

CHAPTER THIRTEEN

AGRICULTURAL INDUSTRIES

This chapter is divided into the following major parts:—Introduction; Sources of statistics and definitions of units; Structural statistics (provides data on the legal arrangements, size and industry class of the business organisations operating within the agricultural sector); Value of agricultural commodities produced and index of values at constant prices; Apparent consumption of foodstuffs and nutrients; Land tenure and utilisation; Crop statistics; Livestock statistics; Livestock products; Agricultural improvements, employment, regulation of agricultural industries, and the agricultural research activities of the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

A special article, contributed by the Division of Water Resources Research, CSIRO, is included at the end of the chapter.

Introduction

The development of Australian agricultural industries has been determined by interacting factors such as profitable markets, the opening up of new land (including the development of transport facilities) and technical and scientific achievements. Subsistence farming, recurring gluts, low prices and losses to farmers were gradually overcome by the development of an export trade. Profitable overseas markets for merino wool and wheat, and the introduction of storage and refrigerated shipping for the dairying and meat industry, combined to make the agricultural sector Australia's main export earner. Until the late 1950s, agricultural products comprised more than 80 per cent of the value of Australia's exports. Since then, the proportion of Australia's exports from the agricultural sector has declined markedly.

However, this decline in importance has been due not to a decline in agricultural activity but rather to an increase in the quantity and values of the exports of the mining and manufacturing sectors. In fact, the agricultural sector experienced an increase in total output over that period. One interesting aspect of this increase in output is that it was accompanied by a large reduction in the size of the agricultural labour force, implying a large growth in productivity within the sector.

Sources of statistics and definitions of units

The major source of the statistics in this chapter is the Agricultural Census conducted at 31 March each year. A wide range of information is collected from agricultural establishments with agricultural activity covering the physical aspects of agriculture such as area and production of crops, fertilisers used, number of livestock disposed of, etc. In conjunction with the Census, certain supplementary collections are conducted in some States where this has proved expedient, e.g. where the harvesting of certain crops has not been completed by 31 March (apples, potatoes, etc.), special returns covering the crops concerned are collected after the completion of the harvest.

The ABS excludes from the Census those establishments which make only a small contribution to overall agricultural production. Thus the 1985–86 Census includes establishments with agricultural activity which had, or were expected to have, an estimated value of agricultural operations of \$2,500 or more. In previous years, the value cut off was applied at the enterprise level—for 1981–82 the value was \$2,500 and for earlier years, \$1,500.

While these changes have resulted in some changes in the counts of numbers of establishments appearing in publications, the effect on the statistics of production of major commodities is small. Statistics of minor commodities normally associated with small scale operations may be affected to a greater extent.

Details of the method used in the calculation of the estimated value of agricultural operations are contained in the publication *Agricultural Industries: Structure of Operating Units, Australia* (7102.0).

Integrated Register Information System—IRIS

Details of agricultural units for 1985-86 have been derived from IRIS. Details of the structure of economic units engaged in agriculture, in hierarchical order, are:

- **Enterprise** (the second level of economic unit). The enterprise is that unit comprising all operations in Australia of a single operating legal entity. (The term 'single legal entity' means a sole trader, partnership, company, trust, co-operative or estate in the private sector, or a department, local government authority or statutory authority in the government sector). For the agricultural sector, a 'multi-State enterprise' is an enterprise which belongs to an enterprise group which undertakes agricultural activities in more than one State.
- **Establishment** (the smallest economic unit). The establishment covers all operations carried out by one enterprise at a single physical location.

Other statistical collections

The ABS conducts a number of other collections to obtain agricultural statistics. These include collections from wool brokers and dealers, livestock slaughterers and other organisations involved in the marketing and selling of agricultural commodities.

For financial statistics from the Agricultural Finance Survey, last conducted for 1980-81, see *Year Book* No. 69, page 250, or *Agricultural Industries: Financial Statistics, Australia, 1980-81* (7507.0).

Structural statistics

The following tables provide information relating to the structure of operating units during 1984-85. Although the definitions of the operating units have been provided above, the following terminology is also used:

- **Industry**. As set out in the *Australian Standard Industrial Classification (ASIC)* (1201.0 and 1202.0). These publications provide details of the methodology used in determining the industry class of an economic unit.
- **Estimated Value of Agricultural Operations (EVAO)**. This is determined by valuing the physical crop and livestock information collected in the Agricultural Census.

A further explanation of this terminology and more detailed statistics are given in the publication *Agricultural Industries: Structure of Operating Units, Australia* (7102.0).

NUMBER OF UNITS BY TYPE OF UNIT

Year/unit	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T.	A.C.T.	Aust.
1982-83—									
Agricultural establishments	52,952	46,661	33,764	19,840	16,471	5,702	238	103	175,731
Establishments with agricultural activity	53,705	47,167	34,036	20,119	16,809	5,840	246	103	178,025
Agricultural enterprises					—n.a.—				
Non-agricultural enterprises operating agricultural establishments					—n.a.—				
1983-84—									
Agricultural establishments	52,704	45,560	33,948	19,289	16,584	5,586	253	101	174,025
Establishments with agricultural activity	53,011	45,984	34,167	19,479	16,750	5,664	255	102	175,412
Agricultural enterprises					—n.a.—				
Non-agricultural enterprises operating agricultural establishments					—n.a.—				
1984-85—									
Agricultural establishments	51,786	45,032	33,614	18,915	16,341	5,384	265	104	171,441
Establishments with agricultural activity	52,116	45,452	33,836	19,191	16,626	5,470	265	105	173,061
Agricultural enterprises	50,209	44,000	32,271	18,439	15,177	5,211	234	85	(a)165,970
Non-agricultural enterprises operating agricultural establishments	584	462	343	153	283	114	3	2	(a)2,088

(a) Includes 'Multi-state' enterprises, i.e. enterprises which operated establishments in more than one State or Territory.

AGRICULTURAL ESTABLISHMENTS(a) INDUSTRY: 1984-85

ASIC Code	Industry of establishment Description	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	Aust.(b)
A	Agriculture, Forestry, Fishing and Hunting—							
01	Agriculture—							
0124	Poultry for meat	320	128	95	69	46	15	674
0125	Poultry for eggs	325	198	183	97	111	25	945
0134	Grapes	707	1,865	127	1,568	189	7	4,465
0135	Plantation fruit	978	1	876	—	105	—	1,965
0136	Orchard and other fruit	2,054	1,234	1,160	1,527	666	290	6,940
0143	Potatoes	171	592	180	125	172	346	1,586
0144	Vegetables (except potatoes)	956	745	1,271	734	562	215	4,501
0181	Cereal grains (incl. oilseeds n.e.c.)	5,087	4,005	3,998	3,114	2,972	31	19,216
0182	Sheep—cereal grains	8,564	4,904	434	4,699	4,971	103	23,676
0183	Meat cattle—cereal grains	1,571	442	2,065	128	47	16	4,274
0184	Sheep—meat cattle	3,738	3,082	689	930	791	606	9,855
0185	Sheep	8,307	7,246	1,372	2,609	2,286	1,149	23,009
0186	Meat cattle	10,586	7,710	9,349	871	1,896	1,051	31,672
0187	Milk cattle	3,036	10,120	2,603	1,302	620	1,109	18,797
0188	Pigs	799	414	713	284	202	119	2,533
0191	Sugar cane	520	—	5,508	—	1	—	6,029
0192	Peanuts	2	—	390	—	1	—	393
0193	Tobacco	31	224	376	—	—	—	631
0194	Cotton	277	—	226	—	—	—	503
0195	Nurseries	773	442	445	183	232	60	2,145
0196	Agriculture n.e.c.	2,984	1,680	1,554	675	471	242	7,632
	<i>Total (ASIC code 01)</i>	<i>51,786</i>	<i>45,032</i>	<i>33,614</i>	<i>18,915</i>	<i>16,341</i>	<i>5,384</i>	<i>171,441</i>
02	Services to agriculture	12	58	28	20	39	2	159
03	Forestry and logging	9	4	9	1	6	7	36
04	Fishing and hunting	—	1	1	4	7	2	15
	<i>Total (ASIC division A)</i>	<i>51,807</i>	<i>45,095</i>	<i>33,652</i>	<i>18,940</i>	<i>16,393</i>	<i>5,395</i>	<i>171,651</i>
B	Mining	4	5	4	3	2	—	18
C	Manufacturing	36	36	27	49	52	5	205
D	Electricity, Gas and Water	—	2	—	1	—	—	3
E	Construction	39	98	24	53	39	13	266
F	Wholesale and Retail Trade	81	71	33	50	41	16	292
G	Transport and Storage	80	75	23	43	42	25	288
H	Communication	—	—	—	—	—	—	—
I	Finance, Property and Business Services	13	14	6	26	6	1	66
J	Public Administration and Defence	2	—	—	1	—	—	3
K	Community Services	33	14	58	11	38	12	167
L	Recreation, Personal and Other Services	21	42	9	14	13	3	102
	<i>Total, all industries</i>	<i>52,116</i>	<i>45,452</i>	<i>33,836</i>	<i>19,191</i>	<i>16,626</i>	<i>5,470</i>	<i>173,061</i>

(a) Includes establishments with an EVAO of less than \$3,000.

(b) Includes the Northern Territory and the Australian Capital Territory.

**Value of agricultural commodities produced and index
of values at constant prices**

Definitions

Gross value of commodities produced: the value placed on recorded production at the wholesale prices realised in the market place.

Marketing costs: include freight, cost of containers, commission and other charges incurred in marketing.

Local value of commodities produced: the value placed on commodities at the place of production and is ascertained by deducting marketing costs from the gross value.

Index of values at constant prices: the index of the gross value of commodities produced at constant prices, i.e. it is a measure of change in value after the direct effects of price changes have been eliminated.

VALUES OF AGRICULTURAL COMMODITIES, 1985-86

	Gross value of agricultural commodities produced	Marketing costs	Local value of commodities produced	Index of values at constant prices of agricultural commodities produced (a) (Base year: 1979-80=1000)
	\$m	\$m	\$m	
Crops	7,377.7	1,140.4	6,237.3	1,170
Livestock slaughterings and other disposals	3,882.8	299.6	3,583.2	973
Livestock products	4,130.9	206.3	3,924.6	1,131
Total agriculture	15,398.0	1,646.6	13,751.7	1,100

(a) Weighted by average unit values for the year 1979-80.

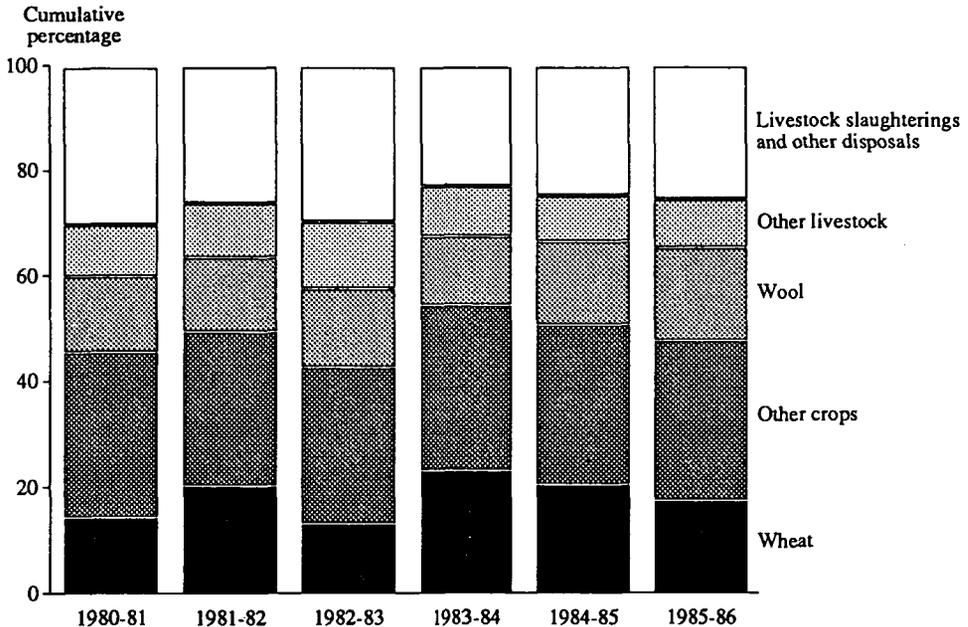
Publications

Two preliminary estimates of value of commodities produced are published: *Value of Principal Agricultural Commodities Produced, Australia, Preliminary (7501.0)* and *Value of Selected Agricultural Commodities Produced, Australia, Preliminary (7502.0)*. A final publication, *Value of Agricultural Commodities Produced, Australia (7503.0)*, contains Indexes of Values at Constant Prices.

Index of Agricultural Commodities Produced

The index is consistent in scope with those of previous years. The indexes are weighted by the average unit values for the year 1979-80 with a reference base of 1979-80=1000.

For further details on how these and earlier series were calculated see *Year Book No. 61*, and *Value of Agricultural Commodities Produced, Australia (7503.0)*.

PERCENTAGE OF TOTAL GROSS VALUE OF AGRICULTURAL COMMODITIES
AUSTRALIA

GROSS VALUE OF AGRICULTURAL COMMODITIES PRODUCED
(**\$ million**)

	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Crops—						
Barley for grain	380.9	463.4	290.8	732.6	759.3	586.8
Oats for grain	139.5	155.7	116.1	203.8	129.6	138.3
Wheat for grain	1,684.1	2,599.4	1,566.2	3,605.6	3,202.9	2,719.4
Other cereal grains	327.6	294.1	260.4	408.7	400.8	346.3
Sugar cane cut for crushing	799.7	590.2	508.9	516.6	512.2	494.2
Fruit and nuts	459.8	464.4	498.0	552.5	670.9	678.6
Grapes	178.2	222.8	212.5	217.0	259.4	270.0
Vegetables	509.0	554.3	556.9	738.6	628.8	713.6
All other crops (a)	827.2	967.6	1,000.5	1,451.1	1,303.5	1,430.5
Total crops	5,305.9	6,311.9	5,010.3	8,426.5	7,867.4	7,377.7
Livestock slaughterings and other disposals (b)—						
Cattle and calves (c)	2,056.5	1,890.1	2,076.2	2,118.0	2,253.2	2,367.3
Sheep and lambs	718.9	646.7	548.0	585.0	576.1	518.0
Pigs	337.5	396.1	414.9	375.5	438.1	438.3
Poultry	361.4	362.7	413.1	430.2	512.6	559.1
Total livestock slaughterings and other disposals	3,474.3	3,295.6	3,452.2	3,508.6	3,783.3	3,882.8
Livestock products—						
Wool	1,669.5	1,788.7	1,760.9	2,016.1	2,434.4	2,707.0
Milk	885.1	1,033.9	1,186.5	1,153.2	1,035.4	1,106.7
Eggs	227.4	253.4	275.3	295.2	283.7	289.7
Total livestock products (d)	2,803.8	3,100.6	3,245.8	3,489.8	3,785.3	4,130.9
Total value of agricultural commodities produced	11,584.1	12,708.2	11,708.3	15,424.9	15,436.1	15,398.0

(a) Includes pastures and grasses cut for hay and harvested for seed. Excludes crops for green feed or silage. (b) Includes net exports of livestock. (c) Includes dairy cattle slaughtered. (d) Includes honey and beeswax.

INDEX OF VALUES AT CONSTANT PRICES OF AGRICULTURAL COMMODITIES PRODUCED(a)

(Base year: 1979-80=1,000)

	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Crops—							
Barley for grain	1,000	724	932	524	1,321	1,500	1,315
Oats for grain	1,000	799	1,146	603	1,627	999	957
Wheat for grain	1,000	663	1,017	545	1,374	1,166	1,008
Other cereal grains	1,000	1,233	1,417	975	1,563	1,485	1,420
Sugar cane (b)	1,000	1,120	1,162	1,192	1,070	1,167	1,152
Fruit and nuts	1,000	1,069	988	1,017	968	1,118	1,127
Grapes	1,000	825	984	963	994	1,030	1,067
Vegetables	1,000	1,011	1,056	1,044	1,123	1,289	1,273
All other crops (c)	1,000	964	1,106	931	1,400	1,671	1,622
Total	1,000	838	1,053	763	1,290	1,266	1,170
Livestock slaughterings and other disposals—							
Cattle and calves (d)	1,000	938	1,005	986	860	837	885
Sheep and lambs	1,000	1,032	946	1,018	936	997	1,072
Pigs	1,000	1,061	1,038	1,087	1,154	1,185	1,223
Poultry	1,000	968	893	1,000	952	1,103	1,171
Total (e)	1,000	968	988	1,002	907	919	973
Livestock products—							
Wool	1,000	990	1,012	995	1,026	1,170	1,176
Milk	1,000	947	956	1,011	1,089	1,109	1,105
Eggs	1,000	959	927	961	935	866	874
Total (f)	1,000	974	990	995	1,035	1,128	1,131
Total agricultural commodities produced	1,000	909	1,019	889	1,115	1,128	1,100

(a) Indexes of values at constant prices (weighted by average unit values of the year 1979-80). (b) Sugar cane cut for crushing and planting. (c) Includes pastures and grasses. Excludes crops for green feed or silage. (d) Includes dairy cattle slaughtered. (e) Component series based on carcass weight. (f) Includes honey and beeswax.

Apparent consumption of foodstuffs and nutrients

Estimates of consumption in Australia are compiled by deducting net exports from the sum of production and imports and allowing for recorded movement in stocks of the respective commodities. The term 'consumption' is used in a specialised sense, since the quantities actually measured are broadly the quantities available for consumption at a particular level of distribution, i.e. ex-market, ex-store or ex-factory depending on the method of marketing and/or processing. Because consumption of foodstuffs is measured, in general, at 'producer' level no allowance is made for wastage before they are consumed. The effect of ignoring wastage is ultimately to overstate consumption but it is believed that more efficient distribution and storage methods in recent years have cut down wastage. Furthermore, it is likely that many of the foodstuffs are being supplemented by householders' self-supplies over and above the broad estimate already made.

The estimates of consumption per capita have been obtained by using the mean resident population for the period.

More detailed information on the consumption of foodstuffs is contained in the publication *Apparent Consumption of Foodstuffs and Nutrients, Australia* (4306.0). For some commodities, more timely information is contained in the publication *Apparent Consumption of Selected Foodstuffs, Australia (Preliminary)* (4315.0).

APPARENT PER CAPITA CONSUMPTION OF FOODSTUFFS

(Kg—unless otherwise indicated)

Commodity	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Meat and meat products—						
Meat (carcass equivalent weight)						
Beef	44.5	47.3	42.4	39.9	40.0	39.3
Veal	2.5	2.6	3.5	2.4	2.1	2.1
<i>Beef and veal</i>	<i>47.0</i>	<i>49.8</i>	<i>45.9</i>	<i>42.3</i>	<i>42.1</i>	<i>41.4</i>
Lamb	15.8	16.3	16.2	16.9	17.0	16.9
Mutton	4.9	3.5	4.5	5.2	6.6	7.1
Pigmeat (a)	15.6	15.1	15.3	16.4	16.4	17.0
Total	83.3	84.7	81.7	80.9	82.9	82.3
Offal and meat, n.e.i.	4.2	4.4	4.4	3.4	2.8	2.7
Total meat and meat products	87.5	89.1	86.1	84.3	85.0	85.0
Poultry—						
Poultry (dressed weight)	20.3	19.6	20.3	20.0	21.8	23.0
Seafood—						
Fresh and frozen (edible weight)—						
Fish—						
Australian	1.8	1.6	1.2	1.7	1.8	2.2
Imported	1.7	1.1	1.5	1.8	1.9	1.8
Crustacea and molluscs	1.1	1.0	1.1	0.8	0.9	0.7
Seafood otherwise prepared (product weight)—						
Australian	0.4	0.4	0.6	0.6	0.4	0.5
Imported—						
Fish	1.8	1.9	1.5	2.0	1.9	1.8
Crustacea and molluscs	0.4	0.5	0.4	0.4	0.5	0.5
Total seafood	7.2	6.5	6.3	7.3	7.4	7.5
Milk and Milk Products—						
Market milk (fluid whole) (litres)	104.0	103.1	102.9	101.6	101.8	102.5
Condensed, concentrated and evaporated milk—						
Full cream sweetened	0.9	0.6	0.9	0.7	0.7	} 2.8
Full cream unsweetened	2.7	2.4	1.8	2.2	2.0	
Skim	1.0	1.2	0.8	0.9	1.2	0.9
Powdered milk—						
Full cream	0.9	0.9	0.8	0.7	0.7	0.6
Skim	3.2	2.8	2.7	2.3	2.3	2.3
Infants' and invalids' food	1.0	1.3	1.2	1.2	1.0	1.2
Cheese (natural equivalent weight)	6.6	7.0	7.4	7.7	8.1	8.0
Total (converted to milk solids, fat and non-fat)	23.2	23.0	22.7	22.5	22.7	22.6

APPARENT PER CAPITA CONSUMPTION OF FOODSTUFFS—*continued*

(Kg—unless otherwise indicated)

Commodity	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Fruit and Fruit Products—						
Fresh fruit (incl. fruit for fruit juice)—						
Citrus	39.2	36.4	47.9	51.2	45.3	40.8
Other	35.5	37.8	39.6	38.1	41.4	42.1
Jams, conserves, etc	1.5	1.8	1.8	1.8	2.1	1.9
Dried fruit	2.2	2.3	2.5	2.4	3.0	2.9
Processed fruit	11.9	10.3	9.4	9.8	11.1	8.0
Total (fresh fruit equivalent)	99.9	97.4	110.6	113.3	114.6	106.9
Vegetables—						
White potatoes	54.9	57.6	52.2	62.6	59.9	57.7
Other root and bulb vegetables	16.3	18.7	16.9	17.4	19.3	18.9
Tomatoes	15.7	16.7	16.5	18.6	19.6	16.9
Leafy and green vegetables	21.8	20.8	21.4	21.9	22.5	22.8
Other vegetables	17.5	17.1	17.9	18.3	21.0	20.0
Total (fresh equivalent weight)	126.3	130.8	124.9	138.8	142.4	136.2
Grain Products—						
Flour (b)	70.7	72.0	67.1	73.1	72.6	71.8
Breakfast foods—						
Oatmeal and rolled oats	0.9	0.9	1.2	1.3	1.3	1.5
Other (from grain)	6.9	7.1	7.6	7.9	8.2	n.a.
Total breakfast foods	7.8	8.0	8.7	9.2	9.6	n.a.
Table rice	2.9	2.9	3.0	3.3	3.7	3.7
Total grain products	81.4	82.9	78.8	85.6	85.8	n.a.
Bread	46.1	47.5	49.3	45.6	45.4	n.a.
Eggs and Egg Products—						
Equivalent number of eggs(c)	220	222	141	140	137	134
Nuts (in shell)—						
Peanuts	1.5	1.5	2.1	1.8	1.4	1.6
Tree nuts	3.0	3.3	3.2	3.6	3.8	3.8
Oils and fats—						
Butter	4.3	4.3	4.0	3.9	3.9	3.8
Table margarine	6.7	6.8	6.8	6.9	6.6	6.9
Other margarine	2.5	2.7	2.8	2.7	2.3	2.1
Total margarine	9.2	9.5	9.6	9.6	9.0	9.0
Total (fat content) (d)	21.5	21.8	21.6	21.5	21.0	21.0
Sugar—						
As refined sugar	13.7	12.5	12.0	11.5	10.0	8.2
In manufactured foods	35.0	34.8	34.0	32.4	34.2	36.8
Total	48.7	47.2	46.0	43.9	44.2	45.0
Honey	0.7	0.9	0.8	0.9	0.7	0.8
Total (e)	52.7	51.5	49.6	49.0	49.1	49.9
Beverages—						
Tea	1.5	1.6	1.4	1.5	1.4	1.4
Coffee (f)	1.9	1.9	2.0	2.1	2.0	1.6
Aerated and carbonated waters (litres)	67.6	64.2	65.7	63.0	67.3	73.0
Beer (litres)	129.3	128.6	121.6	117.8	114.5	115.5
Wine (litres)	18.2	19.1	19.7	20.4	21.3	21.6
Spirits (litres alcohol)	1.1	1.2	1.2	1.1	1.2	1.2

(a) Includes bacon and ham. (b) Includes flour used for breadmaking. (c) Data from 1982-83 consists of commercial disposals only. (d) Includes an estimate for vegetable oils and other fats. (e) Includes sugar content of syrups and glucose. (f) Coffee and coffee products in terms of roasted coffee.

Nutrients

The nutrients table has been compiled by the Nutrition Section of the Commonwealth Department of Community Services and Health and is based on the estimates of the quantity of foodstuffs available for per capita consumption.

For further information on the level of nutrient intake see the publication *Apparent Consumption of Foodstuffs and Nutrients, Australia* (4306.0).

ESTIMATED SUPPLY OF NUTRIENTS AVAILABLE FOR CONSUMPTION (a)
(per capita per day)

(Source: Department of Community Services and Health)

<i>Nutrient</i>	<i>Unit</i>	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Protein—							
Animal	g	65.1	65.0	64.1	62.9	64.3	64.7
Vegetable	g	32.6	33.2	32.2	34.7	34.4	34.1
<i>Total</i>	g	97.7	98.2	96.3	97.6	98.7	98.8
Fat (from all sources)	g	146.2	148.0	145.9	146.3	146.0	146.7
Carbohydrate	g	400.0	399.9	386.3	405.7	407.5	404.6
Calcium	mg	922	917	914	912	924	914
Iron	mg	14.7	15.0	14.9	15.1	15.3	15.2
Vitamin A activity	µg	1,492	1,510	1,496	1,446	1,400	1,367
Vitamin C (b)—							
Unadjusted	mg	106.0	105.0	114.0	122.0	119.0	112.0
Adjusted	mg	78.0	77.0	88.0	93.2	90.8	83.8
Thiamin (b)—							
Unadjusted	mg	1.8	1.8	1.8	1.9	1.9	1.9
Adjusted	mg	1.5	1.5	1.5	1.6	1.6	1.6
Riboflavin	mg	2.6	2.6	2.6	2.6	2.6	2.6
Niacin (b)—							
Unadjusted	mg	22.2	22.5	22.7	23.0	23.2	23.2
Adjusted	mg	38.6	38.9	38.7	39.3	39.7	39.7
Energy value	kJ	14,390	14,471	14,125	14,458	14,506	14,497

(a) Figures are based on conversion factors calculated from the revised and enlarged edition of S. Thomas and M. Corden *Metric Tables of Composition of Australian Foods*, Canberra, 1977. (b) Data show adjustments made for loss of nutrients in cooking and the extra niacin obtained from the metabolism of protein.

Land tenures

Land tenure statistics mainly relate to land held under freehold tenure ('alienated or in process of alienation') or leasehold tenure ('leased or licenced') with all agricultural establishments falling within these categories. Descriptions of the land tenure systems of the States and the Territories, and conspectuses of land legislation in force were provided in *Year Book* No. 48 and *Year Book* No. 50.

Disposal of Crown lands

For a description of the provisions that exist in all mainland States for the disposal of Crown lands for public purposes, for unconditional purchase and occupation under lease or licence, see *Year Book* No. 61.

Closer settlement and war service settlement

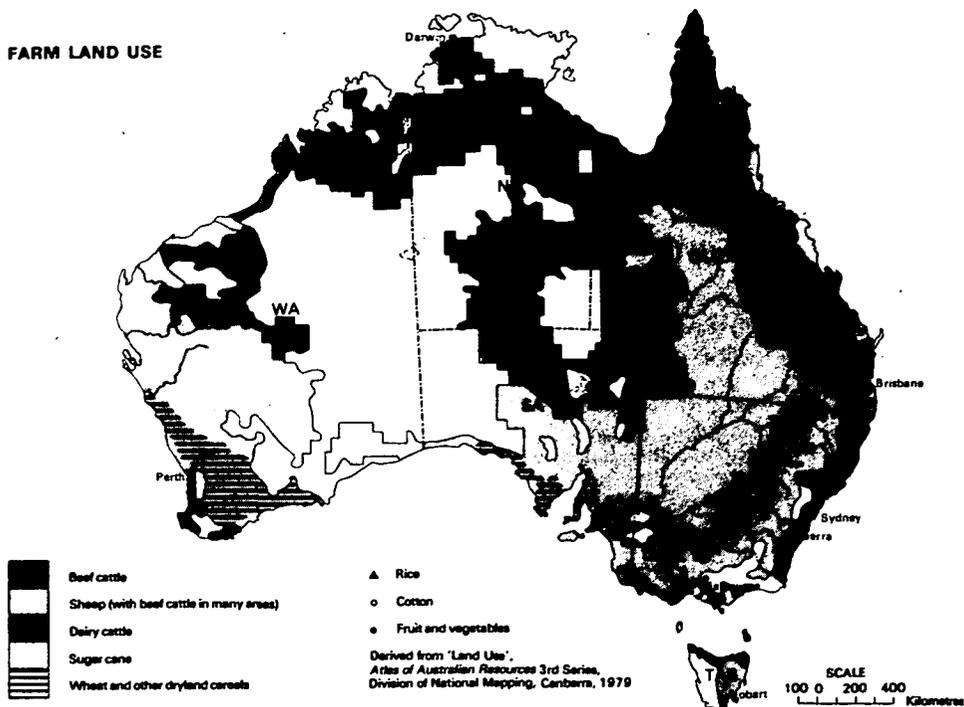
Particulars of these are given in issues of the *Year Book* up to No. 22, and in *Year Book* Nos. 48, 55 and 61.

Alienation and occupation of Crown lands

For data relating to land tenures in the States and Territories, see *Year Book* No. 66 and *Year Book* No. 67.

Land utilisation in Australia

The total area under tenure differs from the total area of agricultural establishments (shown in the following table) by amounts which represent unused land or land held for non-agricultural purposes. In general, land in the more fertile regions tends to be mostly freehold, while the less productive land is held under Crown lease or licence.



AREA OF ESTABLISHMENTS WITH AGRICULTURAL ACTIVITY
(million hectares)

At 31 March	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas	N.T.	Aust. (incl. A.C.T.)
1981	65.2	14.7	157.5	62.4	115.8	2.2	77.6	495.4
1982	63.4	14.4	157.1	62.9	113.5	2.2	77.1	490.8
1983	64.0	14.2	155.9	60.2	112.0	2.2	75.2	483.8
1984	64.0	14.3	158.1	62.1	114.3	2.2	73.7	488.6
1985	63.7	14.2	157.2	62.7	114.0	2.1	74.0	488.0
1986	63.3	14.2	158.1	60.7	113.8	2.1	72.9	485.2

LAND UTILISATION: AUSTRALIA
(million hectares)

Year	Area of			Total		Percentage of Australian land area (768,284,000 hectares)
	crops (a)	sown pastures and grasses (b)	Balance (c)	Area of establishments		
1980-81		18.3	24.9	452.3	495.4	64.5
1981-82		19.6	26.9	444.2	490.8	63.9
1982-83		19.4	25.6	438.8	483.8	63.0
1983-84		22.0	26.1	440.5	488.6	63.6
1984-85		21.1	27.1	439.8	488.0	63.5
1985-86		20.9	27.5	436.8	485.2	63.2

(a) Excludes pastures and grasses harvested for hay and seed which have been included in 'sown pastures and grasses'. (b) Prior to 1981-82 figures related to area 'used for' crop or pasture, i.e., an area used for more than one purpose during the year was counted only once. From 1981-82, an area double cropped or an area of pasture also planted to crop has been counted separately each time used. (c) Used for grazing, lying idle, fallow, etc.

The total area of agricultural establishments in 1985-86 constituted 63.2 per cent of the Australian land area, the remainder being urban areas, State forests and mining leases, with an overwhelming proportion of unoccupied land (mainly desert). The balance data include large areas of arid or rugged land held under grazing licences but not always used for grazing. Balance data also include variable amounts of fallow land.

The crop area data represent up to 4.3 per cent of the area of agricultural establishments and emphasise the relative importance of the livestock industry in Australia. (see page 501)

Crops

For this section, statistics relating to crop areas and production have been obtained from the annual Agricultural Census. The Census returns are collected in all States and the two Territories at 31 March each year and relate mainly to crops sown in the previous twelve months.

Where harvests are not completed by March (e.g. potatoes), provision is made in some States for a supplementary collection after the harvest is completed. Additional statistics relating to value of agricultural commodities produced, manufactured production and overseas trade are also included. Agricultural Census data published in this section refer to the 'agricultural' year ended 31 March, while other data refer to the year ended 30 June; but for most purposes there will be little error involved in considering 'agricultural year' data as applying to the financial year.

The following table shows the area of crops in each of the States and Territories of Australia since 1860-61.

AREA OF CROPS (a)
(^{'000} hectares)

Year	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas	N.T.	A.C.T.	Aust.
1860-61	100	157	2	145	10	62	—	—	475
1870-71	156	280	21	325	22	64	—	—	868
1880-81	245	627	46	846	26	57	—	—	1,846
1890-91	345	822	91	847	28	64	—	—	2,197
1900-01	990	1,260	185	959	81	91	—	—	3,567
1910-11	1,370	1,599	270	1,112	346	116	—	—	4,813
1920-21	1,807	1,817	316	1,308	730	120	—	1	6,099
1930-31	2,756	2,718	463	2,196	1,939	108	1	2	10,184
1940-41	2,580	1,808	702	1,722	1,630	103	—	2	8,546
1949-50	2,295	1,881	832	1,518	1,780	114	—	4	8,424
1954-55	2,183	1,904	1,049	1,711	2,069	122	—	2	9,040
1959-60	2,888	1,949	1,184	1,780	2,628	130	1	3	10,564
1964-65	4,182	2,621	1,605	2,414	3,037	163	2	4	14,028
1969-70	4,999	2,212	2,208	2,290	3,912	98	6	2	15,728
1971-72	4,186	1,925	2,017	2,278	3,751	67	7	1	14,231
1972-73	4,329	1,943	1,963	2,122	3,814	80	12	1	14,265
1973-74	4,628	1,981	1,786	2,451	4,133	74	6	1	15,060
1974-75	4,089	1,772	1,898	2,257	3,754	67	7	1	13,845
1975-76	4,285	1,851	2,010	2,116	4,208	60	8	1	14,539
1976-77	4,520	1,943	2,026	2,036	4,417	65	2	1	15,010
1977-78	4,984	2,163	2,107	2,564	4,910	70	1	1	16,800
1978-79	5,020	2,209	2,307	2,827	4,993	80	2	1	17,438
1979-80	5,243	2,243	2,334	2,771	5,281	79	2	1	17,954
1980-81	5,208	2,180	2,481	2,772	5,547	84	1	1	18,273
1981-82	5,744	2,184	2,765	2,865	5,963	90	2	1	19,613
1982-83	5,200	2,234	2,648	2,856	6,380	98	3	1	19,420
1983-84	6,566	2,655	2,998	3,108	6,526	101	5	1	21,961
1984-85	5,789	2,569	3,047	2,902	6,723	99	6	1	21,136
1985-86	5,990	2,528	3,231	3,039	5,970	88	7	1	20,853

(a) The classification of crops was revised in 1971-72 and adjustments made to statistics back to 1967-68. After 1966-67 lucerne for green feed, hay and seed, and pasture cut for hay and harvested for seed or green feed are excluded.

NOTE: From 1970-71 to 1980-81 figures related to area 'used for' crops, ie, an area used for more than one purpose during the year was counted only once. From 1981-82, an area double cropped has been counted separately each time used.

The wide range of climatic and soil conditions over the agricultural regions of Australia has resulted in a diversity of crops being grown throughout the country. Generally, cereal crops (excluding rice, maize and sorghum) are grown in all mainland States over wide areas, while other crops are confined to specific locations in a few States. However, scanty or erratic rainfall, limited potential for irrigation and unsuitable soils or topography have restricted intensive agriculture. Despite this, agricultural production has increased over time to meet increased demands both in Australia and from overseas.

The following table provides an Australian summary of the area, production and gross value of the principal crops.

CROPS: AREA, PRODUCTION AND GROSS VALUE

	1983-84			1984-85			1985-86		
	Area ('000 ha)	Prod- uction ('000 tonnes)	Gross value (\$m)	Area ('000 ha)	Prod- uction ('000 tonnes)	Gross value (\$m)	Area ('000 ha)	Prod- uction ('000 tonnes)	Gross value (\$m)
Cereals for grain—									
Barley	3,109	4,890	733	3,518	5,554	759	3,284	4,868	587
Grain sorghum	730	1,885	246	723	1,369	197	734	1,416	181
Maize	68	238	36	103	291	46	84	278	40
Oats	1,772	2,296	204	1,041	1,367	130	1,068	1,330	138
Rice	119	632	89	122	866	123	107	716	81
Wheat	12,931	22,016	3,606	12,078	18,666	3,203	11,736	16,167	2,719
Legumes for grain									
	510	541	96	787	784	114	894	854	163
Crops for hay—									
Oats	279	994	80	182	633	45	182	594	47
Wheat	71	209	15	53	163	12	59	165	13
Crops for green feed, silage—									
Barley	58	} n.a.	} n.a.	54	} n.a.	} n.a.	75	} n.a.	} n.a.
Forage sorghum	72			81			116		
Oats	611			571			662		
Wheat	23			19			29		
Sugar cane cut for crushing	307	24,194	517	313	25,450	512	304	24,402	494
Tobacco	7	14	71	5	12	65	5	11	56
Cotton	137	400	269	183	679	330	177	685	325
Peanuts	32	47	40	30	42	37	29	43	38
Linseed	5	4	1	6	6	2	10	12	4
Rapeseed.	18	17	5	30	32	10	74	87	24
Safflower.	55	31	8	44	32	8	47	28	6
Sunflower	234	170	59	354	293	88	277	215	53
Fruit (excl. grapes)	108	—	552	109	—	259	113	—	679
Fruit—									
Orchard	90	—	418	91	—	522	94	—	518
Oranges	n.a.	392	105	n.a.	445	132	n.a.	496	132
Apples	20	267	134	21	352	178	20	292	139
Pears	n.a.	122	46	n.a.	139	51	n.a.	143	64
Peaches	n.a.	48	25	n.a.	60	28	n.a.	61	29
Bananas	9	146	87	9	145	93	10	134	102
Pineapples	6	115	26	6	125	33	6	132	33
Grapes	65	841	217	64	890	259	64	907	270
Vegetables									
	110	—	739	111	—	629	111	—	714
Potatoes	38	1,020	290	38	992	163	36	965	206
Total, all crops (excluding pastures)	21,961	—	7,892	21,136	—	7,626	20,853	—	7,049

In the tables that follow, crop statistics are shown in these groupings: wheat, coarse grains, rice, oilseeds, sugar, vegetables, fruit, grapes and other crops such as tobacco, mushrooms and fodder crops.

Cereal grains

In Australia, cereals are conveniently divided into autumn-winter-spring growing ('winter' cereals) and spring-summer-autumn growing ('summer' cereals). Winter cereals such as wheat, oats, barley and rye are usually grown in rotation with some form of pasture such as grass, subterranean clover, medics or lucerne. In recent years, alternative winter crops such as rapeseed, field peas and lupins have been introduced to cereal rotation in areas where they had not previously been grown. Rice, maize, sorghum and the millets are summer cereals with the latter two being grown in association with winter cereals in some areas. In Northern Queensland and Western Australia there are two rice growing seasons—a dry season winter crop and a wet season summer crop.

Cereals for grain form a significant percentage of both the value of Australia's agricultural commodities and of the country's export earnings. The following table shows the significance of cereal grains in the last 6 years.

CEREAL GRAINS IN AUSTRALIA: A PERSPECTIVE

Year	Cereal grains(a)		Total agriculture gross value	Total Australian exports— all produce value f.o.b.	Gross value of cereal grains as a percentage of gross value of agriculture	Export value of cereal grains as a percentage of total Australian exports
	Gross value	Export value f.o.b.				
	\$m	\$m	\$m	\$m	per cent	per cent
1980-81	2,532.0	2,160.6	11,584	18,949	21.9	11.3
1981-82	3,512.7	2,367.9	12,708	19,294	27.6	12.1
1982-83	2,230.4	1,669.7	11,714	21,454	19.0	7.6
1983-84	4,950.6	2,564.9	15,425	24,013	32.1	10.9
1984-85	4,492.6	4,068.8	15,436	29,708	29.1	13.9
1985-86	3,790.8	3,812.6	15,398	32,795	24.6	11.9

(a) Principally wheat, barley, oats, grain sorghum, rice and maize, with panicum/millet, canary seed and rye being minor cereals.

Wheat

Wheat is grown in all States, and is Australia's most important crop in terms of production and exports. As 70 to 80 per cent of the wheat crop is exported, wheat marketing arrangements play an important role in the industry. The Australian Wheat Board (AWB) was constituted in September 1939, under *National Security (Wheat Acquisition) Regulations*, to purchase, sell or dispose of wheat and wheat products. At the end of World War II, the AWB continued to operate under extensions to these regulations, until 1948, when the Commonwealth and States agreed to national marketing arrangements. After a poll of growers had approved the plan the necessary complementary legislation was passed by the Commonwealth and the States. The *Wheat Industry Stabilization Act 1948* established the present AWB to acquire and market all wheat and to administer successive stabilisation plans. The *Wheat Marketing Act 1979* replaced the stabilisation plans with a guaranteed minimum price scheme, applicable to an unlimited quantity of wheat.

Wheat marketing and pricing arrangements 1984-85 to 1988-89

The basic elements of the new arrangements were negotiated between the Australian Wheatgrowers' Federation (now renamed the Grains Council of Australia) and Commonwealth and State Governments. The enactment of State legislation complementary to the Commonwealth legislation was necessary for the implementation of a national scheme.

Under current arrangements, the AWB continues as a statutory authority responsible for the marketing of wheat in Australia and overseas although it can now issue permits for the domestic sale of stockfeed wheat outside the pooling arrangements. The concept of a guaranteed minimum price is retained. The Board has been given greater commercial freedom but is required to operate in accordance with an approved corporate plan and be accountable to growers as well as parliament. The following are important features in the current plan.

Guaranteed Minimum Price

The Commonwealth Government underwrites wheat returns on a net basis through a Guaranteed Minimum Price (GMP) Scheme. The Australian Standard White (ASW) GMP is set at 95 per cent of the average of the estimated gross return per tonne for all wheat (ASW basis) from the subject season and the lowest two of the previous three seasons less the estimated pool costs per tonne for the subject season. Separate GMPs are established for categories of wheat, the quality of which is above or below ASW, based on the expected market value of the wheat in those categories relative to ASW.

Growers receive a split first advance payment. Upon delivery of the wheat, a grower is paid 90 per cent of the estimated GMP for the relevant category less contributions to research (wheat tax), dockages for non-approved varieties and allowances for storage, handling and transportation charges. When the final GMP has been determined (before 1 March during the subject season), the grower receives the final GMP, increased or decreased by an allowance for the quality of wheat (in addition to the deductions made at the time of delivery), less the interim advance payment already received. Initial allowances may be adjusted by the Board at a later date to reflect actual costs and returns. If the net return per tonne exceeds the GMP, the excess is returned to growers by way of a final payment, which may be made by instalments over a number of years. The government meets any deficiency between the net pool return rate and the GMP.

These arrangements are market related but they provide the industry with support from the government that is designed to help it overcome any major short-run down-turn in producers' returns. Particulars of GMP rates may be found in *Crops and Pastures, Australia* (7321.0).

Financial arrangements

From 1984-85, the AWB with the Minister's approval has been able to borrow overseas up to an amount equal to the aggregate size of expected foreign currency denominated sales in respect of a particular season, provided that amount does not exceed that season's net financing requirement.

Domestic pricing

The domestic price for human consumption wheat is determined each quarter by averaging the quoted export prices for the forward and past quarters and adding a margin to cover the additional costs of servicing the domestic market. The prices for the four quarters from October 1986 ranged from \$184.56 per tonne to \$192.79 per tonne, including \$1.30 per tonne Tasmanian freight levy. This levy applies to all domestic wheat sales and is used exclusively to cover the cost of shipping wheat from the mainland to Tasmania each season.

Domestic prices for industrial and stockfeed wheats are quoted daily by the AWB in the light of its commercial judgment and are related to export prices.

Domestic marketing arrangements

The AWB controls the domestic marketing of wheat although domestic stockfeed wheat may be directly sold by growers to buyers under a permit issued by the AWB. The availability of these permits is governed by guidelines issued by the Federal Minister for Primary Industries and Energy and the relevant State Ministers. Wheat sold pursuant to a stockfeed purchase permit is subject to a deduction to cover wheat research tax, Tasmanian freight, the AWB's administration costs and a reduced bulk handling authority charge. No pooling or GMP provisions or minimum or maximum prices apply in respect of such wheat.

The AWB may also authorise a grower to sell wheat on behalf of the AWB under grower-to-buyer direct delivery transactions. The grower and buyer negotiate quality and freight allowances around the AWB's domestic ASW price applicable for the same end use. The proceeds of sale are incorporated in the AWB's pooling arrangements.

The grower receives payment from the AWB as if he had delivered ASW wheat, adjusted by the abovementioned allowances and a reduction in the relevant bulk handling authority's charge.

Wheat which is retained by a grower for his own use does not come under the control of the AWB.

The AWB has power to import wheat for use on the domestic market.

Overseas marketing arrangements

Under the 1984 Act, the AWB maintains sole authority for the export of wheat but no longer controls the export of wheat products. The Act extends the powers of the Board in relation to overseas marketing to enable it to enter into tripartite barter arrangements and the sale and shipment of other grains in combination with wheat. The AWB undertakes market research and promotion both within and outside Australia.

Wheat classification

Unlike the other wheat exporting nations, Australia does not produce red grained wheats, nor does it have the traditional winter or spring wheats found in the northern hemisphere.

All Australian wheats are white grained, and all are planted during the Australian winter months of May, June and July. They grow during the spring months of August, September and October. The harvest commences in Queensland in September/October and gradually progresses southwards, culminating in Victoria and the southern part of Western Australia in January.

The various combinations of wheat varieties, soil fertility and seasonal conditions encountered throughout the Australian wheat belt enable a wide spectrum of recognised wheat types to be produced. These range from high protein hard grained wheats to low protein soft grained wheats.

Before wheat delivered by farmers can be received into the bulk handling system, the wheat must conform to strict receival standards. These standards are set by the AWB and are collectively referred to as Australian Standard White specification, which broadly relates to moisture content (12 per cent maximum), test weight (74 kilograms per hectolitre minimum), no insects, and a range of tolerances for unmillable material, weather damaged and sprouted kernels, foreign matter and foreign seeds.

In addition to the receival standards, a system of varietal control operates Australia-wide in which the AWB can impose a monetary penalty on wheat received according to the variety delivered and the region of production. The aim of this system is to ensure that varieties are grown in areas where the protein content that they are likely to achieve is in line with the processing characteristics of the wheat (grain hardness, milling quality, dough properties), and to highlight to growers the need to grow marketable varieties of wheat.

The system of classification of Australian wheats has evolved in response to changing market demands. The wheats are classified into two broad categories, namely the milling and non-milling classes, according to test weight, grain soundness and other physical factors. Further classification into grades is based on wheat variety, protein content and grain hardness.

Australian wheats of the following categories are suitable for milling purposes:

- Australian Prime Hard
- Australian Hard
- Australian Standard White (ASW)
- Australian Soft
- Australian Durum
- Australian General Purpose 1

Australian General Purpose 2 and Feed categories are non-milling wheats which have incurred weather damage or have some other defect.

There can exist within each category a number of individual classes, many of which have been developed to meet individual customer requirements. Particulars of Australian wheat standards may be found in *Crops and Pastures, Australia* (7321.0).

Central Grain Research Laboratory

In 1976, the Australian Wheat Board established this laboratory in Sydney as an addition to the facilities of the Bread Research Institute of Australia. The main functions of the laboratory are to test and report on the Australian crop, to analyse and compare competitor wheats from other countries and to develop research programs to aid the marketing of wheat.

WHEAT: AREA, PRODUCTION AND RECEIVALS

Season	Area (a)		Production (a)		Australian Wheat Board receivals (b)
	For grain	All purposes	Grain	Gross value	
	'000 ha	'000 ha	'000 tonnes	\$m	'000 tonnes
1980-81	11,283	11,436	10,856	1,684.1	10,021
1981-82	11,885	11,995	16,360	2,599.4	(b)15,531
1982-83	11,520	11,755	8,876	1,566.2	7,927
1983-84	12,931	13,025	22,016	3,605.6	21,059
1984-85	12,078	12,150	18,666	3,202.9	17,544
1985-86	11,736	11,823	16,167	2,719.4	15,085

(a) Area and production data relate to the year ending 31 March. (b) Due to amendments to the *Wheat Marketing Act 1979*, the AWB has changed from a December-November to an October-September crop year. To facilitate this transition, 1981-82 was a 10 month (December-September) reporting period.

WHEAT FOR GRAIN: AREA AND PRODUCTION, BY STATE

Season	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	Australia
AREA ('000 hectares)							
1980-81	3,345	1,431	727	1,445	4,333	2	11,283
1981-82	3,600	1,322	941	1,427	4,593	1	11,885
1982-83	3,162	1,327	767	1,398	4,865	1	11,520
1983-84	3,999	1,614	1,006	1,564	4,746	2	12,931
1984-85	3,603	1,523	921	1,378	4,652	2	12,078
1985-86	3,663	1,508	973	1,443	4,148	2	11,736
PRODUCTION ('000 tonnes)							
1980-81	2,865	2,538	485	1,650	3,315	3	10,856
1981-82	5,910	2,467	1,482	1,695	4,803	2	16,360
1982-83	1,499	394	754	692	5,534	1	8,876
1983-84	8,961	3,971	1,922	2,843	4,316	3	22,016
1984-85	5,805	2,666	1,579	2,031	6,580	4	18,666
1985-86	5,916	2,250	1,691	1,944	4,362	4	16,167

PRODUCTION AND DISPOSAL OF WHEAT

('000 tonnes)

	1981	1982	1983	1984	1985	1986
Year ended 31 March—						
Production	10,856	16,360	8,876	22,016	18,666	16,167
Balance held on farm for seed, feed and other uses	835	829	949	957	1,122	1,082
Year ended 30 September(a)—						
Wheat received	10,021	15,531	7,927	21,059	17,544	15,085
Carryin	4,268	2,044	4,879	2,285	7,518	8,456
<i>Total availability for export, domestic disposal and carryover</i>	<i>14,289</i>	<i>17,575</i>	<i>12,806</i>	<i>23,344</i>	<i>25,062</i>	<i>23,541</i>
Exports of wheat, flour and wheat products	9,614	11,068	7,280	14,159	14,679	16,026
Domestic disposals	2,631	1,628	3,241	1,667	1,941	1,709
<i>Total disposals</i>	<i>12,245</i>	<i>12,696</i>	<i>10,521</i>	<i>15,826</i>	<i>16,620</i>	<i>17,735</i>

(a) Due to amendments to the *Wheat Marketing Act 1979*, the AWB has changed from a December-November to an October-September crop year. To facilitate this transition, 1981-82 was a 10 month (December-September) reporting period.

Wheat pools

Details of wheat receivals by State of origin for the several Pools together with Pool payments and times of payment will be found in the latest issue of *Crops and Pastures, Australia* (7321.0).

International Wheat Agreement

A number of Agreements have operated since 1933 to provide a valuable framework for continuing international consultation and co-operation on world wheat matters, including the regular monitoring of the world wheat situation. On 1 July 1986, the International Wheat

Agreement 1986 entered into force and will remain in force until 30 June 1991. It comprises two separate legal instruments, the Wheat Trade Convention and the Food Aid Convention, linked by a common preamble. The primary objective of the Wheat Trade Convention is to promote international co-operation in all aspects of trade in wheat and other grains. Under the Food Aid Convention, countries undertake to provide minimum annual amounts of food grain as aid. Contributions are made by both wheat importing and exporting countries in the form of grain (or grain products) for human consumption or cash for the purchase of grain.

WHEAT EXPORTS: A COMPARISON WITH OTHER EXPORT COMMODITIES^(a)

Year	Wheat for grain: Export		Total Australian exports— all produce: Value f.o.b.	Export value of wheat for grain as a percentage of total Australian exports
	Quantity '000 tonnes	Value f.o.b. \$m	Value f.o.b. \$m	per cent
1980-81	10,552	1,729.4	18,949	9.0
1981-82	10,912	1,719.7	19,249	8.8
1982-83	8,022	1,343.1	21,454	6.1
1983-84	10,535	1,813.8	24,013	7.3
1984-85	15,704	2,866.9	29,708	9.8
1985-86	16,109	2,968.8	32,795	9.3

(a) These statistics exclude re-exports.

WORLD WHEAT: AREA AND PRODUCTION

(Source: International Wheat Council, *World Wheat Statistics, 1986*)

	Area (million hectares)			Production (million tonnes)		
	1983-84	1984-85	1985-86	1983-84	1984-85	1985-86
Europe	27.1	27.2	26.3	103.6	129.2	112.5
EEC (10)	13.2	13.6	13.0	59.4	76.1	65.6
U.S.S.R.	50.8	51.1	50.3	77.5	68.6	78.1
North & Central America	39.4	41.3	40.9	95.9	96.4	95.5
Canada	13.7	13.2	13.7	26.5	21.2	24.3
U.S.A.	24.8	27.1	26.2	65.9	70.6	66.0
South America	10.0	8.9	9.0	16.9	17.4	15.1
Asia	82.5	83.3	83.5	169.6	177.1	177.6
China (a)	29.1	29.6	29.2	81.4	87.8	85.8
India	23.6	24.7	24.4	42.8	45.5	44.2
Iran	6.0	6.0	6.0	6.5	6.0	6.5
Pakistan	7.4	7.4	7.3	12.4	10.9	11.7
Turkey	9.3	9.0	9.1	16.4	17.2	17.0
Africa	8.1	8.3	8.6	8.5	9.4	10.5
Oceania	13.0	12.2	11.8	22.3	19.0	16.3
Australia	12.9	12.1	11.7	22.0	18.7	16.2
Total	230.9	232.3	230.5	495.9	516.8	505.3

(a) Excludes Taiwan Province; FAO estimates.

NOTE 1. Crop years shown cover northern hemisphere harvests combined with those of the southern hemisphere which immediately follow.

2. The 10 members of the EEC are: Belgium, Denmark, France, Federal Republic of Germany, Greece, Ireland, Italy, Luxembourg, Netherlands and the United Kingdom.

Australia acceded to the Wheat Trade Convention, 1986 in July 1986. Major changes from the previous Wheat Trade Convention, which operated from 1971, include expansion to cover coarse grains and amendments to reflect the fact that the Convention does not contain economic provisions. The Wheat Trade Convention through its plenary body, the

International Wheat Council (IWC), provides a forum for exchange of information and discussion of members' concerns regarding trade in grains. In the context of the current round of GATT Multilateral Trade Negotiations, Australia has proposed that the IWC Secretariat undertake a study examining the effects of changes in national policies on world grains markets.

Australia made a formal application to accede to the Food Aid Convention, 1986 at the 53rd Session of the Food Aid Committee in December 1986 with a minimum annual contribution of 300,000 tonnes, compared with 400,000 tonnes under the previous Convention. The decision to reduce the level of Australia's commitment was made against the background of the severe economic difficulties being experienced in Australia which, inter alia, have effectively reduced our capacity to provide development assistance, including food aid. Australia's application was accepted at the 54th Session of the Food Aid Convention in June 1987.

Coarse grains

In the late sixties and early seventies, restrictions on wheat deliveries and low returns in the sheep industry caused a resurgence of interest in coarse grain crops and the newer oilseed crops. The resultant higher level of plantings and production has been maintained, despite the lifting of wheat delivery quotas and a general improvement in market prospects for wheat, wool and meat.

Oats

Oats are traditionally a cereal of moist temperate regions. However, improved varieties and management practices have enabled oats to be grown over a wide range of soil and climatic conditions. They have a high feed value and produce a greater bulk of growth than other winter cereals; they need less cultivation and respond well to superphosphate and nitrogen. Oats have two main uses: as a grain crop, or as a fodder crop, (following sowing or fallow or rough sowing into stubble or clover pastures). Fodder crops can either be grazed and then harvested for grain after removal of livestock or else mown and baled or cut for chaff. Oats produced in New South Wales are marketed through a statutory board while the Victorian Oatgrowers' Pool and Marketing Company Ltd and private merchants market the bulk of oats produced in Victoria. In South Australia the Barley Marketing Act was amended in 1977 to give the Australian Barley Board powers over oat marketing in that State. Under the legislation amendments, the Board controls export sales and grain resold on the local market; however, direct sales between producers and consumers are outside the Board's supervision. In Western Australia, oats are marketed under a warehousing system operated by Co-operative Bulk Handling Ltd.

Oats are usually next in importance to wheat and barley among the grain crops. About three-quarters of the crop is used domestically as stockfeed or for human consumption.

OATS FOR GRAIN: AREA, PRODUCTION AND EXPORTS

Year	Area	Production		Exports	
		Quantity	Gross value	Quantity	Value f.o.b.
	'000 ha	'000 tonnes	\$m	'000 tonnes	\$m
1980-81	1,093	1,128	139.5	196	27.7
1981-82	1,388	1,617	155.7	153	24.1
1982-83	1,212	848	116.1	83	13.2
1983-84	1,772	2,296	203.8	289	40.9
1984-85	1,041	1,367	129.6	391	49.0
1985-86	1,068	1,330	138.3	185	25.1

Barley

This cereal contains two main groups of varieties, 2-row and 6-row. The former is generally, but not exclusively, preferred for malting purposes. Barley is grown principally as a grain crop although in some areas it is used as a fodder crop for grazing, with grain being subsequently harvested if conditions are suitable. It is often grown as a rotation crop with wheat, oats and pasture. When sown for fodder, sowing may take place either early or late

in the season, as it has a short growing period. It may therefore provide grazing or fodder supplies when other sources are not available. Barley grain may be crushed to meal for stock or sold for malting.

Crops sown for malting purposes require a combination of light textured soil of moderate fertility, reliable rainfall, and mild weather during ripening. The main barley-growing areas in Australia are situated in South Australia, but considerable quantities are also grown in New South Wales, Western Australia, Victoria and Queensland. In December 1980, a joint Commonwealth/industry research scheme for the barley industry commenced operation. The scheme is financed by a levy on barley production and a Commonwealth contribution not exceeding the total of the levy.

Barley is marketed by statutory marketing authorities in each of the mainland States. The Australian Barley Board controls marketing in both South Australia and Victoria, while separate authorities operate in the three other States.

BARLEY FOR GRAIN: AREA, PRODUCTION AND EXPORTS

Year	Area	Production		Total		Exports	
		2-row	6-row	Quantity	Gross value	Quantity	Value f.o.b.
		—'000 tonnes—			\$m	'000 tonnes	\$m
	'000 ha						
1980-81	2,451	2,563	119	2,682	380.9	1,598	242.7
1981-82	2,685	3,252	198	3,450	463.5	1,577	241.3
1982-83	2,452	1,785	153	1,939	287.6	834	131.4
1983-84	3,109	4,585	305	4,890	732.6	3,121	499.4
1984-85	3,518	5,194	361	5,554	759.3	5,183	750.0
1985-86	3,284	4,635	233	4,868	586.8	4,168	536.6

Grain sorghum

The sorghums are summer growing crops which are used in three ways: grain sorghum for grain; sweet or fodder sorghum, sudan grass and, more recently, columbus grass for silage, green feed and grazing; and broom millet for brooms and brushware.

Grain sorghum has been grown extensively only in the last two decades. Rapid increases in production have resulted in a substantial increase in exports over this period. The grain is used primarily as stockfeed and is an important source for supplementing other coarse grains for this purpose.

The climatic conditions of Queensland and northern New South Wales are particularly suited to the growing of sorghum. In Queensland, grain sorghum production is concentrated in the Darling Downs, Fitzroy and Wide Bay-Burnett Divisions. In New South Wales, the northern and north-western slopes and plains are the main areas.

In Queensland, a degree of orderly marketing is ensured by the operation of the Central Queensland Grain Sorghum Marketing Board (a statutory authority in a defined area in central Queensland). A State statutory marketing board handles sorghum grown in New South Wales.

GRAIN SORGHUM: AREA, PRODUCTION AND EXPORTS

Year	Area	Production		Exports	
		Quantity	Gross value	Quantity	Value f.o.b.
	'000 ha	'000 tonnes	\$m	'000 tonnes	\$m
1980-81	657.9	1,203.9	152.0	462.7	57.5
1981-82	648.6	1,316.7	140.1	1,270.9	152.8
1982-83	706.5	958.0	124.4	445.0	53.9
1983-84	730.3	1,885.5	246.3	772.1	110.7
1984-85	723.0	1,369.0	196.9	1,593.6	242.1
1985-86	734.2	1,415.7	180.8	1,234.2	177.6

Maize

Like sorghum, maize is a summer cereal demanding specific soil and climatic conditions. Maize for grain is almost entirely confined to the south-east regions and Atherton Tablelands of Queensland; and the north coast, northern slopes and tablelands and the Murrumbidgee Irrigation Area in New South Wales. Small amounts are grown in all States, except South Australia, for green feed and silage, particularly in association with the dairy industry.

A statutory board controls the marketing of maize in the Atherton Tablelands area of Queensland. A large proportion of the crop is sold directly to food processors.

MAIZE: AREA, PRODUCTION AND EXPORTS

Year	Area	Production		Exports	
		Quantity	Gross value	Quantity	Value f.o.b.
	'000 ha	'000 tonnes	\$m	'000 tonnes	\$m
1980-81	56.5	172.8	26.1	29.1	3.4
1981-82	61.0	212.4	29.6	14.2	1.9
1982-83	64.3	139.1	23.3	18.3	2.4
1983-84	68.4	238.2	35.6	19.0	2.8
1984-85	102.9	291.4	46.1	139.8	24.9
1985-86	84.2	277.7	40.4	81.3	13.2

Rice

In Australia, rice was first grown commercially in 1924-25 in the Murrumbidgee Irrigation Area, one of three irrigation areas in southern New South Wales where rice is now produced. Today, about 97 per cent of Australia's rice is grown in New South Wales. The remainder is grown in the Burdekin River basin and at Mareeba in Northern Queensland.

Rice is a summer growing crop in New South Wales. The combination of irrigation water and the relatively cloudless days characteristic of summers in temperate regions of the world is the main contributing factor to the very high yields per hectare often achieved by New South Wales growers. In Queensland, a winter and a summer crop are grown.

State statutory marketing boards are responsible for the marketing of the New South Wales and Queensland crops.

RICE: AREA, PRODUCTION AND EXPORTS

Year	Area	Production		Exports	
		Quantity(a)	Gross value	Quantity	Value f.o.b.
	'000 ha	'000 tonnes	\$m	'000 tonnes	\$m
1980-81	103.9	727.5	138.2	281.3	99.9
1981-82	122.9	853.9	103.5	596.3	195.4
1982-83	84.8	547.7	88.4	404.7	120.3
1983-84	119.0	632.2	88.9	245.6	91.9
1984-85	122.0	865.7	123.1	341.4	121.7
1985-86	106.6	716.1	80.5	177.9	77.0

(a) In terms of paddy (or rough) rice.

Oilseeds

Specialised oilseeds

The oilseeds industry is a relatively young industry by Australian agricultural standards. Production has increased rapidly in recent years following changes in relative profitability and agronomic advances. The expected profitability of oilseeds relative to crops such as wheat and coarse grains will continue to influence future production levels in the industry. This profitability will be related to domestic and international markets for protein meals and vegetable fats and oils.

The specialist oilseed crops grown in Australia are sunflower, soybeans, rapeseed, safflower and linseed. Sunflower and soybeans are summer grown while the others are winter crops. In Australia, oilseeds are crushed for their oil, which is used for both edible and industrial purposes and protein meals for livestock feeds.

Oilseed crops are grown in all States but the largest producing regions are the grain growing areas of the eastern States.

Sunflower

When crushed, sunflower seed yields a high quality dual purpose oil used primarily to manufacture margarine, salad and cooking oils.

Queensland produces about two-thirds of the Australian crop with the Darling Downs and Central Highlands being the major regions. New South Wales is the next largest producer with the north-west of the State dominating production. Smaller amounts are produced in all other States except Tasmania.

Soybeans

The major uses of soybean oil are in salad and cooking oils and margarine. Small amounts are used in the production of paints, detergents and plastics. Soybeans also yield a high protein feed for livestock with a small proportion used to manufacture adhesives and synthetic fibres and meats.

Queensland and New South Wales produce virtually all of Australia's soybean crop. The main producing areas are the irrigation districts of the Darling Downs and northern New South Wales. Lesser areas include the Burnett and Lockyer regions of Queensland, while production of raingrown soybeans is expanding on the North Coast of New South Wales.

In irrigated areas, soybeans have increasingly been used as a rotational crop for cotton.

Rapeseed

The main use of rapeseed oil has been in salad and cooking oils and in margarine with a small amount being used for industrial purposes.

The major production areas are the tablelands and western slopes of New South Wales followed by the south-east of South Australia and the Western Districts of Victoria. Smaller levels of production occur in the South Coast region of Western Australia.

Following significant increases in the 1960s and 1970s, rapeseed production declined rapidly due to problems of blackleg disease and erucic acid content. Production has recovered in recent years with the development of varieties to overcome these problems and in response to the crop rotation benefits of rapeseed.

Safflower

The oil from safflower is used in the production of cooking oil, margarine, soaps, paints, varnishes, enamels and textiles. In recent years, New South Wales and Queensland together have produced around 90 per cent of Australian output. In Queensland, most production occurs in the Central Highlands with smaller amounts coming from the Dawson-Callide Valley and the Darling Downs. New South Wales production is centred on the Central West.

Wide fluctuations in safflower production since the mid-1960s have been due to variable seasonal conditions affecting yields and the profitability of other crops which has influenced plantings.

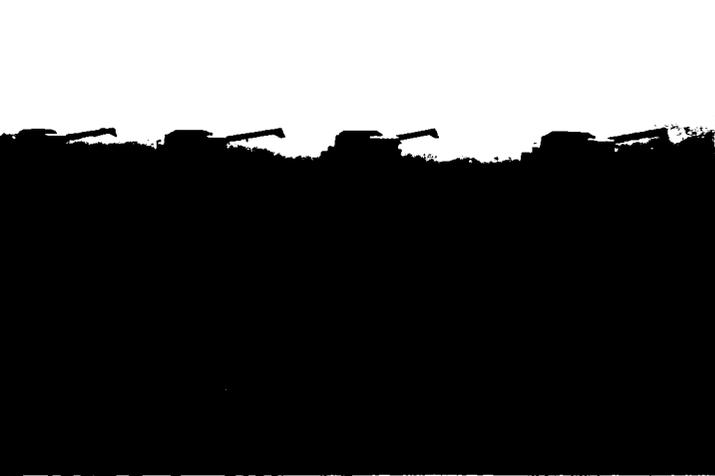
Linseed

The oil from crushed linseed is used in the manufacture of paints, varnishes, technical inks and linoleum.

The main producing areas are the wheat belt of New South Wales, the Darling Downs in Queensland, the Western Districts of Victoria and, to a lesser extent, the south-eastern districts of Victoria. Linseed production has been generally declining in recent years.

Other oilseeds

Peanuts and cottonseed are summer crops grown primarily for human consumption and fibre purposes respectively. The rapid expansion of the cotton industry in recent years has resulted in cottonseed becoming the major oilseed in Australia. Cottonseed oil is used mainly in the manufacture of compound cooking fats and margarine. The least important source of vegetable oils in Australia is peanuts as it is only the low quality kernels which are crushed



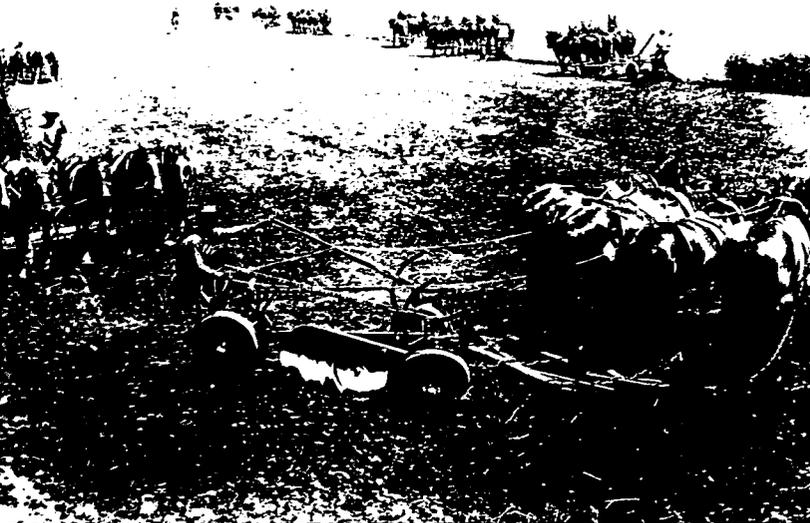
Harvesting wheat in Northern N.S.W.



A prize winning Merino ram.



Sugar cane fields, North Queensland.



Disc ploughs and horse teams—once a familiar sight in the wheatfields of Australia.

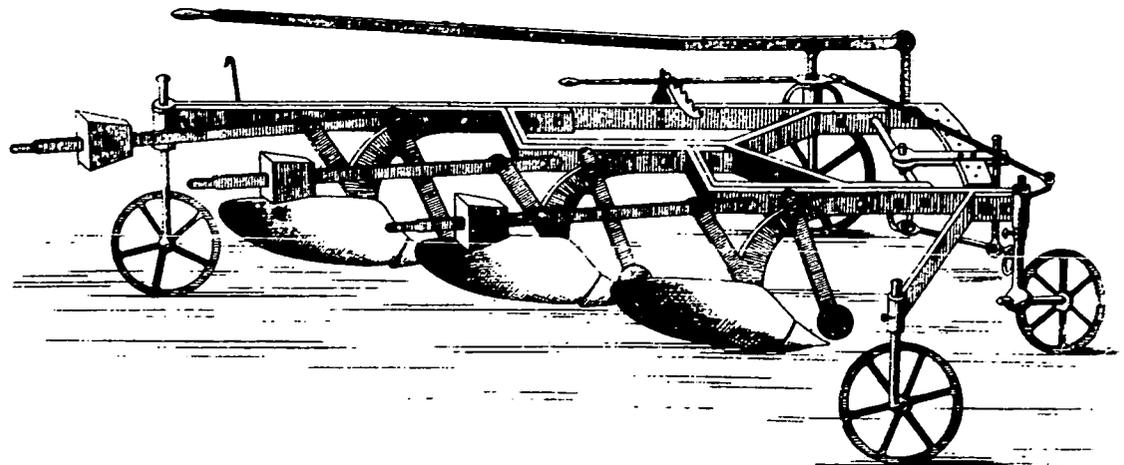
Photographs—Promotion Australia.

Shearing shed near Hall, A.C.T.



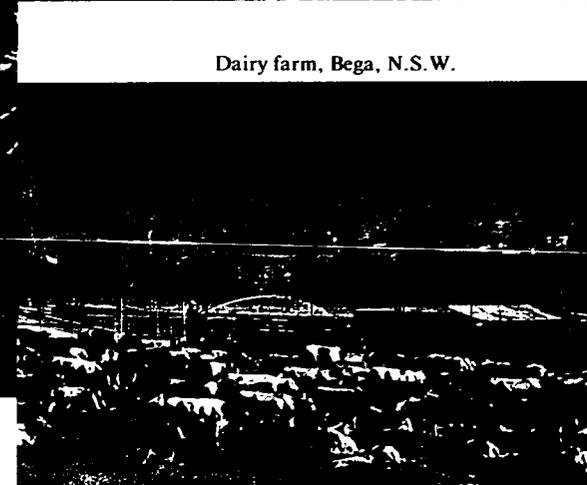
Photographs—Promotion Australia.

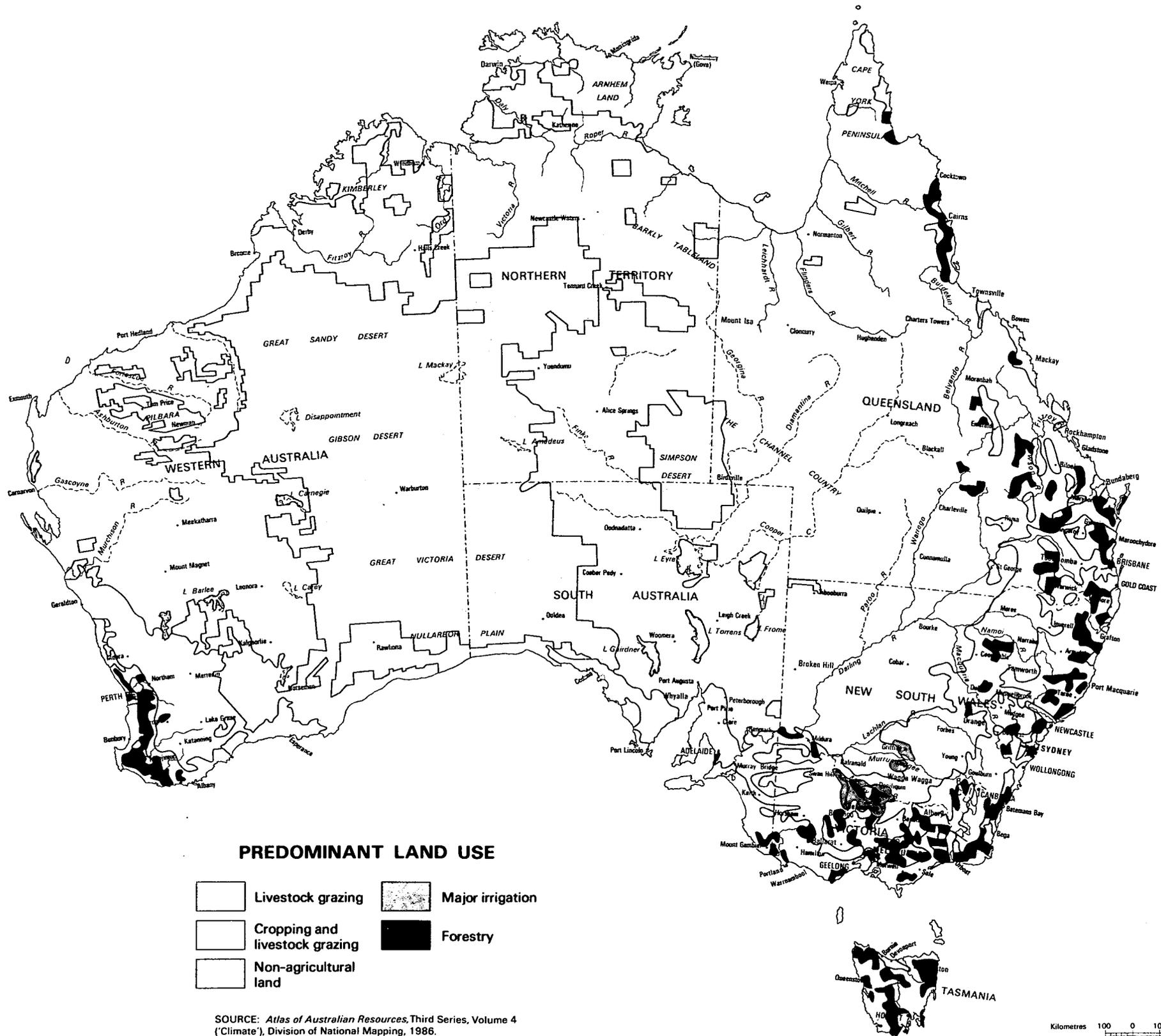
The first "stump jumping" plough, the vixen, a three furrow version made by the Smith Brothers in 1876.



Cropdusting near Narromine, N.S.W.

Dairy farm, Bega, N.S.W.





for oil. Crushings may vary between 3,000 and 7,000 tonnes per annum depending on the quality of the crop. Peanut oil is a high quality oil which is used in the manufacture of margarine and in compound cooking fats and is also used as a cooking and salad oil.

Peanuts

The major peanut growing areas are around Kingaroy in south-east Queensland and the Atherton Tablelands in North Queensland, with smaller pockets of production around Tweed Heads in New South Wales and around Douglas in the Northern Territory.

About 80 per cent of peanuts grown in Australia are of Virginia variety, the remainder being of Spanish types.

Although area planted to peanuts has stabilised in recent years at around 25,000 to 33,000 hectares, production has fluctuated depending on seasonal conditions. Output in 1985-86 is estimated to total some 43,500 tonnes compared with 42,400 tonnes produced in 1984-85.

Local demand for peanuts and peanut products is comparatively static with a limited potential for growth corresponding to population growth. The local growing industry normally supplies most of the domestic demand for edible peanuts in its major outlets: peanut butter, packaged trade and confectionery. Any surplus is sold on export markets. Exports vary according to the size of the crop.

SELECTED OILSEED CROPS: AREA, PRODUCTION AND GROSS VALUE

<i>Year</i>	<i>Sunflower</i>	<i>Soybeans</i>	<i>Rapeseed</i>	<i>Safflower</i>	<i>Linseed</i>	<i>Total</i>
AREA ('000 hectares)						
1980-81	197.7	39.6	23.6	18.3	10.0	289.2
1981-82	177.5	40.5	15.7	33.4	6.6	273.7
1982-83	176.1	48.3	12.4	11.5	4.9	253.2
1983-84	233.5	48.1	17.8	54.9	5.3	359.6
1984-85	354.0	63.1	30.0	44.3	5.6	497.0
1985-86	276.9	70.7	74.2	47.4	10.2	479.3
PRODUCTION ('000 tonnes)						
1980-81	139.0	73.2	17.2	8.1	7.4	244.9
1981-82	115.1	77.1	14.5	19.6	6.0	232.3
1982-83	104.0	53.2	6.7	5.3	2.5	171.7
1983-84	170.4	88.6	17.2	30.6	4.3	311.1
1984-85	292.7	109.8	32.4	32.3	5.7	472.9
1985-86	214.9	105.2	87.0	27.7	12.1	446.9
GROSS VALUE (\$ million)						
1980-81	34.3	22.4	4.5	2.2	2.2	65.6
1981-82	28.3	19.8	3.3	5.2	1.6	58.2
1982-83	27.2	16.3	1.6	1.6	0.7	47.4
1983-84	58.9	26.9	5.0	7.8	1.3	99.9
1984-85	88.3	35.8	9.9	8.2	1.9	144.1
1985-86	53.1	28.0	24.1	6.1	3.7	115.0

PEANUTS: AREA, PRODUCTION AND GROSS VALUE

<i>Year</i>	<i>Area</i>	<i>Production</i>	<i>Gross value</i>
	'000 hectares	'000 tonnes	\$ million
1980-81	27.1	43.2	36.6
1981-82	33.4	57.6	37.0
1982-83	35.9	23.3	17.8
1983-84	32.3	47.2	40.2
1984-85	30.0	42.4	36.6
1985-86	29.2	43.4	38.1

Cotton

Cotton is grown primarily for its fibre (lint). When the cotton is matured, seed cotton is taken to a gin where it is separated (ginned) into lint, seed and thrash. Lint is used for yarn while seed is further processed at an oil mill. There the short fibres (linters) remaining on the seed after ginning are removed. They are too short to make into cloth but are used for

wadding, upholstery and paper. The seeds are then separated into kernels and hulls. Hulls are used for stock feed and as fertiliser, while kernels are crushed to extract oil. The remaining cake is ground into meal which is protein roughage used as stock feed.

Over three-quarters of Australia's total production of cotton lint is grown in New South Wales, principally in the Namoi, Macquarie, Gwydir and McIntyre Valleys and the Bourke area. Irrigation water for these areas is provided from the Keepit, Burrendong, Copeton and Glenlyon Dams and the Darling River. The rest is grown in Queensland, in the Emerald, Biloela, St George, and Darling Downs areas. Most of these areas are also irrigated. Australian production has for some time satisfied most of the requirements of local mills for short and medium staple cotton. Since the mid-1970s there has been very strong investment growth in the cotton industry and the resultant surge in plantings has resulted in large amounts of cotton becoming available for export.

COTTON: AREA, PRODUCTION AND EXPORTS

Year	Area	Seed cotton (a)			Raw cotton export		
		Quantity	Gross value	Cottonseed (b)	Lint(c)	Quantity	Value f.o.b.
	'000 ha	'000 tonnes	\$m	'000 tonnes	'000 tonnes	'000 tonnes	\$m
1980-81	77.9	236.6	147.2	161.2	98.9	58.7	92.1
1981-82	92.3	324.9	182.0	219.0	134.0	79.2	117.2
1982-83	96.4	285.6	167.5	164.0	101.0	129.2	197.6
1983-84	137.4	400.5	268.8	230.0	141.0	81.5	147.9
1984-85	183.1	679.4	330.2	410.4	248.7	139.7	259.6
1985-86	177.1	684.7	324.9	366.0	256.7	241.2	378.4

(a) Before ginning. (b) Estimated by the Australian Bureau of Agricultural and Resource Economics. (c) Provided by the Raw Cotton Marketing Advisory Committee.

Sugar

Sugar cane is grown commercially in Australia along the east coast over a distance of some 2,100 kilometres in a number of discontinuous areas from Maclean in northern New South Wales to Mossman in Queensland. The geographical spread contributes to the overall reliability of the sugar cane crop and to Australia's record as a reliable sugar supplier.

Approximately 95 per cent of production occurs in Queensland, with some 75 per cent of the crop grown north of the Tropic of Capricorn in areas where rainfall is reliable and the warm, moist and sunny conditions are ideal for the growing of sugar cane. Farm sizes range between 20 and 70 hectares.

Australian cane farmers are regarded as amongst the most efficient in the world and employ a high degree of mechanisation in ploughing, planting, harvesting, and transportation activities. The Australian industry was the first in the world to introduce mechanical cultivation and harvesting techniques and by 1964 the entire industry had converted to bulk handling.

The cane crop is generally planted in April/May and harvested from June to December the following year. The major proportion of each year's crop is from ratoons while in New South Wales most crops are allowed to grow for two seasons due to the slower growing conditions.

The organisation of the Australian sugar industry is complex. The Queensland Government controls the quantity of raw sugar produced through a system of mill peaks which is translated into cane quotas for growers. In addition the Queensland Government contracts with CSR Limited and Millaquin Sugar Company Pty Limited for the refining, marketing and distribution of home consumption needs, arranges through CSR Limited the export marketing of raw sugar, and regulates the division of industry proceeds between growers and millers.

There are 33 raw sugar mills located throughout the growing regions: 30 are located in Queensland and the remaining three in New South Wales. Fifteen of the mills are co-operatively owned by canegrowers and the remaining eighteen by proprietary companies. Refineries are located in each mainland capital city and at Bundaberg. The six bulk sugar export terminals located in Queensland are at present capable of storing 2.9 million tonnes. While raw sugar is the main product from mills, important by-products are bagasse (fibre), molasses, ash and filter mud.

In recent years sugar cane production has been around 24 million tonnes yielding between 2.8 and 3.3 million tonnes of sugar. Area, production and yield levels for sugar cane from 1980-81 to 1985-86 are provided in the following table.

SUGAR CANE: AREA, PRODUCTION AND YIELD

Year	New South Wales					Queensland				
	Sugar cane cut for crushing			Raw sugar(a)		Sugar cane cut for crushing			Raw sugar(a)	
	Area harvested	Production	Yield	Quantity	Yield	Area harvested	Production	Yield	Quantity	Yield
	'000 ha	'000 tonnes	t/ha	'000 tonnes	t/ha	'000 ha	'000 tonnes	t/ha	'000 tonnes	t/ha
1980-81	14.0	1,435.3	102.4	181.2	12.9	274.3	22,540.4	82.2	3,148.5	11.5
1981-82	14.3	1,505.9	105.4	184.7	12.9	301.7	23,587.9	78.2	3,250.4	10.8
1982-83	16.0	1,702.3	106.5	175.9	11.0	302.5	23,114.8	76.4	3,324.2	11.0
1983-84	15.2	1,468.4	96.7	159.0	10.5	292.0	22,723.0	77.8	3,011.6	10.3
1984-85	14.9	1,540.5	103.6	198.9	13.4	297.8	23,910.0	80.3	3,349.2	11.2
1985-86	15.3	1,398.2	91.1	170.0	11.1	288.3	23,003.5	79.8	3,208.6	11.1

(a) In terms of 94 net titre.

The domestic market is reserved entirely for sugar produced in Australia. This is achieved by an embargo on the import of sugar. The maximum price of refined sugar for sale to wholesalers and manufacturers is fixed each six months under a formula contained in the Commonwealth/Queensland Sugar Agreement.

Domestic sales account for about 760,000 tonnes annually or approximately 20 per cent of the total industry sales. Granulated sugars account for about 75 per cent of the total domestic sales with liquid sugars (15 per cent), castor sugar (5 per cent), and raw sugar taking up the bulk of the remainder. About two-thirds of the sales of refined sugar products go to processed food and drink manufacturers.

The Australian sugar industry exports about 75 per cent of its annual raw sugar production and is one of the world's largest sugar exporters. The disposal pattern of Australia's sugar production is shown in the following table.

SUGAR: AREA, PRODUCTION, EXPORTS AND CONSUMPTION

Year	Area harvested	Production			Exports		Apparent consumption in Australia(a)	
		Sugar cane		Raw sugar	Raw and refined sugar			
		Quantity	Gross value	Quantity	Quantity	Value f.o.b.	Total	Per head
		'000 ha	mil. tonnes	\$m	mil. tonnes	mil. tonnes	\$m	'000 tonnes
1980-81	288.3	24.0	799.7	3.3	2.6	1,146.2	721.4	48.7
1981-82	315.9	25.1	590.2	3.4	2.5	777.7	710.7	47.2
1982-83	318.5	24.8	508.9	3.5	2.5	557.7	703.0	46.0
1983-84	307.1	24.2	516.6	3.2	2.4	621.3	679.5	43.9
1984-85	312.6	25.4	512.2	3.5	2.5	572.2	692.4	44.2
1985-86	303.7	24.4	494.2	3.4	2.7	613.2	714.1	45.0

(a) Total quantity of sugar available for consumption in Australia comprises refined sugar and refined sugar contained in manufactured foods.

Australia has regularly participated in arrangements to regulate the international sugar market and was a signatory to the 1984 International Sugar Agreement (ISA). The Agreement is an administrative pact only, and unlike previous Agreements contains no economic provisions. This means that member countries are not constrained in their sugar exports.

Vegetables

Vegetables for human consumption

The area sown to vegetables reached a peak of over 200,000 hectares in 1945, but has remained static at around 109,000 hectares since 1975-76. However, yields from most vegetable crops have increased due to variety breeding for increased yields, greater use of

irrigation and better control of disease and insect pests.

Because of the wide climatic range in Australia, supplies for main city markets are drawn from widely different areas, depending on the times of maturity of the various crops. Historically, market gardens were located near urban centres and, while many small scale growers still produce crops close to city markets, urban expansion, rising urban land values, improvements in transport and irrigation, and developments in freezing, canning and drying have extended the industry far from the cities. Transport costs are reduced by the location of processing establishments in producing areas, although city markets still absorb the bulk of fresh and processed produce.

For further information on vegetables see *Year Book* No. 70.

APPARENT CONSUMPTION OF VEGETABLES
(kilograms per capita per year)

Year	Potatoes	Other root and bulb vegetables	Tomatoes	Leafy and green vegetables	Other vegetables	Total, fresh equivalent weight
1980-81	54.9	16.3	15.7	21.8	17.5	126.3
1981-82	57.6	18.7	16.7	20.8	17.1	130.8
1982-83	52.2	16.9	16.5	21.4	17.9	124.9
1983-84	62.6	17.4	18.6	21.9	18.3	138.8
1984-85	59.9	19.3	19.6	22.5	21.0	142.4
1985-86	57.7	18.9	16.9	22.8	20.0	136.2

VEGETABLES FOR HUMAN CONSUMPTION: AREA AND PRODUCTION

Year	French and runner beans	Cabbages	Carrots	Cauli-flowers	Onions	Green peas		Potatoes	Tomatoes	Total vegetables
						Processing (shelled weight)	Sold in pod (pod weight)			
AREA ('000 hectares)										
1980-81	(a)6.3	2.4	3.7	(a)2.8	4.0	(a)10.8	35.7	9.1	9.1	103.0
1981-82	7.1	(a)2.4	3.9	3.1	4.0	12.1	(a)36.1	9.1	9.1	106.7
1982-83	6.7	2.5	3.8	3.3	4.2	14.8	(a)37.4	8.7	8.7	110.3
1983-84	6.7	2.5	4.3	3.4	3.8	12.2	37.9	9.1	9.1	109.9
1984-85	6.3	2.4	4.6	3.6	4.4	11.4	38.4	9.3	9.3	111.0
1985-86	5.9	2.3	4.3	3.6	4.5	11.2	36.1	9.5	9.5	110.7
PRODUCTION ('000 tonnes)										
1980-81	(a)34.0	76.1	112.6	(a)79.2	114.8	(a)32.6	(a)1.5	865.8	216.8	216.8
1981-82	(a)34.6	(a)71.0	112.5	85.4	127.4	38.4	1.7	(a)918.6	228.4	228.4
1982-83	33.5	67.2	105.0	76.5	129.0	46.0	1.9	858.5	224.1	224.1
1983-84	32.3	72.3	124.3	84.4	115.9	44.0	2.1	1,019.8	258.3	258.3
1984-85	31.1	69.5	130.6	101.1	151.7	41.8	2.1	992.1	270.5	270.5
1985-86	31.3	70.4	127.6	103.8	159.7	39.7	1.5	964.9	252.6	252.6

(a) Incomplete, information on this commodity was not separately collected in some States.

For further information on vegetables see the following publications: *Crops and Pastures, Australia* (7321.0), *Apparent Consumption of Foodstuffs and Nutrients, Australia* (4306.0) *Value of Agricultural Commodities Produced, Australia* (7503.0), and *Year Book* No. 70.

Fruit (excluding grapes)

A wide variety of fruit is grown in Australia ranging from pineapples, mangoes and papaws in the tropics to pome, stone and berry fruits in the temperate regions.

In recent years there has been rapid expansion in the cultivation of many relatively new fruit crops in Australia and there is considerable scope for continued growth in the future.

Avocado is perhaps the most commonly known of these crops and production has expanded considerably during the past decade to a current gross value of over \$10m. Avocado production is mainly in Queensland and New South Wales with minor quantities produced in Western Australia, South Australia and Victoria.

Kiwifruit is a relatively new temperate fruit crop to Australia. Production has been expanding rapidly mainly in Victoria and New South Wales and further expansion is expected. Of the berry fruits, strawberries are widely grown, with largest production in Victoria and Queensland. Interest in the production of blueberries in Australia has developed only recently and plantings of blueberries have increased rapidly mainly in Victoria and New South Wales. Other berries (currants and raspberries) are grown predominantly in Tasmania and production has been reasonably constant over the past five years.

Tropical fruit such as mangoes, papaws, passionfruit, custard apples and guavas, are grown mainly in Queensland. Smaller quantities of tropical fruit are produced in the north coast region of New South Wales, Western Australia and more recently the Northern Territory. The largest expansion has been of mango production which has more than doubled since 1979. Given the large number of non-bearing mango trees production is expected to continue to increase dramatically. There is also considerable interest in many other exotic tropical and subtropical fruits. Production of lychees and persimmons has recently commenced and some plantings of rambutan, sapote and longans have been made, mainly in Queensland and the north coast region of New South Wales.

Almond is still the major nut crop in Australia with almost the entire almond crop produced in South Australia and Victoria. Pecan nut production increased substantially in the 1970s, mainly in northern New South Wales. More recently plantings of pistachio trees have commenced in South Australia, Victoria, New South Wales and Western Australia. The major expansion in the nut crops has been with macadamias, a native Australian tree. The main growing regions are the coastal region of northern New South Wales and southern Queensland. During the past decade production of macadamia nuts has increased rapidly to a current gross value of about \$4 million.

SELECTED FRUIT STATISTICS

Year	Orchard fruit: number of trees('000)				Tropical and other fruits: area (ha)			Total area of fruit (ha)
	Apples	Oranges	Pears	Peaches	Bananas	Pineapples	Other fruit	
1980-81 . . .	6,099	5,872	1,622	1,649	8,558	6,583	1,831	100,516
1981-82 . . .	6,065	6,055	1,703	1,669	8,740	6,373	1,738	102,068
1982-83 . . .	6,098	6,219	1,556	1,642	9,040	6,010	1,774	104,325
1983-84 . . .	6,066	6,397	1,584	1,646	9,282	6,011	2,085	107,534
1984-85 . . .	6,147	6,657	1,548	1,696	9,205	6,268	2,272	109,095
1985-86 . . .	6,397	6,777	1,592	1,793	9,640	6,325	2,432	112,655

Year	Apples	Apricots	Bananas	Cherries	Oranges	Peaches	Pears	Pine-apples	Plums and Prunes
PRODUCTION ('000 tonnes)									
1980-81 . . .	306.9	30.6	124.3	6.5	424.5	79.2	145.6	123.3	20.8
1981-82 . . .	294.5	27.1	129.6	5.4	376.3	64.6	109.7	125.5	16.4
1982-83 . . .	300.8	26.9	140.5	4.2	410.0	63.0	119.2	111.3	20.6
1983-84 . . .	267.0	23.6	146.4	3.5	391.8	48.3	122.1	115.1	20.0
1984-85 . . .	352.0	24.5	144.8	3.8	445.0	59.8	138.5	124.5	20.6
1985-86 . . .	292.1	29.6	134.4	3.9	496.2	61.4	142.9	131.6	21.7

GROSS VALUE OF PRODUCTION (\$ million)									
1980-81 . . .	118.9	16.9	59.5	10.0	86.0	25.7	41.4	19.8	15.2
1981-82 . . .	124.2	18.1	61.4	13.2	89.6	23.0	30.8	20.5	11.2
1982-83 . . .	132.4	18.3	70.1	7.9	101.0	21.3	41.9	25.4	16.9
1983-84 . . .	134.1	17.6	86.8	8.7	105.3	25.4	45.9	26.2	17.5
1984-85 . . .	178.3	19.7	93.2	10.8	131.9	28.3	50.7	33.5	19.8
1985-86 . . .	139.0	24.5	101.7	9.5	132.5	29.3	63.7	32.6	23.5

Processed fruit and fruit products

After rapid expansion in the 1960s, output of canned fruit declined and then levelled off due to the effects of contracting overseas markets for Australian canned fruit. Production of natural fruit juices has increased markedly in the last decade and this has reflected improvements in marketing methods, effective promotion and public awareness of the nutritional value of natural juices.

FRUIT PRODUCTS

(Derived from the Annual Manufacturing Census and the recorded monthly production)

	Unit	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Fruit juice based cordials and syrups(a)	ML	77.8	80.4	78.7	86.5	101.1	98.1
Natural fruit juice(b)—							
Single strength	ML	232.6	186.5	201.1	214.1	317.7	} n.y.a.
Concentrated(c)	ML	32.6	27.3	32.6	26.5	43.6	
Cider and perry	ML	15.0	19.0	18.4	(d)9.4	(d)9.8	
Canned or bottled fruit (excl. canned pulp)	'000 tonnes	226.4	146.7	157.6	152.0	186.2	179.2
Jams	'000 tonnes	29.1	32.6	29.3	30.3	29.8	29.5

(a) Containing at least 25 per cent by volume of pure fruit juices. (b) Excludes fruit drinks consisting of diluted fruit juices with or without artificial flavourings. (c) Excludes grape must, and comprises actual quantity of concentrated juices. (d) Excludes alcoholic cider and perry.

APPARENT CONSUMPTION OF FRUIT AND FRUIT PRODUCTS

(kg per capita per year)

Year	Fresh			Jams, conserves, etc.	Dried tree fruit	Processed fruit	Total, fresh equivalent weight
	Oranges	Other citrus	Other fresh fruit				
1980-81	31.7	7.5	35.5	1.5	0.4	11.9	99.9
1981-82	29.5	6.9	37.8	1.8	0.5	10.3	97.4
1982-83	41.4	6.4	39.6	1.8	0.6	9.4	110.6
1983-84	43.4	7.7	38.1	1.8	0.7	9.8	113.3
1984-85	37.8	7.5	41.4	2.1	0.6	11.1	114.6
1985-86	33.7	7.1	42.1	1.9	0.6	8.0	106.9

Fruit exports

The value of exports of fruit and fruit products (excluding grapes) has in most recent years accounted for more than a quarter of the value of the production of fresh fruit. Fresh or chilled fruit (mostly apples, pears and citrus) account for some 40 per cent of this; preserved fruit (mostly canned pears and peaches) make up most of the remainder; only small quantities of dried fruits (other than grapes) are exported. The total value of those exports has been relatively constant in recent years.

FRUIT EXPORTS: VALUE F.O.B.

(\$ million)

Year	Fresh and chilled			Canned or bottled					
	Apples	Pears	Oranges	Apricots	Peaches	Pears	Peaches and pears	Pine- apples	Fruit salad
1980-81	15.3	20.0	8.0	1.3	16.0	20.6	3.0	3.5	9.6
1981-82	19.0	13.7	8.9	1.0	15.4	13.7	2.1	3.6	7.5
1982-83	15.7	17.8	12.6	1.1	13.8	16.5	2.4	2.2	9.8
1983-84	13.7	15.9	9.4	1.2	13.4	10.9	1.8	2.5	10.7
1984-85	12.0	21.3	14.4	0.4	12.1	17.9	1.4	3.9	10.2
1985-86	17.7	28.5	18.9	0.8	19.3	17.8	1.9	5.2	14.6

Fresh apple exports to Europe have been markedly reduced in recent years mainly because of rising shipping costs and improved storage techniques in Europe. On the other

hand, markets in other areas such as South East Asia and the Middle East have been maintained in most years. Fresh pear exports to Europe have also declined but not to the same extent as apples. Other export markets for pears, such as South East Asia, have gained importance in recent years. Exports of citrus, predominantly oranges, were relatively steady at around 30,000 tonnes for the five years to 1984-85 but increased rapidly to an estimated 50,000 tonnes in 1986-87. Citrus exports are sensitive to competition from the U.S.A. Exports of oranges were made to Japan for the first time in 1983-84, and sales in subsequent years have been steadily expanding. The Australian industry believes there is a potentially very important trade with Japan.

FRUIT: VALUE OF PRODUCTION AND EXPORTS
(**\$ million**)

Year	Gross value			Exports(a) value f.o.b.
	Orchard fruit	Tropical, berry and other	Total	
1980-81	366	94	460	131
1981-82	365	99	464	122
1982-83	396	113	509	135
1983-84	418	135	552	117
1984-85	522	149	671	152
1985-86	518	161	679	196

(a) Fruit and nuts, excluding grapes (fresh and dried); includes fresh, dried and preserved and fruit preparations.

Fruit imports

Small but increasing quantities of fresh fruit, mainly off-season citrus from the U.S.A., are imported, while most imports of dried fruit consist of dates from China and Pakistan and dried apricots from Turkey. Imports of orange juice increased to a peak of 106 million litres in 1983-84, but have since declined to 55 million litres in 1985-86.

Marketing and regulation of the fruit industry

Apples and pears

The Australian Apple and Pear Corporation has the function of promoting and controlling the export of Australian apples and pears as well as the promotion of trade and commerce in apples and pears within Australia. It also has power to promote, or engage in, research relating to the production, packaging, handling, transportation or marketing of apples and pears and to promote new apple and pear products.

The current underwriting schemes for export apples and pears terminate at the end of the 1990 export season. Under the schemes, the government guarantees a minimum export return separately for 'at risk' and forward sales of apples and pears which is equal to 85 per cent of the average export returns in the last three of the previous four years. If the average export return for any of the four categories of exports should fall below the bigger price in any year, the government will make up the difference without limit.

Canned fruit

On 29 November 1979 the Commonwealth enacted legislation restructuring the industry's marketing arrangements. Similar complementary legislation has been enacted by the four States of New South Wales, Victoria, South Australia and Queensland.

Under the legislation, the Australian Canned Fruits Corporation (replacing the Australian Canned Fruits Board) is empowered to acquire and sell the production of canned apricots, peaches and pears and is responsible for determining prices, terms and conditions for sales in both Australian and export markets. Sales are made through markets nominated by canners and approved by the Corporation. Markets are classified as Pool and Non-Pool with returns from Pool markets equalised by the Corporation. Entitlements for sales in Pool markets are allocated to canners prior to the start of each season.

The Corporation's administrative expenses are financed by a levy imposed on the production of canned fruits under the *Canned Fruits Levy Act 1979*.

The Corporation is advised in the performance of its functions by the Australian Canned Fruits Industry Advisory Committee.

In October 1984, the operation of the Australian Canned Fruits Corporation (ACFC) was extended for a further three years to the end of 1987. A more commercially orientated and flexible corporation was achieved with the expansion of the Corporation's board to make it more effective in its commercial operations, more accountable to industry and government and more capable of achieving its objective of improving returns to growers.

For further data on fruits and fruit products see the publications *Fruit, Australia (7322.0)*, *Production Bulletin No. 3: Food, Drink and Tobacco, Australia (8359.0)*, *Apparent Consumption of Foodstuffs and Nutrients, Australia (4306.0)* and *Value of Agricultural Commodities Produced, Australia (7503.0)*.

Grapes

Grapes are a temperate crop which require warm to hot summer conditions for ripening and predominantly winter rainfall. Freedom from late spring frosts is essential. They are grown for wine-making, drying and, to a lesser extent, for table use. Some of the better known wine producing areas are the Barossa, Clare, Riverland, Southern Districts and Coonawarra (S.A.); North Eastern Victoria and Great Western (Vic.); Hunter and Riverina (N.S.W.); Sunraysia (N.S.W. and Victoria); Swan Valley and Margaret River (W.A.).

Nearly all the dried fruit is produced along the River Murray and its tributaries in Victoria and New South Wales with small localised areas in other States.

VITICULTURAL STATISTICS: AREA, PRODUCTION AND VALUE

Year	Area		Production: grapes used for—			
	Bearing	Total	Winemaking	Drying	Total (a)	
					Quantity	Gross value
	'000 ha	'000 ha	'000 tonnes fresh weight	'000 tonnes fresh weight	'000 tonnes fresh weight	\$m
1980-81	64.7	69.5	473.1	248.1	743.4	178.2
1981-82	63.7	68.4	499.9	361.7	884.9	222.8
1982-83	61.9	66.5	431.3	310.3	768.1	212.5
1983-84	60.2	64.5	495.1	320.0	840.9	217.0
1984-85	59.9	64.0	559.0	296.8	889.6	259.4
1985-86	60.0	63.8	509.9	358.8	906.6	270.0

(a) Includes grapes used for table and other purposes.

Multipurpose grapes are used predominantly for winemaking and drying, the latter process being particularly susceptible to adverse seasonal conditions. A serious oversupply of dried vine fruit existed on world markets in 1983 and 1984, however the situation has improved since 1985 as a consequence of reduced production from northern hemisphere suppliers in late 1984. Australian exporters have made significant sales on international markets. The Australian Dried Fruits Corporation is the body responsible for the organisation of the export trade in dried vine fruits. The Corporation also administers the statutory Dried Vine Fruits Equalisation Scheme and the Dried Sultana Production Underwriting Scheme. Both these schemes were restructured by the Government in 1985 following an inquiry into the dried vine fruits industry by the Industries Assistance Commission. The Government's objective was to make the industry more responsive to market signals. Until 1983, imports of dried vine fruit had been largely insignificant. However, since that time significant imports have occurred each year, the major sources being Greece and the U.S.A. The Australian industry has demonstrated injury from subsidised imports from Greece and countervailing measures have been implemented.

Varietal statistics: 1986 season

VITICULTURE: AREA AND PRODUCTION BY VARIETY, 1986 SEASON (a)

	Area of vines at harvest			Grubbings (actual and/or intended)	Production			Total
	Bearing	Not yet bearing	All vines		Grapes used for—			
					Wine- making	Drying	Other	
—hectares—	—hectares—	—hectares—	—hectares	—tonnes (fresh weight)—				
Red grapes—								
Cabernet Sauvignon	3,535	345	3,880	106	26,033	—	11	26,044
Currant (incl. Carina)	1,603	132	1,735	67	86	25,664	59	25,809
Grenache	3,136	16	3,152	338	33,264	—	196	33,459
Mataro	932	4	936	69	10,717	—	92	10,809
Pinot Noir	438	194	632	5	2,765	—	1	2,766
Shiraz	5,865	89	5,953	368	52,684	—	80	52,765
Other red grapes	2,905	534	3,439	138	11,073	13	10,926	22,012
Total red grapes	18,413	1,315	19,728	1,091	136,623	25,677	11,363	173,663
White grapes—								
Chardonnay	1,967	653	2,621	30	17,442	—	4	17,445
Doradillo	1,320	13	1,332	92	28,987	598	83	29,667
Muscat Blanc	553	59	612	44	5,656	—	86	5,742
Muscat Gordo Blanco	4,111	340	4,451	135	75,906	8,265	431	84,601
Palomino and Pedro Ximenes	1,938	20	1,959	193	27,825	—	19	27,844
Rhine Riesling	4,250	138	4,388	230	44,053	—	2	44,055
Semillon	2,735	191	2,926	92	38,629	—	10	38,638
Sultana	16,863	413	17,276	438	51,199	313,241	16,149	380,589
Waltham Cross	1,488	36	1,524	109	3,331	10,834	5,093	19,259
Other white grapes	6,331	601	6,933	381	80,283	162	4,653	85,099
Total white grapes	41,557	2,466	44,023	1,744	373,311	333,100	26,529	732,940
Total grapes	59,970	3,781	63,750	2,835	509,934	358,777	37,892	906,603

(a) Varietal data not collected in Northern Territory and the Australian Capital Territory.

**DRIED VINE FRUIT: PRODUCTION, EXPORTS AND CONSUMPTION
(dried weight)**

Year	Production			Exports			Total		Consumption of dried vine fruit
	Raisins	Sultanas	Currants	Total	Raisins/ sultanas	Currants	Quantity	Value f.o.b.	
	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes	'000 tonnes	\$m	
1980-81	5.7	50.7	4.8	61.1	50.1	1.9	52.0	75.5	1.8
1981-82	5.8	78.5	5.9	90.2	38.5	0.8	39.4	49.5	1.8
1982-83	3.9	64.9	4.7	73.4	57.1	2.4	59.5	59.7	1.9
1983-84	1.4	69.0	4.6	75.0	51.6	0.9	52.5	54.1	1.7
1984-85	2.1	60.1	5.7	67.8	61.5	1.0	62.4	58.0	2.3
1985-86	5.2	72.9	6.3	84.4	48.4	2.9	51.3	71.3	2.3

Wine industry

Australia produces a wide range of wine and brandy products. Over the past twenty years there has been a distinct trend towards greater production and consumption of unfortified or table wines. In the twelve months ending June 1986 sales of table wine accounted for nearly 78 per cent of all sales of Australian wine. The large growth in table wine sales has been principally due to the successful marketing of wine in 'casks' (usually fibreboard, box-shaped, 4 litre containers equipped with dispensing faucets).

Exports and imports of wine are relatively insignificant accounting respectively for 2.5 per cent of production and 3.7 per cent of the apparent domestic market for wine. Legislation reconstructing the Australian Wine and Brandy Corporation as the body responsible for the control of the export trade in wine, brandy and grape spirit products was enacted in June 1986. The Corporation has the power to regulate exports as well as organise promotion and publicity functions in export markets and in Australia.

PRODUCTION, CONSUMPTION AND EXPORT OF WINES

Year	Pro- duction	Exports		Consum- tion in Australia per capita
		Quantity	Value	
		mil. litres	f.o.b. \$m	
1980-81	374.3	7.5	11.9	18.2
1981-82	402.7	8.4	14.0	19.1
1982-83	340.1	8.0	13.4	19.7
1983-84	396.2	9.0	16.8	20.4
1984-85	451.2	8.8	17.4	21.3
1985-86	389.2	10.9	21.3	21.6

For further details on viticulture, dried vine fruit, wine, etc. see the following publications: *Fruit, Australia* (7322.0), *Sales and Stocks of Australian Wine and Brandy* (8504.0) and *Viticulture, Australia* (7310.0).

Miscellaneous crops

The principal crops not covered above include fodder crops, tobacco, hops and mushrooms which in 1985-86 had gross values as follows:

Crops	Gross value	Per cent of total crop gross value	
		\$m	%
Fodder crops (hay)	64.5		0.9
Lupins	81.6		1.1
Tobacco	58.0		0.8
Hops	9.4		0.1
Mushrooms	43.8		0.6
Other (incl. nurseries)	331.1		4.5

Fodder crops

As well as crops specifically for grain, considerable areas of Australia are devoted to fodder crops. These crops are utilised either for grazing (as green feed), or conserved as hay, ensilage, etc.

This development of fodder conservation as a means of supplementing pasture and natural sources of stockfeed is the result of the seasonal and comparatively unreliable nature of rainfall in Australian agricultural areas.

FODDER CROPS: AREA AND PRODUCTION

Year	Hay(a)			Green feed or silage(b)	
	Area	Production		Area	Silage made
		Quantity	Gross value		
	'000 ha	'000 tonnes	\$m	'000 ha	'000 tonnes
1980-81	320	826	58.3	1,096	338
1981-82	380	1,043	77.1	936	413
1982-83	408	907	100.6	1,292	301
1983-84	377	1,269	99.5	896	698
1984-85	258	848	60.3	876	502
1985-86	268	820	64.5	1,062	620

a) Principally oaten and wheaten hay.

(b) Principally from oats, barley, wheat and forage sorghum.

Lupins

Lupins are grown primarily as a grain crop, but grazing of standing crops and stubble is also an important use. Because of their high protein content, lupins are becoming increasingly important in livestock feed and for human consumption, particularly in some of the Asian countries.

There has been a significant expansion of lupin production in recent years, particularly in Western Australia which is the major producer and exporter of lupins. Smaller quantities are also grown in New South Wales, Victoria and South Australia mainly for domestic use.

FARMSTOCKS OF CEREAL GRAINS, HAY AND SILAGE

('000 tonnes)

<i>At 31 March</i>	<i>Cereal grains</i>				
	<i>Barley</i>	<i>Oats</i>	<i>Wheat</i>	<i>Hay</i>	<i>Silage</i>
1981	518	933	860	4,764	578
1982	628	1,356	832	4,941	502
1983	506	711	970	2,983	333
1984	627	1,705	1,021	6,789	642
1985	684	1,479	910	5,872	697
1986	872	1,403	1,185	5,555	851

Tobacco

Tobacco is a summer-growing annual which requires a temperate to tropical climate, adequate soil moisture and a frost-free period of approximately five months. In Australia, all tobacco is grown under irrigation. Because of specialised requirements, production is limited to areas with suitable soils and climate. The main centres of production are the Mareeba-Dimbulah districts of north Queensland and Myrtleford in north-eastern Victoria. Other areas where tobacco is grown include Bundaberg, Beerwah and Texas (Queensland) and Yetman and Coraki (New South Wales). All tobacco grown in Australia is of the flue-cured type except for small quantities of burley tobacco produced mainly in Victoria.

TOBACCO: AREA, PRODUCTION AND OVERSEAS TRADE

<i>Year</i>	<i>Area</i>	<i>Production (dried leaf)</i>	<i>Exports (value f.o.b.)</i>		<i>Imports (value)</i>	
			<i>Unmanu- factured</i>	<i>Manu- factured</i>	<i>Unmanu- factured</i>	<i>Manu- factured</i>
	<i>'000 ha</i>	<i>'000 tonnes</i>	<i>\$'000</i>	<i>\$'000</i>	<i>\$'000</i>	<i>\$'000</i>
1980-81	7.1	14.5	2,893	8,559	44,007	31,129
1981-82	6.6	13.3	2,080	8,551	46,268	23,187
1982-83	6.7	13.4	4,835	9,667	52,916	30,420
1983-84	6.5	14.4	2,434	12,172	58,939	31,425
1984-85	5.4	12.5	110	14,545	59,789	27,692
1985-86	4.7	10.7	158	15,021	64,495	33,197

Marketing

In 1965 the Commonwealth and State Governments agreed to a stabilisation plan which provided for an annual Australian tobacco leaf marketing quota of flue-cured tobacco and a guaranteed minimum average reserve price. The plan is administered by the Australian Tobacco Board, constituted under the *Tobacco Marketing Act 1965*, and is composed of representatives of the Commonwealth Government, tobacco-growing States, growers and manufacturers.

Following a review by the Industries Assistance Commission of the tobacco industry in 1982, the Government announced a new 5-year stabilisation scheme which began in 1984. The new scheme is designed to rationalise marketing arrangements in the industry. The scheme provides that the annual tobacco leaf quotas are adjusted in line with consumption, that manufacturers' stocks are reduced to a level equivalent to 13 months' consumption by 1988, and that prices be adjusted so as to significantly reduce the gap between Australian and world prices by 1990.

Hops

Hops are grown from perennial rootstocks over deep, well-drained soils in localities sheltered from the wind. The hop-bearing vine shoots are carried upon trellises, from which they are later harvested. The green hops are kiln-dried and baled on the farm. The dried hops can be further processed at centralised processing establishments into pellets, extract or high density packs. The pelleted form constitutes the bulk of the exported hops.

The area planted to hops in Australia is about 1,300 hectares. About 65 per cent of plantings are in Tasmania (confined to the Derwent, Huon and Channel areas in the south-east, the Scottsdale-Ringarooma district in the north-east, and the Gunn Plains in the north-west of the State). The other hop producing areas are the Ovens and King Valleys in Victoria and a small area near Manjimup in Western Australia.

Australian hop production is about 2,600 tonnes, approximately 70 per cent of which is used by domestic breweries, with the remainder being exported.

Mushrooms

Statistics of mushroom growing were collected for the first time in all States for the year ended 30 June 1975.

MUSHROOMS: AREA, PRODUCTION, GROSS VALUE AND IMPORTS

Year	Total production			Canned or bottled production	Imports			
	Area	Quantity	Gross value		Dried		Canned or bottled	
					Quantity	Value f.o.b.	Quantity	Value f.o.b.
	hectares	tonnes	\$m	tonnes	tonnes	\$'000	'000 litres	\$'000
1980-81	56	8,265	18.5	3,743	93	1,140	5,864	7,120
1981-82	57	9,382	21.7	4,776	120	1,478	6,413	8,454
1982-83	65	10,266	27.1	n.p.	58	895	5,845	8,447
1983-84	69	11,036	29.4	n.p.	94	1,447	4,760	7,218
1984-85	76	12,857	36.7	n.p.	92	1,449	4,426	8,278
1985-86	70	13,026	43.8	n.p.	81	1,669	3,201	6,426

Jojoba

Jojoba is an arid zone perennial shrub native to the Sonoran Desert in U.S.A. and Mexico where it has a reputation for its ability to survive and grow under extremely adverse conditions. About 50 per cent of seed weight consists of a high quality liquid wax suitable for a wide range of industrial applications.

Attempts are being made to establish a jojoba growing and processing industry in Australia using wild, unimproved planting material. A research backing is needed, and research in this country has investigated the environmental factors controlling flowering and fruit growth, the physiological basis of jojoba's adaptation to moisture and temperature extremes, and the sites with the best potential to support an industry.

The future development of a jojoba industry depends upon the use of improved, high-yielding plant lines and the selection of the best plantation sites. Although there are many proposed uses for the wax, future market size and price structure are unknown.

Livestock

Since 1861, annual enumerations of livestock have been made based, with few exceptions, on actual collections made through the agency of the State police or by post. Particulars concerning the numbers of each of the principal kinds of livestock in Australia at ten-yearly intervals from 1861 to 1971, and then from 1981 on by single years, are given in the following table.

LIVESTOCK, AUSTRALIA

('000)

Year	Cattle	Sheep	Pigs	Year	Cattle	Sheep	Pigs
1861	3,958	20,135	351	1951	15,229	115,596	1,134
1871	4,276	41,594	543	1961	17,332	152,679	1,615
1881	7,527	62,184	816	1971	24,373	177,792	2,590
1891	10,300	97,881	891	1981	25,168	134,407	2,430
1901	8,640	70,603	950	1982	24,553	137,976	2,373
1911	11,745	98,066	1,026	1983	22,478	133,237	2,490
1921	13,500	81,796	674	1984	22,161	139,242	2,527
1931	11,721	110,568	1,072	1985	22,738	149,747	2,512
1941	13,256	122,694	1,797	1986	23,436	155,561	2,553

While livestock numbers (particularly sheep) have increased substantially since 1861, marked fluctuations have taken place during the period, mainly on account of widespread droughts which have from time to time left their impressions on the pastoral history of Australia.

Australia has suffered ten major widespread droughts since the keeping of rainfall records began:

1864–1866 All States were affected except Tasmania.

1880–1886 Southern and eastern mainland States were affected.

1888 All States were hit except Western Australia.

1895–1903 This drought, one of the worst on record, halved Australia's sheep population (originally 100 million) and cut cattle numbers (12 million) by 40 per cent.

1911–1916 Wheat crops were affected in most States, sheep numbers declined by 19 million and cattle by 2 million.

1918–1920 During this period, parts of Western Australia were the only areas completely free from drought.

1939–1945 This prolonged drought affected crops and/or pastoral areas in all States. Sheep numbers fell from 125 million in 1942 to 96 million in 1945.

1965–1967 This drought, in its impact on Queensland, New South Wales and Victoria, ranked with the 1902 drought as one of the most severe on record. It resulted in a 40 per cent drop in the wheat harvest, a loss of 20 million sheep, and a decrease in farm income of \$300–500 million. There was a chain reaction to other industries, with heavy losses being suffered by manufacturers of farm machinery and the New South Wales Railways. Effects of the drought were worsened by water rationing in irrigation areas.

1972 Widespread drought occurred throughout Australia.

Much of eastern Australia experienced one of the worst droughts on record in 1982 and early 1983. Widespread and soaking rains during the autumn months of 1983 greatly alleviated the situation and most areas received further good rains during 1983–84. However, 1985 saw the return of light and variable rainfall conditions. In July 1985, much of New South Wales and western Queensland had again been drought declared and regional areas of concern were notified in western Victoria, parts of South Australia and Western Australia, and much of the Northern Territory. Good rains during August 1985 relieved much of this problem.

For further details of droughts in Australia *see* the special article at the end of Chapter 16, on page 620.

The years in which the numbers of livestock attained their peaks are as follows: cattle, 1976 (33,434,000); sheep, 1970 (180,080,000); and pigs, 1973 (3,259,000).

Cattle

Cattle-raising is carried out in all States, the main object in certain districts being the production of stock suitable for slaughtering purposes and in others the raising of dairy herds. While dairy cattle are restricted mainly to southern and to coastal districts, beef cattle are more widely distributed. Cattle numbers in Australia increased slowly during the 1960s and 1970s, despite seasonal changes and heavy slaughterings, to a peak of 33.4 million in 1976. There was a continuous decline, aggravated by drought conditions, to 22.2 million in 1984. Improved seasonal conditions and higher export prices in 1984 encouraged producers to commence rebuilding herds and numbers increased to 23.4 million in 1986.

Beef cattle production is often combined with cropping, dairying and sheep. In the north (north of the 26th parallel), cattle properties and herd size are very large, pastures are generally unimproved, fodder crops are rare and beef is usually the only product. The industry is more intensive in the south because of the more favourable environment including more improved pasture.

For further details on cattle, *see Livestock and Livestock Products, Australia* (7221.0).

CATTLE NUMBERS
(’000)

<i>31 March</i>	<i>N.S.W.</i>	<i>Vic.</i>	<i>Qld</i>	<i>S.A.</i>	<i>W.A.</i>	<i>Tas.</i>	<i>N.T.</i>	<i>Aust. (incl. A.C.T.)</i>
1981	5,459	4,313	9,925	1,091	2,034	659	1,675	25,168
1982	5,429	4,121	9,782	1,013	1,942	628	1,624	24,553
1983	5,018	3,408	9,349	828	1,754	562	1,548	22,478
1984	5,036	3,487	9,154	813	1,730	542	1,390	22,161
1985	5,226	3,576	9,413	846	1,673	554	1,484	22,784
1986	5,409	3,720	9,662	914	1,690	570	1,458	23,436

CATTLE NUMBERS, BY AGE, SEX, PURPOSE
(’000)

<i>Classification</i>	<i>31 March</i>					
	<i>1981</i>	<i>1982</i>	<i>1983</i>	<i>1984</i>	<i>1985</i>	<i>1986</i>
Milk cattle—						
Bulls used or intended for service	54	49	47	46	45	43
Cows, heifers and heifer calves	2,672	2,661	2,642	2,693	2,697	2,655
House cows and heifers	74	73	69	66	63	61
<i>Total</i>	<i>2,799</i>	<i>2,783</i>	<i>2,757</i>	<i>2,805</i>	<i>2,806</i>	<i>2,759</i>
Meat cattle—						
Bulls used or intended for service	533	527	499	498	524	554
Cows and heifers (1 year and over)	11,269	11,032	9,929	9,964	10,274	10,626
Calves under 1 year	5,135	5,023	4,644	4,455	4,897	5,010
Other cattle (1 year and over)	5,431	5,188	4,649	4,438	4,282	4,487
<i>Total</i>	<i>22,368</i>	<i>21,770</i>	<i>19,721</i>	<i>19,356</i>	<i>19,978</i>	<i>20,678</i>
Total, all cattle	25,168	24,553	22,478	22,161	22,784	23,436

Sheep

With the exception of a short period in the early 1860s, when the flocks in Victoria outnumbered those of New South Wales, the latter State has occupied the premier position in sheep raising. Western Australia is the second largest sheep raising State, followed by Victoria. Sheep numbers reached a peak of 180.0 million in Australia in 1970. They then declined rapidly up to March 1973 as producers turned off large numbers for slaughter and moved from wool-growing towards grain and beef production. By 1975, the numbers had again increased to 151.7 million, but in March 1978 the numbers had fallen to 131.4 million, the lowest since 1955. Improved seasonal conditions during 1978 and 1979 enabled producers to begin rebuilding their flocks. By March 1980, numbers had risen to 136.0 million. Subsequently, high levels of drought-induced slaughter led to a decline in numbers to 134.4 million by March 1981. Numbers rose to 138.0 million in March 1982 with improved seasonal conditions and the attractiveness of sheep enterprises relative to cattle contributing to the growth in numbers. Subsequently, drought conditions saw the flock reduce to 133.2 million in March 1983. The increase in flock numbers to 139.2 million in March 1984 reflects flock rebuilding by producers in response to favourable seasonal conditions beginning in the autumn of 1983, improved lambing rates, and a favourable outlook for wool and live sheep enterprises. This trend continued and, in March 1986, flock numbers reached 155.6 million.

SHEEP NUMBERS
(millions)

<i>31 March</i>	<i>N.S.W.</i>	<i>Vic.</i>	<i>Qld</i>	<i>S.A.</i>	<i>W.A.</i>	<i>Tas.</i>	<i>Aust. (incl. N.T., A.C.T.)</i>
1981	46.0	25.5	10.6	17.1	30.8	4.4	134.4
1982	48.7	25.3	12.3	16.7	30.3	4.5	138.0
1983	48.1	22.7	12.2	15.4	30.2	4.5	133.2
1984	51.0	24.6	13.0	16.4	29.5	4.6	139.2
1985	55.5	26.5	14.0	17.3	31.6	4.8	149.7
1986	58.0	26.9	14.3	17.9	33.2	5.1	155.6

SHEEP, BY AGE AND SEX
(millions)

31 March	<i>Sheep: 1 year and over</i>				<i>Lambs and hoggets (under 1 year)</i>	<i>Total, sheep and lambs</i>
	<i>Rams</i>	<i>Breeding ewes</i>	<i>Other ewes</i>	<i>Wethers</i>		
1981	1.8	66.9	4.8	30.1	30.8	134.4
1982	1.8	68.5	4.8	30.5	32.4	138.0
1983	1.7	65.6	5.5	28.8	31.6	133.2
1984	1.7	70.3	4.9	30.5	31.8	139.2
1985	1.8	71.0	5.4	33.3	38.3	149.7
1986	1.8	72.1	6.6	38.7	36.3	155.6

The combined value of wool and sheep slaughtered during 1985-86 is estimated at 20.5 per cent of the gross value of agricultural commodities. This proportion varies with wool and meat prices and seasonal conditions. Australia has about 20 per cent of the world's woolled sheep but produces around 25 per cent of the world's greasy wool output. In addition, in the year ended 30 June 1986 the sheep industry produced 578,000 tonnes of mutton and lamb. Exports of live sheep for slaughter during the same period totalled 6.4 million head, with Kuwait and Saudi Arabia accounting for 61 per cent of the total.

SHEEP AND LAMBS: ANALYSIS OF MOVEMENT IN NUMBERS
(millions)

<i>Year ended 31 March</i>	<i>Season</i>	<i>Number at beginning of season</i>	<i>Lambs marked</i>	<i>Live sheep exports</i>	<i>Sheep and lambs slaughtered (a)</i>	<i>Estimated deaths on farms (b)</i>	<i>Number at end of season</i>
1981	1980-81	136.0	43.7	6.1	31.4	7.8	134.4
1982	1981-82	134.4	44.8	6.3	28.3	6.6	138.0
1983	1982-83	138.0	45.4	6.2	30.8	13.1	133.2
1984	1983-84	133.2	44.5	6.6	25.0	6.8	139.2
1985	1984-85	139.2	51.9	6.3	27.2	7.9	149.7
1986	1985-86	149.7	49.8	6.8	31.5	5.7	155.6

(a) Comprises statistics from abattoirs and other major slaughtering establishments and includes estimates of animals slaughtered on farms and by country butchers; also includes animals condemned or those killed for boiling down. (b) Balance item.

LAMBING

<i>Year ended 31 March</i>	<i>Season</i>	<i>Number of breeding ewes at start of season</i>	<i>Mating intentions at start of season</i>	<i>Actual matings</i>	<i>Ratio of actual matings to intended matings</i>	<i>Lambs marked</i>	<i>Ratio of lambs marked to actual matings</i>	<i>Ratio of lambs marked to breeding ewes</i>
		million	million	million	%	million	%	%
1981	1980-81	66.5	60.3	58.1	96	43.7	75	66
1982	1981-82	66.9	61.9	60.5	98	44.8	74	67
1983	1982-83	68.5	64.6	60.9	94	45.4	74	66
1984	1983-84	65.6	58.9	58.5	99	44.5	76	68
1985	1984-85	70.3	65.9	63.5	96	51.9	82	74
1986	1985-86	71.0	65.3	62.8	96	49.8	79	70

Pigs

Over the past 30 years there have been significant changes to the structure of the Australian pig industry. Initially, pigs were raised as part of a dairying operation where there were abundant supplies of liquid skim milk. Today, however, with introduction of factory separation of milk and cream, coupled with the low grain prices of the 1960s, pig raising has become more and more associated with grain production.

In addition there has been a major move away from the so called extensive method of pig raising to the intensive conditions that apply today. This has meant an increase in the capital investment in the industry and a greater degree of specialisation in pig raising. The average pig production unit today would be based on approximately 300 sows with feeds being almost exclusively grain based. While the number of sows in Australia has remained fairly constant the number of pig farmers has decreased.

PIG NUMBERS
(^{'000})

31 March	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	Aust. (incl. N.T., A.C.T.)
1981	787	400	502	394	289	54	2,430
1982	766	406	513	374	263	47	2,373
1983	794	387	551	405	300	51	2,490
1984	799	404	556	417	300	48	2,527
1985	814	410	563	402	274	47	2,512
1986	798	432	585	414	278	45	2,553

Poultry

The commercial poultry industry comprising hatcheryworkers, egg producers and broiler growers is highly specialised, although a proportion of production comes from 'backyard' egg producers, roughly estimated at from 20 to 25 per cent of the total. There are also separate research schemes funded jointly by industry and government for the egg and meat chicken industries but close liaison exists. Both sectors are good examples of specialised, large scale, capital-intensive production.

POULTRY NUMBERS (a)
(^{'000})

31 March	<i>Chickens</i>			<i>Other poultry</i>			<i>Total all poultry</i>
	<i>Hens and pullets for egg production</i>	<i>Meat strain chickens (broilers)</i>	<i>Total chickens(b)</i>	<i>Ducks</i>	<i>Turkeys</i>	<i>Other poultry</i>	
1981	15,187	29,077	46,386	228	750	175	47,539
1982	14,930	27,478	44,761	317	713	213	46,004
1983	15,532	30,296	48,389	294	467	243	49,393
1984	14,075	31,318	47,529	370	535	239	48,673
1985	13,497	33,761	50,109	219	653	293	51,273
1986	13,752	35,619	51,807	288	580	378	53,053

(a) Data are for numbers of poultry on agricultural establishments as reported in the annual Agricultural Census. (b) Includes breeding stock and data not available for separate publication.

For further details on pigs and poultry see the publication *Livestock and Livestock Products, Australia* (7221.0).

Meat production, slaughterings and other disposals

The ABS collects details of slaughterings and meat production from abattoirs, commercial poultry and other slaughtering establishments and includes estimates of animals slaughtered on farms and by country butchers. The data relate only to slaughterings for human consumption and do not include animals condemned or those killed for boiling down.

PRODUCTION OF MEAT BY TYPE (a)
(^{'000 tonnes})

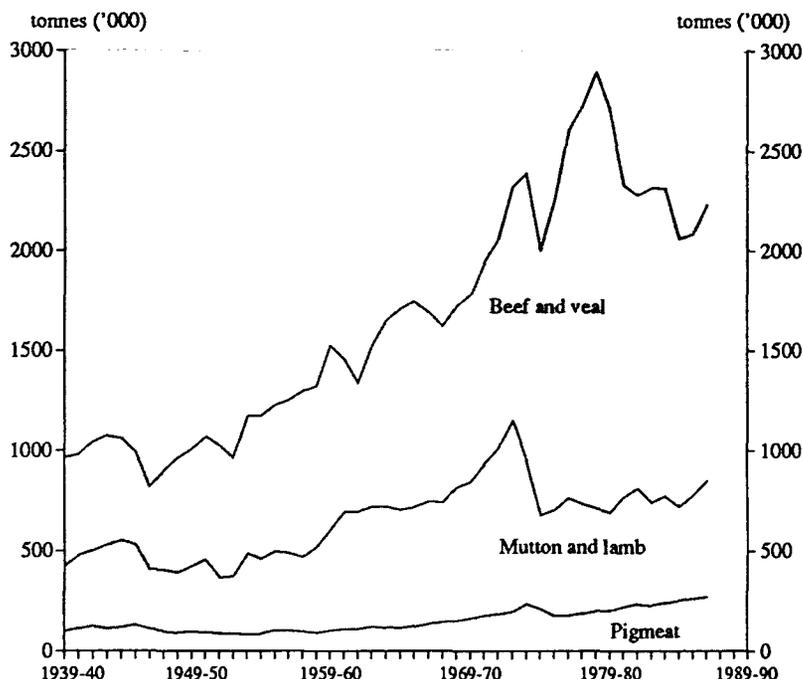
Year	<i>Carcass weight</i>				<i>Dressed weight(b)</i>			
	<i>Beef</i>	<i>Veal</i>	<i>Mutton</i>	<i>Lamb</i>	<i>Pig meat</i>	<i>Total meat</i>	<i>Chickens</i>	<i>Total all poultry(c)</i>
1980-81	1,418	50	299	279	233	2,278	276	303
1981-82	1,526	50	234	277	228	2,316	259	286
1982-83	1,482	61	250	280	239	2,313	283	314
1983-84	1,303	42	169	296	253	2,064	272	298
1984-85	1,271	39	215	301	260	2,086	315	345
1985-86	1,344	41	258	320	269	2,232	334	367

(a) Excludes offal.

(b) Dressed weight of whole birds, pieces and giblets.

(c) Includes other fowls, turkeys, ducks and drakes.

PRODUCTION OF MEAT, AUSTRALIA



NUMBERS OF LIVESTOCK AND POULTRY SLAUGHTERED FOR HUMAN CONSUMPTION (million head)

Year	Cattle	Calves	Sheep	Lambs	Pigs	Chickens (a)	Other fowls (b) and turkeys	Ducks and drakes
1980-81	7.0	1.5	15.2	16.6	4.2	221.7	11.2	1.7
1981-82	7.2	1.5	11.9	16.3	4.1	205.9	10.0	2.0
1982-83	7.4	1.7	13.1	16.9	4.2	226.2	10.9	1.9
1983-84	6.0	1.3	8.4	17.1	4.4	216.2	10.2	1.7
1984-85	5.8	1.2	10.5	17.5	4.5	244.2	10.7	2.1
1985-86	6.2	1.2	12.9	19.1	4.5	258.4	11.8	2.3

(a) Comprises broilers, fryers and roasters. (b) Comprises hens, roosters, etc.

Mutton and lamb

Production of sheepmeats in Australia is closely associated with the wool industry. Sheep grazing often occurs on mixed farms in conjunction with beef and/or grain enterprises and in some areas producers specialise in lamb production. The supply of sheepmeat depends greatly on seasonal conditions, decisions to build up or reduce flock numbers, expectations of wool prices, live sheep exports and the pattern of domestic consumption of meat.

There was a movement out of sheep raising in Australia early in the 1970s, principally as a result of low wool prices, and many producers diversified into cattle and grains. Flock numbers declined from a peak of 180.0 million in 1970 to a low of 131.0 million by 1978. After 1978, wool and sheepmeat prices improved and the trade in live sheep for slaughter overseas continued to expand. As a result, the national flock size increased slightly to 136.0 million by March 1980. Since March 1980, flock numbers have fluctuated as a result of climatic and market conditions peaking at 138.0 million in March 1982, before dropping to 133.2 million in March 1983. Total Australian sheep flock in March 1986 is 155.6 million head.

Sheepmeat production declined rapidly from the high levels of the early 1970s, which were associated with flock reduction, to annual levels of between 400,000 and 600,000 tonnes from 1973-74. Lamb production has remained close to 280,000 tonnes per year, while mutton production has varied between 230,000 and 300,000 tonnes in recent years until 1983-84, when it declined to 169,000 tonnes. Production increased to 289,000 tonnes in 1986-87.

A high proportion of lamb is consumed in Australia with per capita consumption remaining steady at about 14-16 kilograms per year. A high proportion of mutton produced is exported. Australia is the world's largest exporter of mutton, with Japan and the Middle East being the main markets.

Live sheep and lamb exports for slaughter during 1986-87 totalled 7.7 million head.

Beef and veal

The cattle industry is very dependent on international trade in beef and is subject to great fluctuations. Over half of Australia's beef and veal production is exported, with the U.S.A. and Japan the main outlets.

Beef and veal production in Australia rose markedly in the 1970s, reaching peak levels of over 2.0 million tonnes in 1977-78 and 1978-79, but declining to 1.3 million tonnes in 1984-85. The increase in production followed the rapid expansion of the beef herd that had occurred during the late 1960s and early 1970s mainly in response to relatively profitable beef prices and increased demand from overseas markets.

In the mid-1970s, poor economic conditions and heavy domestic supplies of beef in major importing countries led them to impose severe restrictions on their imports. With reduced international demand and heavy supplies in Australia, saleyard prices fell greatly and remained low for about four years. The depressed conditions were accompanied by a severe reduction in the national herd.

Improved seasonal conditions during 1983, accompanied by strengthening overseas demand, resulted in a move towards herd rebuilding. However, the high level of drought-induced slaughterings during 1982 had reduced the breeding herd base implying very slow herd expansion until 1986. Higher slaughtering in 1986-87 indicate that there has been a break in the rebuilding due to favourable prices. Current projections by the Australian Meat and Livestock Corporation (AMLC) indicate that cattle numbers will slowly increase throughout the 1980s. The lower levels of slaughter accompanying the rebuilding process suggest a decline in the levels of beef and veal production in coming years. Export demand for beef during 1986-87 improved, in part due to the continuing depreciation of the Australian dollar. Saleyard prices of cattle have reached record levels due to strong competitive demand between graziers and cattle fatteners for a limited supply of cattle.

Pigmeat

Significant changes have taken place in the pig producing industry in recent years. Capital investment and corporate takeovers have seen the emergence of a few large companies producing 30 per cent of all pigs sold in Australia. These moves on top of the trend to more intensive and efficient production techniques have seen pigmeat production rise steadily since 1982 to reach 269,000 tonnes in 1985-86. In addition, there has been an increase in the slaughter weights of pigs reflecting the demands of the fresh pork trade.

It is believed that about 60 per cent of production is processed into bacon, hams and smallgoods, with the rest sold as fresh pork. Less than 2 per cent of the industry's output is exported. The increasing production of pigmeat therefore reflects a steady increase in per capita domestic consumption over the past three years.

In recent years a small but useful market for the meat of feral pigs has been established in Europe.

Prices paid for pigs at auction have varied quite markedly in recent years. However, producers have benefitted from lower prices for feed grains which have prevailed over the past few years.

Poultry meat

The poultry meat industry developed rapidly in the 1970s with both output and consumption rising steeply, although in recent years production has exceeded demand and excess production capacity in the industry continues. Genetic and technical improvements and the

organisation of the industry into large-scale enterprises have raised efficiency and helped to reduce production costs relative to other meats. The price competitiveness of chicken meat compared with other meats, especially beef, continues to improve, consolidating the position of poultry meat as the second most important meat after beef in Australian diets.

EXPORTS OF FRESH, CHILLED OR FROZEN MEAT

Year	Beef	Veal	Mutton	Lamb	Pork	Poultry
QUANTITY (a) ('000 tonnes)						
1980-81	753.7	13.6	241.5	39.4	2.4	7.7
1981-82	775.2	8.5	154.6	32.1	1.5	4.1
1982-83	817.2	10.1	201.1	36.9	1.8	2.2
1983-84	657.8	4.6	90.8	33.2	2.0	1.2
1984-85	604.2	7.0	97.9	29.1	3.3	1.2
1985-86	704.3	7.7	141.6	51.9	2.8	1.7
VALUE f.o.b. (\$ million)						
1980-81	1,086.4	22.9	248.2	62.3	5.7	12.1
1981-82	1,009.8	14.4	155.3	50.7	3.1	7.3
1982-83	1,164.8	17.9	167.1	61.1	5.4	4.4
1983-84	1,109.6	10.6	84.0	53.4	6.2	2.5
1984-85	1,062.2	16.2	91.7	50.1	11.9	2.5
1985-86	1,301.5	15.7	123.9	87.1	9.9	3.6

(a) Quantity data on beef, veal, mutton and lamb exports are shown in carcass weight equivalents.

Exports of live animals

For details of the regulation governing the export (and import) of live animals see *Year Book* No. 61.

EXPORTS OF LIVE ANIMALS

Year	Livestock			Poultry		
	Sheep and lambs	Total(a)		Day old chicks	Total	
		Number	Value f.o.b.		Number	Value f.o.b.
		—'000—	\$'000		—'000—	\$'000
1980-81	5,740	5,842	208,483	862	974	832
1981-82	6,009	6,112	214,886	809	935	720
1982-83	6,992	7,086	212,277	370	415	565
1983-84	6,349	6,434	228,481	477	568	693
1984-85	6,256	6,316	216,707	234	369	503
1985-86	6,368	6,537	217,716	289	333	700

(a) Also includes cattle, calves, buffaloes and pigs.

PRODUCTION AND EXPORT OF BACON, HAM AND CANNED MEAT

Year	Production			Exports			
	Bacon and ham(a)		Canned meat(b)	Bacon and ham(c)		Canned meat(d)	
	Bone-in	Bone-out		Quantity	Value	Quantity	Value
		tonnes	tonnes	tonnes	\$'000	tonnes	\$'000
1980-81	18,878	55,564	36,431	528	1,991	17,400	42,139
1981-82	18,112	57,818	34,590	523	1,959	19,651	50,461
1982-83	17,051	55,634	n.a.	515	2,292	21,587	58,704
1983-84	18,355	59,796	n.a.	592	2,316	18,571	57,658
1984-85	17,638	61,136	n.a.	316	1,323	12,979	37,984
1985-86	18,077	60,039	n.a.	173	825	14,878	41,952

(a) Production of bacon and ham 'on the bone' is shown in terms of 'bone-in' weight, while production of boneless bacon and ham is shown in terms of 'bone-out' weight. Production of canned bacon and ham, which is reported in terms of 'stated net weight of packs', is included in the 'bone-out' category. (b) Canned weight. Includes bacon, ham and meat and vegetables, but excludes rabbit, poultry and baby foods. (c) Cured carcass weight of smoked or cooked bacon and ham. Includes 'stated net weight of packs' of canned bacon and ham. (d) Canned weight; excludes canned bacon and ham.

GROSS VALUE OF LIVESTOCK SLAUGHTERINGS AND OTHER DISPOSALS(a)
(\$ million)

<i>Year</i>	<i>Cattle and calves</i>	<i>Sheep and lambs</i>	<i>Pigs</i>	<i>Poultry</i>	<i>Total</i>
1980-81.	2,056.5	718.9	337.5	361.4	3,474.3
1981-82.	1,890.1	646.7	396.1	362.7	3,295.6
1982-83.	2,076.2	548.0	414.9	412.7	3,451.8
1983-84.	2,118.0	585.0	375.5	430.2	3,508.6
1984-85.	2,253.2	576.1	438.1	512.6	3,783.3
1985-86.	2,367.3	518.0	438.3	559.1	3,882.8

(a) Includes adjustment for net exports of live animals.

Consumption

The methodology for calculating meat consumption has been revised for the years 1975-76 to 1983-84 and is now shown purely in carcass weight equivalent terms. Canned meat as such is not available. Carcass weight is defined as ex abattoir (i.e. bone in). Owing to diverse cutting practices by butchers and the difficulty in clearly defining 'retail weight of meat' it is considered impractical to derive a factor for the purpose of expressing estimated meat consumption in terms of retail weight. (Estimates of retail weight as a percentage of carcass weight range from 70 per cent for beef, 80 to 85 per cent for lamb and 80 per cent for pork.)

APPARENT CONSUMPTION OF MEAT AND MEAT PRODUCTS AS HUMAN FOOD

<i>Year</i>	<i>Beef and veal</i>	<i>Mutton</i>	<i>Lamb</i>	<i>Pigmeat (a)</i>	<i>Offal</i>	<i>Total meat</i>	<i>Poultry meat</i>
TOTAL ('000 tonnes)							
1980-81.	695	72	234	231	62	1,295	301
1981-82.	750	53	245	227	66	1,341	294
1982-83.	701	68	247	233	67	1,316	311
1983-84.	654	81	261	254	53	1,303	309
1984-85.	660	104	267	256	44	1,331	341
1985-86.	656	113	268	269	43	1,349	365
PER CAPITA PER YEAR (kg)							
1980-81.	47.0	4.9	15.8	15.6	4.2	87.5	20.3
1981-82.	49.8	3.5	16.3	15.1	4.4	89.1	19.6
1982-83.	45.9	4.5	16.2	15.3	4.4	86.1	20.3
1983-84.	42.3	5.2	16.9	16.4	3.4	84.3	20.0
1984-85.	42.1	6.6	17.0	16.4	2.8	85.0	21.8
1985-86.	41.4	7.1	16.9	17.0	2.7	85.0	23.0

(a) Includes pigmeat products such as bacon and ham.

NOTE: Beef, veal, mutton, lamb, pigmeat and offal are expressed in terms of carcass weight, and poultry meat in dressed weight.

For further details on meat production and slaughtering see the following publications: *Livestock and Livestock Products, Australia* (7221.0), *Value of Agricultural Commodities Produced, Australia* (7503.0) and *Apparent Consumption of Foodstuffs and Nutrients, Australia* (4306.0).

Australia Meat and Livestock Corporation

Legislation was enacted to establish the Australian Meat and Livestock Corporation (AMLC) from 1 December 1977. The Corporation, which regulates and promotes the export of both meat and livestock and the promotion of domestic consumption, replaced the Australian Meat Board.

In mid-1984 the Australian Government introduced measures to restructure the administration of the Australian livestock and meat industry. Legislation enacted at the time, or foreshadowed, had three primary components:

- a restructured AMLC;
- establishment of the Australian Meat & Livestock Industry Policy Council (AMLIPC);
- the foreshadowed replacement of the Australian Meat Research Committee (AMRC)

with an incorporated body called the Australian Meat and Livestock Research and Development Corporation (AMLRDC).

The AMLC has the power to trade in meat and livestock in a manner which accords with adopted policy and with normal commercial practice. Its power is also extended to engaging in sole trading or to permitting restricted trading by a specified holder or holders of meat or livestock licences. The exercise of this sole or restricted trading power is limited to circumstances where: a monopoly buying power is, in the AMLC's opinion, distorting normal market forces; such action is necessary or desirable to ensure that producers receive a fair return for the meat or livestock exported to that market; the exercise of sole trading powers would be beneficial for the development or further development of that market; the exercise of sole trading powers would be in the best commercial interests of the industry.

In order to foster consultation, the AMLC may, for the purposes of considering any matter relating to the performance of its functions, make arrangements for consulting persons and bodies representative of different sectors of the industry.

The AMLC's main functions are to:

- improve the production of meat and livestock in Australia;
- encourage and promote the consumption and sale of Australian meat, and the sale of Australian livestock, both in Australia and overseas;
- encourage, assist, promote and control the export of meat and livestock from Australia.

Exporters of meat and livestock are licenced by the AMLC and have to comply with its requirements in relation to export trading. The AMLC assists exporters in overseas market development and conducts meat promotion activities in Australia and abroad. It has authority also, to perform a wide range of other functions aimed at improving the production of meat and livestock for the general benefit of the meat and livestock industry.

Two bodies have been established within AMLC to undertake major programs for the meat and livestock industry. These are the Authority for Uniform Specification of Meat and Livestock (AUSMEAT), which is developing and implementing a meat and livestock description language, and Computer Aided Livestock Marketing (CALM) which is conducting livestock sales by computer.

Australian Meat and Livestock Industry Policy Council

The legislation referred to above established a new statutory body, the AMLIPC, to relieve the AMLC of responsibility for the examination of all broad industry policy issues. It is intended that AMLIPC:

- facilitate the participation of industry in the development and formulation of industry policies;
- provide a forum of consensus, building between different sectoral interests within the industry;
- provide opportunities, through AMLIPC Working Groups, for all interested parties to work together on the factual examination of industry problems, and to present practical proposals to government for their solution.

Wool

The Australian Sheep Flock contains nearly 20 per cent of the world's sheep, and produces over 28 per cent of the total annual production of wool. Approximately 75 per cent of the Australian Flock are of a single breed, the Merino, raised primarily for its heavy fleeces of fine quality wool.

Wool production

Wool as shorn from the sheep ('greasy wool') contains an appreciable amount of grease, dirt, vegetable matter and other extraneous material other than the clean wool fibre. The exact quantities of these impurities in the fleece vary between countries, differing climatic and pastoral conditions, with seasonal fluctuations and with the breed and condition of the sheep. It is, however, the clean wool fibre that is ultimately consumed by the textile industry and the term 'clean yield' is used to express the net wool fibre content present in greasy wool.

Since the 1946-47 season, the average clean yield of Australian wool has been assessed annually. In the early years, the average clean yield was assessed on the basis of a small number of tests and subjective appraisal. However, in recent years the Australian Wool Corporation has calculated the clip average yield on the basis of laboratory tests of yield applied to nearly all wool offered for sale at auction in Australia. It was 64.31 per cent in 1985-86.

Wool scoured and carbonised in Australia before export, however, has a somewhat lower clean yield than the whole clip, because much of the greasy wool treated locally for export in this form is dirty, low-grade wool. The quantity of scoured and carbonised wool exported during 1985-86 was about 16 per cent of total raw wool exports in greasy terms. For the clean yield of Australian scoured wools exported, a standard factor of 93 per cent has been adopted.

The following table shows details of total wool (i.e. shorn, dead, fellmongered and exported on skins) as well as the numbers of animals shorn, the average fleece weight and the gross value of the wool.

SHEARING, WOOL PRODUCTION AND VALUE

Year	Wool production				Total wool	
	Sheep and lambs shorn	Average fleece weight	Shorn wool	Other wool(a)	Quantity	Gross value
					'000 tonnes	\$m
	million	kg	'000 tonnes	'000 tonnes	'000 tonnes	\$m
1980-81	150.0	4.25	637.9	62.3	700.1	1,670
1981-82	155.2	4.26	661.0	56.2	717.2	1,789
1982-83	149.1	4.30	641.5	60.2	701.7	1,761
1983-84	152.6	4.40	671.2	56.4	727.6	2,016
1984-85	168.2	4.48	752.7	61.6	814.3	2,434
1985-86	173.8	4.39	762.1	67.4	829.5	2,707

(a) Comprises dead and fellmongered wool, and wool exported on skins. (b) Gross value is based, for shorn wool, upon the average price realised for greasy wool sold at auction and, for skin wools, on prices recorded by fellmongers and skin exporters.

The wool market

The primary raw wool market in Australia is at public auctions where brokers receive wool into store and then acting on the growers' behalf arrange sampling for valuation and for laboratory measurement of the main, variable physical characteristics and then offer the wool for sale at a rostered auction. Some 80 per cent or more of the clip is normally marketed this way. The remainder is sold privately at transaction prices agreed between the grower and a buyer.

The Australian Wool Corporation, on behalf of all growers, operates a minimum price support scheme at public auction sales.

Wool receipts

TAXABLE WOOL RECEIVALS

Year	Receipts			Dealers as per cent of total receipts	Shorn wool production(b)
	Brokers (NCWSB)	Dealers(a)	Brokers and dealers		
	—'000 tonnes—			per cent	'000 tonnes
1980-81	523.8	134.2	658.0	20.4	637.9
1981-82	539.0	141.4	680.4	20.8	661.0
1982-83	509.6	141.2	650.8	21.7	641.5
1983-84	535.5	152.9	688.4	22.2	671.2
1984-85	588.3	164.0	752.2	21.8	752.7
1985-86	599.2	167.6	766.7	21.9	762.1

(a) Includes brokers who are not members of the National Council of Wool Selling Brokers of Australia (NCWSB). (b) Obtained from the annual Agricultural Census.

Under the terms of the Wool Tax Acts, all growers pay a tax on the gross value of shorn wool sales, to provide financial backing for wool promotion, research and the operation of a statutory Reserve Price Scheme. The ABS collects details of the total amounts of taxable wool received by wool selling brokers and dealers each year. These figures exclude wool received by brokers on which tax had already been paid by other dealers (private buyers) or brokers.

Wool marketing arrangements

The Australian Wool Corporation is a Commonwealth statutory authority, established at the request of the nation's woolgrowers to undertake a number of functions on their behalf, principally to stimulate the demand for Australian wool. Most important of these functions is a Reserve Price Scheme in the raw wool market, and comprehensive global wool promotion programs.

The Reserve Price Scheme was introduced to the market in 1970 and seeks to provide a measure of wool price stability, in Australian dollar terms, to the benefit of the industry.

At the commencement of each season a Minimum Price for each wool type is established, and published, to apply for the entirety of that season (financial year). Any wool which fails to attract bids equal to or higher than this minimum is purchased by the Corporation at that price and held by the Corporation until demand improves. As well, when the market is trading above floor price levels, the Corporation may intervene in the market with the aim of providing market stability. This may be needed, for instance, when there is uncertainty about exchange rates or when the market enters a cycle of volatile price change.

Finance for the operation of the Reserve Price Scheme is provided by growers, through a compulsory Wool Tax. The Australian Wool Corporation has a number of other responsibilities which include supervision of the industry's comprehensive research programs, establishing, monitoring and when necessary enforcing industry agreed clip preparation standards, shearer training and encouraging efficiency within the sphere of wool handling and transport. It also operates extensive commercial storage facilities on the industry's behalf.

Wool testing

The Australian Wool Testing Authority came into existence in 1957 but its role became more prominent with the introduction, in 1971, of wool valuation techniques relying on objective specification of wool's main physical characteristics. From the first sales of wool in this manner in the early 1970s, this technique has achieved universal acceptance and now 99 per cent of all wool sold at auction is accompanied by certified measurements for yield, (i.e. the amount of clean wool fibre), average fibre diameter and the percentage and type of vegetable fault.

During the 1986-87 season, commercial testing commenced for the additional characteristics of staple length and strength. Adoption of these new measurements will be a necessary prelude to further marketing innovations including the possible sale of wool solely on the basis of measurement and description.

At the direction of the Commonwealth Government, the Authority, which had operated as a division of the Corporation, was transferred to the private sector effective from the beginning of July 1982. The new company is known as AWTA Ltd.

Wool promotion

Since 97 per cent of the Australian wool clip is exported, the other major arm of wool marketing is the demand stimulating activities carried out in manufacturing and consumer markets around the world. These programs, which commenced in 1937, were significantly scaled up in the 1960s in response to the challenge posed by synthetic fibres. In more recent times, these programs have again been increased in an effort to ensure wool's future as a preferred textile fibre in the world's major consumer markets. Growers have financed wool promotion since its inception, and currently do so at the rate of 4 per cent of their gross wool sales revenue. This is boosted by a Commonwealth Government contribution equal to 1.2 per cent of gross wool sales revenue, and in 1986-87 these contributions totalled \$147 million. The majority of these funds are remitted to the International Wool Secretariat which operates actively in more than 50 countries around the world.

Wool research

Australian woolgrowers have financed industry research programs since 1937. In recent times this was co-ordinated through the Wool Research Trust Fund to which both the woolgrowers and the Commonwealth Government contributed. The Fund was administered by the Commonwealth Department of Primary Industries and Energy.

From 1 July 1986, the task of determining industry research priorities and allocating funds was transferred to a new body, the Wool Research & Development Council which was constituted as a committee of the Australian Wool Corporation.

Major recipients of wool industry research funds include the Commonwealth Scientific and Industrial Research Organisation (CSIRO)—especially in the fields of wool textile research; the Australian Bureau of Agricultural and Resource Economics; universities and States' departments of agriculture primary industry.

Wool income

Fluctuations in wool prices have a marked effect on agricultural and national income. In 1945-46 the gross value of wool production was \$117.2 million, representing 17.4 per cent of the gross value of all agricultural commodities produced, while in 1950-51, when prices reached a peak during the Korean War, wool was valued at \$1,303.8 million, or 55.6 per cent of total agricultural industries. More recent figures for the contribution of wool income to total agricultural production and national exports reflect the growth in other commodities over the intervening years, rather than a decline in the fortunes of the wool industry.

WOOL INCOME (per cent)

<i>Year</i>	<i>Value of wool as a per cent of total agriculture</i>	<i>Value of wool exports as a per cent of total Australian exports</i>
1980-81	14.4	10.2
1981-82	14.1	10.2
1982-83	15.0	8.5
1983-84	13.1	8.7
1984-85	15.8	8.7
1985-86	17.6	7.3

The gradual strengthening of wool prices since the mid-1970s has seen wool's contribution to total national export revenue increase steadily and in the years since 1983-84 has almost doubled to almost \$4,000 million in 1986-87. This makes wool Australia's largest primary industry export earner and second only to coal on the list of national export industries.

Stocks

Stocks shown below of raw and semi-processed wool were held by wool processors, scourers, fellmongers, brokers, dealers and the Australian Wool Corporation. They exclude wool on skins since this wool is not recorded as production until fellmongered in Australia or exported on skins.

WOOL STOCKS

('000 tonnes)

At 30 June	Stocks of—					
	Raw Wool		Semi-processed wool		Total wool	
	Greasy	Clean	Greasy	Clean	Greasy	Clean
1981	155.1	96.0	10.8	6.8	165.9	102.8
1982	210.7	131.6	8.5	5.3	219.2	137.0
1983	305.4	189.5	8.2	5.1	313.6	194.6
1984	368.4	232.1	9.6	6.1	378.0	238.2
1985	332.8	212.5	9.1	5.9	341.9	218.3
1986	299.0	190.9	8.5	5.5	307.5	196.3

Wool processing

Approximately 85 per cent of all wool passing through the Australian auction system comprises combing fleece and oddment types which are ultimately processed on the worsted system. The remaining 15 per cent, being the shorter or carding wools such as locks, crutchings, and lambs wool, is directed to the woollen system. This latter group is boosted some 5–10 per cent by noils combed out during worsted processing.

At present about two-thirds of total carding types produced are processed in Australia, though recent expansion in carbonising capacity in Taiwan and Japan has introduced a new element to this section of the market.

During the 1970s there was a trend to increased early stage processing of Australian wool before export. Recently, however, early stage processing has stabilised at around 18 per cent of wool production. Over 95 per cent of total Australian wool production ultimately enters international trade.

The main scope for expanded domestic processing remains with worsted types for export in scoured or combed top form. Japanese processors initiated the export of scoured worsted types from Australia, and Japan became Australia's major export market for scoured wool in 1973–74.

Before 1975 the wool processing industry was largely centralised in cities close to major ports. Since then, however, a general trend towards decentralised, inland locations has occurred.

Wool consumption

Two series of calculations on Australian wool consumption are shown below.

- Consumption of raw wool, which measures consumption in terms of scoured wool used by mills.
- Consumption of processed wool, which is calculated from the usage of woollen and worsted yarn.

Raw wool comprises greasy, slipe, scoured and carbonised wool. This series has been included for comparison purposes with other countries.

CONSUMPTION OF RAW AND PROCESSED WOOL

('000 tonnes)

Year	Consumption of processed wool							
	Consumption of raw wool		Worsted yarn used(a)		Woollen yarn used(b)		Total	
	Greasy	Clean	Greasy	Clean	Greasy	Clean	Greasy	Clean
1980–81	51.9	31.0	9.4	5.5	14.5	8.9	25.0	14.9
1981–82	55.5	33.1	8.6	5.1	15.3	9.5	25.1	15.1
1982–83	54.7	32.7	9.8	5.8	13.1	8.2	24.1	14.5
1983–84	54.4	32.4	9.8	5.7	14.4	8.9	25.5	15.2
1984–85	59.3	35.4	10.7	6.3	17.0	10.6	28.9	17.4
1985–86	62.5	37.3	10.5	6.1	18.3	11.4	29.9	18.1

(a) Wool content of yarns containing a mixture of wool and other fibres.

(b) Comprises pure and mixed woollen yarn.

The second series is considered to be a more satisfactory measure of Australian wool consumption, principally because allowance is made for significant quantities of wool tops exported. However, both series relate to consumption of wool by the wool textile industry, and should not be used as measures of consumption of wool at retail level. It has not been possible to estimate wool consumption at retail level because of the impracticability of obtaining reliable data concerning the wool content of the multiplicity of woollen and worsted piece-goods.

Exports of wool

From its earliest days the Australian wool industry has been export oriented, and today approximately 95 per cent of total annual production of wool is exported.

The great bulk of this leaves the country in its natural 'greasy' state, but increasing quantities are being exported in part processed forms (i.e. scoured, carbonised, top and noil) and as wool on skins.

EXPORTS OF WOOL

Year	Selected exports ('000 tonnes: greasy basis)			Total exports	
	Greasy and slipe	Scoured and carbonised	Exported on skins	Greasy basis (a)	Value f.o.b.
				'000 tonnes	\$m
1980-81	531.7	101.9	57.0	714.8	1,931
1981-82	497.6	93.0	50.6	667.9	1,913
1982-83	487.7	82.0	54.2	653.6	1,881
1983-84	497.7	95.7	50.7	669.8	2,049
1984-85	554.9	108.5	55.4	746.8	2,548
1985-86	607.9	130.4	61.2	830.5	3,098

(a) Includes processed wool.

For further details on sheep shorn, wool production and overseas trade see the following publications: *Livestock and Livestock Products, Australia* (7221.0), *Sheep Numbers, Shearing and Wool Production Forecast, Australia* (7211.0), *Shearing and Wool Production Forecast, Australia (Preliminary)* (7210.0), *Livestock Products, Australia* (7215.0), *Foreign Trade, Australia* (5409.0, 5410.0), *Production Bulletin No. 4: Australia* (8360.0) and *Value of Agricultural Commodities Produced, Australia* (7503.0).

Dairying

Dairying in Australia has experienced quite significant changes in recent decades. In response to changed demand patterns and consumer preference, both in Australia and overseas, there have been dramatic changes in cow numbers, farm productivity, product mix, export levels and major export destinations.

Although dairying occurs in all States, Victoria, Tasmania and New South Wales combined account for 80 per cent of total milk production. In recent years there has been structural adjustment in some States to match production with domestic market demand—particularly liquid milk demand. With the exception of some inland irrigation areas, e.g. the Goulburn/Murray Valley and the M.I.A., most dairying is centred along the coastal belt. Some feed lot dairies have been established in Australia.

Production

Wholemilk production has been around 6,000 million litres in more recent years with Victoria representing approximately 60 per cent. Although total production has stabilised, this has been associated with a fall in both cow numbers and the number of registered dairy farms. In 1985-86 there were some 18,500 registered dairy farms with 1,776,000 cows in production. This compares with 1982 figures showing some 20,300 farms and 1,812,000 cows.

The factors behind the yield gains of about 4 per cent per annum since 1982 include improved feeding programs (pasture and supplementary), genetic/breeding gains and generally enhanced farm management practices. Economy of operation gains have been possible as average farm and herd size has increased. This has enabled more economic application of new technology.

There has also been change within the processing sector, reflecting adjustments to relative prices. Persistent world stockpiles of butter have depressed export prices over recent years. As a result there has been a marked swing away from butter production to cheese and wholemilk powder production. Associated with falling butter production has been a fall in skim milk powder production. New technology, e.g. short method cheese production and ultra filtration, is enabling the processing sector to improve its relative competitiveness. Recent amalgamations within the processing sector should enable further competitive gains.

Domestic market

The consumption of dairy products in Australia has undergone change in recent years in both the volume and composition of dairy product consumption. These changes generally reflect changes within the Australian population as Australia becomes more culturally diverse. Other factors influencing dairy food consumption include changed consumer preference, e.g. more diet/health conscious, and changed relative prices (butter with respect to margarine). Liquid milk sales account for around 27 per cent of total milk production and compete heavily against other non-alcoholic beverages, e.g. fruit juices. Changes in manufactured dairy produce consumption have been more dramatic than for liquid milk. Recent product developments such as spreadable butter and butter/vegetable oil blends have been commercialised with reasonable success.

Since 1960 annual per capita cheese consumption has risen by an average of 7.9 per cent with current levels at around 8.4 kilograms. The area of greatest growth has been in the specialty type cheeses while per capita consumption of traditional cheddar type cheeses has stabilised at around 4.5 kilograms per annum. The cheeses to have experienced quite large increases include Camembert, Mozzarella and Parmesan.

Recent figures indicate a slight trend towards locally produced cheese at the expense of imported product—particularly from the E.E.C. This trend towards local product reflects international currency movements and a more responsive local processing sector. Smaller, sometimes on-farm, cheese plants have been recently established in response to this consumer trend towards the specialty type cheeses.

MILK CATTLE NUMBERS

('000)

31 March	Bulls used or intended for service	Cows and heifers used or intended for production of milk or cream for sale				House cows and heifers (a)
		Cows (in milk and dry)	Heifers		Under 1 year	
			1 year and over	Under 1 year		
1981	54	1,819	460	393	74	
1982	49	1,810	465	387	73	
1983	47	1,792	460	390	69	
1984	46	1,809	483	401	66	
1985	45	1,809	475	413	63	
1986	43	1,770	488	397	61	

(a) One year and over, kept for the establishment's own milk supply.

International marketing

During 1986-87, Australia exported dairy product to the value of \$466m (f.o.b.). In value terms, the main exports were cheese and milk powders, especially skim and whole milk. Given changes in the international marketing environment—especially the E.E.C.—the direction of Australian dairy product exports has changed significantly over recent years.

World market price minima for dairy products are established under the General Agreement on Tariffs and Trade (GATT). The minima are determined after consultation with relevant signatory nations. However, given over-supply of some dairy products there has been an incentive to sell product on the world market at below GATT minimum prices.

Government assistance

New institutional market arrangements in the Australian dairy industry were introduced on 1 July 1986. This scheme was developed after much industry consultation and replaced an equalisation scheme which aimed to protect the industry from unexpected and sharp falls in market prices. Central to the former scheme was that returns on export markets were pooled and manufacturers received an equalised return.

Under the current scheme there is to be no equalising of returns and, as such, individual manufacturer performance may be reflected in farm gate returns. The general thrust of the new arrangements are to further expose the industry to market forces, both locally and overseas. An integral part of the current arrangements is the operation of the Market Support Payments and the Supplementary Support Payment funds. These funds aim to support export market returns.

The Market Support Payments Fund is financed via an all milk levy which is determined by government following recommendation of the Australian Dairy Corporation. The all milk levy for 1986-87 was set at 35c/kg milkfat, current legislation prevents the levy exceeding 45c/kg milkfat.

The Supplementary Support Payment Scheme was established to cover the transition from the former underwriting/equalisation scheme to the current arrangements. Product levies are payable on all domestic sales of butter and certain cheese varieties. Assistance to industry is also offered via the Rural Adjustment Scheme which provides financial assistance for such things as farm build-up, farm-improvement and household support. Government funding of dairy research is provided on a dollar for dollar matching basis with industry funded contributions. Producers at present pay a 2.5 cents/kg milkfat levy for research and a 5.5 cents/kg milkfat levy for promotion.

The allocation of research funds is administered through the Dairy Research Council. Dairy Research Council supported research covers three broad areas—farm, manufacturing, and economics and marketing. Examples of more specific research include promotion effectiveness, cheese making technology, pasture renovation, animal nutrition and distribution.

PRODUCTION, UTILISATION AND GROSS VALUE OF WHOLE MILK

Year	<i>Whole milk intake by factories (a)</i>				Gross value \$ million
	<i>Market milk sales by factories</i>	<i>Milk used in the manufacture of dairy products</i>	<i>Total intake</i>		
	—million litres—				
1980-81	1,540	3,703	5,243	885.1	
1981-82	1,552	3,716	5,268	1,033.9	
1982-83	1,573	3,951	5,524	1,186.5	
1983-84	1,572	4,351	5,923	1,153.2	
1984-85	1,593	4,445	6,038	1,035.4	
1985-86	1,625	4,412	6,037	1,106.7	

(a) These milk intake figures have been collected (from milk factories) by the Australian Dairy Corporation and replace statistics of whole milk production and utilisation previously compiled by ABS.

Industry outlook

The short-term future of the Australian dairy industry is very dependent on future developments within the international trading environment. Stocks of butter are still relatively high, and future world prices will obviously reflect changes to these stock levels. While measures have been implemented in the E.E.C. and the U.S.A. to restrict milk production they have had no significant impact.

At present, trade between Australia and New Zealand is covered by a Memorandum of Understanding. This aims to ensure that there is close liaison between the two countries on matters such as third markets, respective domestic issues regarding production, pricing etc., and access to each country's market. Currently, sales growth of New Zealand is restricted to growth in the total Australian market. Access is currently set at approximately a 5 per cent share of the Australian cheese market. However under the terms of the Australia-New Zealand Closer Economic Trade Agreement (CER), trade between the two countries is to be unrestricted by 1995. There will be a review of the CER agreement during 1988 and, the future of the dairy industry will depend, in part, on future negotiations and trade with New Zealand.

While the international market heavily influences the Australian dairy industry, so too does the domestic market. It is possible that the national liquid milk market may be less controlled in the future. This possibility, together with changing consumer preferences provides the Australian dairy industry with significant challenges.

PRODUCTION AND TRADE OF BUTTER AND CHEESE

Year	Butter			Cheese			Imports
	Factory production	Exports(a)		Factory production(c)	Exports(b)		
		Quantity	Value f.o.b.		Quantity	Value f.o.b.	
	'000 tonnes	'000 tonnes	\$m	'000 tonnes	'000 tonnes	\$m	'000 tonnes
1980-81	79.4	12.0	23.1	136.7	54.1	103.7	13.3
1981-82	76.4	5.0	14.0	153.3	57.5	122.9	16.1
1982-83	88.3	15.5	41.1	158.2	54.5	134.6	19.7
1983-84	111.3	27.4	50.3	161.1	54.6	141.1	22.3
1984-85	114.0	40.7	69.2	159.6	67.6	163.7	22.3
1985-86	105.0	42.9	71.6	170.1	66.1	165.5	20.3

(a) Excludes ghee and butter concentrates. (b) Includes processed cheese exports. (c) Factory production is shown only for non-processed cheese.

APPARENT CONSUMPTION OF MILK, BUTTER, CHEESE AND MARGARINE

Year	Apparent consumption Total			Apparent consumption Per capita per year			Margarine	
	Market milk	Butter	Cheese	Market milk	Butter	Cheese	Table	Other
							kg	kg
	ML	'000 tonnes	'000 tonnes	Litres	kg	kg	kg	kg
1980-81	1,540	64	98	104.0	4.3	6.6	6.7	2.5
1981-82	1,552	65	105	103.1	4.3	7.0	6.8	2.7
1982-83	1,572	61	113	102.9	4.0	7.4	6.8	2.8
1983-84	1,572	60	118	101.6	3.9	7.7	6.9	2.7
1984-85	1,594	62	126	101.8	3.9	8.1	6.6	2.3
1985-86	1,625	60	125	102.5	3.8	8.0	6.9	2.1

For further details on the dairying industry see the publications, *Livestock and Livestock Products, Australia* (7221.0), and *Production Bulletin No. 3: Food, Drink and Tobacco, Australia* (8359.0).

Beekeeping

The beekeeping industry consists of approximately 300-400 full-time apiarists, who produce approximately 70 per cent of Australian honey, and a large number of part-time apiarists who produce the rest. Some of these apiarists move as far afield as from Victoria to Queensland in an endeavour to obtain a continuous supply of nectar for honey from suitable flora. While honey production remains the predominant sector of the industry, production of breeding stock and provision of pollination services is significant.

Exports of honey are regulated by the Australian Honey Board which also promotes honey consumption.

Statistics in the following table relate to apiarists with forty or more hives.

BEEKEEPING STATISTICS

Year	Number of apiarists	Number of beehives		Honey produced		Beeswax produced		
		Productive	Total	Average production per productive hive	Gross value	Quantity	Gross value	
								Quantity
		'000	'000	'000 tonnes	kg	'000	tonnes	'000
1980-81	2,224	379	531	19.5	51.5	15,815	366	1,530
1981-82	2,263	405	552	24.8	61.3	18,211	482	1,978
1982-83	2,182	390	540	22.5	57.7	16,605	424	1,613
1983-84	2,148	393	529	25.0	63.6	19,220	467	1,622
1984-85	2,222	413	553	28.0	67.7	21,257	528	2,077
1985-86	2,250	427	560	26.9	63.0	25,387	490	2,035

EXPORTS OF HONEY AND BEESWAX

Year	Honey		Beeswax	
	Quantity	Value f.o.b.	Quantity	Value f.o.b.
	'000 tonnes	\$'000	tonnes	\$'000
1980-81	8.2	8,985	177	733
1981-82	12.8	10,596	303	1,216
1982-83	14.8	13,075	368	1,387
1983-84	11.0	11,152	256	963
1984-85	17.5	16,480	390	1,589
1985-86	14.6	16,724	292	1,352

Honey levy

The *Honey Levy Acts (Nos. 1 & 2) 1962* impose a levy on domestic sales of honey. The rate of levy is set by regulation up to a maximum of 2.70c per kg fixed by the legislation.

The *Honey Export Charge Act 1973*, imposes a charge on exports of honey. The legislation provides for a maximum charge of 1.5c per kg.

For further information, see the publication *Livestock and Livestock Products, Australia (7221.0)*.

Eggs and egg products

Commercial egg production in Australian States (incl. N.T. but excl. A.C.T.) in 1985-86 was about 183.1 million dozen. The decrease of recent years is expected to continue as all States endeavour to reach their goal of maintaining quota hen numbers at such levels as will result in production being very close to domestic needs with very little left over for export. Such action has been taken as the net return on exports of shell eggs and egg products has been well below the cost of production in past years.

EGGS AND EGG CONSUMPTION

(million dozen)

Year	Recorded Commercial production	Exports (a)	Apparent consumption in Australia as human food	
			Total	Per capita (number) of eggs
1983-84	197.5	20.1	180.0	140
1984-85	185.8	6.3	178.6	137
1985-86	183.1	7.6	177.4	134

(a) Includes shell eggs and egg products in shell egg equivalent.

Exports

The Australian Egg Board, established by Commonwealth legislation in 1947, was responsible for co-ordinating export marketing arrangements. It was empowered to purchase surplus domestic supplies from State marketing authorities, if they so wished, and to arrange to sell such eggs or products on overseas markets.

EXPORTS OF EGGS AND EGG PRODUCTS

Year	Eggs in shell		Eggs not in shell			
	Quantity	Value f.o.b.	Liquid form		Dry	
			Quantity	Value f.o.b.	Quantity	Value f.o.b.
	'000 doz	\$'000	tonnes	\$'000	tonnes	\$'000
1980-81	1,423	1,113	8,508	8,891	50	337
1981-82	1,143	1,095	5,013	6,400	62	219
1982-83	2,672	1,763	3,455	4,108	85	682
1983-84	6,734	3,541	6,892	6,112	95	312
1984-85	1,964	1,837	3,696	4,462	203	1,058
1985-86	2,321	2,013	2,315	2,743	129	652

Following reviews of the Board's operations, in the light of falling export quantities resulting from industry actions to reduce surplus production, the Commonwealth Government announced in August 1984 its decision to abolish the Australian Egg Board. Legislation was enacted late in 1984 to abolish the Board.

Any export marketing is now undertaken by the individual State Board concerned under the aegis of an Exporters Committee established by the Australian Egg Marketing Council (AEMC). The AEMC is a non-statutory body whose membership is made up of the members of the State Egg Marketing Boards.

Exports are predominantly in egg pulp form—white, yolk and whole egg.

Agricultural improvements

Irrigation on agricultural establishments

Irrigation is one of the factors by which agriculture is developed. The variability in stream flow and annual rainfall means that successful irrigation of crops and pastures is dependent on storage. Ground water supplies are also used in areas where the quantity is adequate and the quality is suitable. The area of land irrigated (approximately 1.6 million hectares in 1983-84) forms about 9 per cent of the total area under crops and only 0.3 per cent of the total area of agricultural establishments.

Chapter 16, Water Resources, contains additional details of water conservation and irrigation with international, national and interstate aspects.

Irrigation statistics are collected every three years in the Agricultural Census and represent area actually irrigated. They were collected in the 1986-87 Census.

SOURCE AND USAGE OF WATER, AUSTRALIA

Irrigation— area irrigated, by source 1983-84(b)	Area	Percentage of total area irrigated	Estimated annual water use in 1983-84(a)			
			Irrigation	Rural (excl irrigation)	Urban/ Industrial	Total
	'000 hectares		—gigalitres—			
Surface water—						
State irrigation schemes	914.2	56				
Rivers, creeks, lakes	367.9	23				
Farm dams	107.3	7				
Total surface water	1,389.5	86			n.a.	
Town or country reticulated (c)	9.8	1				
Underground (ground water)	225.6	14				
Total, all sources	1,624.9	100	10,226	1,342	3,062	14,629

(a) Source: 1985 Review of Australia's Water Resources and Water Use. Water Use Data set, Department of Resources and Energy; Australian Water Resources Council. The data in the original are shown by Drainage Division and provide a sound basis for the efficient utilisation of existing resources and the planning of future projects. (b) Source is the Agricultural Census and represents area actually irrigated. (c) This source represents irrigation water which has come from either surface or underground sources.

Fertilisers

Most Australian soils are deficient in phosphorus. Because of this and the significant but less widespread deficiency of sulfur in many soils, phosphatic fertilisers, particularly single superphosphate, account for the bulk of fertiliser usage. Nitrogen deficiency is also general in Australian soils and the use of nitrogenous fertilisers is increasing. Potassium deficiency however is confined mainly to soils in the higher rainfall areas which are intensively cropped or used for irrigated pastures.

The pattern of fertiliser usage in Australia has changed dramatically in recent years. Prior to 1973-74 the usual consumption ratio of elemental N:P:K has been 2:6:1, but by 1983 the ratio had changed to almost 3:3:1. This variation has resulted from a combination of reduced consumption of phosphatic fertilisers with an increased consumption of nitrogenous fertilisers.

The domestic industry has sufficient manufacturing capacity to meet normal local demand for phosphatic fertilisers but not nitrogenous fertilisers. Australia is dependent on imports of potassic fertilisers, rock phosphate and sulfur. Imports of compounded high analysis fertilisers and specialised fertilisers were insignificant until 1982-83. Since then, however, imports have been rising strongly, largely as a result of oversupply and lower prices on the world market.

ARTIFICIAL FERTILISERS: AREA AND USAGE

Year	Area fertilised	Super-phosphate used	Nitrogenous fertilisers used	Other fertilisers used
	'000 ha	'000 tonnes	'000 tonnes	'000 tonnes
1980-81	n.a.	2,947	392	609
1981-82	26,777	2,873	395	599
1982-83	n.a.	2,562	429	633
1983-84	n.a.	2,481	414	721
1984-85	26,407	2,374	421	885
1985-86	25,089	2,160	408	869

Since the Second World War there has been a great expansion of the area of sown pasture accompanied by an increased use of fertilisers. New pasture varieties (including tropical species) have been developed, and nutrient or trace elements deficiencies in soils identified.

The main artificial fertiliser used in Australia is superphosphate, over half of which is used on pastures, mainly in areas with moderate to good rainfall. Large quantities are also used on cereal crops.

SUPERPHOSPHATE USAGE

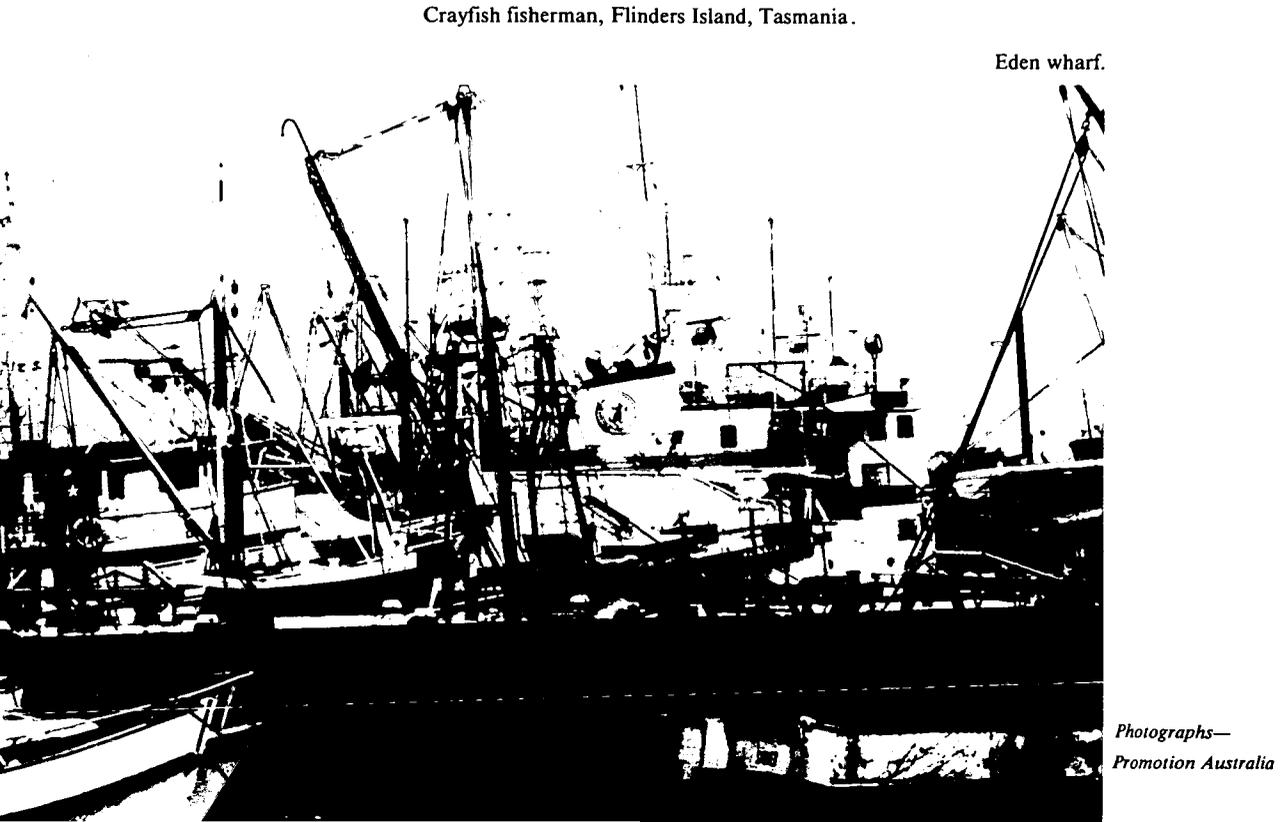
<i>Selected crops and pastures</i>						
Year	<i>Sown and native pastures</i>		<i>Wheat</i>	<i>Other cereals</i>	<i>Sugar cane</i>	<i>Total</i>
	<i>Lucerne</i>					
AREA FERTILISED ('000 hectares)						
1980-81	13,964	n.a.	8,723	n.a.	291	n.a.
1981-82	12,240	106	9,361	4,034	301	26,777
1982-83	10,711	n.a.	9,299	n.a.	300	n.a.
1983-84	10,175	n.a.	9,672	n.a.	292	n.a.
1984-85	10,686	133	9,694	4,588	297	26,407
1985-86	10,674	n.a.	8,813	n.a.	288	25,089
SUPERPHOSPHATE USED ('000 tonnes)						
1980-81	1,733	n.a.	756	n.a.	32	2,947
1981-82	1,518	21	801	416	31	2,873
1982-83	1,289	n.a.	777	n.a.	27	2,562
1983-84	1,229	n.a.	720	n.a.	23	2,481
1984-85	1,227	24	618	352	18	2,374
1985-86	1,211	n.a.	499	n.a.	16	2,160

PRODUCTION AND IMPORTS OF FERTILISERS

Item	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	
PRODUCTION							
Superphosphate (a)	'000 tonnes	3,557	3,464	2,877	2,668	2,647	n.y.a.
Mixed chemical fertilisers (including complete manures)	'000 tonnes	1,277	1,092	967	990	1,167	n.y.a.
Leaf and foliage type fertilisers (including dry and liquid form)	tonnes	n.p.	7,765	6,846	n.p.	n.p.	n.y.a.
Manures (without added chemical fertilisers) (b)	tonnes	29,906	26,677	34,128	39,107	37,545	n.y.a.



Crayfish fisherman, Flinders Island, Tasmania .



Eden wharf.



Marine turtle industry, Darnley Island.

Photographs—Promotion Australia

Poling tuna, Eden N.S.W.





A Forestry Commission nursery, Sydney.

Photographs—Promotion Australia

Felling a tree.





Mountain ash.

A cleared forest being prepared for regeneration.



PRODUCTION AND IMPORTS OF FERTILISERS—continued

Item		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
IMPORTS							
Crude fertilisers (mainly natural phosphate)	'000 tonnes	2,294	2,772	2,148	1,689	1,763	1,922
	Value \$m	102.1	128.6	109.1	86.3	89.5	107.6
Manufactured, mineral or chemical fertilisers—							
Nitrogenous (c)	'000 tonnes	86	108	101	91	201	200
	Value \$m	12.7	16.2	15.6	14.8	41.8	29.9
Potassic (d)	'000 tonnes	213	255	203	228	239	195
	Value \$m	21.5	26.7	20.7	23.1	29.3	27.2
Other (e)	'000 tonnes	66	92	273	389	437	331
	Value \$m	14.8	19.1	53.1	87.8	106.7	89.6

(a) Includes double and triple superphosphate and ammonium phosphate in terms of single superphosphate. (b) Blood, bone and/or offal, and other material. (c) Mainly ammonium nitrate, ammonium sulfate, calcium ammonium nitrate, sodium nitrate and urea containing in the dry state more than 45 per cent by weight of nitrogen. (d) Mainly potassium chloride and potassium sulfate. (e) Includes phosphatic fertilisers and compounds of the main elements nitrogen, phosphorus and potassium (N.P.K. complete

Agricultural machinery on agricultural establishments

Statistics on the type of agricultural machinery on agricultural establishments were published in early issues of the *Year Book*. Additional information was published in the publication *Agricultural Land Use, Improvements and Labour, Australia, 1980-81* (7103.0). Details of the sales of new tractors for agricultural purposes are given in the quarterly publication *Sales and Stocks of New Tractors, Australia* (8507.0).

Employment in agriculture

Employment on agricultural establishments

Prior to 1976, data on employment collected at the annual Agricultural Census differentiated between permanent full-time employees and temporary employees. Full-time workers excluded casual or seasonal workers and other persons working only part-time. Casual or seasonal workers were shown as temporary employees.

In the past it has been difficult to maintain comparability of employment on agricultural establishments from year to year because of the changing number of lessees and share farmers and because of the tendency of many farmers to include part-time family helpers as full-time workers in their returns. Since World War II there has been a decline in the percentage of people living in rural areas due, in part, to a rising standard of living accompanying the introduction of new techniques and increasing use of capital equipment, fuel, fertilisers, and pesticides. As a result, a smaller agricultural labour force is now producing a larger output of farm products.

EMPLOYED PERSONS IN AGRICULTURE AND SERVICES TO AGRICULTURE ('000)

Month of August	Males	Married females	All females	Persons
1981	281.9	87.1	104.6	386.5
1982	281.7	87.1	101.0	382.8
1983	290.2	80.2	94.1	384.2
1984	279.3	80.0	93.8	373.1
1985	287.4	89.5	107.1	394.5
1986	278.4	94.0	112.1	390.6

Regulation of Australian agricultural industries

Year Book No. 61, pages 837-57, contains a summary of the means by which agricultural industries are assisted and regulated. It is not intended as a comprehensive statement of all the consultative and legislative assistance and control measures that exist, but rather as a description of the way in which these processes affect the crops, livestock and livestock products referred to earlier in this chapter.

Agricultural research by CSIRO

Agricultural research, conducted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) is directed primarily to aspects of agricultural production that are of widespread significance and require mid to long-term research. It is aimed at establishing principles, practices and technologies that will improve the efficiency and long-term viability of Australian agriculture and its capacity to respond to changing needs. This work ranges from studies in basic biology to those designed to integrate new plant varieties, animal breeds and production technologies into sound production systems.

CSIRO's research is appropriate for attacking problems or developing opportunities that transcend State boundaries, are complex and require concentration of disciplinary effort for their solution, and may need sustained long-term effort before they yield practical results. CSIRO's agricultural research complements that of State government departments and universities, and the Organisation attaches considerable importance to collaborative research with them.

CSIRO's agricultural research makes up one-third of its overall research effort and covers the following research areas: plant improvement, plant physiology and biochemistry, soils and plant nutrition, crop and pasture pests and diseases, livestock production, livestock health, and agricultural systems. In addition, secondary industry research directly relevant to the agricultural industries covers wool textiles, food handling, processing and storage, and agricultural and veterinary chemicals. There is also research directly relevant to the agricultural industries carried out within the research area of environmental protection and rehabilitation.

Most of CSIRO's agricultural research is performed within the Institute of Animal and Food Sciences and the Institute of Biological Resources. The Institute of Animal and Food Sciences carries out scientific and technological research aimed at improving the efficiency of livestock production and the quality and safety of human foods. The Institute's activities include research on control of indigenous and exotic animal diseases; nutrition, reproduction, genetics and management of livestock; methods of processing, handling and storing meat, fish, dairy foods, fruit, vegetables and grain; and molecular and cellular biology and its application in the livestock and pharmaceutical industries. This research is performed by the following constituent units of the Institute—Divisions of Animal Health, Animal Production, Tropical Animal Science, Molecular Biology, Food Research, Australian Animal Health Laboratory and the Wheat Research Unit.

Research in the Institute of Biological Resources is directed to improvement of the productivity of Australia's rural industries and conservation of its biotic resources, recognising that the two are highly interdependent. Plants are sources of fibre and food, and the start of all human food chains. Research to optimise plant production is therefore of fundamental importance, and is directed to producing increased quantities of usable plant material of high quality and with least disruption to water resources, soils and fragile ecosystems. Work to increase plant productivity is complemented by research to improve our understanding of the Australian environment. This research is performed by the following constituent units of the Institute—Divisions of Plant Industry, Tropical Crops and Pastures, Horticultural Research, Soils, Water Resources Research, Wildlife and Rangelands Research, Entomology, and the Centre for Irrigation Research.

The Institute of Industrial Technology is also engaged in research of direct benefit to the agricultural industries. Wool textile and marketing research is performed by the Divisions of Protein Chemistry, Textile Physics, and Textile Industry, and research on the design and synthesis of potential agricultural chemicals is performed by the Division of Applied Organic Chemistry.

CHANGING PATTERNS OF LAND USE IN AUSTRALIA

(This special article has been contributed by the Division of Water and Land Resources, CSIRO—written by Dr P. Laut)

The land and its limitations

In terms of world agriculture, Australian agriculture is characterised by:

- its heavy dependence upon overseas markets;
- the large scale of activities compared with similar enterprises in other parts of the world;
- its heavy and long term concentration on a limited range of products;
- its dependence upon a low rainfall, seasonally dry and periodically droughty environment, and a geologically old land resource with limited fertility and relatively high propensity to degradation;
- the relatively high standard of living of the agricultural community.

The outstanding feature of Australian agriculture is its dependence upon overseas markets. As the Australian community consumes only a small part of the country's total agricultural production, most products must be sold in competition with other major producers, many of whom have large populations to help support their industries. Australian agriculturalists must therefore be economically efficient by world standards to compete on world markets.

A large part of the Australian continent is not particularly suited to agricultural production in comparison with the land resources of other major agricultural producers. This is mainly due to the seasonality and limited rainfall of the continent combined with very high rates of potential evaporation, and to prolonged droughts which periodically affect most parts of the Australian continent.

The vast interior of the Australian continent receives little rainfall in either winter or summer (less than 300 mm a year). This, combined with very high potential evaporation (in excess of 3,000 mm a year from a standard pan in which water is available at all times), means that in most years and in most seasons there is a soil moisture deficit. At best, this part of Australia may be used for extensive livestock grazing. As the northern portion of the continent receives almost all its rainfall (400–1,200 mm) during the hot summer months when evaporation is greatest (2,800–3,200 mm a year pan evaporation), it is less effective for plant growth than in the south of the continent. Generally, there is a severe dry period during the winter, with a consequent need for irrigation for any cropping. The exception is the very high rainfall 'sugar coast' of Queensland which receives more than 1,600 mm of rainfall and has less than 1,600 mm pan evaporation.

The southern portion of the continent receives most of its rainfall (400–1,200 mm) during the cooler winter months when pan evaporation is usually less than 1,600 mm a year. Consequently there is more soil moisture available for plant growth for a given amount of rainfall than in the north, especially during the wet winter season, when even relatively dry lands may be used to grow cereal crops. The eastern coastal zone receives more rainfall than most other parts of the continent (800–1,600 mm a year) and has relatively low pan evaporation (less than 1,600 mm a year). This rainfall occurs during all seasons giving a potential growing season longer than for most other parts of Australia. Because of the rugged terrain and cooler temperatures of the eastern highlands, land use is highly varied, ranging from wilderness to intensive cropping and horticulture.

The Australian climate is also well known for its periods of low rainfall or drought which severely reduce the production of crops and animal forage and expose soils to erosion. Between 1965 and 1980, almost all of southern Australia experienced drought conditions, i.e. received less than the 10 percentile long-term rainfall for between 30 per cent and 40 per cent of all months.

At the commencement of European settlement these broad climatic patterns and limitations were unknown. The range and seasonal variability of the continent's regional climates had to be learnt and appreciated, often by bitter experience. Over the past 150 years, cropping activities were often extended well beyond sensible climatic limits, occasionally causing such hardship and environmental damage that government decrees were enacted to

limit the geographical extent of cultivation. In South Australia, for example, Goyder's Line was defined in 1865, while in New South Wales the non-agricultural Western Division was designated in 1901.

Within those lands climatically suitable for agriculture, local areas of steeply sloping lands, or lands with particularly fragile soils impose further restrictions on the pattern of land use. In the past, there was very little appreciation of these limitations of the Australian land resource. Very steeply sloping lands were often cleared for grazing and, worse still, for cultivation which led to widespread and severe erosion in areas such as the Southern Tablelands of New South Wales. In the southern pastoral lands where shrub vegetation, 'saltbush' and 'bluebush' provided forage for sheep and cattle, lack of understanding of annual rates of shrub growth led to gross overstocking which, in conjunction with depredation of huge rabbit populations, precipitated very serious losses of vegetative cover and consequent serious soil erosion. Much of western New South Wales for example, which suffered from these depredations, has never fully recovered and sheep numbers today remain well below those at the turn of the century.

Limitations on land for agriculture may be defined in terms of land capability. Most States are now completing land capability mapping for their agricultural lands, assisting land users to avoid mistakes of the past. But land users are frequently unwilling or unable to change land use practices. Sometimes this is because of difficult economic circumstances; at other times it is because land users have little or no understanding of the long-term consequences of their activities.

Information on the harmful effects of certain land use practices has often been ignored with consequent serious long-term effects. Dry land salinity was observed and explained in terms of extensive clearing of native woodlands in Western Australian wheatlands in the mid-1920s, and Victoria in the early 1960s; rising water tables and salinity led to the abandonment of a number of early irrigation areas along the Murray River around the turn of the century; and the serious long-term consequences of rising water tables in the Murrumbidgee Irrigation Area have been known since the 1950s.

The historical development of Australian agriculture

Australian agriculture has passed through the following five broad phases in its continuing evolution since 1788.

1. The earliest phase, from 1788 to around 1820, represents the subsistence period of the early colony.
2. The second phase, from 1820 to 1860, highlights the early export of agricultural commodities.
3. The third phase, from the early 1860s to around the turn of the century, includes the development of the continental pattern of land use.
4. The fourth phase, from 1900 to the 1950s, was a period of adjustment and consolidation.
5. The fifth phase, from the 1950s to the present, has been a period of secondary expansion.

1. 1788-1820

During this period, the colonists of New South Wales and Van Diemen's Land struggled to provide even basic food requirements. They were not always successful in the earlier years and chronic hunger was not uncommon. Lack of agricultural experience, capital equipment of the most rudimentary kinds and of draught animals were complemented by an unknown environment. Towards the end of this period the economic potential of sheep was beginning to be appreciated by Marsden, Macarthur and others, with irregular wool and tallow exports. Exploration, of what proved to be better and far more extensive pastoral lands west of the Dividing Range and the interior of Van Diemen's Land, began in this period. The most important cultivation lands were the Windsor, Parramatta and Liverpool districts near Sydney where wheat and maize were the major crops. Sheep and cattle grazing were concentrated in the Cumberland basin and the south-east of Van Diemen's Land.

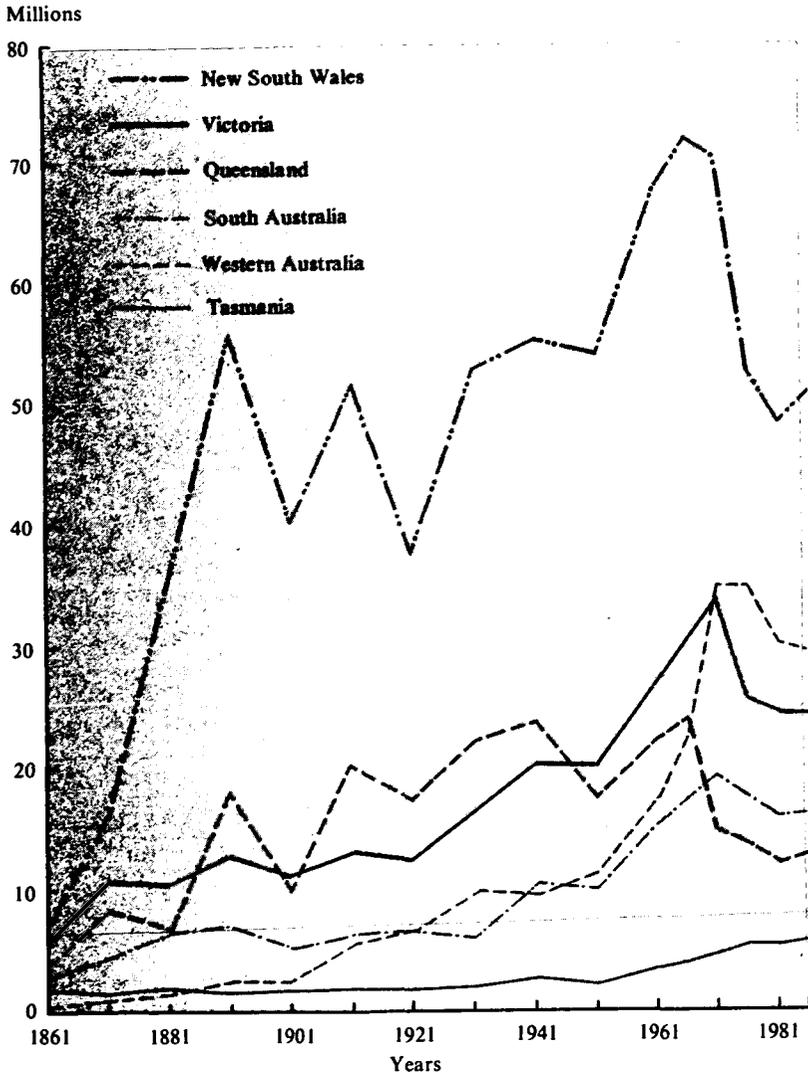
2. 1820-1860

This phase was characterised by rapid expansion both of the pastoral industry across Australia and wheat cultivation along the gulf seaboard of South Australia. Elsewhere, grain cultivation stagnated for three reasons: transportation problems were considerable (there were few roads capable of supporting grain laden wagons between the newly settled lands and exporting ports); soils of the older settled areas showed alarming declines in fertility after three to five years of cropping; and wheat varieties particularly suited to the climates of the

colonies were not available. However, by the end of this period, draught animals were more plentiful, and manures provided some soil improvement; cultivation and harvesting techniques and machinery suitable for Australian conditions had been developed, for example the wheat stripper; and greater numbers of small farmers or 'dungarees' were turning to wheat cultivation both for export, and throughout the 1850s, to meet an increasing domestic demand.

This period includes three very important changes to the structure of the colonial economies: the cessation of convict transportation; the development of free settler colonies with varying policies for land pricing; and the start of the gold rushes which brought both population and economic wealth to Victoria and New South Wales and later to other colonies. Each had profound effects on Australian colonial agriculture, varying from labour shortages and rapid regional increases in demand for foodstuffs, to long-term land marketing arrangements. By the end of 1860, the combined colonies possessed some 20 million sheep and 4 million cattle, and had almost half a million hectares under cultivation, half of which was wheat. At the end of this period, the broad pattern of Australian dryland agriculture was well towards the making.

FIGURE 1: SHEEP NUMBERS

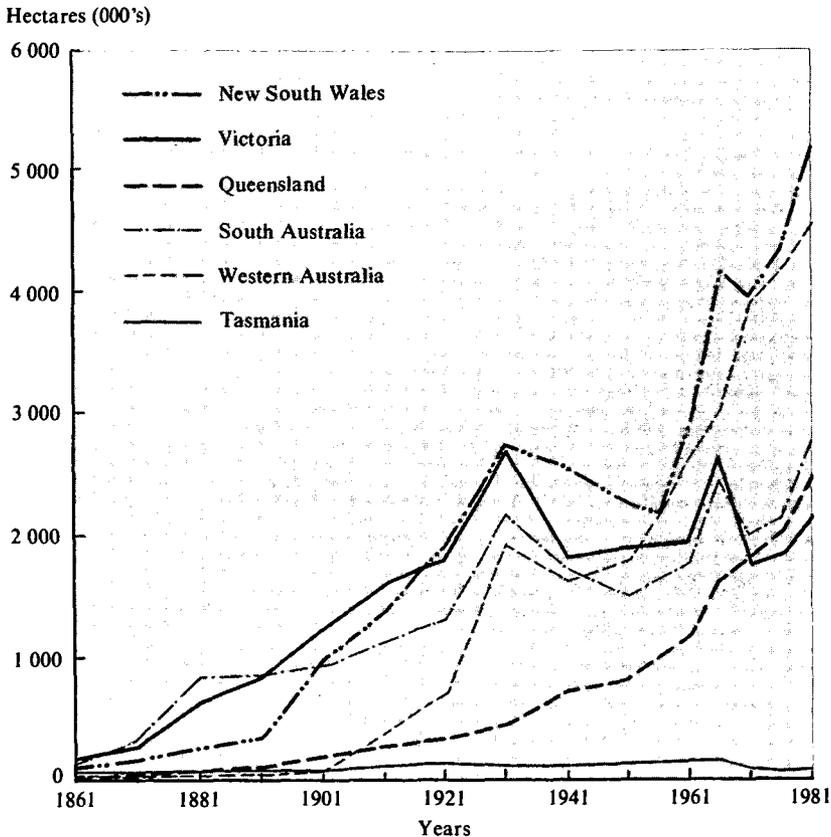


3. 1860–1900

From the early 1860s to around the turn of the century the broad pattern of Australian land use was firmly established through the closer settlement Acts such as the Robertson Acts of New South Wales. In this period, a suitable land and water transportation system, was developed for the movement of agricultural products from source of production to the European and especially British markets. Australia became an important exporter of a wide range of agricultural products: wool, wheat, mutton, beef, fruit, sugar and dairy products.

Cattle numbers for the continent doubled in this period with increases of between nine- and ten-fold in Queensland and Western Australia. Sheep numbers increased three and a half times for all the colonies with a nine-fold increase in Western Australia and a six-fold increase in New South Wales (*see* Figure 1). The area cultivated increased around seven and a half-fold for all colonies between 1860 and 1900 with notable increases of over nine-fold in New South Wales and Queensland and over eight-fold in Victoria and Western Australia (*see* Figure 2). With the exceptions of Queensland and Tasmania, wheat sowings were responsible for most of the increases in cultivated area. In this period, New South Wales and Victoria increased their areas sown to wheat twelve-fold and South Australia and Western Australia, six-fold.

FIGURE 2: AREA CULTIVATED



4. 1900–1950

The broad geographic pattern of Australian agriculture did not alter radically during the first half of the twentieth century. The severe drought in eastern Australia which began in the last years of the nineteenth century continued into the new and, combined with the

rabbit plague, wreaked havoc on the agricultural economies of the eastern States. There were also notable regional droughts in the 1930s and 1940s and these, with the Great Depression and World War II, had severe impacts on the regional structure of agriculture, although not its geographical pattern. In particular, the economic depression and the droughts of the 1930s reduced many land holders to penury.

During the period 1900 to 1950, there were general agricultural adjustments in regions of harsher physical environments and livestock densities were permanently reduced throughout much of semi-arid Australia. At the same time there was a retreat from the drier margins of agricultural lands. But in all, this was a period of consolidation, based on the reconciliation of a relatively stable technology with a now reasonably well known environment. The two World Wars brought both benefits and problems. They reduced the supply of labour and capital for agriculture but increased the demand for its products. At the end of World War II there were large quantities of American ex-army equipment available which radically altered the level of mechanisation on Australian farms.

Despite setbacks from droughts, wars and economic depressions, national livestock numbers increased notably from 1900 to 1950, although not nearly as rapidly as in the previous period. Australian cattle numbers increased by 69% and sheep numbers by 60%. Only in the Northern Territory were these increases of the magnitude experienced elsewhere in Australia during the previous 40 years. Similarly, the area of cropland (predominantly sown to wheat) slightly more than doubled in this period.

In a 'dry' continent such as Australia, irrigation is often thought of as a major benefit and in this period State governments strongly supported the development of irrigation schemes. Towns such as Mildura and Griffith were established to service the needs of irrigation farmers and to process their products. By the end of this period the total of actual and planned irrigated land of all types comprised almost 3% of all Australia's crop and pasture lands.

5. 1950-present

This phase of Australian agriculture has involved some remarkable changes in world markets for agricultural products. These changes have precipitated major shifts in the structure and organisation of the agricultural economy. There have been considerable benefits from scientific research into problems of cropping and farm animal husbandry in this period. In particular, the introduction of myxomatosis devastated the immense Australian rabbit population and paved the way for significant increases in livestock numbers. The post-war economic boom and rural to urban migration facilitated widespread mechanisation, which in turn opened up large tracts of hitherto grazing lands in northern New South Wales, central eastern Queensland and southern Western Australia for cereal cultivation. War-time marketing restrictions on agricultural products led to more stable systems for their marketing. Road trucking for livestock helped reduce the impact of local and regional drought. In addition, there has been an expansion of irrigation areas especially for the cultivation of cotton and rice; introduction of a range of new crops such as oil seeds, and improved varieties to suit varying regional conditions; and a general intensification of land use throughout the higher rainfall areas of the southern and eastern portions of the continent.

There have been challenges also to 'traditional' agriculture as the rightful user of all possible lands, and to the right of the agriculturalist to ignore long-term ramifications of land use on the land resource. Conservation has become an important influence, both in the sense of improved management of the agricultural land resource to provide long-term sustainable yields, and in the sense of excluding agriculture from areas set aside for the preservation of native species. Urban development has also claimed notable areas of agricultural land along the margins of Australia's major cities for 'extensive' suburban or 'acreage' development and for recreation.

At the same time there have been considerable external pressures on Australian agriculture. Its traditional major market disappeared with Great Britain's entry into the European Economic Community which, because of the strongly supportive policies of that organisation, has now become a competitor with some of Australia's exports. To counter these losses Australian agriculture has had to turn to the U.S.S.R., Japan, and China to dispose of its products, and has had to adjust to meet their particular requirements.

This has also been a period in which the longer term degradation of the Australian land resource has been irrefutable as the results of long-term overstocking and poor cultivation techniques have been scientifically documented and publicly debated. The dryland salinity problem of Western Australian wheatlands and the rapidly increasing water tables of Murray-

Murrumbidgee irrigation areas are two such major issues confronting not only the agricultural community but the Australian community at large.

During the 1970s and 1980s Australian agriculture has been in a state of continuous flux with agriculturalists experimenting with new techniques and crops; varying the emphasis of their enterprises and gradually increasing the scale of their enterprises to spread the costs of specialised and expensive capital items such as auto-headers and four-wheel drive tractors.

The traditional indicators of Australian agricultural growth, numbers of cattle and sheep and areas of all crops and wheat, remain significant, despite the wide range of changes in the industry. In general over this period, sheep gave way to cattle with a peak in sheep numbers in 1970 and a huge increase in cattle numbers by 1976. Between 1950 and 1980 there was only a 16% increase in national sheep numbers compared to a 79% increase in cattle numbers.

In the same period, the areas sown to all crops and to wheat have grown steadily but consistently with only a 114% increase in cropland and a 125% increase in area sown to wheat. This suggests that with the present world market situation for agricultural products there may be little further increase in arable farming. While on the one hand farmers prefer to move between cropping and livestock as markets change, on the other they are often forced by economic circumstances to cultivate as much area as possible to cover the cost of their expensive cultivation and harvesting equipment. This has occurred to such an extent that many farmers in traditional wool-wheat mixed farming areas no longer follow rotations and have become wheat mono-cultivators. Wheat mono-cultivation, which requires much more precise management to maintain soil fertility and control diseases and weeds, places additional stresses on the Australian land resource, on farm management, and on land administration.

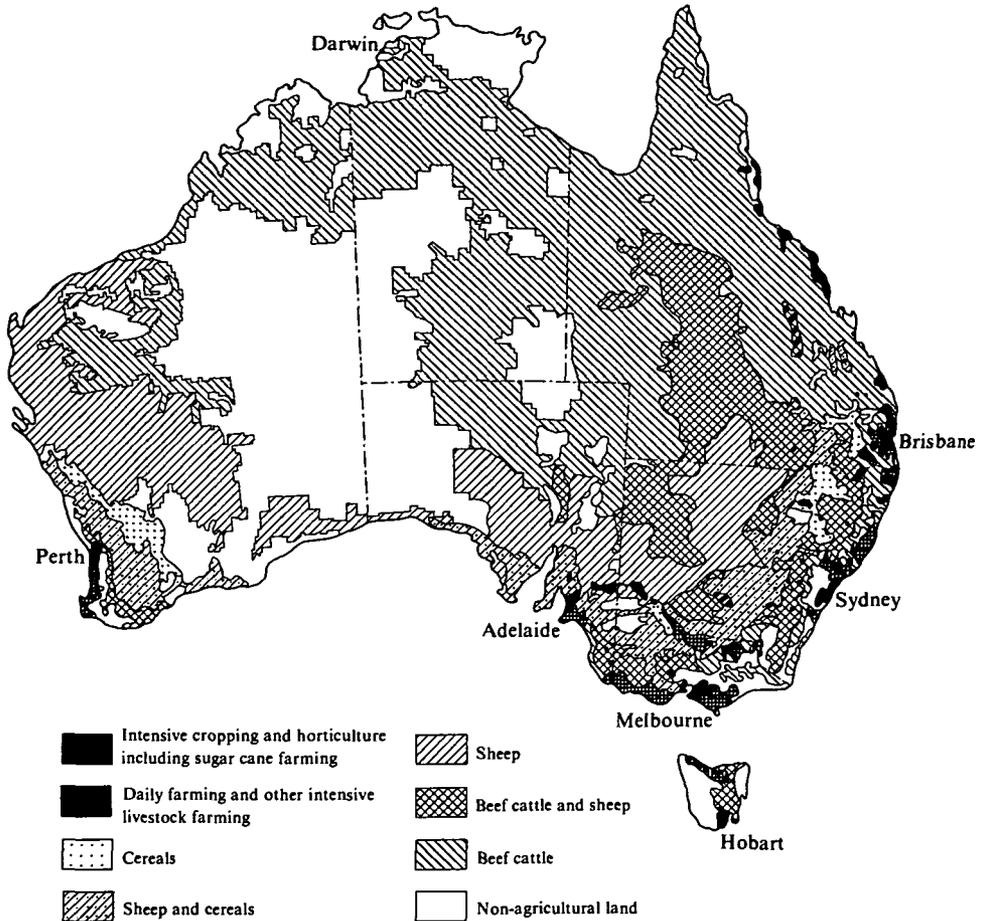
Agricultural land use in the 1980s

In 1984-85 there were some 488 million hectares in agricultural enterprises in Australia. Only 4% of this area was cropped and 6% was under sown pastures and grasses. The remaining 90% remained under modified or unmodified native vegetation. The total area of agricultural land has remained approximately the same over the past decade. Two States, Western Australia and New South Wales, account for approximately 60% of Australia's cropped land but improved pastures are somewhat more evenly distributed amongst the States with New South Wales, Victoria and Western Australia accounting for 67% of the continent's total.

The area of individual establishments varies considerably according to types of activity. Vegetable growing farms or market gardens in Victoria and Tasmania vary from tens to hundreds of hectares, while cattle stations in the Northern Territory are commonly several hundred thousand hectares in extent. However, the mean size of agricultural establishments for each State is generally indicative of productivity of the land resource. The mean area of agricultural establishments for Australia for 1984-85 was 2,800 hectares, varying from 310 and 390 for Victorian and Tasmanian farms respectively, to 1,200 for New South Wales, 3,150 for South Australian, 4,600 for Queensland and 6,750 for Western Australian farms, with the cattle stations of the Northern Territory averaging an enormous 274,000 hectares.

The types and proportions of types of farming establishments also vary considerably from State to State. In 1984-85 Australia had approximately 173,100 agricultural establishments. In all States and the Northern Territory, livestock grazing dominates farming activities. Cereals cultivation and mixed cereals cultivation with sheep or beef cattle involves approximately 20-55% of all farms except in the Northern Territory. Most types of farming are widely spread among States (see Figure 3), and conversely most States have a wide range of farm types, with a few exceptions: sugar cane farms are almost exclusively in Queensland (91%) as are peanut farms (99%); tobacco farms are mostly in Queensland (59%) and Victoria (36%) and cotton farms in Queensland (45%) and New South Wales (55%). Agricultural establishments in the Northern Territory are almost exclusively beef cattle stations. Diversity of farm type by State, combined with a degree of flexibility in livestock and cropping components in southern Australia have proved advantageous in periods when one or two agricultural products receive low prices, but offer little advantage during periods of generally depressed agricultural markets.

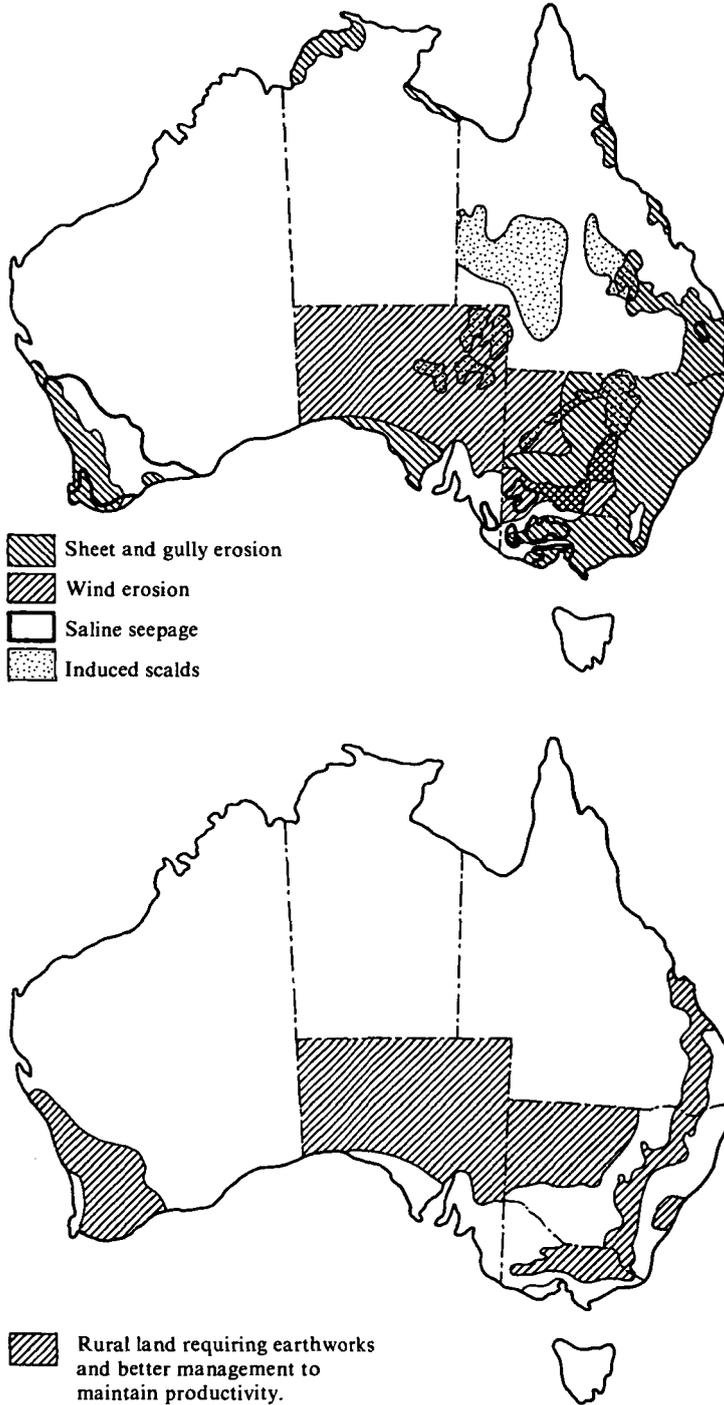
FIGURE 3: FARM TYPES



Source: *Atlas of Australian Resources, Third Series, Volume 3, Agriculture.*

The largest areas of irrigation occur in New South Wales and Victoria which include 41% and 34% of the continent's irrigated lands respectively. In New South Wales almost 60% of these irrigated areas are in State irrigation schemes (56% of irrigated area) and the emphasis has been on high value field and cereal crops such as cotton and rice. In Victoria, where there is also a heavy dependence on State irrigation schemes, emphasis has been on intensive livestock grazing (dairying and fat lambs) and horticulture (dried vine fruits). Queensland which has some 16% of the nation's irrigated lands depends heavily on underground water supplies and only 25% of the irrigated land receives its water from State irrigation schemes. Many of Australia's irrigation areas face serious problems of rising water tables because of the soils on which they were developed and water management techniques employed.

FIGURE 4: LAND DEGRADATION



Source: *Land Degradation in Australia*, L. E. Woods, AGPS, 1983.

Australian agriculture in the coming decade

It seems likely that Australian agriculture will face a very competitive future with comparatively lower world prices for cereals and meats than have been experienced over the past two decades or so. It is doubtful whether this will markedly alter the structure of the industry or its geography, however it may accelerate trends towards larger and more economically efficient farming enterprises.

Perhaps the most worrying for the longer-term is the degradation of the land resource base of Australian agriculture. It is widely accepted that many of Australia's most productive agricultural lands are at risk to water erosion, wind erosion and salinity. Figure 4, adapted from a national survey of land degradation in the mid-1970s, indicates generally where these problems occur. Other forms of degradation also occur over much of our best agricultural lands but are more readily treated. For example, soil acidity in heavily fertilized grazing lands can be rehabilitated by applications of lime; and areas of soil structural damage caused by continuous use of heavy equipment may be restored by conservation farming techniques.

Australian agriculture will undoubtedly continue to face competition from other forms of land use for resources; plantation forestry is currently replacing marginal agriculture in the higher wetter lands of south-eastern Australia; the requirement for land and water as recreation resources will also expand, and the competition for water resources from urban development will continue to increase. On the more positive side, the agricultural community including farmers, politicians, State government advisors and administrators, and agricultural land and water resources scientists are now well aware of these problems and are constantly seeking ways to assist Australian agriculture evolve to face the world market situation and to ameliorate the effects of resources constraints.

BIBLIOGRAPHY

ABS Publications

- Australian Standard Industrial Classification* (1201.0,1202.0)
Apparent Consumption of Foodstuffs and Nutrients, Australia (4306.0)
Apparent Consumption of Selected Foodstuffs, Australia, Preliminary (4315.0)
Foreign Trade, Australia (5409.0, 5410.0)
The Labour Force, Australia (6203.0)
Agricultural Industries: Structure of Operating Units, Australia (7102.0)
Agricultural Land Use, Improvements and Labour, Australia, 1980-81 (7103.0)
Principal Agricultural Commodities, Australia, Preliminary (7111.0)
Selected Agricultural Commodities, Australia, Preliminary (7112.0)
Shearing and Wool Production Forecast, Australia, Preliminary (7210.0)
Sheep Numbers, Shearing and Wool Production Forecast, Australia, Preliminary (7211.0)
Livestock Products, Australia (7215.0)
Livestock and Livestock Products, Australia (7221.0)
Viticulture, Australia (7310.0)
Cereal Grains: Estimates of Area Sown, Australia (7312.0)
Crops and Pastures, Australia (7321.0)
Fruit, Australia (7322.0)
Agricultural Land Use and Selected Inputs, Australia (7411.0)
Value of Principal Agricultural Commodities Produced, Australia, Preliminary (7501.0)
Value of Selected Agricultural Commodities Produced, Australia, Preliminary (7502.0)
Value of Agricultural Commodities Produced, Australia (7503.0)
Agricultural Industries: Financial Statistics, Australia, 1980-81 (7507.0)
Production Bulletin No. 3: Food, Drink and Tobacco, Australia (8359.0)
Production Bulletin No. 4: Textiles, Bedding and Floor Coverings, Australia (8360.0)
Sales and Stocks of Australian Wine and Brandy by Winemakers (8504.0)
Sales and Stocks of New Tractors, Australia (8507.0)

Other Publications

INTERNATIONAL WHEAT COUNCIL. *World Wheat Statistics, 1986.*

RESOURCES AND ENERGY, DEPARTMENT OF. *1985 Review of Australia's Water Resources and Water Use.* Water Use Data Set, Australian Water Resources Council.

THOMAS, S. and CORDEN, M. *Metric Tables of Composition of Australian Foods.* AGPS, Canberra, 1977.