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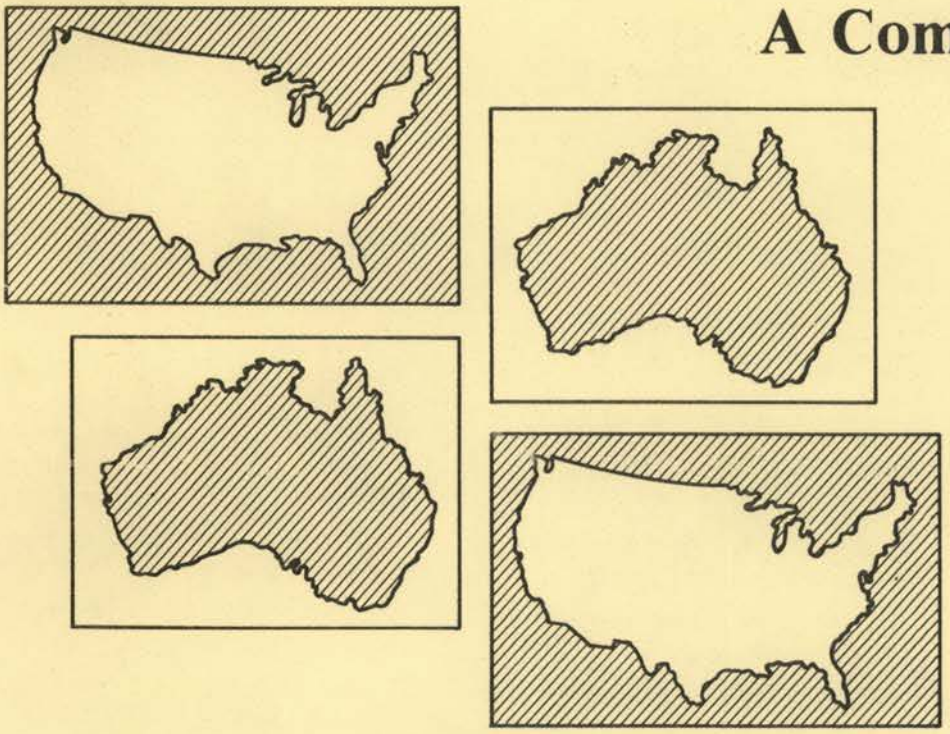
Australian and United States Wheat Marketing Systems

A Comparison



Robert L. Sargent

Cooperative Extension Service
UNIVERSITY OF IDAHO
College of Agriculture

U.S. and Australian Wheat Industries
A Comparison at a Glance

Item	U.S.	Australia
Area planted	Around 30 m. hectares, fairly steady	Around 11 m. hectares, rising
Yield/planted h.a.	About 2 tonnes, rising, modest fluctuations	About 1.4 tonnes, steady, sharp fluctuations
Production	50 to 60 m. tonnes, rising moderately	11 to 16 m. tonnes, rising moderately
Utilization, domestic	21 to 24 m. tonnes, rising slowly	About 3 m. tonnes, rising slowly
Exports	Around 30 m. tonnes, rising, fluctuate	Around 9 m. tonnes, rising, sharp fluctuations
Carryover	Considerable variability, 10 to 40 m. tonnes	Goal — less than 2 m. tonnes, varies with production
Storage — handling	On-farm, private and cooperative elevators	State-controlled bulk handling authorities
Shipping	Country to millers and/or river and rail sub-terminals to export terminals	Country to millers or to rail sub-terminals or direct to export terminals
Transport	Via privately owned and operated rail, barge and/or truck	Via state owned and operated railway, very limited truck
Export destinations	Worldwide, but PNW white wheat largely to Pacific Rim and Middle East	Largely Pacific Rim and Middle East
Sales for export	Dominated by large international traders	Australian Wheat Board sole statutory seller, but international traders used some on commission
Sales, domestic	Largely to millers and feed dealers on competitive, free enterprise basis	AWB sole seller at legislated home consumption price (HCP)
Prices	Determined in competitive cash and futures markets	Legislated domestic HCP, competitive world export price
Gov't involvement	Loan and target price, "set-aside" acreage limitations, storage loans	AWB sole seller, HCP, rare marketing quotas
Sales receipts by farmers	Paid in full when sold, sales decision by individual	Initial payment after delivery to BHA, subsequent payments over 2 or more years as pool is sold

Acknowledgments

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Perhaps the greatest assistance that enabled the author to gain an understanding of the wheat industry in Australia was provided by the many leaders he contacted while there. Any listing one gives is inadequate, but special recognition must be given to J. L. Chapman, D. G. Barwick, B. C. Peelgrane, K. L. Lyons and Ron Pacey of the Australian Wheat Board, B. G. McGee of the Grain Elevators Board of N.S.W., Don Cameron of Cooperative Bulk Handling of W.A., I. F. X. Stoney of the Grain Elevators Board of Victoria, R. F. Komoll of the Department of Agriculture, N.S.W., and Cliff DeGode of the U.S. Embassy.

Thanks are also extended to Sue Lucas, Roberta Cox and Teresa Dean for their patience in typing various drafts of this report.

The author views the opportunity to visit Australia a "once in a lifetime" experience, but he must bear the sole responsibility for errors and omissions in this report.

The Author

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A Comparison

Introduction

Australia and the Pacific Northwest (PNW) region of the United States produce comparable amounts of similar wheat — white wheat. They compete for virtually the same markets in the Pacific Rim of Asia, South Asia and the Middle East and export about the same proportion of their production — around 75%. Actually, PNW exports constitute a larger share of production than this.

The marketing systems in the two countries are, however, vastly different. Australia relies upon the Australian Wheat Board (AWB) to market its wheat crop, both domestically and internationally. The U.S. relies heavily upon a free enterprise sytem to carry out the various marketing functions. Government is certainly involved in both systems, but the degree of involvement is different.

The AWB was created by an Act of Parliament and concurrent state legislation in 1939 as the sole marketing agency for wheat produced in Australia. The Board is primarily responsible for wheat sales, but also sets policies related to receiving, handling, storing, grading, selecting varieties, segregating and shipping. These functions are actually carried out by state Bulk Handling Authorities (BHA's), subject to licenses issued by the Board. Limited amounts of wheat are also received by millers and stock-feed manufacturers who have been licensed by the Board.

State-owned and operated railways transport virtually all of the wheat which moves for export from the producing areas to the ports in Australia. They also carry substantial proportions of the wheat that is used domestically to the various mills or stock-feed manufacturers.

The U.S. has no counterpart to the AWB. The decision to sell rests with the individual grower. An extensive structure has developed in the U.S. to carry out the various marketing functions. It relies heavily upon privately or cooperatively owned firms. At harvest the grower must make a choice between placing the wheat in storage on the farm or delivering it to a local elevator. The grower also has the choice of selling at harvest, storing for later sale or, if eligible, taking a government loan on the wheat for later sale on the commercial market. If commercial (cash) prices are unsatisfactory when the loan comes due, the grower may forfeit the wheat to the Commodity Credit Corporation (C.C.C.) to satisfy the loan. Maintenance of quality is the grower's responsibility in the case of farm-stored wheat, but elevators assume this responsibility for wheat which is delivered to them.

Grading in the U.S. is conducted by state grading laboratories based upon samples taken when the grain is delivered to country elevators. Wheat that moves into export channels is graded again, by the Federal Grain Inspection Service, at the export terminals.

A typical sales pattern in the U.S. involves sale by the farmer to a local elevator. In turn, the elevator sells to a domestic miller or an international trading company which then makes the sale to a foreign buyer. This typical pattern has many modifications and refinements, however; these will be discussed later.

Railroads are an important means of transporting wheat to ports in the U.S., but they are owned and operated by privately held stock companies. Barges, though, carry nearly as much wheat to export terminals and provide an important element of competition with the railroads. Substantially lesser amounts of wheat are transported to the ports by trucks.

Growers and grower groups in both countries sometimes raise questions and suggest that their system should be changed to be more like that of the other country. For example, some elements in the U.S. industry feel that a board system would be better for American growers. Conversely, some in Australia feel that they would be better off with more of a free enterprise system. This study was undertaken to compare the two systems in the hope that each will have a clearer understanding of how the other system operates. The investigation includes both production and marketing and attempts to bring out the similarities and differences of the two systems.

Background

The development of wheat production and marketing patterns and systems in Australia and the U.S. can be better appreciated with an understanding of climatic and geographic limitations, settlement and population patterns, government organization, transportation and other infrastructural development.

Settlement

A historical comparison of development of Australia and the U.S. by H. C. Allen (1) points out several factors that influenced the development of the wheat industries and other agricultural aspects that are important to understanding the relationships of the two countries. Allen notes that:

> The two continental domains of Australia and the (48 contiguous) United States are equal in extent, being almost exactly three million square miles in area. Nor are they altogether dissimilar in shape . . . The more central position of the United States in the world, as compared with that of Australia, is indicated by the fact that it is 3,000 nautical miles from New York to Liverpool, and 4,500 from San Francisco to Yokohama whereas, though it is not far from Darwin to Indonesia, it is by sea 4,700 miles from Perth to Capetown, 9,500 from Perth to London through Suez, and 6,550 from Sydney to San Francisco via Suva and Honolulu. What is more, compared with Australia, the United States is, as it were, on the way to many places . . . This Australia is not . . .

Interestingly, Portland, Oregon and Sydney are almost exactly the same distance from Tokyo — about 4,850 air miles. Japan is an important market for wheat, whether it is produced in Australia or the U.S.

Discussing settlement patterns, Allen notes:

> For the United States, the very barrier of Panama acted as a powerful incentive to open up land routes across the Great Plains and the mountains to the Pacific Coast, and eventually, of course, to build the canal itself. No comparable spur to the opening of the difficult interior of Australia existed, so that ease of coastal transportation may have been a disadvantage in disguise . . .

Australia, of course, is an island. Unlike the U.S., which Allen notes was settled primarily from east to west, Australia was settled from east, south, west and even north.

Transportation

These factors partly explain vast differences in the transportation systems which developed to serve the two countries. The U.S. rail system, though privately owned, adopted a uniform gauge early which enables trains to move across state lines with a minimum of difficulty and also enables the transfer of rail cars from one line to another. Admittedly, a few small lines attempted to adopt a different gauge, but most of those lines failed long ago. Likewise, the interstate highway systems, a recent product of the U.S., provide easy movement from one state to another. Barges, the third important link of the U.S. grain transportation system, depend on navigable rivers, and the U.S. has enough of these to greatly facilitate wheat transportation.

Railroad development played a very important role in both countries, not only in opening grain-growing areas to settlement, but also in providing them with access to markets. Railroad development differed sharply. In the U.S., private companies were given large grants of land by the federal government to encourage rail-building; in Australia, the rail system was largely a state responsibility. Each state built, owned and operated its own railway system and, except for South Australia, still does. Apparently the principal thrust was to assure that the hinterlands would have access to the individual state's capital city and major ports. Different railway gauges were used in the various states and sometimes within states (for economy of building reasons), with the result that interstate movement is virtually impossible. Some sources suggest that this was also to prevent direct merchandise transfers between the then independent colonies, as well as to limit competition from across-the-border imports. These difficulties have been modified in recent years with the establishment of the Australian National Railway System. It links the capital (major) cities of the nation. It appears doubtful that standard gauge will be generally adopted in the agricultural areas for a long time, if ever.

Population Density and Patterns

Though the two countries are quite comparable in size, their populations are much different. The U.S. population, at about 215 million in 1976 (18) compares with an Australian population of 13.5 million the same year (2). This means, of course, that domestic markets in the U.S. are a great deal larger than those in Australia.

While the total population of the U.S. is nearly 16 times that of Australia, the U.S. farm population

was only 10 times that of Australia in 1971. Both countries are experiencing declines in their farm populations, both in absolute numbers and as a percentage of total population. Australia has a larger percentage of its population living on "rural holdings" than the U.S. has "on farms."

Although Australia has a greater proportion of its population living on "rural holdings," it always has been urban-oriented. About 70% of the Australian population lived in cities of 100,000 or more in 1976 (2). This compares with about 71% who lived in Standard Metropolitan Statistical Areas of 100,000 or more in the U.S. in 1975 (20). If one looks only at cities of 500,000 or more, (metropolitan statistical districts in Australia; standard metropolitan statistical areas in the U.S.), there is a higher concentration in Australia. This group would include only the 5 largest capital cities, which account for 61% of Australia's population. U.S. cities (SMSA's) of 500,000 or more include only 52% of its population.

Climate and Geography

Allen (1) has brought out the climatic differences in the two countries very well, noting that:

> Australia is a dry continent . . . and almost all her ills are connected with and subsidiary to it. No less than 87% of the continent has an average annual rainfall of less than 30 inches, much of it very unreliable. More than a half of the United States but only about a third of Australia has a better rainfall than 20 inches a year . . . The United States has about 5 times as much temperate land with a rainfall of over 20 inches as Australia, and Australia about 5 times as much arid country with a rainfall of less than 10 inches as America.
>
> The aridity is aggravated by temperature control, for Australia is also warm, falling as it does, with the exception of Tasmania, entirely between the 10th and 40th parallels, compared with the 20th and 50th parallels in the case of the United States. Evaporation rates are therefore high throughout Australia.
>
> The situation is further aggravated by Australia's lack of mountains. The eastern coastal range of Australia is comparable in position and size with the Appalachians, the highest peaks reaching 6,000 and 7,000 feet, respectively. But whereas these are the highest mountains in Australia, in the West of the United States there looms the majestic Cordillera system, attaining in places a height of 14,000 feet. Australia's only other two little mountain groups, in central and western Australia, are hardly worthy of the name. This not only means more evaporation and less snow, but also little precipitation of rain.

The general aridity of Australia combined with its lack of mountains to collect and hold snow mean that it does not have river systems comparable to those in the U.S. Hence, the opportunity to develop river transport, so important to many grain-growing areas of the U.S., is severely restricted. The Murray-Darling system has been and is sometimes used for river transport, but no grain has been shipped on the system in recent years. Its flow is not sufficient for year-round navigation. The lack of continuous river flow also limits irrigation development, but through dam construction in key areas, the Australian government has made some progress in the development of irrigation (6). Ironically, the areas of high rainfall in Australia lie almost entirely adjacent to the eastern coast where they can be used in only a very limited manner for irrigation and almost none for navigation.

Government Organization

Government organization also differs considerably in the two countries. This, too, has important implications for their wheat industries. Government policies, and how they are derived, have considerable impact on production, marketing, transportation and international relations. Both countries have had access to basically the same technology, but the way this technology is used tends to differ somewhat because of structural differences inherent in the government organization.

The individual state governments, as contrasted with the federal government, exercise considerably more autonomy in Australia than in the U.S. At first glance one might attribute this to the sheer force of numbers. Australia has only 6 states and 2 territories compared with 50 states in the U.S.; hence each of the states in Australia is much larger and represents a greater proportion of the whole than in the U.S. This may partly explain the difference but the basic reason is more fundamental.

The Australian states served as governmental entities during colonial times long before independence and the formation of the federal government. They have tended to retain many of these characteristics since. While the same claim can be made for the original 13 colonies of the U.S., the very fact that they attained their independence through revolution required them to accede some of their state sovereignty to the federal government. The net result has been that the Australian Constitution provides for relatively stronger state governments

and relatively weaker federal government vs. relatively weaker state governments and relatively stronger federal government under the U.S. Constitution. In Australia most taxation and expenditure matters have been reserved by the Commonwealth, but agricultural policy rests with the states. Such policy is somewhat restricted, though, since the dollars are controlled by the Commonwealth. In the U.S. agricultural policy tends to rest primarily with the Federal Government which also has extensive taxing and expenditure powers. U.S. states' authority to tax is a distinct difference.

The Australian Wheat Industry Stabilization schemes serve as one illustration. These schemes have been adopted as a series of 5-year plans. The federal government must pass the legislation. Complementary legislation must then be introduced and passed by each of the state legislatures that are affected before the scheme can actually be implemented. By contrast, when the Food and Agriculture Act of 1977 passed the U.S. Congress and was approved by the President, it became the law of the land. Individual state governments have only limited input towards such legislation. Financing to implement the Act comes from the Federal Treasury.

The railroads serve as another example. In the U.S., the federal government made land grants and other financial assistance to private companies to encourage and help them build railroads to open the frontiers. State governments, many at the time only territories, had little to offer in the way of assistance, financial or otherwise. In Australia, on the other hand, the state governments built the railroads, with some federal and private assistance, and continue to operate them.

Other examples could be cited, but these two perhaps serve to illustrate how differences in government organization influence the wheat and other industries of the two countries.

Wheat Production

Wheat production methods and technology in Australia and the U.S. are very similar. Much of the equipment used is identical. In general, the land on which most of the wheat in the two countries is produced is also very similar — nearly flat to gently rolling. It was, however, necessary to clear trees from more of the land in Australia. Even today many of the paddocks (fields) in Australia have a few scattered trees that have been left to provide shade for livestock during that period of the rotation when the paddock is in pasture. This practice is virtually nonexistent in the U.S. One reason is that much of U.S. wheat land was initially a tree-less prairie. Any trees that were growing were cleared to permit more efficient use of large-scale equipment. If shade was necessary, a few trees would be left at the edge of the fields or in some corners.

This suggests one of the major differences in the production aspects of the two countries. Livestock production, primarily sheep raising, is a major enterprise, frequently more important than wheat, on most Australian wheat farms. Hence pasture is a very important part of most rotations. Legumes are included in the pastures and they aid in maintaining or improving the nitrogen levels of the soil. Commercial nitrogen fertilizers are scarce and expensive in Australia. Further, Australia has a long history of sheep and wool production and has well-developed marketing channels for this output. Its growers have also gained considerable expertise in sheep and wool raising.

Australia's wheat-sheep area lies in a belt west of the Great Dividing Range in the eastern states, along the southern coast and into southwest Western Australia (Fig. 1).

A survey of wheat growing conducted by the Australian Bureau of Agricultural Economics (7) covering the 1969-70 to 1971-72 seasons indicated that, on average for three years, wheat and livestock receipts per farm were about equal — $A9,052[1] for wheat vs. $A9,137 for livestock. Sheep and wool accounted for $A1,624 and $A4,769, respectively, of the livestock receipts. Other contacts in Australia noted that this is a typical pattern on wheat farms.

By contrast, wheat farming in the U.S. tends to be more specialized. Other crops — barley, sorghum or, in the PNW, peas — may be included but pasture in the rotation is a rarity. Some farms in the Southern Plains areas do regularly pasture cattle on their wheat fields in the fall, but this is normally considered an aid to tillering and the fields are so used for only a few months. Wheat farms in a number of areas of the U.S. do have substantial livestock operations, usually cattle, but the livestock are generally raised on land that is unsuited for wheat production. A few wheat farms also carry out livestock (cattle) feeding operations.

[1]Throughout this publication the notation $A is used in reference to Australian dollars. $ is used to represent U.S. dollars.

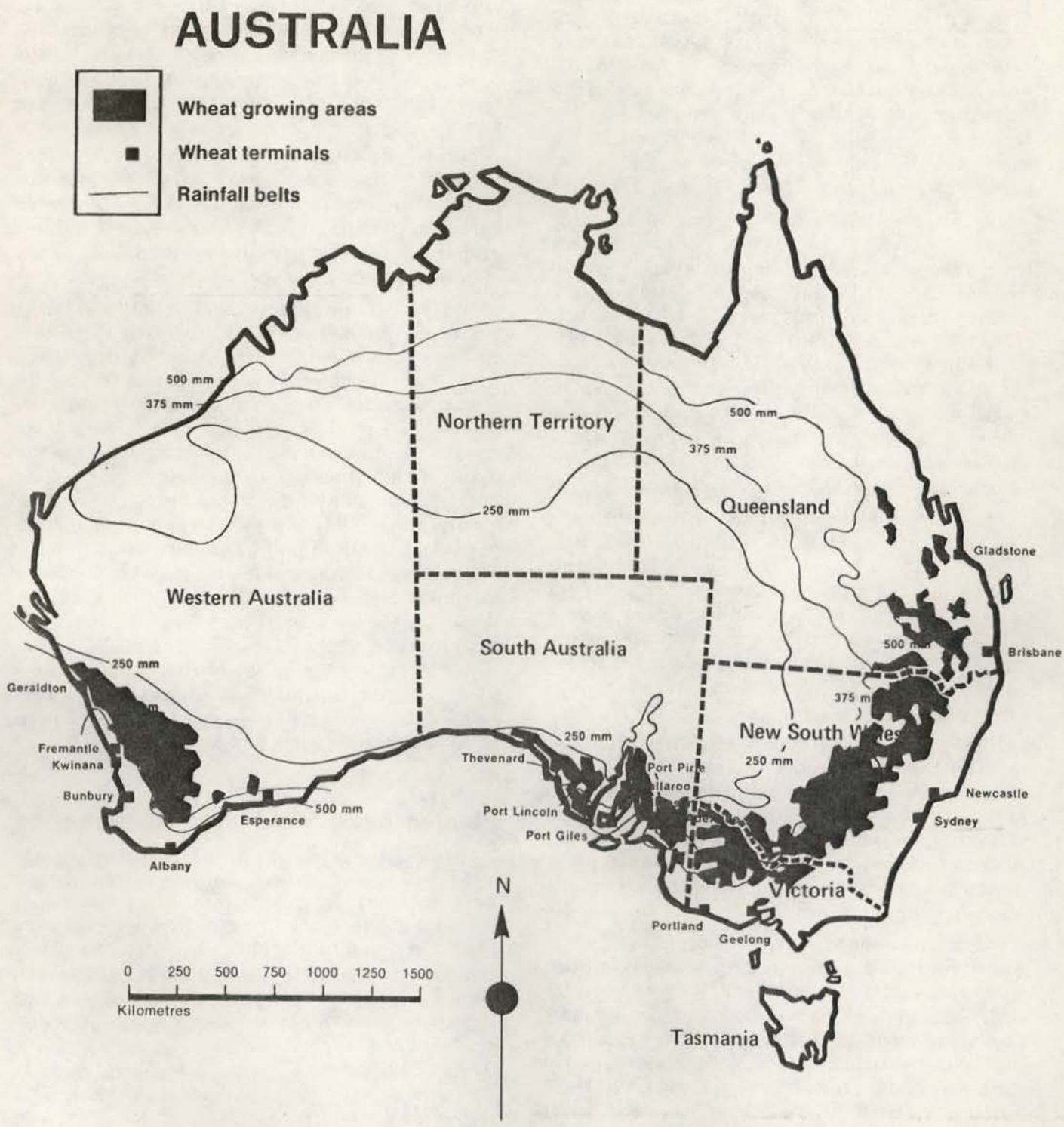

Fig. 1. Wheat in Australia, major producing areas and port terminals.
SOURCE: Australian Wheat Board (3).

Wheat Classes

White wheats are the primary wheats raised in Australia. Most are actually spring varieties, but they are seeded in early winter (May). Wheat is graded by variety and protein content. Australian Standard White (ASW) is dominant and is produced in all wheat-growing areas of Australia. Most commonly grown varieties meet the ASW standards but may fail to meet this grade because of discoloration and weather damage, weeds and other foreign or unmillable material. Wheat which fails to meet ASW standards is classed as general purpose wheat and is usually sold for feed (12).

The amount of general purpose or off-grade wheat delivered to the AWB varies considerably from year-to-year, depending on weather conditions at harvest. During the 1963-77 period, the quantity delivered ranged from 4.56 million bushels (124,000 tonnes) in 1964 to 77.3 million bushels (2.1 million tonnes) in 1973. Heavy rates of off-grade wheat most often come from New South Wales, Queensland and Victoria. In most cases this is rain damaged. South Australia and Western Australia usually have smaller but more consistent amounts of off-grade wheat, more often light weight.

Two premium wheats, prime hard and hard, are also produced in Australia. Prime hard wheat is produced in northern New South Wales and Queensland and must meet or exceed all specifications of ASW wheat. In addition, it must have a protein content of at least 13% on a natural moisture basis. In recent years prime hard wheat has represented about 7.5% of Australia's total wheat production (8).

Hard wheat, the other premium class, is produced in all of the wheat-producing states. It, too, must meet all requirements of ASW, but must also have a minimum of 11% protein. In recent years hard wheat has, on average, accounted for about 13% of Australian wheat production (8). Small amounts of durum wheat are also raised in Australia, virtually all in New South Wales.

While Australia's production centers on white wheat, the U.S. produces nearly all classes of wheat. Red wheats predominate and hard red winter (HRW), a major bread wheat, is by far the most important single class. Normally this wheat has a protein content of 12% or more. Most is produced in the Great Plains area of the country (Fig. 2). Hard red spring (HRS) wheat is another bread wheat noted for its high protein, usually 13% or more. Most of it is raised in the Northern Plains.

Soft red winter (SRW) wheat, used extensively for pastry and cake flour, is raised mostly in the eastern corn belt region of the U.S. It is a low protein wheat, usually 12% or less. Soft white (SW) wheat is another low-protein wheat which is used primarily for pastry and cake flour and noodles. It is the major wheat of the Pacific Northwest, but small amounts are also raised in New York, Ohio and Michigan. While most soft white wheats are winter varieties, some spring varieties are also grown. Most durum wheat produced in the U.S. is produced in the hard red spring area of the Northern Great Plains and is used for the making of macaroni.

Nearly all of the 48 contiguous states produce some wheat but the outline in Fig. 2 shows the major production areas of the various classes. The wide variety of wheat classes produced in the country permit it to at least partially meet world demands regardless of the end use.

U.S. production of hard wheats (HRW and HRS) for making bread flour is vastly greater than Australia's hard wheat (prime hard and hard) production which is used for the same purposes. U.S. white wheat production, though, is slightly less than Australia's ASW production (Fig. 3). These two wheats compete for many of the same markets. Data in the figure are not strictly comparable because the U.S. data include total white wheat production even though portions of this wheat (in periods of adverse harvesting weather) may be suitable only for feed. The Australia data include only ASW deliveries to the AWB. Some of the ASW wheat produced may be held on the farms for seed or feed and, of course, the off-grade wheat is not included in the figure. Nevertheless, the figure shows that the two countries produce comparable amounts of white wheat and that U.S. production has gained slowly relative to Australia during this period.

Planted Area, Yield and Production

Statistical data for wheat are reported on slightly different bases in the two countries, so adjustments were necessary for comparison. Most Australian statistics are reported in metric terms — hectares (2.47 acres) and tonnes (36.74 bushels). Most U.S. statistics are reported in terms of acres and bushels. Both figures are used in this report. Australia also reports in terms of planted area but not harvested area. The U.S. reports both, but it reports yields in terms of bushels per *harvested* acre. To get the data on a comparable base, U.S. yields in this study were computed on a *planted* area basis. This results in lower yields for the U.S. in this study than those reported in most sources.

The U.S. planted area and production are substantially greater than that of Australia. For this reason different scales have been used in some

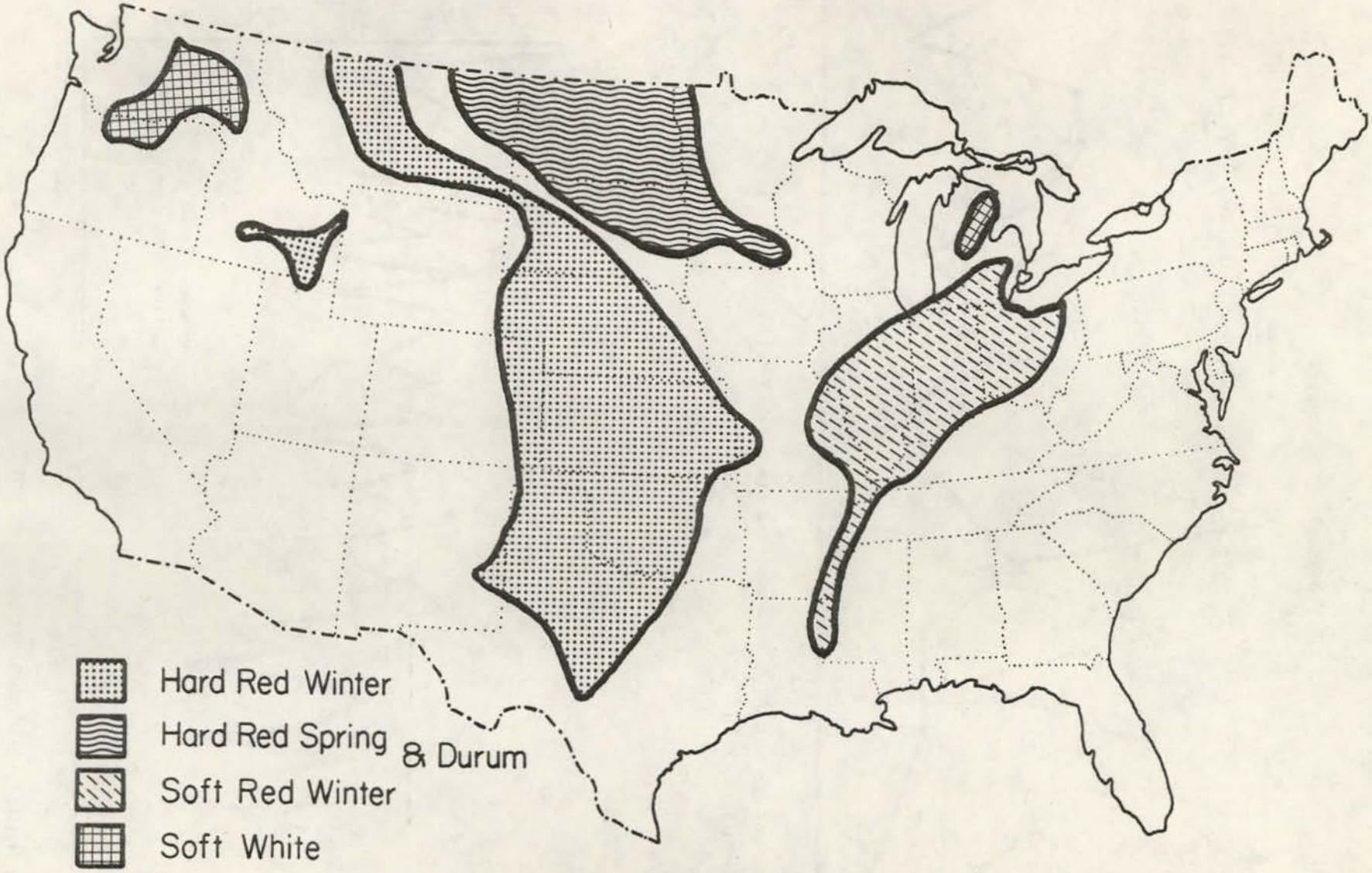

Fig. 2. Major production areas of U.S. wheat by class.

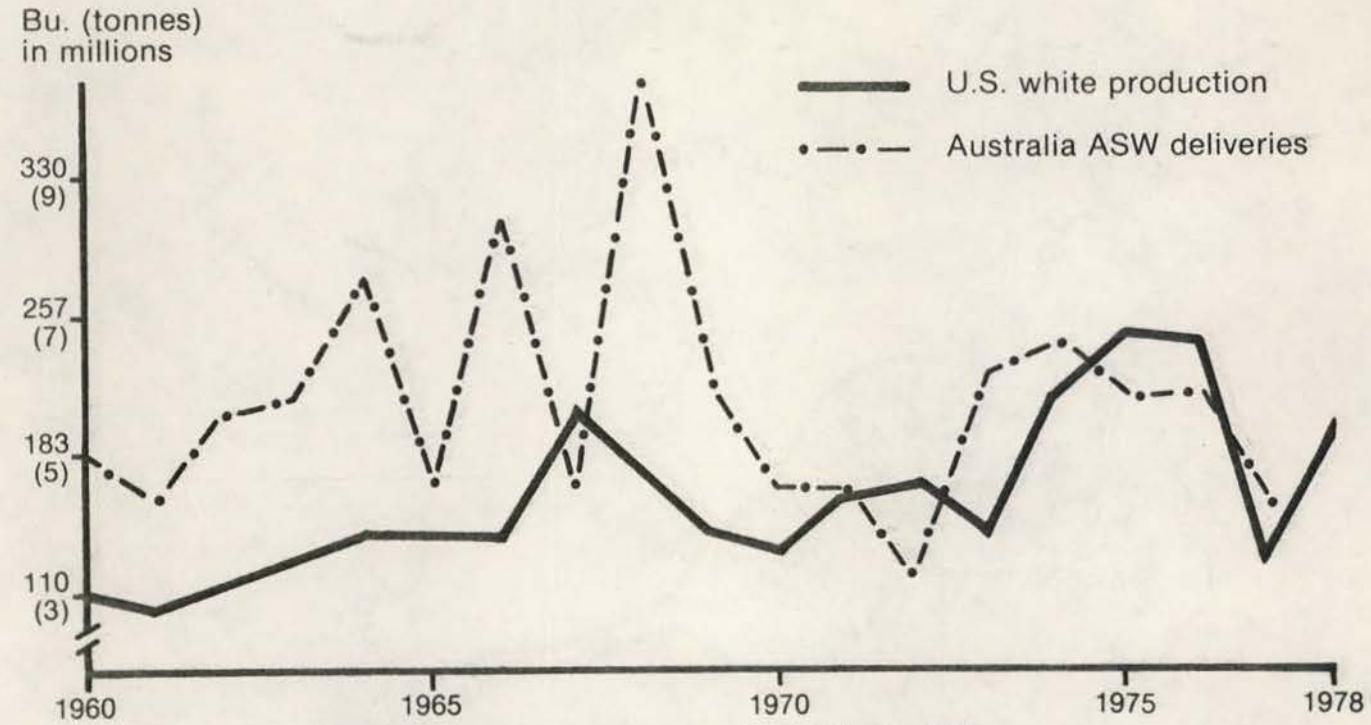

Fig. 3. Production and deliveries of U.S. white wheat and Australian ASW, 1960-1978.

SOURCE: Appendix Tables 3 and 4.

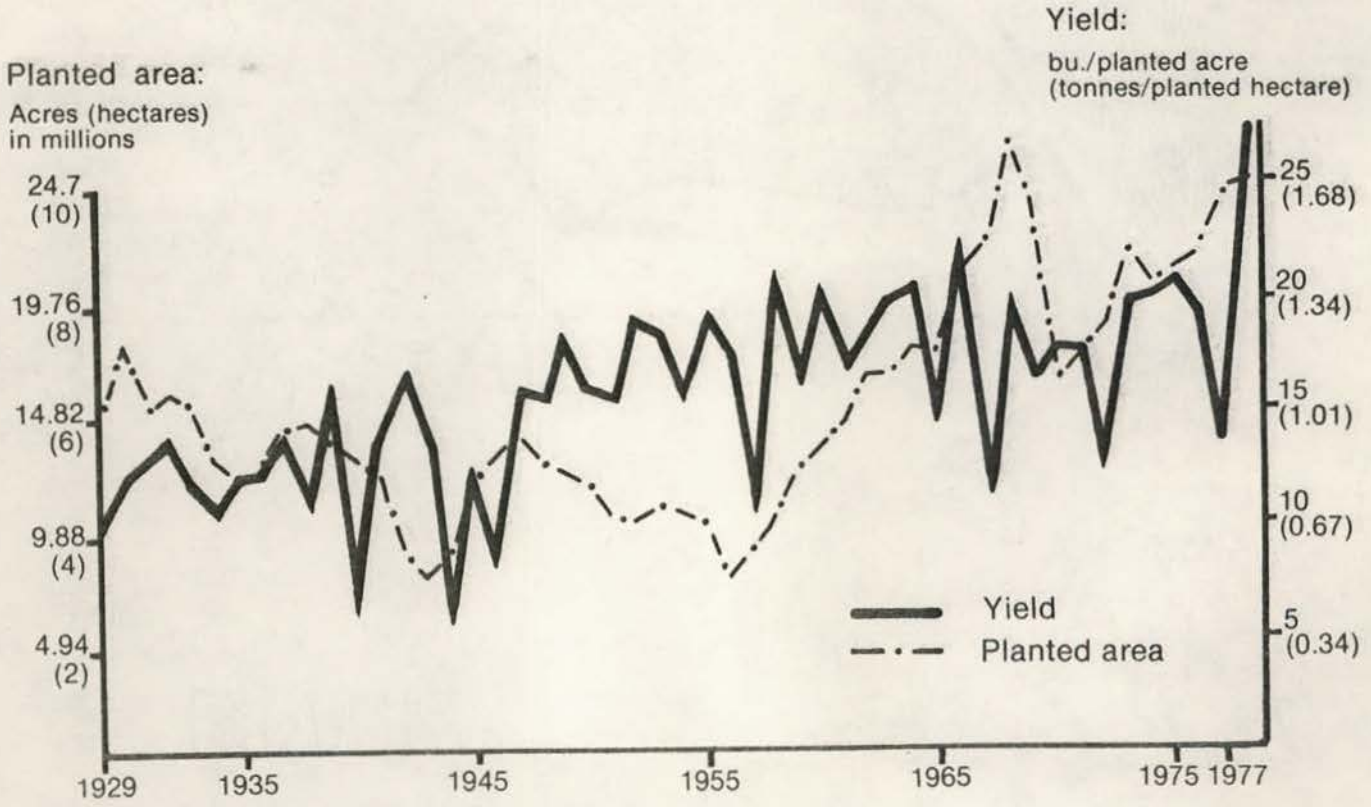

Fig. 4. Planted area and yield of Australian wheat, 1929-1978.

SOURCE: Appendix Table 1.

figures of this section to avoid masking significant variations.

The planted area in Australia tended to decline from 1929 to 1956, except for a period during and immediately following World War II (Fig. 4). From 1956 to 1968, planted area increased rapidly to a record 26.7 million acres (10.8 million hectares). The imposition of marketing quotas brought some reduction in 1969 and a sharp further drop in 1970. Since then the planted area has again been rising and in 1977 and 1978 Australia had the third and second, respectively, highest planted area on record.

The relationship between wheat and wool prices is very evident here. Wool prices were quite strong relative to wheat during the post-war period until about 1956. Farmers thus shifted from planting wheat to increasing their pasture area. Wheat prices and markets then became more favorable and there was a shift to wheat which continued until about 1968. The imposition of quotas in 1969 brought a sharp drop in area planted to wheat and, though it has increased since 1970, it has not reached 1968 levels. Wool prices were quite depressed in the 1970's.

Wheat yields in Australia tend to reflect the climatic variability with sometimes dramatic fluctuations. Lows result from general droughts or, in some years, lack of rain at crucial growth periods. However, average yields show a general rising trend until about 1958 (Fig. 4) and then a leveling, despite the extreme fluctuations.

The rising trend in yields came at the same time the planted area was trending down. This would be expected since the areas abandoned for cropping would be, in general, the marginal production areas that would have the lowest and most variable yields. Further, the areas where wheat continued to be grown probably received more timely tillage and may have been fertilized more heavily.

When the rising trend in planted area began in 1956, yields tended to level off and, in fact, became much more variable than they had been for several years. This occurred in spite of new technology that has made it possible in most years to produce wheat economically on lands that were previously unsuitable for wheat production.

U.S. wheat planting from 1929 to 1978 exhibits greater variability than was true in Australia (Fig. 5). This tends to reflect the acreage restriction programs. Severe restrictions were imposed from 1939 to 1942. They were again imposed in 1955 and were generally maintained until 1966 when they were relaxed briefly. They were imposed again in 1969 and were continued until 1973 when they were again relaxed as a result of the large U.S.S.R. wheat purchases in 1972. A voluntary set-aside program was initiated for the 1978 crop and the planted area again declined.

The stairstep appearance of U.S. wheat yields is interesting. Significant yield increases accompanied each of the drops in planted area. Three factors probably account for this:

1. Marginal land was dropped from wheat production and wheat was planted on the better land.
2. More fertilizer was applied and better cultural practices were employed on the land that remained when acreage restrictions were in force.
3. New and better wheat varieties became available and were rapidly adopted while acreage was restricted.

New technology in the form of better cultural practices and better wheat varieties became the norm, however, even when acreage was expanded. Fertilizer application was also continued with the result that yields did not decline appreciably even with expanded acreage. Significantly, too, the planted area in the U.S. has not shown the increase that was evident in Australia during this period.

Fig. 6 compares changes in planted area for the two countries from 1942 to 1978. The rising trend in area planted in Australia clearly contrasts with the limited change in the U.S. A statistical measure, the coefficient of variation, also confirms the conclusion that Australia's planted area is more subject to fluctuations than that of the U.S. In fact, Australia's C.V. of .321 vs. the U.S.'s C.V. of .150 indicates about twice as much variability of planted area in Australia as in the U.S.

Wheat yields on a planted area basis were comparable in the two countries from the 1930's to the mid 1950's, except for a period in the early 1940's when Australia was plagued with droughts (Fig. 7). Since 1956, though, U.S. yields have continued to increase while Australia's yields levelled off or, except for the record yield in 1978, trended slightly downward.

In total wheat production, Australia again has much greater variability (Fig. 8). This is a reflection of its yield fluctuations caused by climatic conditions. U.S. production has increased at a rather steady rate over the entire period, particularly from about 1960 to 1978. The coefficient of variation measure again shows the greater fluctuation in Australia (C.V. .510 vs. .321), but both countries have greater fluctuations of production than of planted area.

A trend covering the entire period would indicate that Australian production is increasing at a faster rate than that of the U.S. On the other hand, three

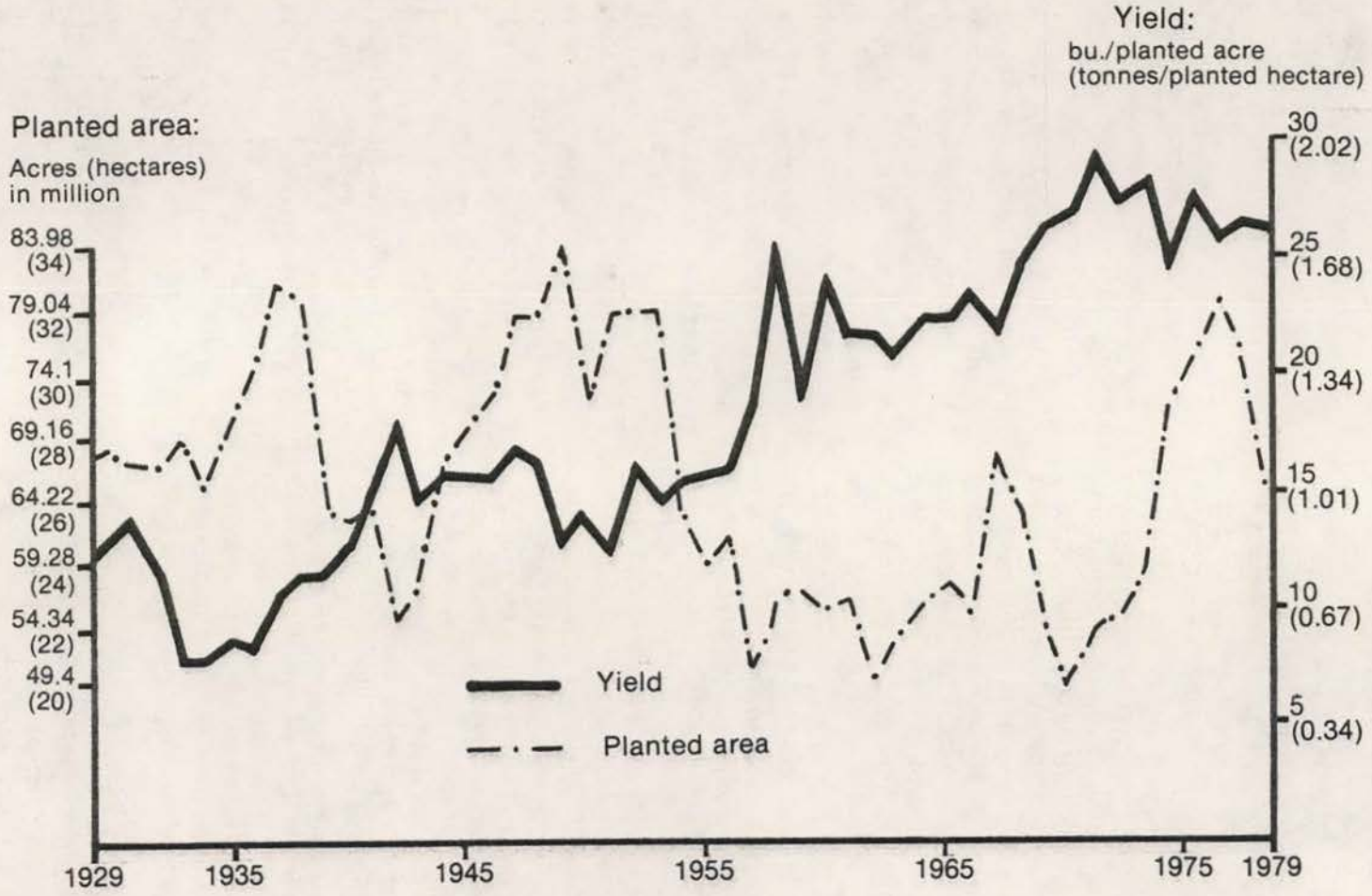

Fig. 5. Planted area and yield of U.S. wheat, 1929-1978.

SOURCE: Appendix Table 2.

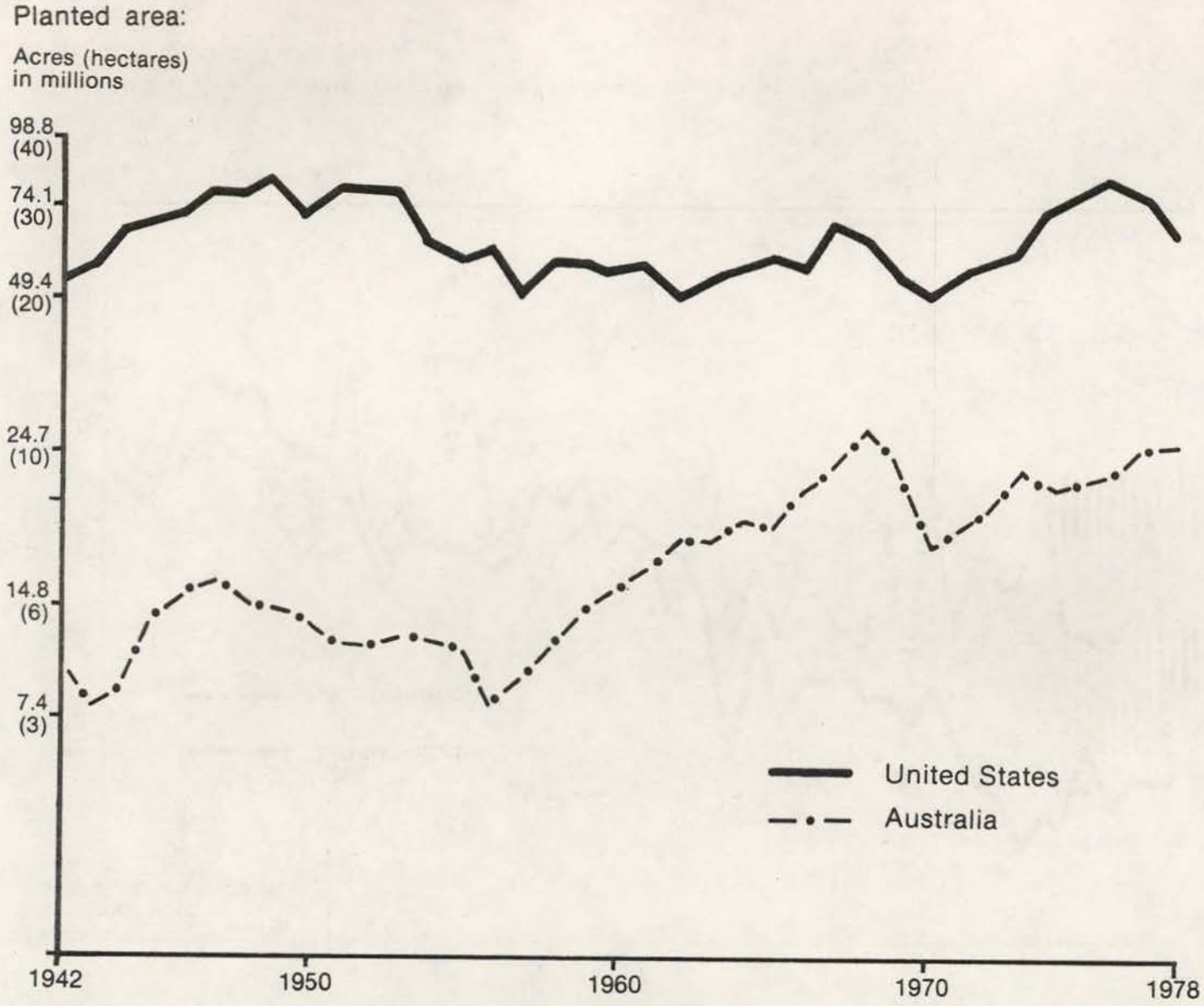

Fig. 6. Planted area of wheat in the United States and Australia, 1942-1978.

SOURCE: Appendix Tables 1 and 2.

NOTE: Semi-log scales have been used in this chart. Hence, the changing relative values of the left hand scale. This enables a direct reading of rates of change.

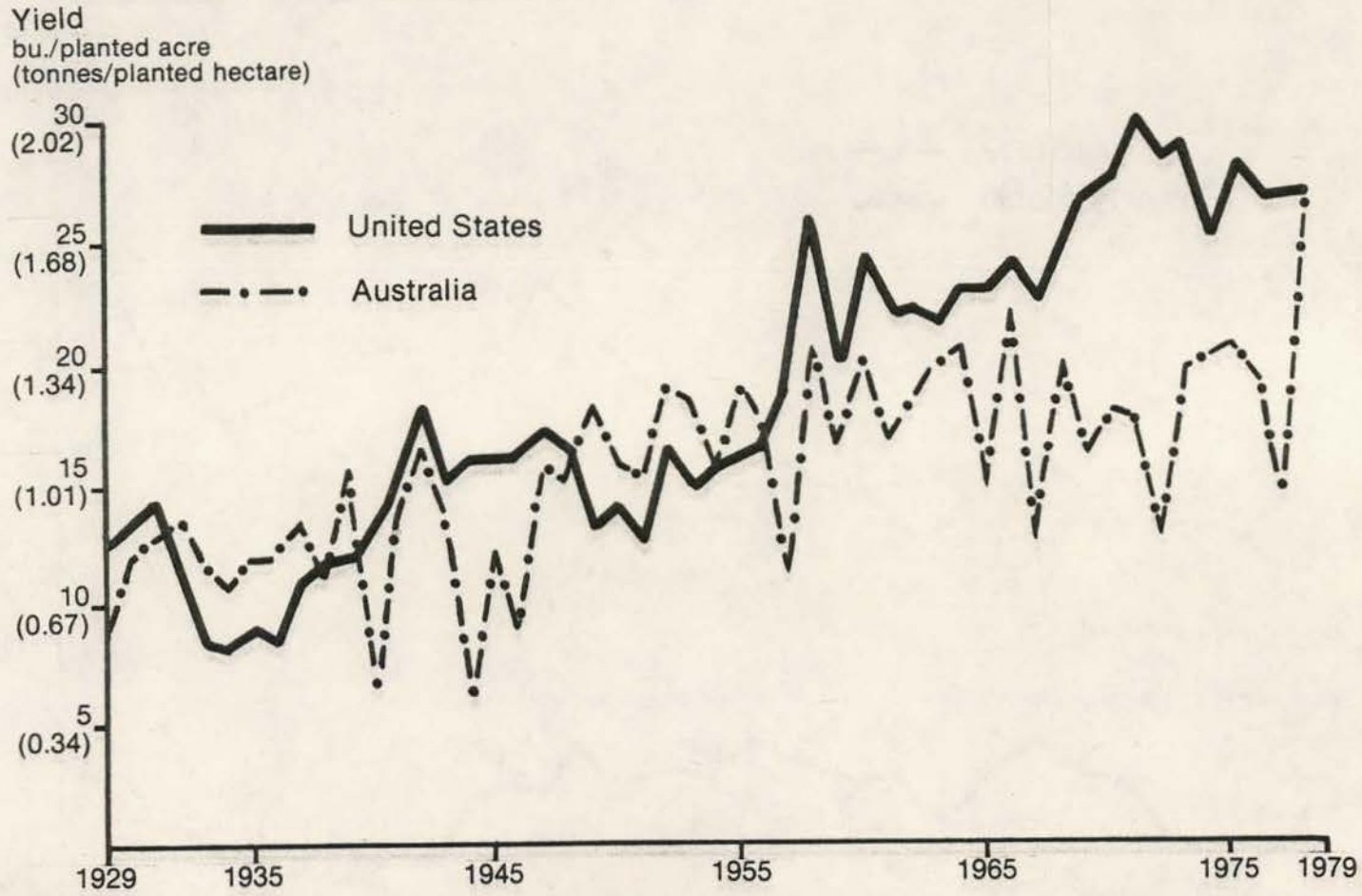

Fig. 7. Wheat yield per planted area in the United States and Australia, 1929-1978.
SOURCE: Appendix Tables 1 and 2.

Fig. 8. Wheat production in the United States and Australia, 1942-1978.

SOURCE: Appendix Table 1 and 2.

NOTE: Semi-log scales have been used in this chart. Hence, the changing relative values of the left hand scale. This enables a direct reading of rates of change.

distinct trends are evident for Australia. During the 1940's and until 1956 the rate of increase was rather slow. It picked up sharply from 1956 until 1968 and since then again shows a relatively slower rate of increase. The mid-trend, had it continued, indicated that Australia would catch up with the U.S. in wheat production by around the turn of the century. Obviously, that trend has not been maintained, and the more recent pattern suggests that each will maintain its present relative position or perhaps the U.S. will move further ahead.

Future wheat production changes will depend on technology. Though the U.S. has more arable land, Australia has more land that is likely to be developed for wheat production. Australia's secret seems to lie in the development of wheat varieties with greater drought resistance and in cultural practices and technology that might overcome some of the vagaries of weather. Conversely, the development of more drought-resistant varieties and improved technologies would also enable the U.S. to bring in considerably more land that is now considered marginal. Wheat prices will influence how much and how rapidly marginal land will be brought into wheat production, and prices of other commodities (i.e., wool, sheep, beef, feed grains) will also affect whether land is diverted to wheat production. Policies that are pursued by the two governments and those of other importing and exporting nations will also influence what develops. From a purely production standpoint, however, Australia appears to have an edge to make greater relative gains in wheat production.

Farm sizes, in terms of area planted to wheat, appear to be much larger in Australia than in the U.S., but completely comparable data are difficult to find. Results of a survey in 1976 by the Australian Bureau of Agricultural Economics (15) indicated that 47,327 farms planted 21.1 million acres (8.6 million hectares) of wheat in 1975, an average of 447 acres (181 hectares) per farm.

The author has not been able to find a comparable report for the U.S. However, the Census of Agriculture (21) counted 533,520 wheat farms in the U.S. in 1974. The area planted that year (19) was 71.0 million acres (28.8 million hectares). The average area planted per wheat farm on this basis was 133.4 acres (54 hectares), or less than one-third that of Australia.

Australian farms with smaller wheat plantings are concentrated in the four eastern states (15). Nearly 79% of the farms in these states planted less than 494 acres (200 hectares) in 1975 and 32% of the farms had less than 123 acres (50 hectares). Wheat farms in Western Australia tend to be much larger. Only 35.7% of the farms there had less than 200 hectares and only 10.4% had less than 50 hectares. For a further contrast, 3.2% of the farms in the four eastern states had over 500 hectares planted to wheat compared with 26% in Western Australia.

Wheat Storage and Handling

Wheat storage and handling facilities in the U.S. and Australia have definite similarities, but their operations are vastly different. State Bulk Handling Authorities (BHA's) operate the storage and handling system in Australia. The BHA's are sometimes known as Grain Elevators' Boards or State Wheat Boards. The BHA's in two states, Western Australia and South Australia, are cooperatives. In the other three wheat states they are government boards.

Most wheat is delivered to local elevators at harvest, though limited amounts are stored on farms, normally for short periods of time, and some is delivered to licensed mills. Wheat usually has priority over other grains for space in the system; hence farm storage is most often used for grains other than wheat. Delivery to BHA elevators is equivalent to delivery to the Australian Wheat Board's wheat pool. Initial payments on the pool are made after this delivery. The producer is not compensated for on-farm storage, either in terms of price or storage payments. New South Wales now offers an on-farm storage allowance of up to 5.4 cents per bushel ($A2 per tonne) for a minimum of 2 months as a result of the large 1978 harvest.

The U.S. system is much different. Local elevators are operated by farmer-owned cooperatives and by private companies. The private companies may be owned and operated by individuals, flour mills or international exporters. Both cooperatives and private companies may operate single elevators or chains of elevators ranging from a few to several hundred. On-farm storage is also used extensively.

Eligible farmers may obtain Commodity Credit Corporation (C.C.C.) loans after their wheat has been placed in commercial or approved on-farm

storage, but otherwise they are not paid for their wheat until they sell. They are then paid in full. An exception to this is the deficiency payments which are paid to eligible farmers who have participated in the set-aside program authorized by the 1977 Food and Agriculture Act. The deficiency payments are made in November and December. These are discussed in greater detail in the section on Prices and Price Determination.

The Australian System

The BHA's are either government authorities or wheat growers' cooperatives, but they are responsible for handling, storing and caring for the wheat for the Australian Wheat Board. They also are responsible for loading the wheat for transport to export terminals and operating the terminals. In addition, the BHA's serve similar functions for the various coarse grains and oil seeds. Separate national or state boards handle the pools and sales of coarse grains and oil seeds in some but not all states.

Policies of the BHA's are set by a board of directors which is usually composed of an appointed chairman, a representative of the railways and elected grower representatives. The Grain Elevators Board of New South Wales, for example, has an appointed chairman, an appointed Treasury representative, an appointed Transportation Commission representative and 4 grower representatives who are elected by zones. The cooperative BHA's are different. Western Australia's board is composed of 10 farmer members elected by districts. South Australia's board is composed of 3 appointed members and 5 farmer members elected by zones. They, in turn, hire a manager who is responsible to the board and handles the operations.

The Australian Wheat Board (3) reported that the BHA's had 838.8 million bushels (22.8 million tonnes) of storage capacity for 1978-79 wheat and other grains (Table 1). Mills had an additional 11.2 million bushels (306,020 tonnes) of storage capacity.

Table 1. Storage capacities of wheat and other grains of Australia's Bulk Handling Authorities.

State	Country	Seaboard	Total
	(000 tonnes)		
New South Wales	6,042	375	6,417
Victoria	2,751	1,070	3,821
South Australia	2,104	1,471	3,575
Western Australia	5,460	2,157	7,617
Queensland	1,263	107	1,370
Tasmania	—	31	31
Australia	17,620	5,211	22,831

Source: Australia's Wheat Board, Annual Report: 1977-78, pg. 10.

The capacity was expanded substantially, through construction of temporary storage, to handle the record 1978 crop. The states have interesting differences in the distribution of inland and seaboard capacity. Western Australia and South Australia have a substantial share of their capacity at the seaboard terminals, but they have 6 and 7 of these terminals, respectively. Further, their major wheat growing areas are relatively close to the terminals. The other 3 mainland states have 2 seaboard terminals each, but they are a substantial distance from the principal wheat growing areas, especially in New South Wales and Queensland.

Some wheat from southern New South Wales moves through the export terminals in Victoria, but generally wheat grown in a particular state is exported through that state's terminals. Further, wheat for domestic consumption is usually sold to millers within the individual state or to feed companies in the state. If growers have delivered wheat to a BHA elevator (and hence to the AWB wheat pool), but later find a need to use some of this wheat for feed, they have the option of withdrawing it. They do, however, have to pay a storage and handling charge and must also repay any advances they have received.

Sharp fluctuations in climatic conditions combined with some shifts and expansion of the wheat growing areas have posed problems for the BHA's in planning and locating their storage facilities. This has led to extensive use of temporary storage. Little wheat is stored in piles on the ground, as is often done in the U.S. for short periods of time following a bumper crop in a given area. Fear of contamination or insect damage prevents this, particularly in the warmer, damper climate of the three eastern states.

Two types of temporary storage dominate. First and most common is above-ground piling somewhat like the wheat piles in the U.S. The pile, however, is usually placed on plastic or asphalt and is cribbed on the sides. The pile is then covered with steel or plastic sheeting and is fumigated for insect control. A second type, recently developed by the Commonwealth Scientific and Industrial Research Organizations (C.S.I.R.O.), involves digging a long pit or trench in a reasonably well drained area, covering it with plastic and a mound of soil 1 to 3 feet thick. Users claim wheat will remain in good condition in this type of storage, even without fumigation, for long periods of time.[2] Though they are relatively inexpensive to construct, both of these temporary storage systems are difficult to outload. The wheat has to be scooped or augered into trucks

[2]Interview with I.F.X. Stoney, manager, Grain Elevators Board of Victoria.

from the storage and hauled to elevators for loading on rail cars.

Permanent flat storage is also used extensively in Australia. Much of the wheat from these storages also has to be loaded on trucks and transported to silos for loading on rail cars. Some have augers in the floors which enable elevating for loading direct to cars, but segregation sometimes presents problems for this type of handling. The BHA's restrict the number of varieties and types that will be accepted at various elevator locations as a means of avoiding segregation problems. Even so, rain during harvest can result in segregation difficulties with this type of storage.

The traditional silo type storage is available at nearly all stations in Australia. A substantial proportion of this type of storage is concrete, but some is steel and a few of the old wooden storages remain. Generally wheat from the flat storages is put through the silos for loading on the "rail waggons."

The seaboard terminals are typical of those found elsewhere in the world and include some modern, highly automated facilities and others with varying degrees of obsolescence. Most are operated on a one-shift, 5-day-per-week basis, with occasional overtime. Close attention is given to cleanliness; significantly, Australia has never had a major dust explosion.

The incidence of industrial disputes in Australia, particularly in New South Wales, appears to be higher than is found in the U.S. These can be highly disruptive of terminal operations. Disputes in other sectors of the economy may also have serious impacts on wheat shipments. For example, a dispute among coal miners in the Newcastle area may result in locomotives being shifted to move coal when the dispute is settled. Then no wheat can be moved. Since almost all wheat is moved by rail, the terminal may find itself temporarily out of operation. Generally, industrial disputes in Australia seem to be of a shorter duration than similar stoppages in the U.S., but of much greater frequency. This makes planning and scheduling difficult. The other states also face problems with industrial disputes, but perhaps not to the extent of New South Wales.

The expansion of the wheat growing area and of production, combined with world-wide inflation, has placed other strains on the BHA systems. New, permanent facilities have become necessary and, of course, are increasingly expensive. This tends to be reflected in the storage and handling charges. These charges doubled from 1939 to 1955, doubled again by 1972 and again by 1977 (3). They actually declined from 3.6 cents per bushel ($A1.33 per tonne in 1939 to 2.7 cents ($A.99 per tonne) in 1945, but in 1977 stood at 30.9 cents per bushel ($A11.36 per tonne), an 11-fold increase.

Storage and handling costs have been pooled and shared on a pro rata basis throughout Australia. In 1978, the AWB altered this arrangement so that growers in any one state would bear directly the costs of their BHA. The wheat areas and production in New South Wales and Western Australia have expanded considerably in recent years. This has resulted in a need for new facilities in these two states. No similar expansion has occurred in the other three states. Hence, under the new arrangement, growers in New South Wales and Western Australia will probably face significantly higher assessments for BHA operations, but growers in South Australia, Victoria and Queensland may actually experience a reduction in these charges.

The U.S. System

Handling and storage in the U.S. operates basically under free market concepts. Wheat growers have the alternative of delivering their wheat, at harvest, to either farmer-owned cooperative or privately owned elevators (both are not always available in nearby locations) or of placing the wheat in their own on-farm storage. If they deliver to the elevators, they have the option of selling the wheat when it is delivered or of having the elevator hold it in storage and paying storage charges. If they place it in their own farm storage, farmers normally hold it there until they feel the "price is right." They then deliver it to the elevator and sell it, or occasionally, arrange to have it hauled direct to an export or other terminal. Handling and storage charges by the elevators are deducted from their proceeds when the wheat is sold.

A majority of the U.S. wheat crop is delivered at harvest to the commercial elevators (cooperative and private) and either sold or stored. Substantial amounts are placed in on-farm storage. The amount of on-farm storage varies considerably from one section of the country to another. Generally there is less on-farm storage in areas dominated by efficient farmer-owned cooperatives. On the other hand, if storage charges are considered excessive or if commercial space is inadequate, on-farm storage may represent a very important proportion of total capacity in an area. Limited receival capacity, which results in long queues at harvest time, can also result in increased on-farm storage. Nevertheless, on-farm storage tends to reduce the seasonality of grain movements and permits fuller use of the off-farm storage, handling and transportation systems.

The 1977 Food and Agriculture Act contains provisions which have the effect of encouraging

substantial further increases in on-farm storage. First, it provides a storage payment of about 2 cents per bushel per month (about $A.735 per tonne) for wheat held under the government loan or reserve programs. If the wheat is stored on the farm, the storage payments go to the operator. Second, intermediate term, low interest loans are available from the federal government for constructing on-farm grain storage facilities. In effect, producers can get these loans, build the facilities and repay the loans with the proceeds of the storage payments they receive from the government. This constitutes a strong incentive for the construction of on-farm facilities and they have been expanded substantially since the inception of the program. Earlier programs had similar provisions, but the incentives were not as strong. Farmers often feel that holding the wheat in their own storage gives them a greater ability to influence available supplies and, thereby, price. There is a question, though, if this has any greater impact on price than holding a warehouse receipt on the commodity in a commercial facility. Possibly it does have some psychological impact, particularly if a commercial facility, faced by a large harvest, is forced to store wheat temporarily on the ground.

The rapid growth in on-farm storage creates two dangers that may not have been fully recognized. The first is associated with the operations of the facilities themselves. More are now being built in areas that heretofore have relied very heavily on commercial facilities. Due to inexperience or limited experience, operators may fail to fumigate on a timely basis. Further, in some circumstances, the temptation may be irresistible to store wheat that is too high in moisture. In either case, the consequences can be disastrous.

The second danger relates to existing commercial facilities. Faced with a large influx of on-farm storage in their areas, they will have a sharp decline in their storage revenues. This could force some to close their doors and result in growers having to truck their wheat considerably further to reach an elevator that can handle it. It could also result in less competition and, thereby, higher handling charges.

Commercially, cooperatives are the dominant first handlers of wheat from the farm. They account for roughly 60 to 70% of the wheat on either a storage or a put-through basis. Cooperatives, however, directly account for only about 9% of the actual export sales from the U.S. Other firms, primarily international trading companies, account for most of the U.S. wheat exports.

New capital for facilities expansion or improvement by the cooperatives comes from three basic sources — internally generated funds, loans from the Banks for Cooperatives or loans from commercial banks. The private elevators derive their new capital from internally generated funds or loans from commercial banks. Some also have the option of selling stock on the stock exchanges as a means of obtaining new capital. In some instances, municipal port authorities have built export or sub-terminal facilities that they, in turn, rent on long-term leases to firms wishing to operate in the area.

The principal wheat export terminals are located at Portland and other Columbia River ports, Seattle and Bremerton on the Pacific Coast; Houston, Galveston, New Orleans and Baton Rouge on the Gulf of Mexico and Duluth on the Great Lakes. Smaller terminals are located in California and limited amounts of wheat are exported from Atlantic Coast ports. There are also numerous subterminals, principally located on the Columbia, Mississippi, Missouri and Ohio rivers. These river systems reach far inland and provide relatively inexpensive barge transportation to large portions of the major wheat areas of the country. There are also a number of sub-terminals at inland points that involve 50, 75, 100 or 125 hopper cars of 3,300 to 3,700 bushels (90 to 100 tonnes) capacity each. These high-capacity terminals load a train in 24 hours or less.

Summary

Government policy in Australia has specified basically single state storage and handling agencies (the BHA's). The BHA's are farmer-controlled, since they have more farmer directors on the boards than other directors. Nevertheless, they are virtually state monopolies.

U.S. policy, on the other hand, has favored a basically competitive free enterprise system of handling and storage. Both farmer-owned cooperatives and privately owned elevators operate in the U.S. wheat growing areas. The government also makes storage payments on wheat held under government loans, whether in approved commercial or on-farm storage. It tends to encourage on-farm storage by making intermediate term, low-interest construction loans available to farmers. The individual storage and handling firms in the U.S. tend to be much smaller than their statewide counterparts in Australia.

Wheat Utilization

Australia and the U.S. have followed similar patterns in the use of their wheat crops during and following World War II, though there are differences in degree. Domestic use remained constant or declined modestly in both countries from World War II until about 1963 and has shown a slowly rising trend in both countries since then. During World War II U.S. exports rose sharply, but Australia did not share in that rise, in part because of a very short crop in 1944. Since about 1947, however, the two countries exhibit very similar patterns of exports. Ending stocks (carryover from one marketing year to the next) have varied a great deal more in the U.S. than in Australia.

Australia Wheat Utilization

Domestic uses of wheat (for food, seed and feed) remained quite constant in Australia from the World War II period until 1963 (Fig. 9). This occurred in spite of about a 41% increase in population from 1947 to 1963. Food consumption per capita declined (Table 2) but the population increase resulted in about a 22% increase in food uses. Domestic use rose gradually from 1963 to 1974 and has declined since, but per capita consumption has continued to decline. Even though significant amounts of wheat are sometimes used for stockfeed, this use declined sharply.

Table 2. Australia population and wheat and wheat products consumption.

		Flour	Breakfast foods	Total wheat
Year*	Population	per capita consumption (kg)		
3 years average				
1937-9	6,870,261	84.9	4.8	89.7
1947-9	7,651,558	91.6	6.1	97.7
1957-9	9,741,073	82.3	6.2	88.5
1967-9	11,919,046	77.4	6.8	84.2
1975-7	13,844,587	73.6	7.2	80.8
Individual years				
1971-2	13,063,866	76.4	6.1	82.5
1972-3	13,281,194	73.8	6.7	80.5
1973-4	13,488,234	76.8	6.6	83.4
1974-5	13,695,682	74.2	6.6	80.8
1975-6	13,846,241	73.9	7.1	81.0
1976-7	13,991,838	72.8	7.9	80.7

*Year ended June 30.

Source: Australian Bureau of Statistics, Apparent Consumption of Foodstuffs and Nutrients, Australia 1975-76 and 1976-77, Canberra, April, 1979, pp 2-4.

Domestic use as a proportion of total production has also declined in the post-war period. While the share varied considerably from year to year, domestic use accounted for roughly 40% of production from 1945 to 1954. It declined to about 35% in the next 5 years and declined further to about 25% from 1960 to 1964. Production varied considerably in the next 5 years and the domestically used share fluctuated from less than 20% to over 34%. It remained at around 33% of production in the early 1970's and dropped to roughly 25% in the mid-1970's.

Exports, therefore, appear to have been the residual or balancing item in Australian wheat utilization. When production has risen, the AWB has increased exports to absorb the additional wheat and prevent sharp rises in carryover (ending) stocks, except for the then-record 1968 crop when both world production and ending stocks also reached new record levels. This brought the imposition of quotas from 1969 to 1972 to force stocks down to more normal levels. Nevertheless, overall the Board has clearly maintained a policy of increasing exports in years of high production, but reducing them, sharply if necessary, in years when production is down due to climatic conditions.

Since they have been a balancing item in Australian wheat utilization, exports as a proportion of production have varied considerably over the 1942-77 period. Nevertheless a trend is discernable (Fig. 9). Exports accounted for a little over half of production during the late 1940's and early 1950's. In the late 1950's this share rose to about 60% and averaged about 73% during the 1960-76 period.

The apparent policy of maintaining stocks at minimal levels combined with the inherent climatic variability of production would appear to raise questions about Australia as a reliable source of wheat. Exports have dropped sharply — over 100 million bushels (3 million tonnes) — one year compared with another on several occasions in the past 15 years. Given this situation, achieving sharp increases in export sales in years of heavy production has to be a monumental task for the AWB. At the same time one can readily see that the sharp increases in production that have been experienced in recent years combined with limited storage capacity can force the Board to restrict carryover stocks as much as possible.

U.S. Wheat Utilization

Domestic use of wheat (for food, feed and seed) actually declined in the U.S. from 1942 to 1963 in spite of a gradual population increase (Fig. 10). Food uses (for flour and cereals) are the dominant

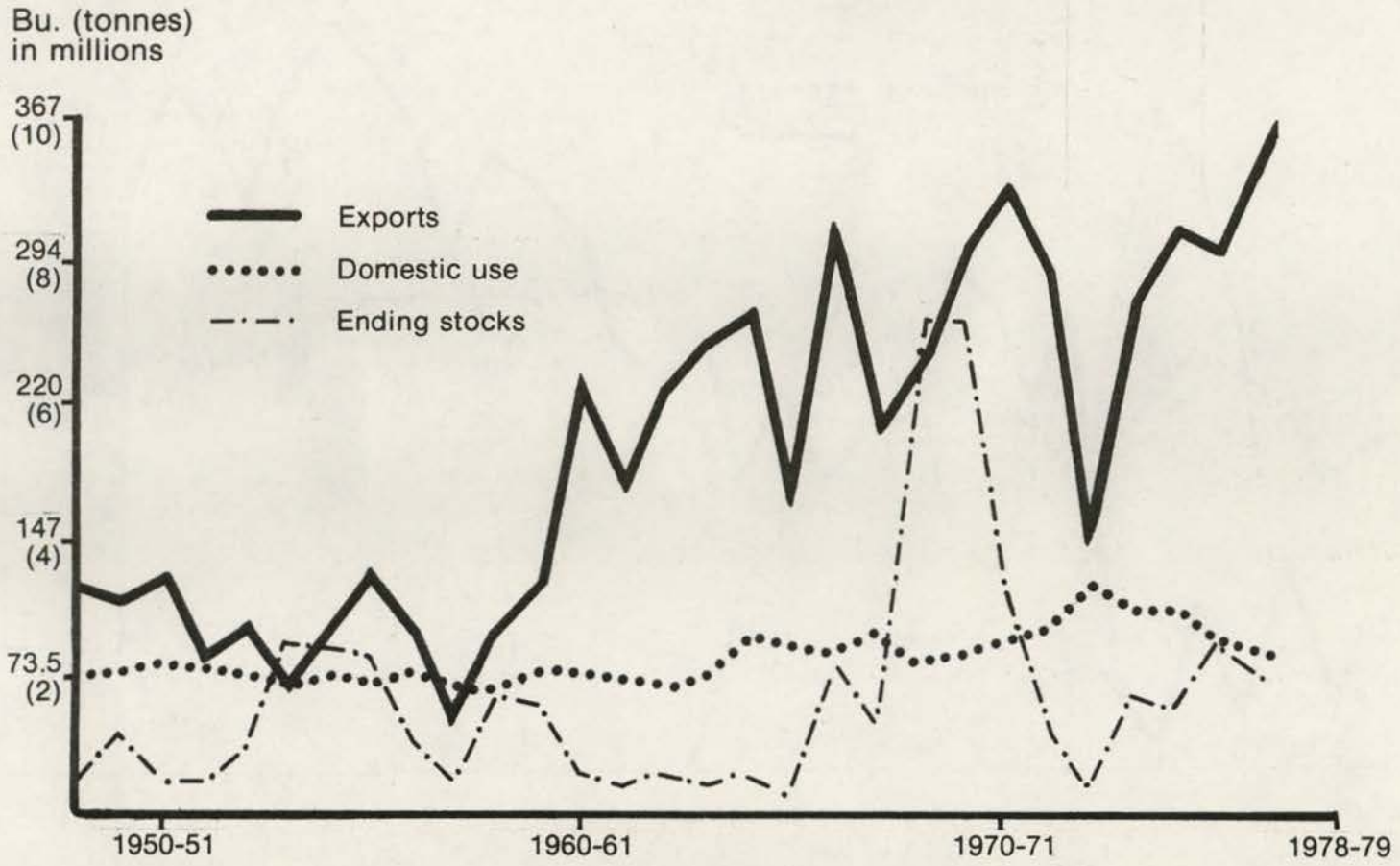

Fig. 9. Domestic use, exports and ending stocks of Australian wheat, 1948-1978.
SOURCE: Appendix Table 5.

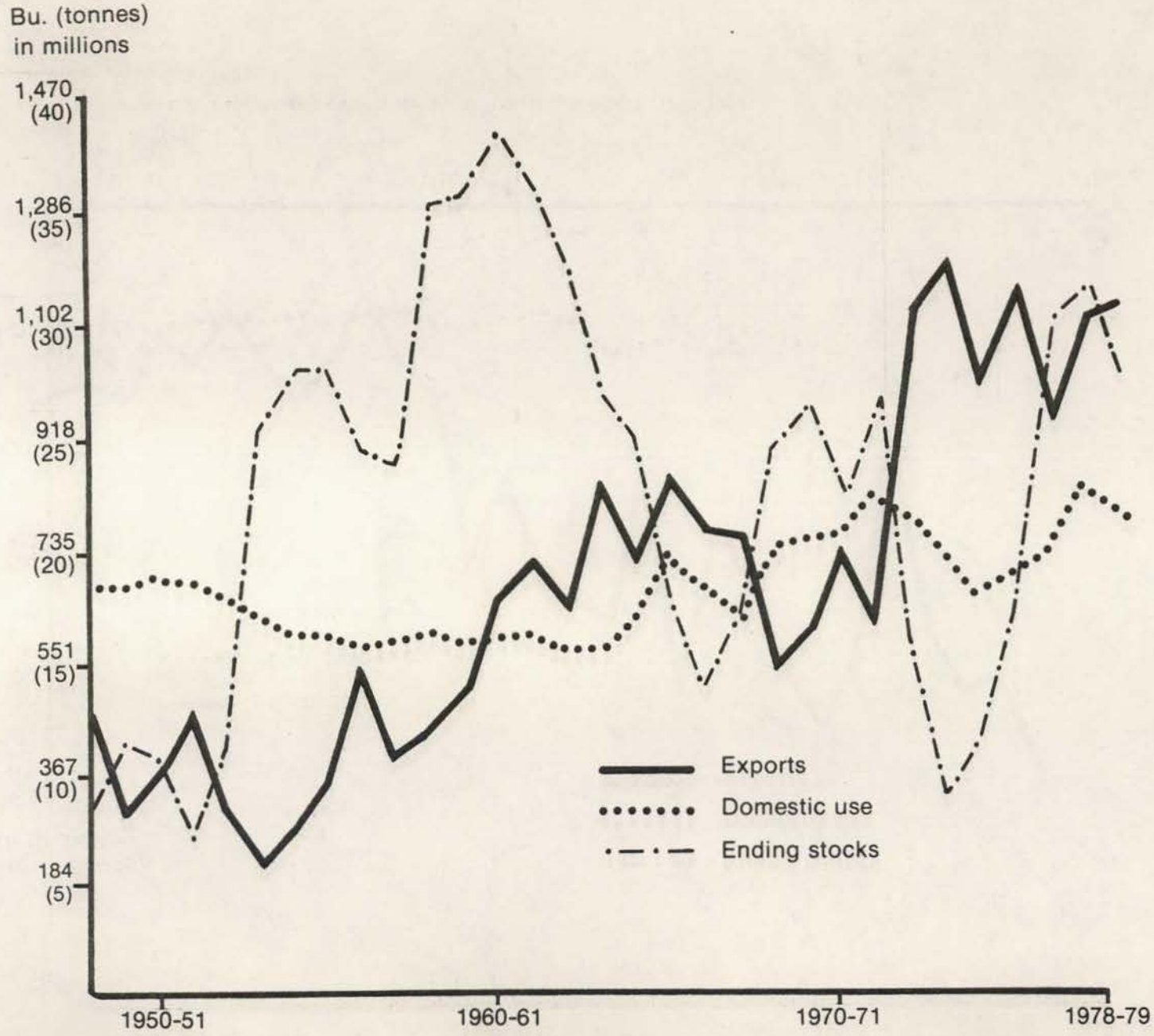

Fig. 10. Domestic use, exports and ending stocks of U.S. wheat, 1948-1978.

SOURCE: Appendix Table 6.

domestic outlet and normally account for over two-thirds of the wheat used within the country. But during the 1942-63 period, per capita consumption dropped from 160 pounds (72.7 kg) in 1942 and 166 pounds (75.5 kg) in 1943 to less than 117 pounds (53.2 kg) in 1963. Domestic use of wheat has trended upward slowly since 1963, but per capita consumption has continued to decline to about 110 pounds (50 kg) in 1975 (18). The decline in per capita consumption of wheat has been more than offset by population increases, however, so domestic food use of wheat has gradually increased.

Most of the fluctuation in U.S. domestic consumption of wheat can be traced to feed uses, though seed uses are also variable. The relative prices and availability of corn and, to a lesser extent, grain sorghum and barley have a direct effect on how much wheat will move into feed channels.

As was true in Australia, the proportion of U.S. production used domestically has also trended downward from World War II to the present. It ranged from 50 to 70% of production during the late 1940's and the 1950's and from 41 to 55% in the 1960's. In 1970-72, it was 52 to 57% and in the most recent period dropped further to 34 to 44%.

U.S. wheat exports in the 1942-78 period have varied considerably more than has domestic use. They increased nearly 10-fold during the war and even further during the immediate post-war period. Exports then tended to decline until 1953, but have trended upward since. As Fig. 10 shows, U.S. wheat exports have reached a series of plateaus in the post-war period — at around 400 million bushels (10.9 million tonnes) from 1948 to 1955, 800 million bushels (21.8 million tonnes) from 1963 to 1971 and 1,100 million bushels (30 million tonnes) from 1972 to 1978. In each case there has been some decline before moving on to the next plateau.

Much of the increase from 1953 to 1963 can be attributed to various AID (Agency for International Development) and P.L. 480 programs, though commercial sales also increased during the period. The increase in 1972 was in commercial sales and concessional activities were of minimal importance until 1976. They were increased in 1977 but constitute a minor share of total exports currently (1979).

Exports as a share of U.S. production varied considerably during the 1942-77 period, though their share has gradually increased. In the late 1940's they represented about one-third of production; in the 1950's they varied from 18 to 54% but averaged about 37%. During 1960-67 they averaged nearly 60% of production, but dropped to 42% in 1968-71 before rising to nearly 60% in 1972-77.

Unlike the Australian situation, carryover (ending) stocks have fluctuated widely in the U.S. The Commodity Credit Corporation (C.C.C.) through its government loan program has tended to accumulate excess supplies in periods when production has exceeded domestic use and exports. During the 1950's and early 1960's, C.C.C. stocks were used extensively in various concessional sales and AID programs. Since the U.S. has had substantial excess stocks during most of the post-war period, it has tended to act as a "residual supplier" to world wheat trade. If a major producing area of the world encountered a production shortfall, it could be virtually certain of getting enough wheat to meet its needs from the U.S. stockpile, often at concessional prices.

The drawdown in carryover stocks in 1964-66, in response to serious crop shortfalls in India, the U.S.S.R. and elsewhere, and in 1972-73 as a result of the heavy Russian wheat purchases, raised some concern about U.S. ability to meet rising world demand. These concerns were short-lived in both instances as U.S. production climbed sharply in succeeding years, when government acreage restrictions were eased. The increases in production quickly raised the specter of excess supplies in the country.

Australia and the U.S. exhibit similar trends when exports are charted on a rate-of-growth basis over the 1942-76 period (Fig. 11). However, Australia's rate-of-growth since about 1960 appears to have slowed relatively to that of the U.S. Generally, Australia's fluctuations reflect the size of the particular year's crop, but the relatively high export levels in 1969-71 represent a drawdown of stocks since this was a period in which marketing quotas were in effect and stocks were at record levels. Generally a decline in exports in the U.S. has been accompanied by a buildup of stocks and, a year or so later, the imposition of production restraints. Mandatory acreage controls were used extensively to limit production in the U.S. before 1972, but the current U.S. program calls on farmers to voluntarily set aside a portion of their crop acres from wheat and several other crops. These government programs will be discussed in greater detail in a later section.

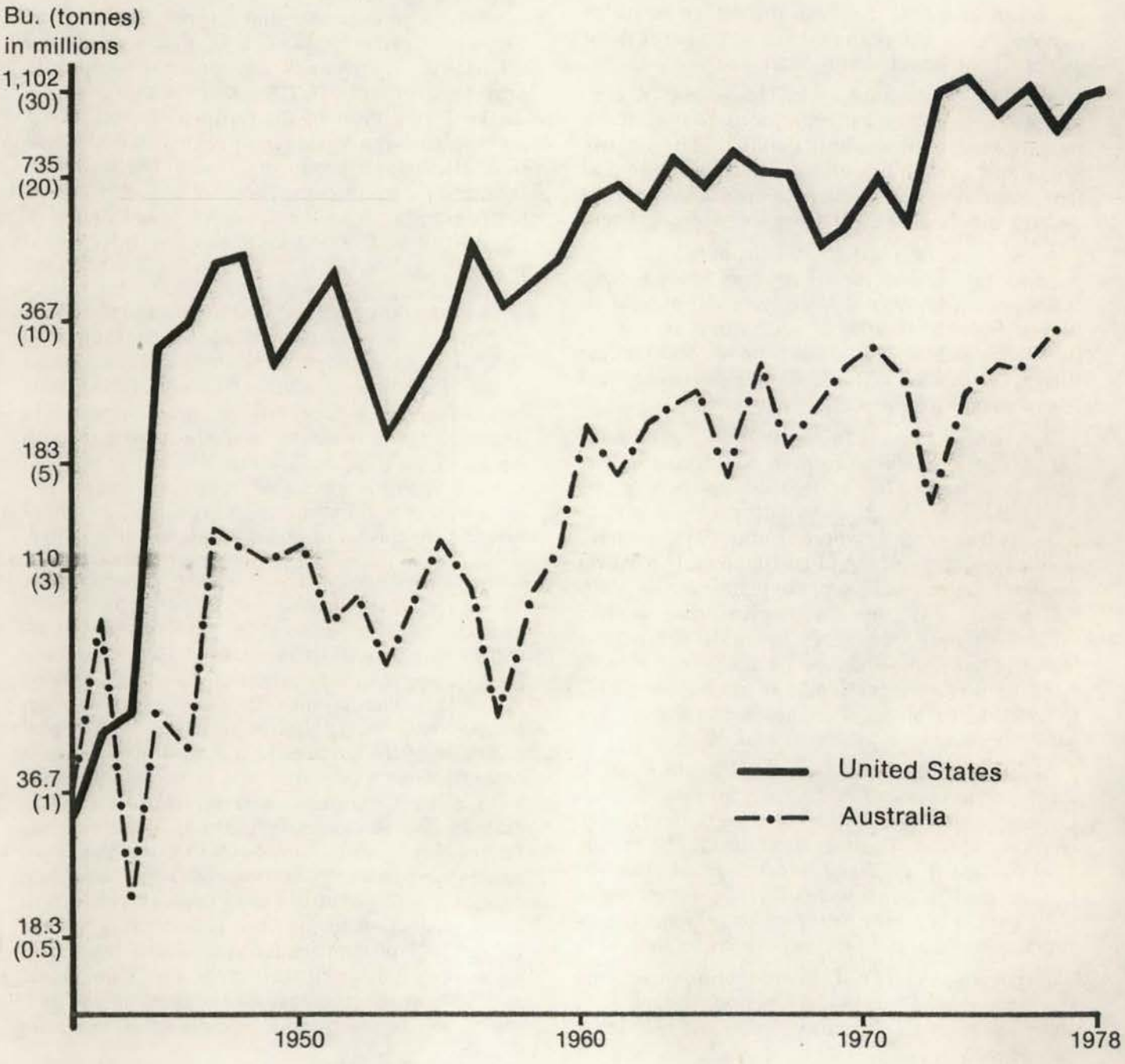

Fig. 11. Wheat exports in the United States and Australia, 1942-1978.

SOURCE: Appendix Tables 5 and 6.

NOTE: Semi-log scales have been used in this chart. Hence, the changing relative values of the left hand scale. This enables a direct reading of rates of change.

Transportation

The transportation systems of Australia and the U.S. represent another aspect of significant differences in wheat marketing, and particularly, exporting. Australia relies primarily on rail systems operated by the individual state governments, though modest amounts of wheat in South Australia and Western Australia are moved directly to export terminals from the farms by truck. The U.S., on the other hand, uses privately owned railroads, river barges and trucks. Trucks are often used to transport wheat from farms or country elevators to river sub-terminals for further shipment by barge or to inland sub-terminals for movement by unit trains, but some wheat is also trucked directly to export terminals.

Australian Wheat Transportation

Since rail is virtually the only means used for transporting wheat to export terminals (some estimates place the amount at 95%), this discussion is directed only to rail transport. Since the rail systems in each of the states were developed by that state, each system tends to funnel into the various ports and each has an export terminal in or very near its capital (principal) city. Different rail gauges were used in the states initially and each state system was built and developed around its particular gauge, although, for economy of building purposes, more than one gauge was sometimes used within a state. This made interstate rail transport a cumbersome and expensive process.

An Australian National Railways system, founded several years ago, now links the major cities with a standard gauge rail system. This means that two systems of track and equipment must be maintained by some of the state transportation commissions. Some interior grain sub-terminals have been built to transfer wheat from the older lines to the ANR system for movement to the ports. Newer and modern equipment is used to transport the wheat from the fast loading sub-terminals to the ports. Existing equipment is used to transport the wheat from the country elevators to the sub-terminals.

The various state transport commissions are in the process of putting new 40 to 60 tonne (1,500 to 2,200 bushel) hopper cars into their fleets, but 55-tonne hopper cars cost about $A55,000 each. The presently used 20-tonne (735-bushel) "grain waggons" can be converted to hopper-type operations, including a permanent cover for the current tarpaulins, for about $A3,500 each. Their capacity is also increased to 23 tonnes in the conversion. I.F.X. Stoney[3] argues that this permits continued operation of the current fleet of "grain waggons" at a sharply reduced cost, while gaining the benefits of hopper-type operations. The much smaller loads they haul would still result in higher handling costs than would be true with the large hopper cars.

Furzer (10) notes that Australia has relatively short hauls to move its wheat from producing areas to export terminals (Table 3). He argues that freight rates in Australia are relatively high — $A10.25 per tonne (27.9 cents per bushel). In New South Wales and Queensland, in particular, wheat has to be hauled over the Great Dividing Range. This imposes sharp limits on how many cars can be handled in a train, often only 25 to 50 cars. This limitation in itself increases the costs, especially when the cars also have relatively small capacity.

Australia has adapted well to the differing rail gauges in the country, primarily through having port facilities available in each of the states. This reduces the need for standardization. Nevertheless, greater economic efficiency of transport could be achieved in some areas either through establishing sub-terminals that would enhance transfer to a different gauge at state lines or closing some small ports.

Some wheat currently moves from southern New South Wales for export through Victorian ports. This movement could be expanded at a savings in distance shipped. It would also involve less difficult terrain which should result in further savings. In addition, congestion sometimes encountered at the Sydney port could be avoided.

In South Australia in particular and to a lesser extent in Western Australia, some port terminals serve basically as farm receival and storage facilities. Limited amounts of grain are loaded onto ocean vessels from these terminals. In some cases ocean vessels have to be moved to other terminals to top out their loads. This study did not include an analysis of these operations, but it appears economies could be gained from closing the export capabilities of some terminals and transporting the grain by rail to other terminals for loading on ships. Indeed

Table 3. Average wheat hauling distances from producing areas to export terminals in Australia.

New South Wales	500 km	(312 miles)
Victoria	330 km	(206 miles)
South Australia	150 km	(94 miles)
Western Australia	270 km	(169 miles)
Queensland	380 km	(238 miles)
Average	360 km	(225 miles)

Source: Furzer (10).

[3]Interview with I. F. X. Stoney, manager, Grain Elevators Board of Victoria, May 4, 1979.

this appears to be the case in Western Australia where the Freemantle terminal has been closed for ship-loading and the grain is now transferred to Kwinana. Possible closure of the Bunbury terminal is also being studied.

The U.S. System

Most major wheat producing areas in the U.S. are much further from export terminals than is the case in Australia. Furzer (10) estimated the average haul for all grain exported from the U.S. at about 940 miles (1500 km). This would probably not be materially different if wheat alone were considered. He also notes that 49% (of all grain) is handled by rail, 43% by barge and 8% by truck. When U.S. wheat exports alone are considered, a greater proportion is probably moved by rail than Furzer indicated. This is because much of the corn raised in the U.S. is raised near the Mississippi River barge system. A larger share of the wheat, however, is grown much farther from the river sub-terminals. Significantly, most U.S. white wheat, the major competitor with Australian wheat, is raised in the Pacific Northwest and much of this wheat is transported by barge to Columbia River terminals.

The U.S. rail system as it relates to wheat has changed dramatically in the last 30 years. Earlier most wheat moved by rail was hauled in boxcars with a capacity of 1,800 to 2,200 bushels (50 to 60 tonnes). These cars were difficult to load and more difficult to unload. They have been replaced, to a considerable extent, by 3,600-bushel (100-tonne) covered hopper cars with gravity unloading. Furzer (10) wrote that:

> In 1961 only 12% of rail grain shipments were made in covered hopper cars, by 1975 the proportion has risen to 80%. Similarly a major change occurred in the ownership of railcar capacity. In 1951 the railroads had 99% of all railcar capacity and by 1972 the share had fallen to less than 89%. Significantly, the railroad(s) still own nearly all the boxcars, but only 76% of the covered hopper cars, and this trend is continuing.

Another important change has been in rate structures. The railroads began issuing lower rates for "unit trains" in about 1970. Special rates apply to 25-, 50- and 100-car units. This does not mean that wheat is moved in a 25- or 50-car train, but that there may be 25, 50 or more grain cars in a longer train that are all headed for the same destination. Often the entire train of 100 or more cars will be hauling grain to a particular port destination.

Two other important changes have also been taking place. The railroads have had to upgrade their mainline tracks to accommodate the heavier cars and longer trains. At the same time they have found it not feasible to upgrade all branch-line track as well, so there is a substantial abandonment of branch line trackage. This is a controversial issue in U.S. transportation policy. Where it has occurred, it has hastened the move to haul by truck from many of the producing areas to sub-terminals for further shipment by rail or barge.

These changes plus competition from barges and trucks have enabled U.S. railroads to hold their overall grain rates relatively steady since the late 1940's (Fig. 12). Single car grain rates, however, have increased more than the averages indicate.

Commenting on the U.S. grain transportation system, an Australian grain manager noted:

> Despite competition from their land-locked (road-to-rail) cousins, the river elevators [barges] continue to ply their trade, taking grain in huge volumes down the Mississippi River and its tributaries to the Mexican Gulf. Barging is still the cheapest method of getting the grain to market for many producers . . . only a small proportion of the grain exported from southern U.S.A. is delivered to the shipping terminals by rail. The cost of road haulage to river elevators, coupled with the probability of increased barging costs to cover maintenance of river locks, will probably tip the scale a little further toward the railroads, but barging is so inherently cheap that it will continue to play the dominant role.[4]

In addition to the Mississippi River barge system to which these comments refer, barges also play an important role in delivering wheat from the Pacific Northwest producing areas to Columbia River ports. Barges now go up the Snake-Columbia River system as far as Lewiston, Idaho, some 300 miles (490 km) upstream from Portland, Oregon. A substantial part of the grain shipped from the Lewiston sub-terminal is hauled from Montana and even the western Dakotas by truck for shipment to port by barge.

Barges haul vast amounts of grain in each tow. On the Mississippi, a tow will often be comprised of 14 barges, each with 51,000-bushel (1,500 tonne) capacity. Some barges carry up to 135,000 bushels (3,700 tonnes). Much smaller tows are employed on the Snake-Columbia where a normal tow is usually limited to four 100,000-bushel (2,700-tonne) barges.

Recent barge rates have ranged from roughly two-thirds of the unit train rates to the Gulf of Mexico to a little over half of the single car rates from the

[4]This is from a mimeographed paper, "Handling of Grain in the United States and Canada," written by B. J. McGee and given to the author.

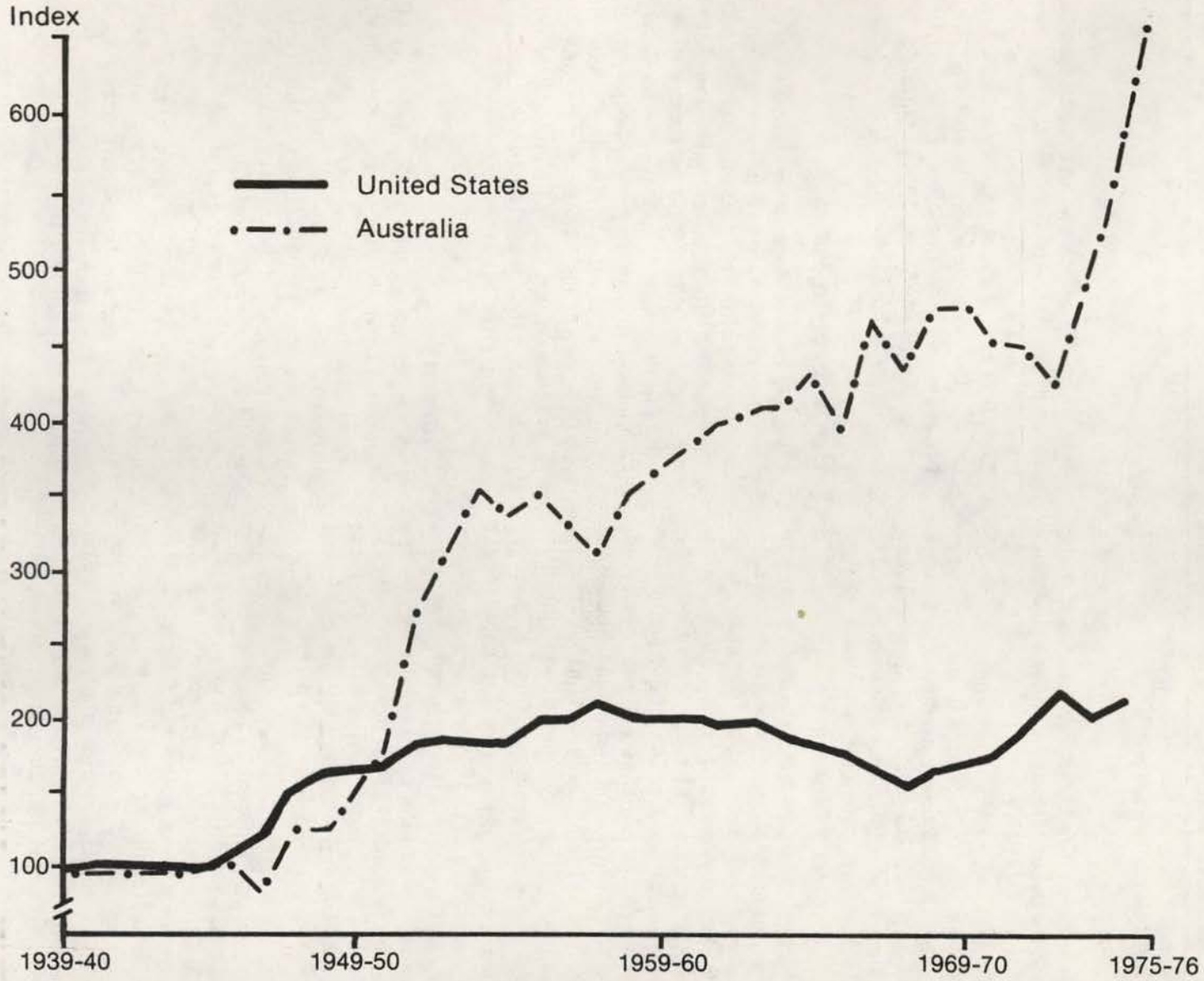

Fig. 12. Index of rail freight in the United States and Australia (base year 1940 = 100).
SOURCES: Australian Wheat Board (3) and Furzer (10).

Table 4. Comparative freight rates to export terminals, Australia and U.S., 1977.

Item	Moree to Newcastle (rail)	Boise to Portland (single car rail)	Lewiston to Portland (truck-barge)
Distance km (miles)	491 (307)	685 (428)	486 (304)
Freight/tonne ($U.S.)*	14.50	13.41	7.72
Freight/tonne/km ($U.S.)	0.0295	0.0196	0.0159

*$A1.00 = $U.S. 1.10 for purposes of illustration.
Sources: Bailey (4) and Turnbull (17).

Pacific Northwest for a comparable distance. In the latter case, single car rates apply where barge transport is not available (17).

Trucks transport only a minor amount of wheat from farms or country elevators to the export terminals. They do, however, account for a much larger proportion of the hauls from farms or country elevators to river or other sub-terminals. The interstate highway system helps considerably to hold rates down on the truck hauls.

The U.S. government has provided direct and indirect assistance to all three modes of wheat transport. It provided the large initial land grants to the railroads and has provided additional forms of less direct assistance since. The barge system has benefitted from initial construction of dams and locks and, where necessary, dredging of the rivers. And, of course, the construction and maintenance of the interstate and other highway systems greatly aids truck transport. Highway construction and maintenance is partly a state responsibility.

Perhaps a clearer perspective of relative freight rates in Australia and the U.S. can be gained from an example. Turnbull (17) investigated freight rates in Idaho in 1977 and Bailey (4) reported on freight rates in Australia in 1977. The distance involved in the Idaho study is greater, particularly in the Boise example, which may introduce a slight distortion, but it still serves to illustrate the differences (Table 4).

The freight rate reported by Bailey for Moree to Newcastle was $A13.18, which translates to $14.50 U.S. The Boise single car rate reported by Turnbull is representative of the higher rail rates in the U.S. because it represents no concessions for volume movement and basically faces only truck competition. Even so, the rate is substantially under the rail rate (on a tonne per kilometer basis) reported by Bailey. The example also illustrates the rate advantages where truck-barge transport is available. The rate from Lewiston to Portland is just over half the Australian rate for a comparable distance.

More recent information suggests that the disparity in freight rates between the two countries has continued. As of September 1979, the Moree to Newcastle rate is about $A18.40 ($20.24 U.S.) per tonne.[5] This would amount to about $0.0412 U.S. per tonne per km. In October 1979, the Boise to Portland rate was $16.50 U.S. per tonne or $0.0241 per tonne per km (13).

Ocean Freight Rates

Freight rates to major markets in the Pacific Rim are comparable for the two countries. Australia has an advantage for South Asian and Middle Eastern markets. The U.S. requires that certain A.I.D. and P.L. 480 shipments be made in American bottoms. This results in higher freight rates for U.S. grains but some of the difference is absorbed by an operating differential subsidy. This is partially offset in Australia by the high domestic rates for shipments to Tasmania from the mainland. These rates are much higher than the international rates at which most Australian wheat is shipped.

Summary

Australia has a decided advantage over the U.S. in terms of the distance from ports of most of its wheat producing areas. Australia's average wheat export distance is about 225 miles (360 km) vs. about 940 miles (1,500 km) in the U.S. This advantage is partly offset by almost total reliance on one mode, rail, whereas the U.S. has rail, barge and truck competing for the export transport business. Partly as a result of this competition, rates have not risen nearly as rapidly in the U.S. Efficiency gains have also been made through the use of much larger hopper cars and unit trains. Barge transport also enables the U.S. to move vast amounts of grain to ports at relatively low rates.

[5]Personal correspondence from D. G. Williams, general manager, Australian National Railways Commission, North Adelaide, S.A.

Prices and Price Determination

The U.S. has tended to become the price leader in the world wheat and grain trade. Other exporting countries, Australia included, and importing countries watch the U.S. cash and futures markets closely to determine the levels of their bids and offers. To the extent that U.S. government farm programs and policies influence the cash and futures markets, they are also considered. A closer look at these markets is appropriate to better understand world wheat prices.

U.S. Cash Markets

Cash wheat markets operate in four major centers — Chicago, Kansas City, Minneapolis and Portland. Daily trading sessions are held at each of these markets during which bids and offers are made and trades are consummated. International trading companies, flour millers, feed manufacturers and others are major buyers at these sessions. Representatives of cooperative and other elevators, brokers and dealers are among the sellers. Chicago, Kansas City and Minneapolis are also the homes of the three major wheat futures markets in the U.S., so the cash and the futures markets have a close relationship. Factors and information that influence the cash markets during any given trading day also affect the futures markets and vice versa. The futures and cash markets are both basically free markets.

In addition to sales at the daily trading sessions, many transactions also take place through telephone calls by major buyers to country points throughout the nation. A system has developed in recent years wherein farmers leave orders with their country elevator or broker to sell a certain quantity of their wheat if the net price they will receive reaches a certain level. These orders are dated and time-stamped to arrive at an order of priorities. If an order is received at that price for the class and quality of wheat they have offered and if they are high enough on the priority list, that wheat is sold and they are notified and paid. Farmers may withdraw their offer any time before actual sale. They may do this if they detect a rising market. This has become a smoothly functioning and well-developed system.

A more traditional approach to the cash marketing of wheat involves the buyer, whether it be a country elevator, broker or dealer, flour miller or international trading company, actually taking a position and outright purchasing the wheat from the grower. Often, though not always, the buyer would then sell a futures contract to avoid the speculative risk of a price drop since he now owns the wheat. Later, when he sells the wheat, he will "offset" his futures position by buying a contract. Since the cash and futures prices usually move somewhat in tandem, he will make approximately as much money on the futures transaction as he would lose on the cash transaction in the event of the feared price drop. Of course, prices on both markets may rise. Then our buyer would lose about as much on the futures transaction as he gains on the cash market. He would not get the windfall gain on the cash market that he would have received had he not traded in futures, but he would still recover his investment.

U.S. Futures Markets

Three major wheat futures markets operate in the U.S. They are the Chicago Board of Trade which trades primarily in soft red winter wheat, the Kansas City Board of Trade which trades in hard red winter wheat and the Minneapolis Grain Exchange which deals in hard red spring wheat. In addition, a smaller futures market also in Chicago, the Mid-America Exchange, deals in smaller lots than the major markets. It, too, trades primarily in soft red winter wheat. No futures market takes soft white wheat or durum as a delivery class, but these classes can still gain most of the benefits of futures trading. The Chicago Board of Trade, the Minneapolis Grain Exchange and the Mid-America Exchange also operate as futures markets for other commodities.

The trading units (contracts) of the three major exchanges involve large lots — 5,000 bushels (136 tonnes) of a specific class and grade of wheat. The Mid-America Exchange uses 1,000-bushel (27-tonne) contracts. The size of the lots, in itself, tends to restrict use of the futures directly by many farmers, especially the smaller operators.

Futures markets do provide an opportunity for growers to hedge, or "lock in," an approximate price for fixed quantities of their anticipated production 12 months or more in advance of when they expect to sell. This can often assure them of recovering the cash costs they have incurred to produce the crop, even if prices on the cash market should tumble. Farmers are urged, however, to become well acquainted with futures market operations before becoming involved. Improper applications of the futures markets can result in the grower finding himself in a speculative position on both the cash and futures markets which can lead to highly undesirable and expensive results. When operating as intended, futures markets are **not** delivery markets. Ordinarily, delivery actually takes place on less than 2% of the contracts traded.

In recent years, American wheat growers have often found it desirable to sell their wheat on "forward contracts." This has been another way of "locking in" or hedging an agreed upon price in advance of harvest or delivery. Some unique features of the forward contracts include:

1. Delivery of the amount of wheat specified in the contract is required.
2. The class and quantity of wheat to be delivered is specified, but the contract may include premiums or discounts for deviations from that quality.
3. The grower still bears the risk of adverse weather since he has no opportunity to "offset" the contract.

Very often, when forward contracts are used, the growers have gained some benefits from the futures markets even though they have not used them directly. The buyer has hedged his purchase on the futures market and can, therefore, offer a higher price on the forward contract than he could if he were assuming all of the price risk.

Most wheat sold in the U.S. is ultimately traded through the cash markets. This is true whether it is exported, sold to domestic millers or sold for feed. Farmers are paid in full for their wheat when it is sold.

The U.S. Government Loan Program

The government loan program is often cited as an important influence not only on U.S. but also on world prices. Certainly in times of excess U.S. and world wheat supplies, this program has tended to set something of a floor price. This was especially true in the pre-1972 period, but it also influenced sales of the 1977 crop. Since then cash prices have been above the loan price so the principal impact of the loan program has been that it has probably enabled more orderly marketing. Farmers can usually cover their cash costs with a loan and can hold their wheat until a price goal is reached rather than having to sell to pay operating loans.

The loan program has been changed somewhat since the first program became effective in the 1930's. Attention here is directed only to the current program (that of the Food and Agriculture Act of 1977, as amended to June 1, 1979). Currently, the loan is set at $2.35 per bushel ($86.25 per tonne), but growers may sell at market prices and not use the loan program at all.

The USDA's Wheat situation (19) outlines the 1979 wheat program (the 1978 program was basically the same) as follows:

> Under the Food and Agriculture Act of 1977, a voluntary 20% set-aside program has been established for the 1979 wheat crop. The basic requirement is that farmers set aside an acreage equal to 20% of their 1979 wheat plantings to be eligible for program benefits. Major program features are:
>
> - 1979 acreage plus set-aside cannot exceed the normal crop acreage (NCA) which is defined as the 1977 planted acreage of major crops: (included are wheat, feed grains and a number of other crops) . . .
> - Grazing of set-aside will be allowed for 6 months . . .
> - Growers who choose not to participate will forfeit eligibility for the loan program and all other program benefits. Cross compliance is required for all set-aside crops grown.
> - Target price payments, if necessary, will be made on a percentage of the 1979 harvested acreage . . .
> - The loan rate will remain at $2.35 per bushel, and the target price will remain at $3.40 per bushel . . .

Since the program is voluntary, market prices could fall below loan levels if large numbers of farmers opt not to participate.

Among benefits for participants not mentioned specifically in this description are deficiency payments and disaster relief. The deficiency payments are the difference between the target price of $3.40 per bushel ($124.80 per tonne) and, whichever is higher, the loan price — $2.35 per bushel ($86.25 per tonne) — or the national average price received by farmers during the first 5 months of the marketing season. In 1977 the loan price was the higher of the two, so the deficiency payment was computed as follows:

$2.90 (the 1977 target price) - $2.25 (the 1977 loan price) = $.65 (the deficiency payment).

In 1978, the 5-month average price received was the higher of the two so the deficiency payment was:

$3.40 (the 1978 target price) - $2.88 (5-month average price) = $.52 (the deficiency payment).

Of course, if the first 5 months average price received by farmers exceeds the target price, no deficiency payment is made. This was the situation in 1979. The disaster relief provisions of the Act provide some relief to farmers who encounter significant losses as a result of hail, wind, drought, flood or other natural disasters.

An additional feature of the 1977 Food and Agriculture Act enabled the creation of a "wheat reserve" stockpile. Its intended purpose was two-fold: (1) to aid in stabilizing and perhaps improving prices to farmers, and (2) to create a stockpile and

thereby avoid unduly high prices to consumers. Farmers who placed their wheat in the "reserve" were granted loans of $2.25 ($2.35 on the 1978 crop) per bushel and were assured of storage payments of S.25 per bushel per year while the wheat was held in storage. Two "trigger" prices were included in the program. When national average wheat prices reached 140% of the loan rate ($3.29 per bushel), storage payments would cease; when prices reached 175% of the loan rate ($4.11 per bushel), the loans would be "called" and, if not paid, the wheat would become the property of the C.C.C.

Some fears were expressed that if prices reached the "call" levels, large amounts of wheat would be dumped on the market and prices would drop or large amounts of wheat would be turned over to the C.C.C. Neither of these arguments seems reasonable. Certainly no thinking farmer would forfeit his wheat for a $2.35 loan if he could get $4.11 or more for it on the market. Only a portion of the wheat would have to be sold to pay off the loan. Alternatively most farmers could, if necessary, borrow money from their bank or P.C.A. to pay off their wheat loan if prices were rising — a circumstance which would be necessary to set off the second trigger.

U.S. Export Pricing and Policies

Wheat exports from the U.S. have largely been on a commercial basis in recent years. They are handled by the private trade, primarily large international trading companies. These traders negotiate sales to foreign buyers, usually government importing agencies, at the best prices they can get consistent with available supplies and perceived demand. The competition for sales includes other firms operating out of the U.S. and other exporting nations, the principal ones being Canada, Australia and Argentina. France and the U.S.S.R. also compete for export sales from time to time. Supplies alone are not an adequate criterion as logistic problems (getting the wheat to ports or loading it once at the ports) sometimes limits the availability of those supplies.

Demand considerations include: population and its growth in importing countries, wheat production or expected production in importing countries, availability of other grains (rice and coarse grains) in these countries, their incomes and, of course, the influence that price may have on consumption.

The Food and Agriculture Act of 1965 and subsequent extensions provided for the payment of a subsidy to exporters in the form of an export payment when domestic prices were higher than those overseas (5). These subsidies were discontinued following the large wheat purchases by the U.S.S.R. in 1972.

Other programs designed to enhance U.S. wheat exports have included a credit program operated by the C.C.C. to facilitate commercial sales from private stocks to certain countries. This program provided financing to exporters (not foreign governments) for up to 3 years. The private firm then extended credit to the foreign party. Under another program the government sold wheat to private firms for export, at prices below domestic levels, from stocks accumulated under domestic price support programs.

Sales to developing countries under local currency sales agreements, dollar-credit agreements and convertible local-currency have been an important means of assisting these countries. The sales are made under the P.L. 480 program, authorized by the Agricultural Trade Development and Assistance Act. The law also provided for donations direct to the foreign governments through nonprofit organizations and the World Food Program, and for fulfillment of obligations under the Food Aid Convention of the International Grain Arrangement. P.L. 480 and other aid exports were an important part of total U.S. exports in the early 1960's, amounting to 400 to 500 million bushels (11 to 14 million tonnes). They declined sharply in importance in the late 1960's and have since been a relatively minor portion of total wheat exports. In recent years they have averaged around 150 million bushels (4 million tonnes) (11).

The U.S. entered into a 5-year trade agreement with the U.S.S.R. in 1975 which provided for the U.S.S.R. to import at least 220 million bushels (6 million tonnes) of grains, about equally divided between wheat and corn, from the U.S. each year. Amounts up to 290 million bushels (8 million tonnes) could be provided under the agreement and, subject to negotiation, even this amount could be increased. Similar agreements were also initialed with Poland, East Germany, Israel and Japan, but they were less formal. Such bilateral agreements may well become more important aspects of U.S. export policy, particularly with the centrally planned countries. These countries appear to prefer such agreements to assure a source of supply. Conversely, the producing country is assured an outlet for a portion of its production. Prices under the above agreements were left open, subject to negotiation.

The U.S. subsidizes its maritime industry, both directly and indirectly. A form of indirect support was included in the U.S.S.R. agreement with the requirement that one-third of the shipments under the agreement be in U.S. bottoms. Since their rates are about 50% or more above world rates, it has had the effect of increasing the cost to the U.S.S.R. of the landed wheat and corn.

Australian Wheat Prices

Powell (16) provides a concise summary of current Australian wheat marketing arrangements as follows:

> The Australian wheat industry has operated under a series of (5 year) stabilization plans since 1948-49 . . . The current scheme which expires with the 1978-79 harvest has the following features:
>
> 1. There is a home consumption price of $A70.41 per tonne in the first year (1974-75) which is adjusted annually in accord with movements in cash costs.
> 2. There is a stabilization price set at $A73.49 per tonne in the first year, and adjusted in succeeding years in line with general market trends. This price acts as a minimum for exported wheat subject to maximum payments into and from the stabilization fund.
> 3. There is a stabilization fund, and when export prices exceed the stabilization price ($A55.12 per tonne), growers contribute to the fund up to $A30m or $A5.51 per tonne, whichever is lower. When export prices are lower than the stabilization price, withdrawals are made from the fund up to $A30m or $A5.51 per tonne, whichever is lower.
> 4. All wheat must be delivered to the Australian Wheat Board. A first advance is paid of $A66 per tonne and subsequent payments made as the crop is sold.
>
> These arrangements give some assistance to producers in the form of a guaranteed return from home consumption sales . . .
>
> Some assistance may be provided via the stabilization provisions but this is very limited and quite small (maximum $A30m relative to the total value of wheat production of around $A1,000m). In reality, Australian growers are generally exposed to world market prices with export returns being the main determinant of grower returns. Consumers, however, are isolated from variations in the world market price.

Thus, the scheme envisions the delivery of all wheat to the Australian Wheat Board through the Bulk Handling Authorities as a pool. The Board then assumes responsibility for all sales and, following an initial payment shortly after delivery, makes a series of subsequent payments to growers as the pool is sold. The actual sale of the pool and payment by the importer may take 2, 3 or more years; only then does the grower receive final payment for a particular year's pool.

A closer look at the Australian Wheat Board — its organization, functions and operations — is appropriate. The Board was formed through enabling legislation in 1939 and has been maintained continuously since then as the sole statutory marketing authority for wheat in Australia, and for wheat and flour sold overseas (3). The Board is composed of an appointed chairman, 2 grower members from each of the 5 principal wheat producing states and 1 representative each from the flour mill owners and labor unions named by the respective organizations and appointed by the government. The government also appoints a finance member. Thus, it is a 14 member board which acts as the policy body. Board members serve 3-year terms and may be reappointed.

The operations of the Board are carried out by a general manager, named by the Board, a deputy and several assistant general managers. They are responsible for initiating and completing wheat sales, both domestically and internationally, arranging shipment of the wheat and flour in conjunction with the BHA's, licensing domestic buyers, collecting on sales and making payments to growers. They also pay freight charges to the ports and handling, storage and other operational fees of the BHA's from the proceeds of sales. They arrange for the necessary financing through the Reserve Bank to make initial payments to growers and, within the confines of the legislation, can grant credit to foreign buyers.

The Board maintains a market development program through which members conduct seminars on milling and baking qualities of Australian wheat, trends in baking technology, proper adjustment of machinery used in bread making, use of flour and bread improvers and the importance of correct conditioning of wheat (3). These activities are similar to programs conducted by Western Wheat Associates and Great Plains Wheat of the U.S. Both were grower organizations which merged in January 1980 to U.S. Wheat Associates.

The Board also maintains an export sales promotion program wherein Board delegations visit countries that are current or prospective customers for Australian wheat. Likewise, they receive delegations from various importing countries. In the U.S. this function is largely conducted by Western Wheat Associates and Great Plains Wheat.

Growers maintain a close relationship with the Board through the Australian Wheatgrowers Federation. As it happens all grower representatives on the Board are members of the AWF. In Queensland the grower representatives on the Board are appointed by the Queensland State Wheat Board which, in turn, is elected by growers. In New South Wales and the other states the representatives are elected in a grower election. Candidates are nomi-

nated before the election and need at least 10 growers' names on their nominating petition.[6] There are slight differences in the procedure in each of the states. The whole Board is up for re-election at the same time.

Most export sales are negotiated directly by the Board on a government-to-government basis. These sales "usually account for about 60% of export sales, while the remainder is sold through private traders operating within constraints imposed by the Board" (14). Trading companies are used where the Board feels they have better contacts and can negotiate better sales. The Board sells to trading companies only for specific destinations, shipping periods, quantities and quality. They will not sell to trading companies where they would compete with the Board for a market.[7]

An interview with a grower in New South Wales apparently reflects the attitude of a majority of the growers in Australia. He commented:

> Land and production husbandry can most effectively be done if we can focus our attention on these aspects. If we can have someone we trust handle the marketing, they can direct more expertise to it than the individual farmer can. The Board (AWB) must, however, be answerable to the farmer, not the government.
>
> We like to have the ability to nominate and vote for our representatives on the Board. We feel that a single marketing authority like the AWB can gain more for us than a number of sellers could.[8]

This view, of course, is not shared by all growers. In fact, some growers do not deliver all wheat to the Board; rather, they hold some on the farm for feed and seed. Some producers, primarily those who operate near state borders, have also engaged in what has become referred to as "black market" sales of wheat. They have taken advantage of Section 92 of the Australian Constitution which provides that interstate trade and commerce shall be "absolutely free" (9).

The difference between production and deliveries to the Board from 1971 to 1976 amounted to nearly 173 million bushels (4.7 million tonnes), an average of 29 million bushels (0.79 million tonnes) per year or 7.5% of the production during that period. Not all of this wheat was involved in over-the-border sales, but the Board viewed the practice as contrary to its legislative mandate. Hence, the Board initiated a court case which challenged the legality of the practice.

Coper (9), a constitutional lawyer, discusses the case as follows:

> . . . The Australian Wheat Board was set up under the Commonwealth legislation and is empowered under the various Acts (of the State and Commonwealth Governments) to undertake the marketing of wheat in Australia and overseas. The key feature of the scheme, of course, is that the Board is constituted as the **sole** authority for the marketing of wheat. This is done by empowering the Board to require wheat to be delivered to it, whereupon the wheat becomes the property of the Board, and by prohibiting any dealing with wheat without the Board's consent. The legislation makes no exemption for interstate trade in wheat but purports to apply to all dealings in wheat throughout Australia . . .
>
> . . . Marketing schemes such as this . . . do not normally provoke any legal or constitutional challenge until the authority decides to exercise its powers to their full extent. So it happened when the Wheat Board decided in 1977 to compulsorily acquire wheat which was in the course of interstate trade, having apparently permitted such a trading for a considerable time. . .
>
> . . . In any event, the scheme was challenged by four separate Victorian companies which bought wheat from New South Wales growers for gristing at the companies' mills in Victoria. The millers all maintained bulk stores; in three instances they were in New South Wales and in the fourth Victoria. The growers delivered the wheat to the bulk stores and were paid on delivery. Because wheat was gristed at the mills more or less continuously throughout the year but was available only at harvest time, and because of the limited storage capacity of the mills, the wheat was frequently held at the bulk stores for considerable periods and transported to the mills only as needed. When the Wheat Board served notices on the mills requiring them to deliver to the Board all of the wheat lying in their bulk stores, the millers went to the High Court (of Australia — the counterpart of the U.S. Supreme Court) and claimed that the scheme infringed Section 92 of the Constitution and therefore could not apply to their wheat, which was asserted to be in the course of interstate trade.

The case was decided in favor of the Wheat Board in a split (3-2) decision on Sept. 8, 1978. Coper noted that, significantly, the majority of the Court arrived at its decision from different bases. Two results from

[6]Interview with D. G. Barwick, New South Wales member, May 12, 1979.

[7]Interview with B. C. Peelgrane, AWB, May 3, 1979.

[8]Interview with Adrian Martin, grower from near Gunnedah, N.S.W.

the decision are certainly in the realm of possibility. Further challenges to the authority of the Wheat Board as the sole marketing authority by proponents of "freer trade" have already been mounted. The second possibility is that new legislation (being considered as of this writing) for a succeeding 5-year scheme (the present one expires Sept. 30, 1979) will expand grower-to-buyer arrangements, though they would remain under the control of the Board (22).

The Industries Assistance Commission (IAC) was assigned the task, in February 1977, of preparing a report to assist the government to prepare new legislation to succeed the wheat stabilization plan that was due to expire on Sept. 30, 1979. The IAC issued a comprehensive report in June 1978. Basically, the report addressed 6 major areas: (1) past stabilization measures, (2) domestic marketing arrangements, (3) export marketing arrangements, (4) payments to growers, (5) costs to growers and (6) pests and diseases. Its comments are summed up as follows (14):

1. **Stabilization.** The Commission noted that past wheat stabilization measures have had little impact on price stability. Instead, cash flows may have been destabilized. They suggest that future policy should be directed more toward cash flow or income stabilization rather than focusing on price. To accomplish this they derived what became known as "potholing" assistance.

   "Potholing" assistance would be based on AWB pool returns. It would be triggered when the expected gross pool return is below 70% of the average of the 2 lowest returns (excluding any potholing assistance) in the previous 5 annual returns. To do this, previous pools would be indexed forward to the current year to take account of general price level changes. They argued that this proposal would not involve any wheat grower funds nor any limit on government assistance.

2. **Domestic Marketing Arrangements.** The AWB has been granted the power of sole receiver and seller of wheat on the domestic market subject to Constitutional constraints by the Commonwealth and State Governments. The Commission recommended that there be no statutory sole seller on the domestic market and that the home consumption price be discontinued. In essence they felt that the AWB would likely continue as the dominant trader on domestic markets, but if private traders were able to cater for the diverse interests of buyers and sellers efficiently, then an increasd share would go through these channels. The Commission considered that any marketing assistance should be linked to developments on world markets rather than to a relatively small and controlled domestic market.

3. **Export Marketing Arrangements.** The commission recommended that the AWB continue as the statutory sole seller for the export of wheat but that the use of international traders by the AWB be continued where it is advantageous to do so.

4. **Payments to Growers.** The Commission noted that it is desirable that growers have access to improved and expanded AWB payment arrangements, and that growers' share of any AWB pool should be an asset which can be traded or used as security.

   In order to finance both existing and new payment offers, they recommended that the AWB be free to borrow on the best terms available from government and commercial sources in Australia and overseas and suggested that some of the finance might be guaranteed by the government.

   Premiums and dockages for particular grades (or varieties) of wheat should reflect market differentials received from the sales as far as practicable. Further, these should be extended to as many grades (or varieties) of wheat as the AWB, the BHA's and others find feasible considering costs and benefits of segregation, according to the report.

5. **Costs to Growers.** The commission recommended that growers in each state be responsible for storage and handling costs in their particular state rather than equalizing these costs among all growers. The AWB has since adopted this practice. This will have the effect of increasing storage and handling costs to growers in New South Wales and Western Australia, but decreasing these costs to growers in South Australia, Victoria and Queensland. They concluded, though, that all wheat sold should be levied to contribute to wheat research.

6. **Pests and Diseases.** The Commission called for a nationally planned and coordinated all-grain pest control program. They were concerned that present control measures are subject to a number of significant unregulated, external hazards. For example, the present system could lead to cross-resistances of insects or run the risk of excessive pesticide residue levels in grains before delivery to the BHA's.

   The Commission recommended that a broad-based all-grains inquiry be undertaken into grain pests and that it be extended to all forms of transporting, handling and storage. Further, they

recommended steps to counter any proliferation of disease-prone wheat varieties.

Realistically, not all of the commission's recommendations will likely be enacted into law or become a part of policy, but some have already been adopted. Others will probably become focal points for continuing discussions.

A new 5-year plan was enacted in November 1979. Basically the new scheme will operate in much the same manner as its predecessors. One significant change is the initial payment to growers under the new scheme. Under the earlier schemes, growers received 65 to 75% of the final pool proceeds (less storage, handling, freight and contributions to the research and finance funds) as an initial payment. The new scheme provides for the initial payment to be 95% of the average proceeds of the current and two preceding pools (less the deductions noted above). For example, the initial 1979-80 payment will be 95% of 1977-78 pool returns plus estimated 1978-79 pool returns plus estimated 1979-80 pool returns divided by 3. Estimates are necessary because the pools are not yet finalized. The new scheme also provides for a home consumption price of $3.48 per bushel ($127.78 per tonne), free on rail, and calls for an advisory panel to study adjustments in the price of wheat that is used as domestic stock feed.[9]

U.S.-Australian Price Comparison

A question that is often raised when discussing the two systems is *Which system is best?* Of necessity the response must be couched with further questions: *What are your goals? Are they price stability or maximum income at a time selected by the grower?*

Wheat price performance in terms of average annual prices received by growers suggests that the Australian system achieves greater price stability (Fig. 13). Relatively stable prices were achieved throughout the 1948-72 period in Australia whereas U.S. prices fluctuated quite sharply.

The relatively stable prices to Australian wheat growers do not necessarily extend to individual farm income or cash flow, however, as the IAC report (14) pointed out. One factor is the considerable time lag before the pool, on which these prices are based, is settled in full. This can pose income instability and cash flow problems. Further contributing to this instability are the fluctuations in yield and production in Australia.

Obviously, the U.S. has had greater price fluctuations over this same period. The fluctuations would be even more pronounced if the highs and lows within a season were shown rather than the season average price. U.S. growers' wheat income, assuming comparable production, would be somewhat higher than that of their Australian counterparts IF they consistently sold at or near seasonal peaks. Conversely, if they consistently sold at or near the seasonal lows, their wheat income would probably be lower, even after considering the government loan program in the U.S. In any event, however, U.S. growers receive full payment when the wheat is sold.

The U.S. government loan and target price program, which is available to eligible participants in the current set-aside program, could probably be regarded as similar to the initial payments paid to Australian wheat growers on delivery of their wheat. They differ in amounts, but are certainly comparable in principle. In either case they will probably be used to defray current operating expenses. In the U.S. any additional price gains the growers make are the results of their own marketing skills, and perhaps some good fortune, whereas in Australia price gains depend on the marketing skills, and perhaps good fortune, of the responsible people in the Australian Wheat Board.

Individually many growers in the U.S. face weather and production variability, but over the U.S. as a whole, these problems are not as extreme as in Australia.

[9]Information provided by telephone by Jim Smith, Australian Embassy, Washington, D.C., Dec. 14, 1979.

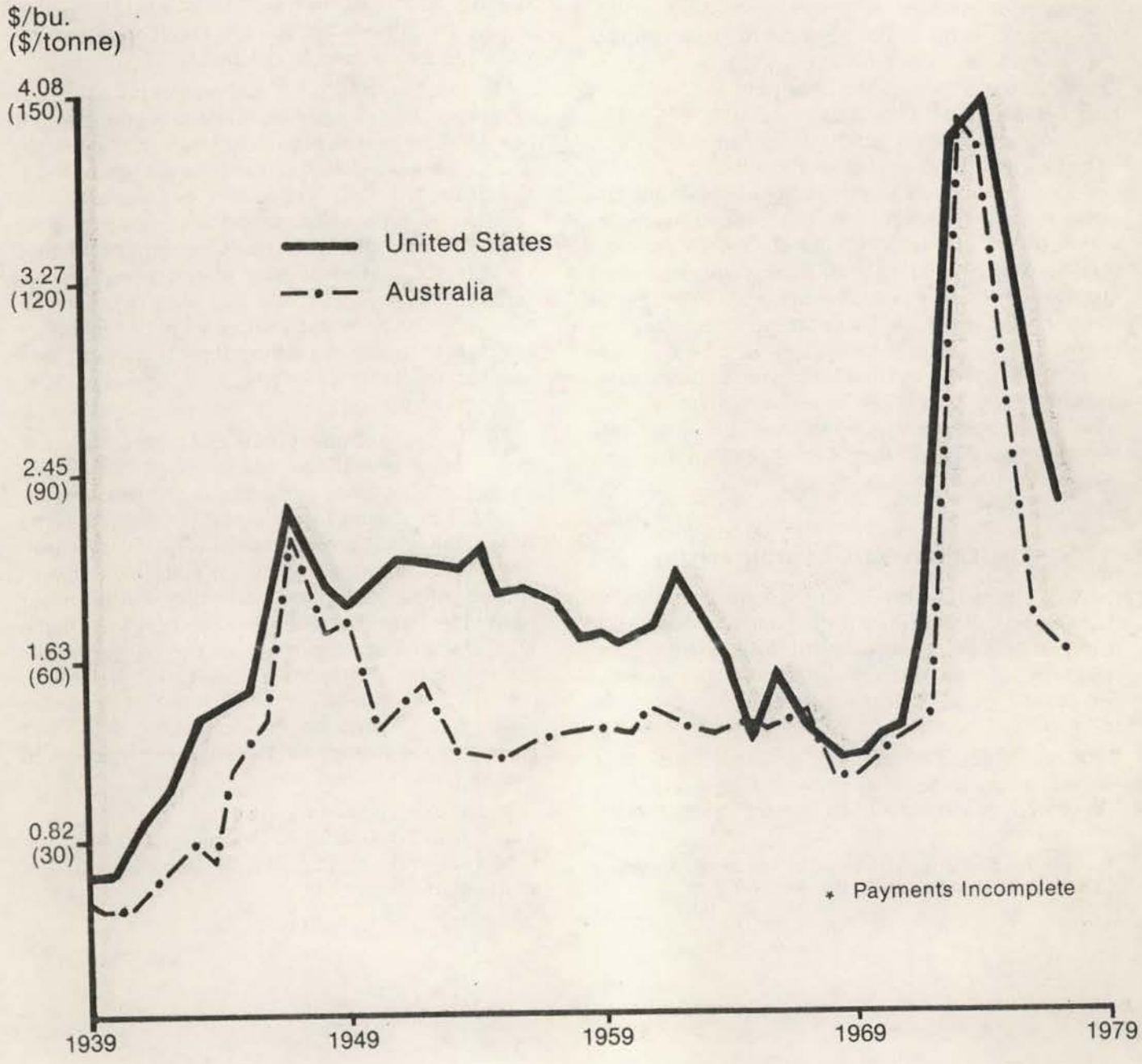

Fig. 13. Price to growers of wheat in U. S. dollars, 1939-77, U. S. and Australia.
SOURCE: Appendix Table 7.

Summary, Conclusions and Implications

Australia and the 48 contiguous United States are very similar in size (about 3 million square miles), but Australia is somewhat warmer since it lies about 10 degrees nearer the equator. On the whole it is also drier than is the U.S.

Australia has only 6 states and 2 territories, so these are much larger than their counterparts in the U.S. They are also more antonomous than U.S. states in that they individually are responsible for policy in agriculture, transportation and other areas, though they do tend to go along with national policy to a considerable extent. Australian states do not have taxing power. This in itself limits their independence.

Wheat production practices in the two countries are also similar. One notable exception in Australia is that livestock, usually sheep, is an important enterprise associated with the wheat operations. Hence, pasture is an important part of most rotations. This tends to reduce the need for commercial nitrogen fertilizers which are expensive in Australia. By contrast, U.S. wheat farmers tend to specialize only in wheat. Many also have livestock operations, usually cattle, but they are kept on land that is not suited to wheat production or, in some cases, the wheat is grazed for a relatively short term to enhance its tillering.

Australia's wheat yields and hence production tend to fluctuate considerably more than those in the U.S. This is related to variation in rainfall and its timeliness. U.S. wheat areas are also subject to droughts but are spread out enough that, usually, a failure in one area will be offset by average or better conditions in other areas. Production variation in the U.S. has tended to be more closely related to government programs and policies than to weather. Acreage restrictions have been imposed when supplies become burdensome.

White wheats dominate in Australia. Two premium wheats, prime hard and hard, are grown but the most important class is Australian Standard White (ASW) which in recent years has accounted for around 65% of deliveries to the Australian Wheat Board (AWB). Small amounts of durum are also grown in Australia.

In the U.S., by contrast, red wheats predominate. Hard red winter wheat accounts for about half of the national production followed by hard red spring and soft red winter with 15% to 20% each, white with about 13% and durum about 5%. White wheat is grown mostly in the Pacific Northwest and production in recent years has been comparable with ASW deliveries.

Australian wheat farms tend to be much larger than their U.S. counterparts (roughly 3 times as large). However, the average is distorted by very large operations in Western Australia and western New South Wales. Many wheat farms in the eastern Australian states are comparable in size to those in the U.S.

Most marketing functions in Australia are carried out by 3 government-sanctioned monopolies. The Australian Wheat Board serves as the sole seller of wheat on both the domestic and export markets, based on national and companion state legislation. State Bulk Handling Authorities are responsible for nearly all receiving, storing, grading, segregating and shipping of wheat, but licenses to carry out these functions are also issued by the AWB to various millers and feed manufacturers for limited amounts of wheat. In practice, the BHA's serve as the second monopoly. State-owned and operated railways handle most of the wheat that is transported in Australia, both to domestic markets and to the export terminals.

The boards of directors of the AWB and the BHA's are dominated by elected farmer representatives. The boards set policies and hire managers to carry out the various functions of these organizations. The railways, of course, carry many products other than wheat, so rates and allocation of cars (waggons) are negotiated between the BHA's and the railways.

The marketing system in the U.S. is basically a free enterprise system. Receiving, handling, storing and shipping functions are carried out by private and cooperative elevators. The private elevators may be individually owned single or multiple site operations or may be chains of elevators owned and operated by millers, exporters or other types of companies. The cooperative elevators are farmer-owned and may be single or multiple site operations. A substantial and growing part of the wheat grown in the U.S. is stored on-farm until sold at which time it is usually delivered to local elevators for shipment.

Transport in the U.S. also varies considerably from that in Australia. Much of the wheat is shipped by rail, but nearly as much is moved by barge, especially wheat for export. Trucks also play an important role, particularly in transporting wheat from local elevators and farms to river and rail subterminals. Generally the wheat is moved much greater distances to export terminals in the U.S. than in Australia.

Large international trading companies are responsible for most of the export sales from the U.S. They negotiate the sales, purchase the needed wheat at country points and operate the export terminals.

The pricing systems in the two countries also differ considerably. Each year's production in Australia is delivered to a pool. An initial payment is made to growers shortly after delivery. Subsequent payments are made as the pool is sold and the proceeds received. Final payments on a particular pool are usually made 2 or more years after delivery. Except for variations in freight, shipping and quality delivered and for variations in the operating costs of the state BHA's, all growers in Australia receive a common price.

A Home Consumption Price is set by legislation for all wheat used domestically. The export price, however, varies with world market conditions. Since exports comprise around 75% of Australia's annual production, the world price is the more important determinant of prices received by growers.

Prices received by U.S. growers depend greatly on the individual grower's marketing expertise and on domestic and world supply and demand conditions. They may vary considerably from one year to another and even within a given marketing year. They also vary by class and quality of wheat delivered and by freight, handling, storage and the like. A number of cash markets operate in the nation at which buyers bid for wheat to satisfy domestic and export needs and orders. Farmers and elevator operators who own the wheat have the option of selling at the offered prices or holding for later sale. Forward contracts and futures markets are also available as a means of "locking in" a price. Farmers are paid in full for their wheat when it is sold.

A U.S. government loan and target price program is also available to participating growers. The program makes non-recourse loans available to farmers. The loans are then repaid when the wheat is sold or, if the cash price is below the loan rate, wheat may be delivered to the Commodity Credit Corporation to satisfy the loans. The target price provision of the legislation provides for deficiency payments to growers of the difference between the target price and the loan price or the average price received by growers during the first 5 months of the marketing year (whichever is higher). There were no deficiency payments in 1979 because the average price received during the first 5 months was above the target price.

Both countries are and have been active participants in the world export market and have shared that market's growth reasonably evenly, though the U.S. may have gained a slight edge in recent years. On the other hand, U.S. white wheat, the class most comparable to Australian wheat, is currently facing severe competition from Australia. Current growth trends of the export market suggest that world needs and demand will be sufficient to enable both countries to continue to expand production. Nevertheless, since world production is quite variable, temporary gluts are likely to plague both countries in years of heavy world production. Past patterns suggest that the U.S. system is better prepared to deal with these situations than is Australia. The U.S. has vast storage capability in its commercial and on-farm storage system and also appears better able to respond to fluctuating world demands. Australia has pursued a policy of minimum carryover. This limits Australia's ability to respond to sharp increases in demand, particularly if it happens to have a short crop concurrently with a short world crop. The U.S., on the other hand, has not faced as much production variability and normally has significantly higher carryover stocks.

While transportation and storage and handling costs have been increasing in the U.S., they have generally not risen nearly as rapidly as in Australia. So long as this pattern continues, it suggests an increasingly favorable position for U.S. wheat growers. In general, however, growers have tended to capitalize any such gains into land purchase. Hence land prices have tended to erode away such gains as may be attained from this "advantage."

Basically, given the goals of the farming communities in the two countries, the systems are apparently performing reasonably well, even though they are in many ways significantly different.

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Appendix

Appendix Table 1. Australia wheat planted area, yield, seasonal average price and production, 1929-1978.

Year	Planted area	Yield	Season average price to grower	Production
	(000 ha)	(tonnes/ ha)	(A$/ tonne)	(000 tonnes)
1929	6,064			
1930	7,351	0.79		5,813
1931	5,966	0.87		5,188
1932	6,380	0.91		5,822
1933	6,030	0.80		4,826
1934	5,076	0.71		3,630
1935	4,839	0.81		3,925
1936	4,984	0.83		4,120
1937	5,558	0.91		5,096
1938	5,806	0.73		4,228
1939	5,376	1.06	11.41	5,728
1940	5,117	0.44	12.54	2,238
1941	4,858	0.93	12.41	4,537
1942	3,756	1.13	14.97	4,238
1943	3,187	0.93	18.05	2,986
1944	3,425	0.42	16.27	1,439
1945	4,624	0.84	25.72	3,876
1946	5,334	0.60	31.74	3,191
1947	5,617	1.07	50.74	5,990
1948	5,092	1.02	39.52	5,190
1949	4,953	1.20	45.51	5,939
1950	4,720	1.06	43.73	5,014
1951	4,202	1.03	48.51	4,347
1952	4,132	1.28	50.47	5,313
1953	4,351	1.24	39.23	5,388
1954	4,319	1.06	39.18	4,589
1955	4,114	1.29	39.06	5,319
1956	3,187	1.15	41.23	3,659
1957	3,581	0.74	43.25	2,655
1958	4,208	1.39	43.34	5,855
1959	4,926	1.10	44.08	5,402
1960	5,439	1.37	44.62	7,449
1961	5,958	1.13	47.51	6,727
1962	6,665	1.25	45.40	8,353
1963	6,667	1.34	44.55	8,924
1964	7,251	1.38	43.45	10,037
1965	7,088	1.00	46.34	7,067
1966	8,427	1.51	45.46	12,699
1967	9,082	0.83	47.79	7,547
1968	10,845	1.36	38.75	14,804
1969	9,486	1.11	36.77	10,546
1970	6,478	1.22	40.03	7,890
1971	7,139	1.19	42.25	8,607
1972	7,603	0.85	43.44	6,590
1973	8,948	1.34	103.11	11,987
1974	8,308	1.37	98.51	11,357
1975	8,555	1.40	86.52	11,982
1976	8,956	1.32		11,667
1977	9,952	0.93		9,299
1978	10,117			18,300

Sources: Australian Wheat Board Annual Report, 1976-77, Melbourne, Appendices 1,2,3,13,14; Bureau of Agricultural Economics, Wheat Situation and Outlook, Australian Gov. Print. Serv., Canberra, 1979, Tables VII, X.

Appendix Table 2. U.S. wheat planted area, yield, production and seasonal average price, 1929-1978.

Year	Planted area	Yield	Season average price to grower	Production
	(000 ha)	(tonnes)	(US$/ tonne)	(000 tonnes)
1929	27,197	0.825	$38.21	22,433
1930	27,352	0.882	24.65	24,130
1931	26,908	0.952	14.37	25,627
1932	26,834	0.767	14.03	20,585
1933	27,939	0.538	27.33	15,030
1934	25,937	0.552	31.16	14,318
1935	28,183	0.607	30.53	17,099
1936	29,947	0.572	37.47	17,144
1937	32,718	0.727	35.34	23,786
1938	31,976	0.783	20.65	25,038
1939	25,426	0.793	25.39	20,174
1940	25,028	0.886	25.06	22,173
1941	25,387	1.049	34.68	26,639
1942	21,457	1.230	40.41	26,385
1943	22,666	1.013	49.97	22,967
1944	26,798	1.077	51.80	28,854
1945	28,013	1.076	54.74	30,148
1946	28,979	1.082	69.81	31,359
1947	31,706	1.167	84.13	36,987
1948	31,719	1.111	72.75	35,245
1949	33,970	0.880	69.07	29,897
1950	28,861	0.961	73.48	27,745
1951	31,791	0.846	77.52	26,896
1952	31,840	1.117	76.79	35,559
1953	31,956	0.999	74.95	31,929
1954	25,319	1.058	77.89	26,780
1955	23,581	1.079	72.75	25,452
1956	24,557	1.114	72.38	27,365
1957	20,179	1.289	70.91	26,014
1958	22,679	1.749	64.30	39,669
1959	22,958	1.325	64.66	30,423
1960	22,229	1.659	63.93	36,873
1961	22,553	1.487	67.23	33,543
1962	19,949	1.490	74.95	29,721
1963	21,605	1.445	67.97	31,214
1964	22,539	1.550	50.33	34,931
1965	23,223	1.542	49.60	35,809
1966	22,022	1.621	59.89	35,702
1967	27,448	1.510	51.07	41,437
1968	25,298	1.696	45.56	42,903
1969	21,640	1.817	45.87	39,310
1970	19,732	1.866	48.81	36,827
1971	21,784	2.023	49.18	44,081
1972	22,225	1.894	64.59	42,096
1973	23,878	1.946	144.96	46,462
1974	28,745	1.694	150.26	48,500
1975	30,283	1.908	130.79	57,770
1976	32,476	1.796	100.30	58,312
1977	30,404	1.823	85.60	55,425
1978	26,842	1.823	109.49	48,925

Sources: USDA Agricultural Statistics, 1972, Table 1 (1929-63); Agricultural Statistics, 1977, Table 2 (1964-73); Wheat Situation, February, 1980, Table 1 (1974-78), all U.S. Gov. Print. Of., Washington. (All data converted to metric units.)

Appendix Table 3. Australia wheat deliveries and exports by grade and class, 1960-1978.

Year	Prime hard		Hard		ASW[1]		Off-grade	
	Delivery	Export	Delivery	Export	Delivery	Export	Delivery	Export
	(000 tonnes)		(000 tonnes)		(000 tonnes)		(000 tonnes)	
1960/61	416		464		5,965	5,498		
1961/62	456		296		5,353	4,159		
1962/63	786		346		6,644	5,544		
1963/64	473		359		6,878	6,029	668	
1964/65	462	121	238	170	8,607	6,326	124	18
1965/66	291	83	249	180	5,540	3,790	299	249
1966/67	910	668	141	95	9,477	6,185	1,427	1,053
1967/68	831	759	171	97	5,599	4,075	130	186
1968/69	1,726	1,377	253	168	11,578	4,414	436	233
1969/70	245	237	572	458	7,065	5,952	1,859	1,029
1970/71	409	158	223	211	5,604	7,594	714	633
1971/72	934	679	317	118	5,626	6,121	762	509
1972/73	269	184	583	341	4,317	3,232	274	98
1973/74	505	365	1,244	595	7,285	5,285	2,104	879
1974/75	971	802	1,156	831	7,768	6,156	767	465
1975/76	923	680	1,811	1,160	6,953	5,603	1,540	519
1976/77	947	933	2,011	1,174	7,031	6,525	911	870
1977/78	1,204	1,168	1,462	1,009	5,342	5,541	496	192
1978/79								

[1]Reported as FAQ in earlier publication.

Sources: Australian Wheat Board Annual Reports, 1968-69 and 1977-78, Appendices 5 and 6 (does not include flour and wheat products

Appendix Table 4. U.S. wheat production and exports by classes, 1960-1978.

Year	Hard red winter		Hard red spring		Soft red winter		White	
	Production	Exports	Production	Exports	Production	Exports	Production	Exports
	(000 tonnes)		(000 tonnes)		(000 tonnes)		(000 tonnes)	
1960	21,639	11,731	5,117	871	5,171	1,470	4,028	3,756
1961	20,523	13,228	3,157	1,143	5,498	1,524	3,783	3,239
1962	14,562	11,894	4,872	1,062	4,246	1,116	4,137	3,348
1963	14,807	15,297	4,573	1,306	5,934	2,286	4,491	3,620
1964	17,284	13,555	4,899	680	6,070	2,177	4,845	3,048
1965	18,318	16,195	5,689	2,341	5,035	1,225	4,872	2,912
1966	18,454	10,261	4,818	3,266	5,906	1,851	4,818	3,593
1967	19,216	10,207	6,260	1,932	7,458	3,293	6,696	4,437
1968	22,074	7,376	6,206	2,096	6,097	1,361	5,825	2,722
1969	21,502	9,145	5,144	2,422	5,280	762	4,927	3,239
1970	20,550	12,248	5,389	3,076	4,736	708	4,654	2,994
1971	20,332	9,173	9,962	2,831	5,770	1,170	5,471	2,831
1972	20,713	19,162	7,512	5,389	6,151	1,851	5,689	4,110
1973	26,048	21,094	8,928	6,668	4,328	735	4,954	3,402
1974	23,925	13,881	7,975	3,538	7,839	3,702	6,941	5,308
1975	28,797	15,814	8,900	4,355	8,873	4,491	7,839	5,852
1976	26,565	11,377	11,187	3,375	9,145	4,927	7,730	5,063
1977	27,001	14,562	10,833	4,246	9,526	5,362	5,879	4,736
1978[1]	22,754	16,603	10,316	6,315	5,498	2,586	6,723	5,035
1979[2]	29,750	19,461	9,935	5,716	8,737	4,355	6,968	4,627

[1]Preliminary

[2]Projected

Sources: USDA Agricultural Statistics, various issues, and Wheat Situation, February 1980, Table 3, U.S. Gov. Print. Of., Washington.

Appendix Table 5. Australia wheat supply and disappearance, marketing years 1948-1978.

Year	Beginning stocks	Production	Total supply[1]	Domestic use[2]	Exports	Ending stocks
			(million tonnes)			
1942/43	2.76	4.24	7.00	1.82	1.02	4.16
1943/44	4.16	2.99	7.15	2.54	2.53	2.08
1944/45	2.08	1.44	3.52	2.69	0.52	0.31
1945/46	0.31	3.88	4.19	2.18	1.52	0.49
1946/47	0.49	3.19	3.68	2.04	1.27	0.37
1947/48	0.37	5.99	6.36	2.01	3.64	0.71
1948/49	0.71	5.19	5.90	2.06	3.34	0.50
1949/50	0.50	5.94	6.44	2.08	3.17	1.19
1950/51	1.19	5.01	6.20	2.19	3.50	0.51
1951/52	0.51	4.35	4.86	2.14	2.23	0.49
1952/53	0.49	5.31	5.80	2.07	2.76	0.97
1953/54	0.97	5.39	6.36	1.95	1.86	2.55
1954/55	2.55	4.59	7.14	2.01	2.64	2.49
1955/56	2.49	5.32	7.81	1.97	3.55	2.29
1956/57	2.29	3.66	5.95	2.12	2.70	1.13
1957/58	1.13	2.66	3.79	1.95	1.40	0.44
1958/59	0.44	5.86	6.30	1.90	2.62	1.78
1959/60	1.78	5.40	7.18	2.15	3.37	1.66
1960/61	1.66	7.45	9.11	2.14	6.30	0.67
1961/62	0.67	6.73	7.40	2.07	4.84	0.49
1962/63	0.49	8.35	8.84	1.98	6.22	0.64
1963/64	0.64	8.92	9.56	2.11	6.89	0.56
1964/65	0.56	10.04	10.60	2.67	7.27	0.66
1965/66	0.66	7.07	7.73	2.52	4.76	0.45
1966/67	0.45	12.70	13.15	2.43	8.53	2.19
1967/68	2.19	7.55	9.74	2.74	5.59	1.41
1968/69	1.41	14.80	16.21	2.31	6.64	7.26
1969/70	7.26	10.55	17.81	2.41	8.18	7.22
1970/71	7.22	7.89	15.11	2.66	9.05	3.40
1971/72	3.40	8.61	12.01	2.80	7.76	1.45
1972/73	1.45	6.59	8.04	3.42	4.14	0.48
1973/74	0.48	11.99	12.47	3.17	7.42	1.88
1974/75	1.88	11.36	13.24	3.03	8.55	1.66
1975/76	1.66	11.98	13.64	2.75	8.23	2.66
1976/77	2.66	11.80	14.46	2.56	9.76	2.14
1977/78	2.14	9.37	11.51	2.59	8.10	0.82
1978/79						

[1]Total supplies = beginning stocks + production

[2]Domestic use = total supplies - exports - ending stocks

Sources: Australian Wheat Board, Annual Report, 1968-69, Appendix 8 (stocks and exports) and Appendix 2 (production) 1942/43 to 1947/48, and Annual Report 1977-78, Appendix 9 (stocks and exports) and Appendix 2 (production), 1948/49 to 1977/78.

Appendix Table 6. U.S. wheat supply and disappearance, marketing years 1948-1978.

Year	Beginning stocks	Production	Imports	Total supply	Domestic use	Exports	Ending stocks
			(million tonnes)				
1942/43							
1943/44							
1944/45	8.6	28.9	1.2	38.6	27.1	3.9	7.6
1945/46	7.6	30.1	0.1	37.8	24.5	10.6	2.7
1946/47	2.7	31.4	*	34.1	21.0	10.8	2.3
1947/48	2.3	37.0	*	39.8	20.7	13.2	5.3
1948/49	5.3	35.2	0.1	40.6	18.5	13.7	8.4
1949/50	8.4	29.9	*	38.3	18.5	8.2	11.6
1950/51	11.6	27.7	0.3	39.6	18.8	10.0	10.9
1951/52	10.9	26.9	0.8	38.6	18.7	12.9	7.0
1952/53	7.0	35.6	0.5	43.1	18.0	8.6	16.5
1953/54	16.5	31.9	0.2	48.6	17.2	5.9	25.4
1954/55	25.4	26.8	*	52.3	16.6	7.5	28.2
1955/56	28.2	25.5	0.3	54.0	16.4	9.5	28.1
1956/57	28.1	27.4	0.2	55.7	16.0	14.9	24.7
1957/58	24.7	26.0	0.3	51.0	16.1	10.9	24.0
1958/59	24.0	39.7	0.2	63.9	16.6	12.1	35.3
1959/60	35.3	30.4	0.2	65.9	16.2	13.9	35.7
1960/61	35.7	36.9	0.2	72.8	16.4	18.0	38.4
1961/62	38.4	33.5	0.1	72.1	16.5	19.6	36.0
1962/63	36.0	29.7	0.1	65.8	15.8	17.5	32.5
1963/64	34.6	31.2	0.1	65.9	15.8	23.0	27.0
1964/65	27.0	34.9	0.1	62.0	17.3	19.7	25.0
1965/66	25.0	35.8	0.1	60.9	19.7	23.2	18.0
1966/67	18.0	35.7	*	53.5	18.6	21.0	14.0
1967/68	14.0	41.0	*	55.0	17.0	20.8	17.1
1968/69	17.1	42.4	0.1	59.6	20.1	14.8	24.6
1969/70	24.6	39.3	0.1	64.0	20.8	16.4	26.8
1970/71	26.8	36.8	*	63.6	21.0	20.2	22.4
1971/72	22.4	44.0	0.1	66.5	23.0	16.6	26.8
1972/73	26.8	42.0	0.1	68.9	21.7	30.9	16.2
1973/74	16.2	46.4	0.1	62.7	20.3	33.1	9.3
1974/75	9.3	48.5	0.1	57.8	18.3	27.7	11.8
1975/76	11.8	57.8	0.1	69.7	19.6	31.9	18.1
1976/77	18.1	58.3	0.1	76.5	20.4	25.8	30.3
1977/78	30.3	55.4	0.1	85.8	23.1	30.6	32.0
1978/79**	32.1	48.9	0.1	81.0	23.3	32.5	25.2

*Less than 50,000 tonnes

**Preliminary

Sources: USDA Agricultural Statistics, various issues, Table 2 (1942-62) for marketing year beginning July 1; Agricultural Statistics, 1977, Table 5 (1963-73) for marketing year beginning June 1; Wheat Situation, February, 1980, Table 1 (1974-78).

Appendix Table 7. Australia and U.S. wheat seasonal average price to grower in Australian and U.S. dollars, exchange rate and U.S. dollar equivalent, 1939-1977.

	Australia season average price to grower	Exchange rate	U.S. dollar equivalent	U.S. season average price to grower
	(A$/tonne)			(U.S.$/tonne)
1939	11.41	1.767	20.16	25.39
1940	12.54	1.526	19.13	25.06
1941	12.41	1.606	19.93	34.68
1942	14.97	1.608	24.07	40.41
1943	18.05	1.608	29.02	49.97
1944	16.27	1.614	26.25	51.80
1945	25.72	1.606	41.30	54.74
1946	31.74	1.607	51.00	69.81
1947	50.74	1.605	81.43	84.13
1948	39.52	1.606	63.46	72.75
1949	45.51	1.469	66.85	69.07
1950	43.73	1.116	48.80	73.48
1951	48.51	1.115	54.08	77.52
1952	50.47	1.113	56.17	76.79
1953	39.23	1.121	43.97	74.95
1954	39.18	1.119	43.84	77.89
1955	39.06	1.112	43.43	72.75
1956	41.23	1.114	45.93	72.38
1957	43.25	1.113	48.13	70.91
1958	43.34	1.119	48.49	64.30
1959	44.08	1.119	49.32	64.66
1960	44.62	1.119	49.92	63.93
1961	47.51	1.116	53.02	67.23
1962	45.40	1.119	50.80	74.95
1963	44.55	1.116	49.71	67.97
1964	43.45	1.112	48.31	50.33
1965	46.34	1.114	51.62	49.60
1966	45.46	1.112	50.55	59.89
1967	47.79	1.113	53.19	51.07
1968	38.75	1.113	43.12	45.56
1969	37.11	1.111	41.22	45.87
1970	40.25	1.114	44.83	48.81
1971	42.40	1.136	48.16	49.18
1972	43.51	1.192	51.86	64.59
1973	103.12	1.419	146.32	144.96
1974	98.57*	1.439	141.84	150.26
1975	86.50*	1.308	113.14	130.79
1976	55.64**	1.222	67.99	100.30
1977	54.99**	1.108	60.92	85.60

*Although finalized for normal pool payments, this pool is still subject to refunds from the Stabilization Fund.

**Payments incomplete.

Source: Season average price, A$/tonne from Australian Wheat Board Annual Report 1977-78, pp. 34-5.

Source: Exchange rates from Banking and Monetary Statistics, 1914-1941, p. 662 and 1941-1970, p. 1035; Annual Statistical Digest, 1971-75, pp. 235, 264; and Federal Reserve Board Publications.

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