test weight (kg/hi)	74	74	74	74	71	68	62
Moisture content (max. %)	12	12	12	12	12	12	12
Protein minimum (11 0/0 moisture basis)	12.8	11.5	11.0	—	—	—	—
Falling number minimum	350	300	250	—	300	200	—
Untillable material[a] (max 0/0):							
Total	7	7	7	7	15	25	50
Below screen	5	5	5	5	10	15	30
Small foreign seeds below screen	1	1	1	1	5	10	20
Growth defects:							
Sprouted grains (max. %)	2	2	5	nil	nil	1	—
Fungal strained grains (max. %)	5	5	10	5	10	50	50
of which fuoarium	2	2	2	2	5	5	5
Dry green, sappy green, and frost affected grains affected by disease or drying	1	1	2	1	10	20	—
Heat damage	nil	nil	nil	nil	nil	nil	—
Ball smut	nil	nil	nil	nil	nil	nil	—
Insect damage	1	1	1	1	2	2	4
Grain contaminants							
Sticks, stones, earth and sand	nil	nil	nil	nil	nil	nil	nil
live insects	nil	nil	nil	nil	nil	nil	nil
Dead insects (max. per 1/2 litre)	5	5	5	5	5	5	5

Dashes indicate not applicable.
[a]Materials passing through a 2-millimeter screen and/or material other than wheat kernels remaining on top Of screen after Sieving.
[b]Other units exist specifically for chemicals, ergots, and seed.

SOURCE: Office of Technology Assessment, 19S9.

ket conditions. Traditionally the ASW class was sold as FAQ (Fair Average Quality) in the early 1970s. Since then the grading system has evolved to reflect increased segregation. A number of changes have occurred in recent years. First, the list of approved varieties changes to reflect availability and experience with marketing particular varieties. Indeed, a variety may change classes between years. Several differences existed in the administration of the standards in ***1984/85*** and 1985/86. Discounts were then built directly into the standards for excessive millable material and for foreign seed, ergot, and sprout damage. But, these discounts only applied to the GP class.

Price Differentials

The receival standards facilitate segregation into relatively homogeneous categories, and therefore aid the AWB in its sales and marketing programs. An important quality control tool is the use of price differentials for different classes and categories of wheat. This is the mechanism used to send market signals to producers. (A detailed description of the pricing mechanism is provided later in the chapter.) Of particular importance is the differentials between classes. The interim advance payments (90 percent of the Preliminary Guaranteed Price) for the different classes in 1987/88 are:

	$/A	*Percentage of ASW*
APH ., ... ,	137.87	113
AH No. 1	126.15	104
No. 2	121.59	100
ASW	121.59	100
GP No. 1. ..,	115.07	95
No. 2. .....,	92.93	76
Feed ....,	89.03	73

These prices are received by producers at the time of first sale. Final payments, and payments for protein within APH and AH, are a result of pooling (discussed in the following section). The point is that there are premiums for qualities above ASW, and fairly substantial discounts

for grades below ASW. This is ultimately the AWB mechanism that reflects incentives for improving quality, or that precludes quality deterioration.

Variety Control

An important aspect of quality control in the Australian wheat industry in the Variety Control Scheme (VCS) administered by AWB. VCS is discussed here as it applies to the receival standards and pricing. The standards are essentially physical characteristics that are easily measured, and with the exception of protein do not directly reflect end-use characteristics. At least three important end-use characteristics—grain hardness, flour milling, and dough processing characteristics—vary by variety and region of production. Since these cannot be measured easily, the VCS was implemented to facilitate segregation. VCS essentially is used to provide incentives/disincentives to producers, and for variety identification. The latter is a prerequisite for segregation and marketing.

VCS is not regulatory but is used to identify varieties, which are then used, in conjunction with protein and physical characteristics, for classification and pricing. Each year prior to planting, the AWB lists varieties by region (i.e., silo groups within each state) that will be eligible for each class. Where appropriate, discounts for certain varieties grown in certain silo groups are listed. A separate list is published for each state, Producers then choose varieties for seeding based on agronomic and price differences.

An example of the variety discount list for 1988/89 in New South Wales is shown in table 5-9. Several points are of interest. Only certain varieties in specified silo groups are eligible for APH or AH. Some varieties maybe AH or ASW in the same silo group, depending on protein level, but ASW in other silo groups regardless of protein. Some varieties may have discounts ($3 or $5/MT) if grown in some silo groups. For example, Hartog would receive a $3/MT discount for ASW if grown in silo group 4, 5, or 6. Unregistered varieties, in addition to any red wheat, are classed as feed wheat. In Victoria, only certain varieties grown in silo group A are eligible for AH. All others are ASW, Feed, and/or subject to discounts.

Enforcement of VCS requires some mechanism of variety identification at the point of first sale. But, most varieties are not easily distinguishable visually. To resolve this problem AWB uses an affidavit system, Upon delivery to the country elevators, producers must declare the variety and sign an affidavit indicating its name. Based on this declaration, wheat is classed and segregated. Three mechanisms are used to enforce the integrity of the affidavit mechanism. First, penalties (including financial and prison) could be imposed if AWB could prove a false declaration. (Prosecution is difficult, however, because under current rules AWB would have to prove the producers "had intended" to produce and deliver another variety.) Second, AWB conducts spot checks using electrophoresis, and these have a high profile—or at least the intent does. Third, there is peer pressure (at least alleged) among producers that violation would eventually harm the reputation of Australian wheat, thereby resulting in long-term negative consequences.

Other Quality Control Mechanisms

Each state has one Bulk Handling Authority authorized to receive, store, and handle wheat for AWB. In general these are state-owned monopolies or farmer-owned cooperatives, but the statutory or organization structure may vary across states. These BHAs are fully integrated, from the country elevator onward and including the export terminal. Wheat received into BHA is the property of AWB, which contracts for standards of operations that influence grain quality. In addition, most wheat is sold and delivered at harvest, with very little stored on-farm for post-harvest delivery.

One important institutional relationship between AWB and the BHAs that facilitates quality control is the logistical coordination of quality requirements. Each BHA submits a weekly composite sample of wheat by location (and silo) to AWB. This is then subjected to more extensive quality evaluation. Through this process AWB knows the physical and end-use char-

Table 5.9.–New South Wales, Varietal Discount List, 1988/89

Wheat variety	Silo group				
	1&2	3	4	5	6
Banks	*PH/AH/ASW*	*PH/AH/ASW*	*AH/ASW*	*AH/ASW*	*AH/ASW*
Comet	*AH/ASW*	*AH/ASW*	ASW	ASW	ASW
Condor	AH/ASW	AH/ASW	AH/ASW	AH/ASW	AH/ASW
Corella	$3	$3	ASW	ASW	ASW
Dial	AH/ASW	AH/ASW	ASW	ASW	ASW
Eagle	.$3			$5	
Egret	$5	$5	$5		$5
Gather	*PH/AH/ASW*	*PH/AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Grebe	*GP2*	*GP2*	GP2	GP2	GP2
Harrier	AH/ASW	*AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Hartog	*PH/AH/ASW*	*PH/AH/ASW*	$3	$3	$3
Kamilaroi	DR/FEED	FEED	FEED	FEED	FEED
Kite	*AH/ASW*	*AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Millewa	*$3*	*$3*	ASW	ASW	ASW
Olympic	*$3*	ASW	ASW	ASW	ASW
Osprey	AH/ASW	*AH/ASW*	*AH/ASW*	*AH/ASW*	*AH/ASW*
Quarrion	$3	ASW	ASW	ASW	ASW
Rosella	$3	ASW	ASW	ASW	ASW
Skua	AH/ASW	AH/ASW	*AH/ASW*	AH/ASW	*AH/ASW*
Sunbird	ASW	*AH/ASW*	*AH/ASW*	*AH/ASW*	*AH/ASW*
Bunco	*PH/AH/ASW*	*PH/AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Sunder	AIH/ASW	*AH/ASW*	*AH/ASW*	*AH/ASW*	*AH/ASW*
Seneca	*PH/AH/ASW*	*PH/AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Suneig	*AH/ASW*	*AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Sunkota	*PH/AH/ASW*	*PH/AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Sunstar	*PH/AH/ASW*	*PH/AH/ASW*	*AH/ASW*	*AH/ASW*	*AH/ASW*
Takari	*AH/ASW*	*AH/ASW*	AH/ASW	AH/ASW	AH/ASW
Vasco	*AH/ASW*	*AH/ASW*	ASW	ASW	ASW
Vulcan	AH/ASW	AH/ASW	AH/ASW	AH/ASW	AH/ASW

NOTE:
1. Varieties marked in bold italics are those approved by the New South Wales Standing Advisory Committee on Wheat for sowing in each particular Silo Group. For detailed information on approved varieties, including the diseaae resistance of varieties, growers should consult the Department of Agriculture.
2. All deliveries are subject to normal receival standards. Varieties discounted at $3and $5 per tonne will be received into the ASW Class, if the sample satisfies the ASW standard.
3. Only varieties iistedfor Prime Hard (PH), Australian Hard (AH) and Durum (DR) will be received into these classes.
4. Registered varieties are those which are entered in aregister maintained by the Registrar of Cereai Cultivars in Australia.

Enquiries regarding the status of varieties not iistedaboveshouid be directed to the Board's State Manager or growers may consult a Master Variety List at their normal receival point.

SOURCE: Australian Wheat Board, "Chairman's Letter," No. 46, October 1987.

acteristics of wheat throughout the marketing system. In addition, at least for the principal buyers, AWB knows the quality requirements, so it can coordinate shipping and loading orders to meet buyer specification. At the extreme this could entail segregation within a class for particular buyer needs.

Essentially only two transactions are made in the Australian wheat market—one between the grower and AWB, and the other between AWB and the importer. In the middle is AWB, which, through coordination with the BHAs, has tremendous control over quality. As a result the benefits of restrictive quality control can be directly captured. Thus blending between grades is generally limited, as is loading to factor limits, as would be the case if there were multiple transactions, each of which required quality evaluation subject to grade limits.

AWB irresponsive to market needs insetting receival standards and relative prices. As an example, the Board is currently in the process of experimenting with further segregation. ASW received by AWB has not in the past been segregated on the basis of protein. Consequently, producers received essentially an average price, masking any implicit values associated with protein and providing a disincentive to maintain or increase protein levels. In addition, lack of protein segregation created problems in marketing. During the same time average protein levels in ASW have declines, while

the world market has placed greater importance on protein. As an example, the U.S.S.R. has become the most important market, and buyers there have indicated to the AWB that "we are not interested in 10 protein ASW. " In early December 1987, the U.S.S.R. apparently told AWB that 12 percent would be the minimum acceptable protein level. But only 20 to 30 percent of the ASW crop is above 12 percent protein, thereby limiting marketing growth in this now very important market (19).

In an attempt to rectify this long-term trend, AWB has introduced a "Quality Testing Pilot Scheme" to try to avert the apparent long-term decline in protein and to encourage production of high-protein wheat. To that end, eventually the AWB wants to segregate by protein within the ASW class and to make payments reflect the protein level. The timetable of planned implementation is:

- 1987/88—pilot testing system to collect data and experiment with equipment (using whole grain analysis);
- 1988/89—payment incentives could be introduced as early as 1988/89 depending on success of the trials in 1987/88; and
- 1989/90—implement a complete data testing system and payments for protein within ASW.

This scheme aims to give growers an indication of market signals in the case of the protein market. In addition, a recent letter to growers from AWB strongly suggested that differential payments may also be introduced for moisture and foreign material.

Producer Pricing and Policy

Prices received by producers are pooled across returns from sales and are net of all costs associated with handling, transport, finance, and sales. The principal policy regarding price and income in Australia is the Guaranteed Minimum Price (GMP). Operations of the GMP and pooling are integrally related and do have an impact on the signals transmitted in the marketing system regarding quality.

Guaranteed Minimum Prices

Current operations of GMP began in 1979, although similar price stabilization schemes have existed since 1948. GMP essentially is a mechanism that provides a price floor for producers during a particular marketing season. In general, GMP reflects returns from past marketing seasons and those expected during the current season. Specifically, it is defined as the higher of two amounts (24):

- 90 percent of the preliminary estimates of GMP, or
- 95 percent of the average of the estimated growers' pool return of the two lowest of the previous three seasons.

In practice, the second procedure is used and deductions are made for estimated interest and administrative costs. GMP then basically reflects a three-term moving average of returns, including those estimated for the current season. The purpose of GMP is to provide some degree of stability in growers' incomes. By definition, however, it typically would be biased downwards, given that only 95 percent of the average is taken and that two out of three terms in the average reflect low price years.

Operationally, separate GMPs are specified for each of five categories of wheat, thus allowing a mechanism of transmitting marketing signals regarding quality. By October of each year (just before harvest), preliminary GMP (PGMP) is announced for producers (thus new crop signals are not directly transmitted until after planting decisions are made). This PGMP is then revised by March of the following year (after harvest) and announced as the Final GMP (FGMP). At the time of delivery, which normally occurs at harvest, an Interim Advance Payment (IAP), net of deductions, is made that is 90 percent of the PGMP. Adjustments to the IAP are made at the time FGMP is made and these are referred to as the Final Advance. To illustrate this process, table 5-10 shows a brief history of the GMPs for ASW and individual classes in recent years. In addition, details of the 1986/87 Final GMP are presented in table 5-n-a year in which GMP was increased be-

Table 5-10.–Guaranteed Minimum Prices for Wheat in Australia, 1976177 to 1987188 (dollar Australia/MT)

Year	ASW	APH	AH No. 1	AH No. 2	GP No, 1	GP No. 2	Feed
1976/77	66.00						
1977178	**66.00**						
1978/79	**75.00**						
1979/80	**114.71**						
1980/81	**131.92**						
1981/82	**141.55**						
1982183	**141.32**						
1983/84	**150.00**						
1984/85	**145.35**						
1985/86	**149.87**						
1986/87	**139.83**	**157.62**	**142.69**	**—**	**128.21**	**117.79**	**105.77**
1987188[a]	**135.10**	**153.19**	**140.17**	**135.10**	**127.86**	**103.76**	**98.92**

[a]Preliminary Guaranteed Minimum Prices.

SOURCE: Office of Technology Assessment, 1989.

Table 5.11 .—Derivation of Final Guaranteed Minimum Prices for Wheat in Australia, 1986/87 (dollar Australia/MT)

Category	Final GMP	Preliminary GMP	Interim advance[a]	Final advance[b]
Prime hard	157.62	148.62	133.76	23.86
Hard	147.69	135.62	122.06	25.63
ASW	139.83	130.62	117.56	22.27
GP1	138,21	119,62	107.66	30.55
GP2	117.79	100.62	90.56	27.23
Feed	105.77	85.62	77.06	28.71

[a]Interim advance = 90 percent of preliminary GMP.
[b]Final advance = final GMP – interim advance.

SOURCE: Office of Technology Assessment, 1989.

tween October and March. The GMP is underwritten by the Commonwealth.

Pooling

A fundamental principle of AWB that has existed in some form since 1948 is price pooling (pooling of handling costs is discussed later in the chapter), which has two objectives. One is to increase returns by selling through a monopoly (i.e., the AWB). The second is to share risks across growers. Through the use of pooling and underwriting of GMP, AWB can easily make advance payments even though sales and pricing typically accrue over succeeding months.

Producers are paid 90 percent of PGMP at delivery, net of direct costs of transport and handling. In succeeding months wheat is priced and shipped. Receipts from credit sales are received over extended periods. From these revenues are deducted operating, interest, and administration costs, as well as the Interim Advance Payment. The balance is paid producers in the form of "Subsequent Payments. "

As with any price pooling scheme, problems can develop. In the case of Australia, these are well documented in the recent Industry Assistance Commission investigation. Two problems of particular interest are highlighted here. First, given that prices do not differentiate by time of sale, there is generally no incentive for post-harvest delivery to BHA. As a result, on-farm storage is limited, but extensive storage and conditioning facilities exist at the country and export elevators. Second, even though payment differs across classes, 70 percent of wheat is ASW, in which (at least currently) within-class segregations and price difference do not exist. As a result, price signals about protein are disguised within this grade. This problem has been recognized by AWB, as discussed earlier, and

AWB is in the process of initiating procedures to resolve it.

Producer Marketing Alternatives

Producers basically have four marketing alternatives: immediate delivery to BHA, deferred delivery to BHA, on-farm use for stockfeed, and grower-to-buyer sale to domestic stockfeed. By far the most common alternative is immediate delivery to BHA, normally concurrent with harvest. In this case extensive on-farm storage is not required and payment is received normally within 3 weeks. One constraint to this option is that of waiting time at receival points, which if excessive may justify at least minimal use of temporary on-farm or field storage.

The deferred delivery option was introduced to facilitate the needs of producers who do not deliver immediately at harvest. Under this scheme delivery can occur between 2 and 14 weeks after a prescribed date for various delivery points. These dates may be as far forward as May of the marketing season. Accrued interest on the Initial Advance Payment is paid producers, but storage and other opportunity costs are not. Producers may store wheat on-farm to use as feed. An alternative is to bypass AWB and the BHAs and make direct grower-to-buyer sales to the domestic stockfeed industry. This market is essentially a nonboard market and often is facilitated by private traders.

These four options are general but they do illustrate alternatives for growers. To put these into perspective, though growers may store for feed or may sell directly for domestic feed, these are extremely small markets. The disposition of the crop is ultimately determined by underlying economics, which encompasses quality, and by storage cost and availability. Given that producers are implicitly charged a storage cost by BHA, regardless of time of delivery, delivery at harvest is inevitably preferable unless special circumstances hold. As a result, relative little on-farm storage capacity has developed in Australia compared with other countries. In turn, extensive storage takes place primarily at country elevators and to a lesser extent at export elevators.

Export Marketing

AWB is responsible for marketing all wheat from Australia with the exception of domestic stock feed. As noted, sales can be made directly by AWB or by private trade. Most, however, are direct cash sales negotiated by AWB, and a number of institutional relationships (strategic tools) are used as part of the marketing mix.

AWB maintains an integrated sales and marketing strategy. For each customer this encompasses pre-sales, sales, and post-sales service. These are promotional as well as technical, and emphasize the quality advantage of Australian wheat. A 5-year marketing plan concurrent with AWB legislation is maintained with 40 countries, which are categorized with respect to quality needs, price, etc.

Export quality specifications generally coincide with the class structure of the receival standards. As recently as the mid-1970s, however, an FAQ system was used. Since then, increased class specificity has allowed greater specification with respect to quality. A standard AWB contract is used, typically with reference to classes and grades. In addition, minimum protein levels are specified for APH, AH, and at least half the ASW contracts. The port, or state, is also specified/negotiated in many cases to account for transport cost differentials, availability of quantity and quality, and inherent quality differences at each port. Though capable of doing so, AWB is reluctant to export on specifications other than those typically included in the receival standards. In practice, AWB knows the quality and quantity of wheat by location. In addition, it knows the quality needs of specific larger buyers. Thus, coordination of shipments is intended to match quality needs of buyer. (Indeed, export terminals tend to receive and bin wheat according to particular quality needs of specific buyers.)

Most wheat is sold and negotiated directly by AWB. This is normally done on a free-on-board basis, but periodic cost and freight sales

are made. Prices are negotiated either as flat figures or as basis contracts. AWB normally reserves certain larger important markets for itself—typically ones with Government buying agencies or when end use is for nonfeed purposes. These markets include the U. S. S. R., China, Egypt, Iran, Iraq, and those in which long-term agreements (LTAs) are maintained.

The alternative means of direct sales is through private trade. Typically up to 30 percent of total exports are bought by private multinationals. But the combination of a reduced crop in 1987/88, the preferred AWB markets, and LTAs means that only 10 to 12 percent were exported this way in 1988. Thus, the privates essentially service the residual. A large proportion of the residual is taken by Japan—all of which is bought directly from AWB by Japanese trading companies for resale to the Japanese Food Agency. As production in Australia decreases, and/or as the number of "preferred" customers increases, trading opportunities for private exporters diminish.

AWB sells directly to private traders for resale to a third country. The procedure is initiated by the trader, who negotiates with AWB on price, quality, shipping period, and market (either declared as a specific third-country market, or to exclude certain market(s)). These markets potentially include all those that are not Australia's preferred customers. In practice they typically include South America, private importers of Southeast Asia (e.g., Malaysia, Indonesia, Thailand, the Republic of Korea, Sri Lanka, and Yemen), New Zealand, and Fiji. In general, to the extent possible, AWB has sought to limit exporter competition in the same third-country market on the idea that competition would reduce returns to sales.

industries Assistance Commission

Currently two investigations of the grain marketing system in Australia are in progress. One directly relates to export marketing and is referred to as the Industries Assistance Commission (IAC) mentioned earlier. The other is the Royal Commission into Grain Storage, Handling, and Transportation (discussed in a later section). The IAC is a product of the sunset clause mentioned earlier, in which new legislation is required every 5 years to continue operating the AWB. This process requires analysis and hearings by IAC. Selected highlights of the process, particularly as they relate to quality, are discussed here. At this time submissions have been made by AWB and the Australian Grain Exporters Association (AGEA), and interim recommendations have been made by IAC.

While IAC encompasses many broad issues related to wheat marketing and AWB, a number of crucial issues are specifically related to wheat quality. AWB cites a number of advantages of a single seller (5,7,8), including bargaining power associated with direct negotiation, coordination of logistics, and research. In addition, specific mention is made that Australia has a reputation for "high quality wheat and meeting exacting quality specification. " Further, at least implicitly, this reputation has been garnered and preserved only because quality control procedures described in the previous section are administered by a single seller. Citation, of course, has been made to U.S. quality problems, which are in part attributed to a private trading system. Allegedly, centralized control over varieties and hygiene is essential for long-term advantages, whereas a fragmented approach could lead to short-term trading profits.

Private traders under the auspices of AGEA have prescribed a 5-year plan for deregulation of the wheat trading industry. The export feed wheat market and domestic milling markets would be deregulated to start with, and in subsequent years the export wheat market would be deregulated. AGEA did indicate that current quality standards would be inadequate in a competitive trading environment:

> Other changes would also need to take place to provide for the maintenance of strict quality control. This could be administered by the DPI [Department of Privacy Industries] in a similar fashion as occurs currently with other grains. However, we believe that, for example, a more specific grading system for wheat would need to be introduced as the current arrangements are considered to be too subjective and

unprecise for the maintenance of a strict quality control in a deregulated export and domestic market ***(1),***

Most exporters recognize the hygiene reputation of wheat but generally claim these are market phenomena and that premiums can and should be market-determined. As the AWB has not specifically pursued Feed wheat markets in longer term plans (including variety development), development of these markets has allegedly been precluded.

The challenge put forth by IAC in their interim proposals was premised on the suspicion that AWB is unlikely to be able to extract premiums. Also, if disbanded, many functions of AWB would merely be absorbed by wheat boards at the state level. IAC has placed less significance on the prerequisite of a single seller to control grain cleanliness and hygiene. Selected specific proposals in the interim report of IAC are (24):

- AWB sell wheat to private traders for export to any market, other than a small number of specified markets reserved for AWB;
- the permit system for sales of Feed wheat be extended to cover wheat for any domestic end use;
- consideration be given to the further disaggregation of revenues and associated costs currently covered by AWB's pooling arrangements, to enable payments to growers to reflect more closely actual market returns and costs; and
- the price underwriting arrangement be terminated.

In addition, the IAC has sought comment on alternatives to the advance payment system, criteria for determining which markets should be reserved for the AWB, and all aspects of variety control (24). Though these recommendations may appear bold, they may be merely interpreted as challenges to participants (e.g., AWB and AGEA) in the next stage of submissions and hearings. To put IAC into perspective, these are merely proposed recommendations and do not constitute policy. The next step in the process is political. In previous IAC inquiries, only minimal recommendations have been accepted in the political process.

GRAIN HANDLING IN AUSTRALIA

A number of unique attributes in the grain handling and transport system affect the quality of wheat exported. These include:

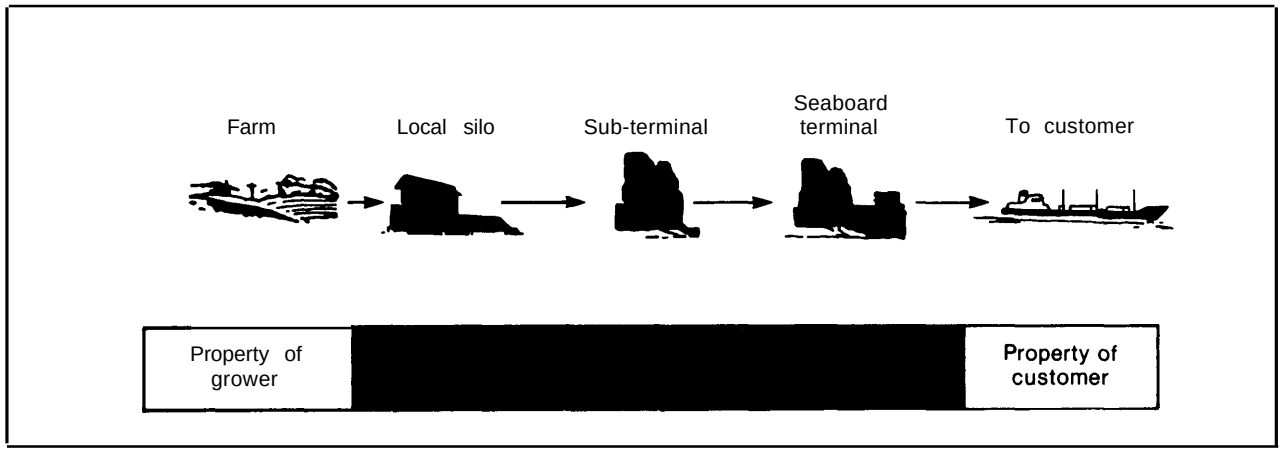
1. limited on-farm storage, but extensive storage throughout the market system;
2. state monopolies generally in both grain handling and transportation; and
3. ownership by AWB from the point of first sale until the point of export.

The organizational operating practices of the grain handling and transport industries are discussed in this section, with particular attention to attributes that have an impact on quality.

Though possible in theory, there is limited trade or transportation between states. This is primarily due to tradition, geography, and logistical constraints. As a result, wheat produced in each state is generally destined to be handled by the state BHA and marketed by AWB. With limited on-farm storage, BHAs have built extensive handling capacity to meet harvest peak demands. Also, considerable storage capacity has been developed throughout the handling system compared with other exporters. Given that, for the most part, storage is provided by handlers allegedly more experienced and knowledgeable about grain storage, wheat is less likely to deteriorate or be subjected to infestation.

The wheat marketing system in Australia is described in figure 5-5. The marketing system is very simple and typically comprised of harvest sales by growers to the AWB, storage within the handling system, and delivery by BHA on behalf of AWB to the customer. Of particular importance here is the role of AWB and the fact that it takes ownership at the point of first sale, and retains it throughout. AWB has control over quality evaluations, preservation,

Figure 5-5.—Australian Wheat Marketing System



SOURCE: Office of Technology Assessment, 1989.

and enhancement, which is exercised through state BHAs. This applies specifically in the case of infestation, but also to other parameters of quality (e.g., segregation and cleanliness). An important fundamental characteristic of wheat marketing which underlies the system is that of applying stringent quality requirements at the point of first sale. This generally precludes problems further in the marketing system. And because there are only two financial transactions in the marketing system, each of which requires sampling and inspection, there is limited incentive for blending to meet specifications or limits. In contrast, the U.S. marketing system is characterized by a number of financial transactions within the marketing system. Each requires a contract specification and generally incentives exist to blend to contract limits.

Bulk Handling Authorities (BHAs)

As mentioned earlier, in each state a monopoly exists which is authorized to handle wheat on behalf of AWB. Table 5-12 shows the authorized handlers in each state. BHAs are in general charged with the responsibility of receival, handling, and storage. In these activities, they are responsible for sampling and inspection and application of receival standards at the country elevator, as well as preserving quality. An extensive storage and handling agreement exists between each individual BHA and AWB. This agreement provides detail regarding services provided and remuneration.

Table 5-12.—Authorized Handlers of Wheat in Each State

State	Organization
Queensland.	State Wheat Board
New South Wales	Grain Handling Authority
Victoria	Grain Elevator Board
South Australia	South Australian Cooperative Bulk Handling Board Ltd.
Western Australia	Cooperative Bulk Handling Ltd.

SOURCE: Australian Wheat Board, Wheat *Industry Grade,* 1987.

A responsibility of BHA is to preserve the condition of the wheat, and if problems arise penalties may be applied. Thus, an important activity and cost of BHAs is related to conditioning which will be discussed later.

In general each BHA operates a centralized system and logistics are closely coordinated with AWB. The system is centralized in the sense that laboratories and quality evaluation as well as logistical planning is closely coordinated with AWB.

Cost of Handling and Storage Services

Costs for handling and storage of wheat are essentially determined by the cost structure of state BHAs. Formally, the Grain Storage and Handling Agreement is the document which specifies the price charged for these services.

On an annual basis the BHA for each state assesses its costs and anticipated output and determines a price for handling and storage. Presumably, the AWB does not or cannot negotiate these fees and strictly relies on cost migration of the BHA (32).

The agreement allows for differential pricing of services to growers but in practice there have only been a few attempts to do so (39). BHAs usually pool their costs and charge an equal rate to each grower. As a result there is limited incentive for participants to necessarily choose the most efficient services (e. g., delivery location and time). This has likely resulted in excessive handling and storage throughout the system. Indeed, cost pooling is a principal issue in the Royal Commission and a potential solution to rationalization of the system.

The various components of handling and storage costs for 1986-87 are shown in table 5-13. Besides "handling and storage" there are a number of other costs deducted in determinating producer prices. Of interest here is the cost of handling and storage which varies from $12.44/MT in South Australia to $17/MT in Queensland. (For comparison this converts to 23.7 to 32.4 ¢/bushel.) The costs of handling and transport have increased substantially through time (table 5-14). Between 1979/80 and 1985/86, these costs increased by 51 percent in nominal terms.

The issue of handling and storage costs are critical to the Royal Commission. In fact at least part of the impetus for the Royal Commission was the apparent high costs of handling and transportation in Australia. Several submissions to the Royal Commission (refs. 1,2,39) have attempted to make comparisons to other exporters. Any international comparisons are questionable for a number of reasons, particularly because handling and storage systems serve different purposes indifferent countries. In the case of Australia more extensive storage is required and the cost of conditioning (e.g., infestation) would exceed that of other exporting countries. Nevertheless, submissions have raised the issue that costs of handling and storage in Australia exceeds costs in other exporting countries, and the rate of increase in handling and storage costs have also exceeded those of other exporters. Spriggs et al. shows that these costs increased 11 percent in real terms in Australia in the past 10 years, compared to a 7-percent decrease in Canada. Whether these cost levels are due to lack of competition, or peculiar handling tasks in Australia is central to the Royal Commission. The point is that it appears the Australian marketing system has been unresponsive to market fundamentals and international competition.

Transportation

Grain is delivered from the farmer by truck to country receiving points, subterminal, or central receiving points, and in some cases directly to export terminals. Each state and BHA has established a grain flow to their export terminals. In some cases, grain is moved by rail from the country receiving point to a subterminal, unloaded and stored, and then reloaded into railcars for shipment to port. In other cases, grain is loaded into railcars at the country receiving point, and railcars from several locations are sent to a central point for shipment as a unit to port. Each state regulates transportation modes between country and export points within it.

Table 5.13.—Handling, Transport, and Other Deductions, 1986/87 (dollar/tonne)

	New South Wales	Victoria	South Australia	Western Australia	Queensland
Handling and storage	16.70	14.63	12.44	13.05	17.00
Freight	24.44	21.71	6.69	14.37	15.70
Wharfage	1.76	0.88	1.05	0.50	1.40
Carryover	0.82	0.85	1.27	1.50	0.61
Two port loading		0.47	1.11	0.30	
Other levies	0.50	0.50	1.59	2.34	2'00
Total	44.22	39.04	24.15	32.06	36.71

SOURCE: Australian Wheat Board, 1987.

Table 5-14.-Principal Growers' Deductions for Handling, Storage, and Freight[a]

Year	New South Wales[b]	Victoria[b]	South Australia	Western Australia	Queensland	Tasmania	Australia
***Handling and* storage:**							
1979-80	12.00	7.00	7.00	11.90	10,50	10,24	9.96
1980-81	12.00	8.00	10.00	12.63	16.00	11.23	10.92
1981 -82.	14.40	10.35	11.35	11.67	16.00	12.44	12.73
1982-83	14.90	12.00	11.95	12.00	16.50	13.07	12.77
1983-84	16.50	12.95	12.43	13.42	2100	14.58	14.73
1984-85	17.20	13.75	12.74	13.05	20.00	15.00	15.29
1985-86	16.70	13.80	11.93	13.05	19.00	16.00	15.08
Freight:[c]							
1979-80	15.71	12.38	5.09	9.23	11.98		11.67
1980-81	15.86	14.08	5.62	9.31	11.90		11.62
1981-82.	19.38	16.21	6.27	12.18	12.87		14.80
1982-83.	19.94	17.21	5.02	13.51	13.08		13,83
1983-84.	22.05	19.98	6.87	14.32	14.87		17.56
1984-85.	23.63	20.09	6.50	14.79	16.20		17.39
1985-86.	24.50	20.76	7.08	13.56	15.70		17.88
Total:							
1979-80.	*27.71*	*19.38*	*12.09*	*21.13*	*22.48*	*10.24*	*21.63*
1980-81.	*27.86*	*22.08*	*15.62*	*21.94*	*27.90*	*11.23*	*22.54*
1981-82.	*33.78*	*26.56*	*17.62*	*23.85*	*28.87*	*23.44*	*27.53*
1982-83.	*34.84*	*29.21*	*16.97*	*25.51*	*29.58*	*13.07*	*26.60*
1983-84.	*38.55*	*32.93*	*19.30*	*26.75*	*35.87*	*14.58*	*32.29*
1984-85.	*40,83*	*33.84*	*19.24*	*27.84*	*36.20*	*15.00*	*32.68*
1985-86. .....,	*41.20*	*34.56*	*19.01*	*26.61*	*34.70*	*16.00*	*32.96*

[a]Calculated for indicative purposes only.
[b]The principal deductions shown for NSW and Victoria are the standard charge deducted from growers at receival sites. in both states, growers are offered discounts to encourage deliveries at a particular site or during a specified period.
[c]Freight figures shown for each state have been calculated by dividing the total dollar amount deducted.

SOURCE: Australian Wheat Board, 1987.

In New South Wales, transportation has been deregulated. However, until Port Kembla, the newest port facility, comes online, existing port terminals do not have the capability to unload trucks. All grain is moved by rail. Transportation modes are regulated more in Victoria and the rail line must be used to transport grain more than 60 kilometers. In Queensland, grain movement from country to export location is regulated and grain is moved by rail only. South Australia does not have its own railroad so grain moves by truck to port locations or on the Australian National Railway. Western Australia regulates the amount of grain moving by rail from country to export locations. This rail system serves approximately 70 percent of the state with the remaining 30 percent serviced by truck, This state has a peculiar situation in that both narrow and standard gauge tracks exist. Several port locations are equipped to receive grain on both gauges while others are dedicated to only one.

Some grain moves across state lines by truck and rail. In some cases, however, rail movement between states is hindered by the existence of both narrow and standard gauge tracks between some states (and, in the case of Western Australia, within the state). The condition of the track and equipment used to move railcars limits the number of railcars that can be moved at one time. In Victoria, for example, a maximum of 39 railcars can be moved as a unit to port.

Storage Types, Capacities and Design

The Royal Commission into Grain Storage, Handling, and Transportation has reported that at least 75 percent of the wheat harvested is handled by BHAs. The rest is handled by private firms or remains on-farm. Each BHA owns and operates country receiving points and export facilities. These facilities consist of verti-

Photo credit: OTA Australia Study Team

Railroads are primarily used to transport grain from country terminals to port facilities in most states. Grain rarely moves across state lines due in part to the existence of different gauge tracks between states.

cal concrete or metal silos, flat (horizontal) warehouses, and bunkers. Any one particular facility may have a combination of these storage types. These facilities are linked together to one or more export facilities within the state by road and rail.

The type of capacities of storage, vertical, horizontal, and/or bunker, varies by state (tables ***5-I5*** and ***5-16).*** Several states have significant amounts of storage at their port locations. Port storage ranges from approximately ***7*** percent of total storage in Queensland to 50 percent in South Australia. It is interesting to note the differences in storage types. For example, in Western Australia the bulk of storage is horizontal while in South Australia vertical storage predominates. This fact produces distinctly different handling and storage problems for each BHA and results in differing strategies for similar problems, i.e., fumigation practices.

On-farm storage is increasing. Table 5-17 outlines on-farm capacities as of ***1984-85.*** These figures represent wheat, barley, oats, and sorghum, but provide an indication of the extent of on-farm storage. On-farm storage in Western Australia is regulated in that only sealed, metal upright silos can be installed. These silos are usually 5 MT capacities that can be pressure tested prior to fumigation.

There is a move to require that all on-farm silos be painted white. Those interviewed believe this helps deflect heat build up and reduces the incidence of infestation. In Victoria and New South Wales, white on-farm silos are voluntarily being installed, and OTA's study team was told that regulations covering these sealed metal silos are anticipated.

Table 5-15.—Total Storage Capacity[a] (000 MT)

State	Country storages	Seaboard storages	Total
New South Wales. . .	5,887	309	6,196
Victoria. , ...	3,027	991	4,018
South Australia	2,379	1,976	4,355
Western Australia. . .	4,724	2,064	6,788
Queensland	1,586	266	1,852
Tasmania	11	20	31
Australia.	17,614	5,626	23,240

[a]At Sept. 30, 1988; excludes bunker and open bulkhead stores.

SOURCE: Australian Wheat Board, 1987.

Table 5.16.–Country and Port Storage Profile (000 MT)

	Vertical	Horizontal	Bunker	Total
Queensland				
Port	265	–	—	**265**
Country. . . .	895	629	2,020	**3,544**
Total	1,160	629	2,020	**3,809**
New South Wales				
Port	297	–		**297**
Country. . . .	2,007	3,799	5,848	**11,654**
Total	2,304	3,799	5,848	11,951
Victoria				
Port	290	720	–	**1,010**
Country, . . .	1,983	922	1,652	**4,557**
Total	2,273	1,642	1,652	**5,567**
South Australia				
port	1,581	320	478	2,379
Country. . . .	1,915	464	—	2,379
Total	3,496	784	478	4,758
Western Australia				
Port	587	1,123	106	**1,816**
Country. . . .	242	5,296	2,458	**7,996**
Total	829	6,419	2,564	**9,812**
Australia (total)				
port	3,020	2,163	584	5,767
Country. . . .	7,042	11,110	11,978	30,130
Total . . .	10,062	13,273	12,562	35,897

SOURCE: Office of Technology Assessment, 1989,

Table 5-17.–On-Farm Storage Capacity, 1984-85

	New South Wales	Victoria	Queensland	Western Australia	South Australia	Australia
Average tonnes per farm.	292	167	251	186	81	209
Number of farms	15,886	8,556	5,750	8,157	7,739	46,088
Estimated total on-farm storage (ret)	4.64	1.43	1.44	1.52	0.63	9.66
Storage capacity as a percentage of harvested winter cereal and sorghum production	59	37	46	17	17	35
Increase in storage capacity since 1978-79 (percent).	24	56	97	39	64	40

SOURCE: P. Howard and M. Lawrence, "Australian Grain Storage Capacity," Quality Review of the Rural Economy S(4): 330-334, AGPS, Canberra, 1986.

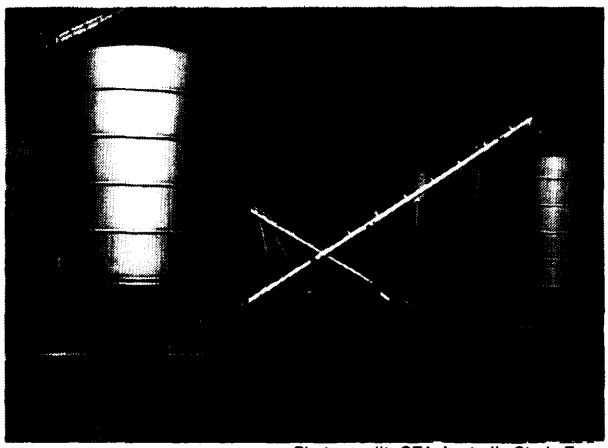


Photo credit: OTA Australia Study Team

Use of on-farm storage is increasing. Regulations are anticipated indicating that only sealed, metal, upright, pressure-tested silos, as shown here, can be used.

Photo credit: OTA Australia Study Team

Initially concrete upright silos, similar to those built in the United States, were constructed in the country along rail lines. As production increased, large flat warehouses were integrated into the facilities.

The mixture of storage and handling facilities is linked to increased production. Initially several upright concrete silos with one leg, one unloading pit for trucks using belts to feed the leg, and a rail and sometimes truck loadout capabilities were constructed. This configuration is similar to country elevators in the United States. In Victoria and New South Wales, these country receiving points were positioned along rail lines at approximately 5-kilometer intervals. As production increased, large flat warehouses were integrated into these facilities.

Warehouses are fed from an inbound leg to an overhead belt in the warehouse. At the warehouses visited, several channels with augers in the floor ran the length of the warehouse. Aeration ducts installed on the floors running across the width of the warehouse were also installed. Unloading takes place by the augers in the channels feeding belts that in turn feed a leg. In some locations, incline belts were installed to connect the warehouse with existing structures. Front-end loaders are used to push the grain pile into channels on the floor.

With further production, bunker type storage was introduced. These plastic-covered bunkers provide large-volume storage at reasonable cost. A bunker consists of three retaining walls lined with a plastic sheet, filled with grain, and then covered with plastic. They are aligned so that length runs north to south. This prevents one side of the cover from deteriorating faster. The bunkers are filled by unloading trucks at the bunker opening and then augering the grain into a pile. Special augering equipment with directional chutes is designed to aid

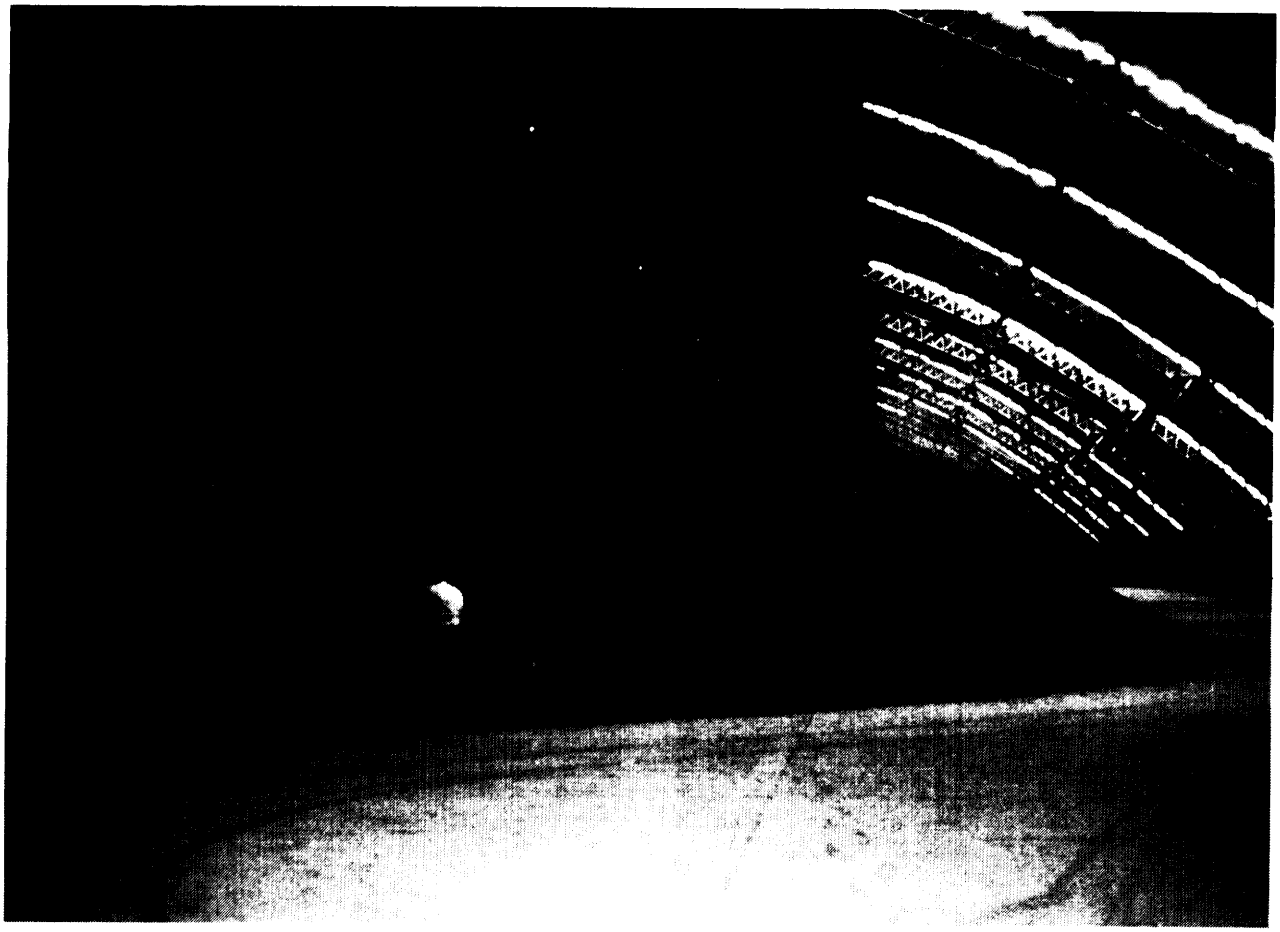


Photo credit: OTA Australia Study Team

Huge warehouses are commonly used to store wheat. They are equipped with augers in several channels running the length of the warehouse for unloading purposes and with aeration ducts installed in the floors running the width of the warehouse.

in this process. This produces a very smooth grain surface that can then be covered with polyethylene film or with woven and coated polyvinyl chloride fabrics. These covers are water-tight, resistant to puncturing, and sealable, since bunkers are fumigated on a regular basis. Unloading takes place by rolling back the cover to expose a portion of the pile. Front-end loaders and augers are used to load grain into trucks that are unloaded at the elevator for loading into railcars. This allows the bunker to be resealed, since an entire bunker is not usually unloaded at one time.

As more storage and handling capabilities were required at subterminal and central receiving points, 5,000 to 10,000 MT sealed upright metal silos fitted with recirculation for fumigation were integrated into the system. At the same time, incline belts were installed in some locations to replace existing legs or provide additional elevation capacity. In addition, multiple truck unloading pits were installed.

A major project was also undertaken to seal and retrofit existing upright concrete silos with recirculation for fumigation. The new export facility being built at Port Kembla in New South Wales consists of sealed metal silos fitted with recirculation for fumigation and incline belts. These improvements to the system provide BHAs with the capability to dedicate truck un-

Photo credit: OTA Australia Study Team

Bunker storage is used when wheat production is very high. H consists of three retaining walls lined with a plastic sheet, filled with grain, and covered with plastic. The covers are watertight, resistant to puncturing, and sealable, since bunkers are regularly fumigated.

Photo credit: OTA Australia Study Team

Special augering equipment with directional chutes, as shown here, is used to place grain in a smooth pile for covering.

Photo credit: OTA Australia Study Team

A major new initiative is the sealing and retrofitting of upright concrete silos with recirculation for fumigation at sub-terminals and ports. The new export facility being built at Port Kembla in New South Wales, shown here, is illustrative of this new requirement.

loading by grade (each unloading pit is designated a grade) and carry out effective fumigation in silos and bunkers.

BHAs are required to store grades separately. In addition, grain designated for special customers is kept separate. Accomplishing this task is difficult in some states because of the type of storage and handling facilities available. In Victoria, five segregations must be maintained; in Queensland, seven; and in South Australia, four. These are based on grade and do not include segregation by customer or the effects that weather damage may have on a crop in any particular year.

Storage systems consisting of large upright concrete and metal silos, large flat warehouses, and large bunkers make it difficult to segregate these qualities and still provide flexibility for loading out specific qualities. In upright silos, facilities often have a limited number of bins, each having very large capacities. The flat warehouses and bunkers are large enough for several segregations to be made. However, assessing specific qualities from this type of facility is difficult since the grain must be unloaded from one end.

Unless commingling of different qualities takes place on grain received from the farmer, i.e., ASW commingled in the same bin with

General Purpose, blending of differing qualities at the country and subterminal level for shipment to a port is difficult. Facility design at the subterminal facilities visited is such that grain can be drawn from multiple bins for loading into railcars. However, blending grain from flat warehouses and bunkers with grain being drawn from bins would be nearly impossible. In the case of the export facilities visited, Port of Sydney and Geelong, blending of differing qualities can and is done to some degree.

These port facilities contain a number of smaller bins and are basically of a design similar to the older export facilities in the United States. The one main difference is that each facility is divided in distinctly separate sections based on the number of load-out spouts. Both facilities have four separate delivery systems fed from four separate sets of bins. Grain from each delivery system is loaded into a separate hold of the vessel.

In the case of Port Sydney, there is no way for one delivery system to cross over to another so blending can only take place within each system. There is a section in both facilities that can be used for holding out-of-condition grain and then reconditioning it for transport to another part of the facility for shipment. At Geelong each delivery system feeds into 18 small shipping bins. These shipping bins are, to a limited degree, dedicated to a particular delivery system but can be directed across systems at this point.

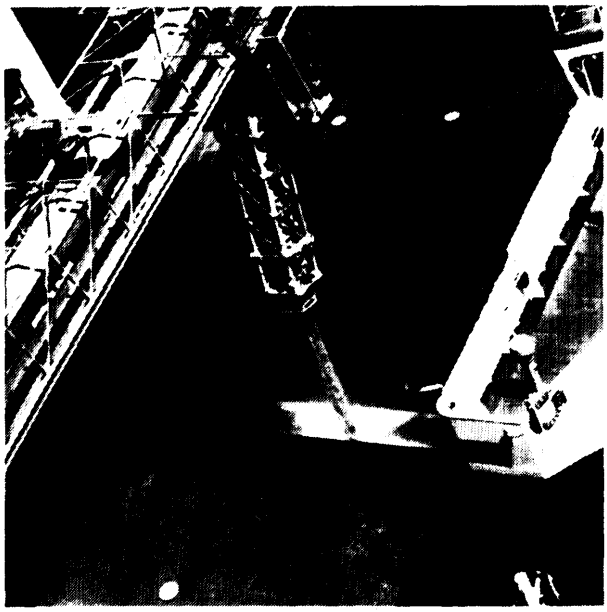


Photo credit: OTA Australia Study Team

Port facilities are of a similar design to older export facilities in the United States. One difference is that Australian facilities are divided into distinctly separate sections based on the number of load-out spouts. Grain from each section is loaded into a separate hold of the vessel limiting the amount of blending that can take place.

Facility managers at both locations indicated that they do blend on a continuing basis. However, blending is limited to a very few factors drawn from only a couple of bins and is not undertaken to the degree found in the United States.

Grain cleaners and grain dryers are not maintained at BHA facilities. Grain that is out of specification on either factor is rejected. Commercial grain cleaning is available and must be used before acceptance by BHA. The export elevators and subterminal visited by the study team all had dust removal equipment. Dust is not reintroduced into the grain stream. It is collected and trucked to landfill sites. Each facility had installed equipment for applying protestants to the grain at the time of receiving. In the facilities visited, this equipment was located on the inbound belts running from the unloading pit to the inbound leg.

Facility cleanliness is a major concern, as is maintaining grain free of infestation. Empty storage space is swept out and sprayed with an insecticide prior to receipt of grain. Dust accumulation and grain spills are cleaned on a continuing basis since the Department of Primary Industry (DOPI) inspects each facility yearly and conducts random unannounced inspections. During these spot checks DOPI reviews the physical structures as well as the records kept by each facility on their cleaning program. Every month grain in storage is inspected for the presence of infestation. In facilities where bins can be turned, a portion of the bin is unloaded (cored), sampled for the presence of insects, re-elevated, and placed into the same bin. In flat warehouses and bunkers, the grain is probe sampled. If it is infested, it

must be fumigated. In addition to general day-to-day housekeeping, every 2 months residual insecticide is applied to all handling equipment.

Infestation Policies and Practices

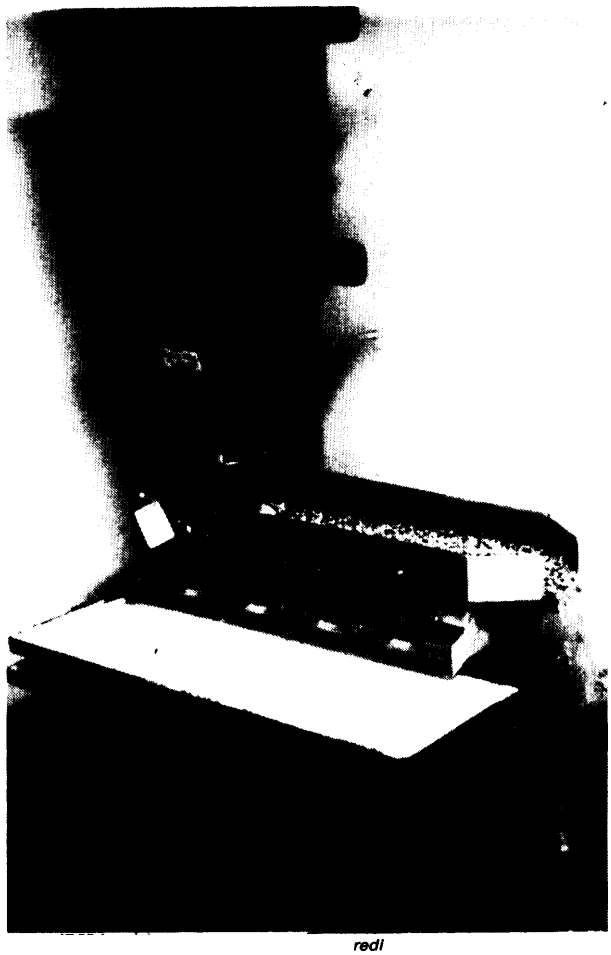
In the early 1960s Australia stood to lose major wheat-exporting markets due to the high incidence of insect infestation in export shipments. In response, the Australian wheat industry requested the Government to enact legislation that would ensure continued access to these markets. Export grain regulations promulgated in 1963 require that wheat, barley, oats, and sorghum be free from live infestation and otherwise fit for export.

Department of Primary Industry

The Export Control Act provides DOPI with inspection authority for a wide range of agricultural products. The Export Inspection Service (EIS) of DOPI is the single entity responsible for checking meat, fish, dairy products, eggs, honey, grain, fresh and processed fruits and vegetables, and other horticultural and plant crops.

EIS's primary role is to ensure exports meet acceptable quality and hygiene standards and are correctly described in trade materials. EIS interprets the terms "free from" and "practically free from" pests to mean nil. In other words, the tolerance for live insects and pests is zero. The service also has zero tolerance for rodent carcasses and excreta and for particular weed seeds and other pests subject to quarantine by importing countries.

The basis for EIS policies is outlined in a 1981 report by the Working Party on Infestation in Grain set up by the Standing Committee on Agriculture to examine alternative pest control strategies and provide recommendations so that Australia could continue providing insect-free grain. The Working Party concluded that Australia should not issue phytosanitary certificates on grain known to contain live insects. This conclusion was based on the percent of shipments requiring phytosanitary certification and a statistical analysis of their sampling systems.



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This analysis determined that, even when no insects are found, a high probability exists that shipments actually contain insects. The Working Party felt that in order to comply with the terms "free from" and "practically free," as spelled out by the International Plant Protection Convention, a zero tolerance had to be maintained.

The Working Party's goal in 1981 was to recommend actions that could be taken to ensure insect-free grain. Any recommendation was to take into account the elimination of chemicals for insect control due to insect resistance and

the problem of pesticide residue. The Working Party's recommendation was to "institute a program to modify three quarters of the country storage system to methods of pest control which do not rely in any way on the use of chemical protestants. Until the program of modifying storages is complete all State Authorities should continue to develop strategies aimed at extending the useful life of protestants. " This recommended program was to begin in 1982 and be completed in 10 years.

All indications are that this recommendation was adopted. Research began at the Government research agency (Commonwealth Scientific and Industrial Research Organization, or CSIRO) on technologies for sealing upright silos, flatware houses, and bunkers so they could be fumigated. This technology was developed and implemented at facilities suitable for sealing. Upright silos were fitted with recirculation for methyl bromide fumigation. Metal silos that are gas-tight, fitted with recirculation, and pressure-tested prior to fumigation have been constructed and installed. Modified atmosphere technology was refined and implemented in some locations. Research continues on other technologies for controlling infestation.

Insecticide, Fumigation, and Other Insect Control Measures

All chemicals used to treat infested grain must be approved by the Australian Government. In addition, each state has control over the chemicals and labeling requirements within its boundaries. Furthermore, AWB provides guidelines on chemical usage and application rates. This resulted in some chemicals being approved for use on a national level while being banned in some states. In other instances, such as phosphine, each state has approved the chemical but they may have different labeling requirements. Fumigation in transit, either in vessels or railcars, is prohibited.

The BHAs require that empty storage spaces be cleaned and sprayed with a contact insecticide prior to the receipt of grain. Grain that will be in storage more than a certain period must be treated with an insecticide upon receipt. In New South Wales, this period is 4 weeks. Insecticides have been approved for use on specific insect species in some states.

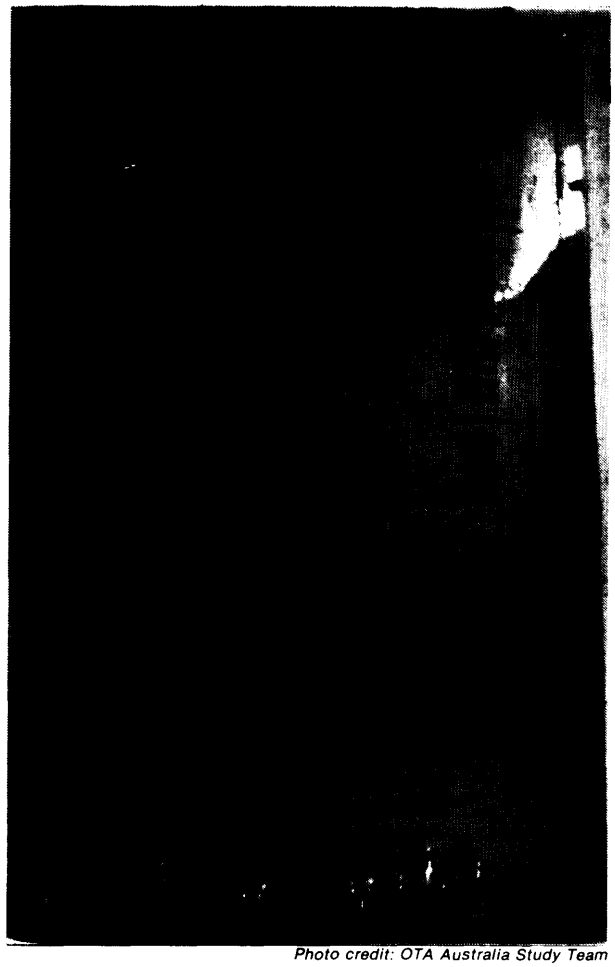

Photo credit: OTA Australia Study Team

The AWB provides strict instructions on chemical use and application rates to treat infested wheat. Signs, such as the one shown here, are found at every major collection point in the system.

Residue Testing

Australians are quite concerned about pesticide residue levels in grain. These concerns stem from the continued use and dependence on protestant-type chemicals that leave a residue and from public, as well as importing countries', concern regarding these residues. Great emphasis is being placed on marketing grain that meets importing countries specific residue

level requirements and the requirements adopted by the Codex Alimentarius Commission.

Two groups continually monitor grain for the presence of pesticide residue: the Australian Government Analytical Laboratory of EIS and the AWB Laboratory. Samples from each export cargo are collected by EIS and BHA inspectors and forwarded to respective laboratories for residue testing. As part of BHAs' ongoing infestation inspections, samples examined at country terminals are sent to the AWB laboratory for residue testing. In addition, AWB has developed a random survey procedure for further identifying potential problems. Both laboratories use gas chromatography technology for testing residue, and they test for residues from all approved chemicals as well as for ethylene dibromide and carbon tetrachloride. The AWB Laboratory told the study team that approximately 17,000 residue tests were performed in 1986.

Research **Areas**

The Stored Grain Research Laboratory funded by CSIRO, AWB, and the BHAs carries out research and development work aimed at ensuring that Australian grain is free from pests. Currently two major research areas are under investigation: flow-through phosphine fumigation and fluidized bed heating.

Flow-through phosphine fumigation is being examined for use in silos and warehouses that cannot be sealed and made gas-tight. This research involves using aluminum phosphine generators to provide constant low-level phosphine concentrations to unsealed silos or warehouses. According to CSIRO scientists, this technology has been tested in several unsealed silos and warehouses with great success. Work is continuing on this technology, with the hope of full acceptance shortly.

Fluidized bed heating involves rapid heating of the grain to kill insects, followed by rapid cooling to safe storage levels. The thrust of this research is to develop continuous-flow in-line systems compatible with handling rates for integration into existing facilities. A pilot plant designed for a 100-MT/hour capacity has been built and tested with good results. CSIRO scientists stated that in trials this plant was able to handle 200 MT/hour. According to literature provided by CSIRO, a 50()-MT/hour unit is the minimum capacity required for successful integration. The literature published in 1984 indicated it would cost $1 million (U. S.) to construct such a unit.

Royal Commission into Grain Storage, Handling, and Transportation

A commission was established in light of the current problems in the grain handling and transport system in Australia. The impetus behind the Royal Commission was concerns about the efficiency and cost-effectiveness of the existing grain distribution network, This is the first comprehensive examination of this system in at least 50 years, despite 5-year reviews of the AWB by the Industries Assistance Commission.

Four issues are generally raised about the handling and storage industry: the increased use of on-farm storage (including private storage), grain insect control, the cost of storage, and handling and segregation. Underlying these are various perceptions related to grain quality and insect control. First, AWB places significant emphasis on cleanliness and hygiene standards (which refers to both cleanliness and the insect control program) in marketing, which may be jeopardized in a more commercial environment. It is commonly believed that increased use of on-farm storage would result in more infestation and/or pesticide residues. Also, deregulation of the marketing system would add difficulties in controlling insects.

Second, a perception exists that a monopoly handler who does not take ownership of the grain is needed to administer the hygiene standards traditionally practiced in Australia, Private handlers would have less incentive to exercise control and more incentive to blend to factor limits. Private traders contend that by not blending to limits, AWB is in fact "giving away" a quality factor and not receiving a

premium; the AWB contends it sometimes intentionally ships more of a preferred quality attribute for purposes of reputation. A third perception is that segregation of wheat into many categories assists the AWB in marketing efforts. Indeed, recent efforts may result in increased segregation. This has the potential effect of requiring more extensive storage facilities, and likely underutilized capacity throughout the system.

Many people maintain that current hygiene standards are appropriate in Australia. Thus, a major problem for the Royal Commission is how to get the benefits of increased competition (i.e., lower handling costs) without jeopardizing grain quality. Extensive modeling was conducted to analyze the impacts of alternative competitive environments. Results indicated that elimination of the state monopoly BHAs and transport as well as pooling of port service costs would lower the average costs of distribution from $58/MT to $50/MT, a 14-percent decrease. An issue haunting the Royal Commission, however, is whether sufficient competition would exist to realize these savings. Underlying any evaluation of the alternatives is that increased competition or increased use of farm storage would result in a deterioration in the quality of wheat. In recognition of these savings and potential costs of increased infestation and pesticide residues, the Royal Commission made several points. In general, it indicated that alternatives exist for administering current hygiene standards and that the costs of doing so are likely below the benefits of increased competition (38).

VARIETY DEVELOPMENT AND RELEASE

Wheat is planted in Australia during winter (May to July), grows during the spring, and is harvested from September and October to January. The varieties are spring type—in the North American sense, varieties that are planted during the winter. All the wheat is white, and any red varieties are classed as feed. All varieties have to meet certain milling criteria and there is no active program to develop feed varieties. The GP and Feed grades are simply milling varieties, typically with excessive weather damage.

The plant breeding industry is predominantly public. Each state's Department of Agriculture includes public expenditures on breeding. Producers pay a checkoff (40 cents/MT) that is matched by the Commonwealth and distributed on a competitive basis. Cargill is one of the few private breeders, or perhaps the only one, and it recently released a hybrid that has gained 30 percent of the sales in New South Wales. Producers typically buy a new variety when released and use it for many years before replacing it with another one.

Role Of AWB

AWB has two important roles to play in the development, release, and production of varieties. First, it administers the Variety Control Scheme, as discussed earlier, which complements the activities of variety release. The VCS is used for classification and segregation at the country elevator level. In addition, through VCS and explicit premiums for APH and AH, or discounts for ASW, AWB essentially provides the incentives/disincentives for production of certain varieties in particular locations (silo groups). Producers are not regulated in marketing varieties they produce, nor are breeders formally regulated in release. But if a variety is not prescribed it may be subjected to discount from ASW, or may be classified as Feed, which entails a substantial discount.

The second role of AWB is that it is a voting member on the quality evaluation committee in the release process of each state. These are important committees that conduct quality tests on advanced lines.

To guide wheat breeders on quality, AWB provided a broad set of guidelines in 1976. These are general guidelines regarding quality but each variety must stand on its own in the review process. The underlying rationale is that all varieties conform to certain physical criteria, as reflected in the receival standards. These guidelines relate to milling criteria for each grade and are intended to provide uniformity with respect to end-use criteria. They are designed to reflect the values customers feel are appropriate for each grade, given price differentials and minimum end-use requirements. There were slight changes in the guidelines proposed in 1987, generally reflecting increased uniformity (table 5-18). Further, minor requirements were also proposed with respect to measurement standards. These guidelines are implemented by AWB (presumably) in its role on the quality committee discussed in the next section.

Procedures for Release

Release of varieties ultimately is at the discretion of each state. While each has a slightly different committee structure, the general procedures are similar, and those for New South Wales are described here. Conformity with the review process is essential for endorsement of a variety by the committee and AWB. Three committees are involved in the variety release decision in this state: the Uniform Quality Testing (UQT) Committee, State Wheat Improvement Committee (SWIC), and Standing Advisory Committee on Wheat (SACW).

UQT is a quality evaluation committee. Voting members include the AWB, end-users, the Bread Research Institute, and State Agriculture Department Laboratories. In addition, observers may attend meetings. Extensive analyses of end-use performance are conducted at multiple laboratories on advanced lines that have been submitted. Tests include, but are not limited to, test weight, particle size index, flour yield, grain protein, falling number, color, loaf score and volume, and measures from the farinograph, extensograph, resistograph, and visograh. Results are compared with control varieties that vary with respect to the criteria.

SWIC evaluates the agronomic characteristics of submitted varieties. Tests included are primarily for yield and disease resistance but also include other production-related criteria. Though not specific, a variety is expected to have a yield greater than or equal to the variety it intends to replace.

The Standing Advisory Committee on Wheat receives data and recommendations from UQT and SWIC committees. Members include representatives from the state farm associations, the registered seed growers association, and, in the case of New South Wales, the Hard and Soft Wheat Growers Association and the Prime

Table 5-18.–Quality Guidelines for Wheat Breeders, 1976, and Proposed for 1987

	Protein[a] percent	Hardness PSI	Extensogram Height BU	Extensogram Extensibility CM	Viscograph BU
1976 *Guidelines:*					
soft	less than 10	Over **22**	**200 * 50**	Over 17	
ASW	9.5-12.0	**16-24**	**350 * 50**	Over 18	—
AH	11.5-13.0+	**10-17**	**450 * 50**	Over 20	—
APH	12.5+	**10-14**	**550 * 50**	Over 22	—
1967 ***Guidelines:***					
soft	**Below 9.5**	Over **22**	**200 * 50**	Over 17	480+
ASW					
Soft grained	**9.5-11.0**	**20-24**	**350 * 50**	Over **18**	450+
Hard grained	**10.0-11.5**	**16-20**	**350 * 50**	**Over 19**	450+
AH	**11.5-13.0+**	**14-17**	**450 * 50**	**Over 20**	450+
APH	**13.0+**	**14-16**	**550 * 50**	**Over 22**	450+

[a]**1987 proposal to measure protein on li-percent moisture basis.**

SOURCE: Australian Wheat Board, 1967.

wheat Association. Formally, this committee evaluates the information and makes a recommendation to the State Minister of Agriculture, who in turn makes the official decision on whether a variety is released. In evaluating the information SACW is much more judgmental than the other two committees. The criteria are not completely rigid and are somewhat responsive to the perceived needs of the market. In recent years, for example, more emphasis has been placed on quality, particularly the protein level, in response to apparently declining levels of protein.

Given the recommendations of SACW, the Minister of Agriculture in each state formally releases a variety. In particular, the Minister prescribes a variety that, if produced in a specified silo group, would not be subject to varietal discounts by AWB. If produced in nonspecified silo groups, it would be subjected to possible discounts. Thus, the State Minister of Agriculture can override the intents of varietal discounts applied by AWB.

FINDINGS AND CONCLUSIONS

The single most important institution affecting the marketing system and quality of wheat in Australia is the Australian Wheat Board. It is the sole buyer of wheat, with exception of that used for stock feed. AWB is also virtually the sole seller to both domestic milling and export markets.

A number of mechanisms used or administered by AWB influence the quality of wheat produced in Australia and exported. First is the development and administration of receival standards. Wheat must meet these standards at the point of first receival; if not, it is precluded and destined to the feed market. An important underlying concept of the marketing system is that applying stringent standards at the point of first sale generally mitigates problems later.

Second, price differentials for class and grade, and for variety in some cases, are established by AWB. This is the key mechanism used by AWB to provide incentives to improve or maintain wheat quality.

The Variety Control Scheme is administered to facilitate segregation by classes, and to provide incentives via price differentials. VCS is not regulatory but is used to identify variety at the point of delivery, which then is used for segregation into classes. Administration of VCS depends on producers declaring variety at delivery.

Wheat in Australia is noted for its high standard of "hygiene," i.e., cleanliness and lack of infestations. This degree of cleanliness is assured by the combined effects of the receival standards, the substantial price differentials, and harvesting technology that has adapted to the former.

Due to pricing policies and tradition, Australia has relatively little on-farm storage. However, extensive storage and handling capacity exists within the marketing system. Blending is very limited at the country elevator due to lack of incentive and possibly to infrastructure. Export elevators do blend, but the process is limited to a few factors.

In sum, the quality of wheat exported from Australia is the result of a multi-faceted approach to marketing and regulations. The important influences include:

1. controlled variety development and release;
2. variety identification in marketing;
3. stringent receival standards administered at first point of sale;
4. administered price differentials, to provide quality incentives;
5. an institutional relationship that allows ownership of wheat to be divorced from handling;
6. no tolerance for insects throughout the system; and
7. limited on-farm storage.

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