# 16

# RURAL INDUSTRY

## FARMING IN VICTORIA

### Land settlement

*Beginnings*

The first permanent settlement of the then Port Phillip District of the Colony of New South Wales occurred in 1834 when the Henty brothers "squatted" on Crown land at Portland. They were followed by Batman and Fawkner who in 1835 similarly squatted on the present site of Melbourne. Although squatting was illegal, settlement had extended some 130 kilometres inland by 1836.

Efforts were made to legalise the position of the squatters and in 1836 regulations were drafted to enable them to acquire for $20 as much land as they wished. This resulted in some very large holdings. At one time four pastoralists held approximately 3 million hectares of the District. By 1840, most of the southern and western parts had been occupied. Also, because of the favourable reports of Major Mitchell, who led an expedition through the area, pastoralists were bringing their flocks south of the Murray River, resulting in extensive settlement in northern areas from New South Wales.

Various Acts of Parliament were proclaimed to give the squatters security of tenure and to break up the large holdings and make land available to more people. However, by the use of "dummy settlers", vast areas of land still remained in the hands of a few.

The early settlers were all pastoralists. Such crops as were grown were for their own consumption and for food for livestock. With the large increase in population that came with the gold rushes and in the aftermath of the Irish potato famines, land-use had to be diverted from grazing to agriculture and large holdings had to be broken up to make land available to the small farmer.

In all, some ninety Acts of Parliament were proclaimed dealing with land settlement. To enable closer settlement to take place, the Government re-purchased land from the original holders and then offered it for sale to small farmers to use for cropping instead of grazing. Full details of these Acts of Parliament can be found in the *Victorian Year Book* 1973.

*Land occupation*

The following tables show alienation and utilisation of Crown land in Victoria:

VICTORIA—ALIENATION OF LAND AT 30 JUNE 1977

| Particulars | Area |
|---|---|
| | hectares |
| Lands alienated in fee simple | 13,740,684 |
| Lands in process of alienation | 131,138 |
| Crown lands | 8,888,178 |
| Total | 22,760,000 |

VICTORIA—CROWN LANDS AT 30 JUNE 1977

| Particulars | Area |
|---|---|
| | hectares |
| Land in occupation under— | |
| Perpetual leases | 15,249 |
| Grazing leases and licences | 2,498,427 |
| Other leases and licences | 12,458 |
| Reservations— | |
| Reserved forest | 2,285,490 |
| Timber reserves (under Land Act) | 59,638 |
| Water catchment and drainage purposes | 85,452 |
| National Parks (under National Parks Act) | 227,320 |
| Wildlife reserves | 54,402 |
| Water frontages, beds of streams and lakes (not included above) | 342,248 |
| Other reserves | 128,084 |
| Unoccupied and unreserved but including areas set aside for roads | 3,179,410 |
| Total | 8,888,178 |

NOTE: Crown lands, alienated in fee simple during the years ended 30 June 1973, 1974, 1975, 1976, and 1977 were 24,323, 39,195, 33,019, 61,200, 57,589, and 41,585 hectares, respectively.

## Physical characteristics

### *Statistical divisions*

*Introduction*

In previous editions of the *Victorian Year Book,* the description of land utilisation in Victoria has been based on the division of the State into eight Agricultural Districts which were combinations of counties, i.e., land areas with immutable boundaries.

From the 1978 edition, land utilisation has been described in terms of twelve statistical divisions (see Figure 7 on page 325), the standard Australian Bureau of Statistics regions which are combinations of local government areas forming coherent socio-economic zones. These regions were adopted by the Victorian Government for planning purposes. Statistical divisions are subject to change as local government areas change and as socio-economic conditions change. (See also pages 168 to 173).

*Melbourne*

As the Melbourne Statistical Division is largely occupied by the metropolitan area, it is of comparatively small agricultural significance. Nevertheless there is quite a range of soils, climates, and agricultural activities.

The basalt plains stretch eastwards from the western plains to the mountains and hills. The topography in the west is quite flat, and hilly to mountainous in the north and east. The Mornington Peninsula comprises the southern boundary.

The predominant soils are Podsolic derived from basalt, sedimentary rocks, and unconsolidated sediments, and Red-Brown Earths. Other soils are the Kranozems and the peaty soils (very acidic, black, and consisting mainly of organic matter over clay subsoils). Rainfall varies from 475 mm in the west to 1,250 mm in the east.

The western area has been well regarded for its hay and barley production. The peripheral shires in most of the remainder of the Division support mainly small farms with dairying, orchards, poultry raising, flower growing, and stud farming. Some of these areas are under wooded hills and mountains, although the land is much clearer to the south.

A recent development has been the proliferation of subdivisions into small farms, many of which are owned by city residents. Many of these properties are kept for recreation; others for small commercial ventures. Recreation is in fact a substantial industry in this Division, as there are a number of golf courses and country clubs. Another trend has been the industrialisation of areas away from Melbourne, e.g., Dandenong and Hastings, which has resulted in additional inroads into the rural areas.

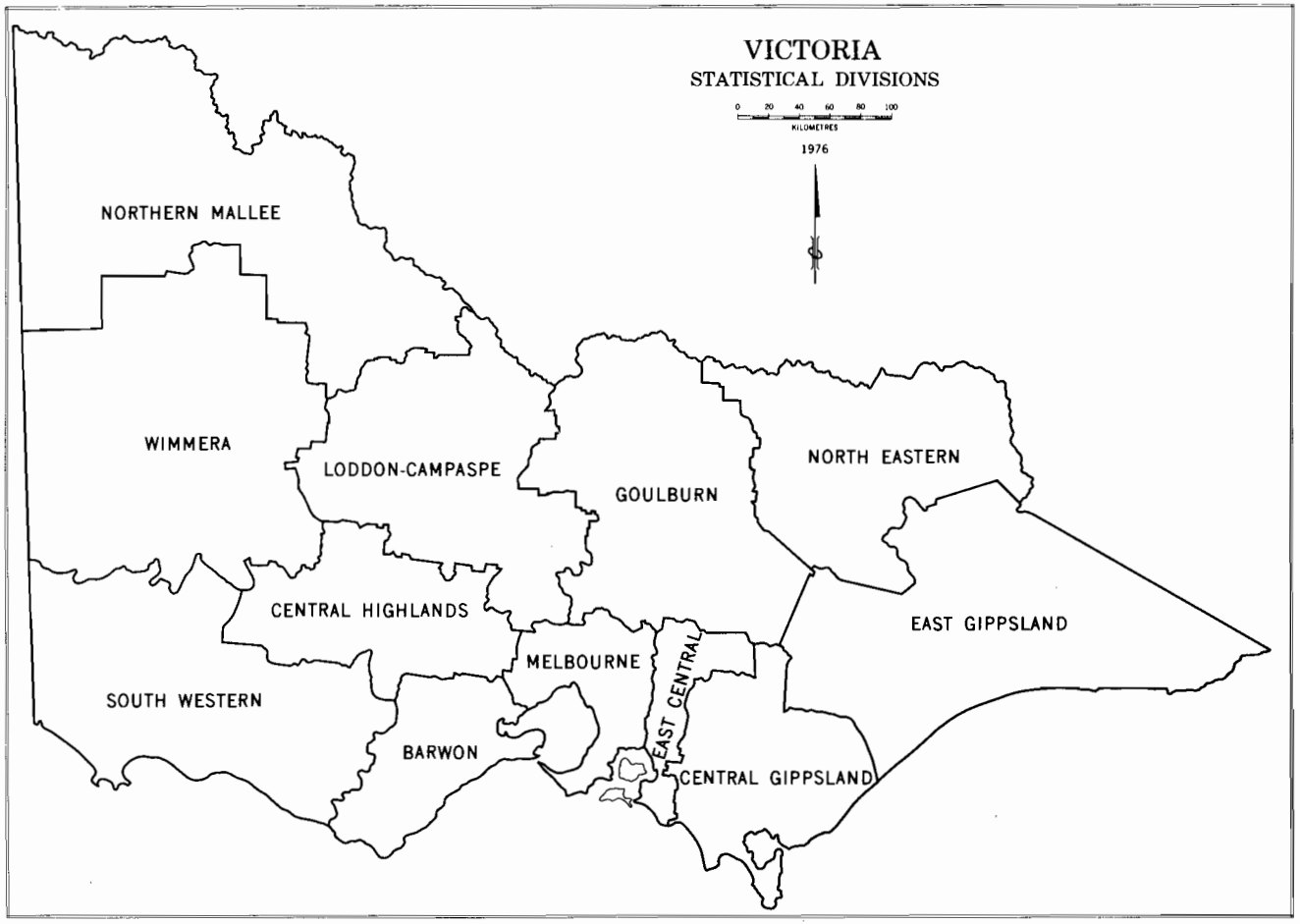


FIGURE 7. VICTORIA—statistical divisions

VICTORIA—MELBOURNE STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establishments |
|---|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41–100 | 101 + | |
| Meat cattle | 1,548 | 74 | 28 | 7 | 4 | 1,661 |
| Orchard and other fruit | 257 | 101 | 83 | 26 | 6 | 473 |
| Vegetables | 135 | 107 | 120 | 93 | 43 | 498 |
| Nurseries | 91 | 64 | 57 | 49 | 25 | 286 |
| Poultry | 63 | 23 | 46 | 61 | 61 | 254 |
| Potatoes | 27 | 15 | 22 | 35 | 3 | 102 |
| Other | 928 | 293 | 203 | 69 | 17 | 1,510 |
| Total | 3,049 | 677 | 559 | 340 | 159 | 4,784 |

*(a)* Establishment is a term used in economic statistics and refers to the full range of activities at the smallest operating level of a business, which in general corresponds to a location. Establishments are classified according to their predominant activity based on the estimated value of commodities produced; the sum of these comprises the "estimated value of operations" of the establishment as a whole.

*(b)* The period covered in this and most subsequent tables in this Chapter is the 1976–77, season which in general refers to the year ended 31 March 1977, but also includes activities which may have been finalised after 31 March (e.g., grape picking). In most of these the growing period occurred before 31 March.

*Barwon*

Barwon is one of Victoria's smallest statistical divisions and lies west of the south-west corner of Port Phillip Bay. It comprises nine shires. In the south, the main topographical feature is the Otway ranges, a steep mountainous region with high rainfall, ideally suited to forestry. To the north is the flat volcanic plain which is used mainly for grazing as well as a little cropping. Intermediate between these extremes are the coastal plains which have a mixture of soil types and topography.

Most of the soils are Podsolic, being derived from basalt, unconsolidated sediments, and sedimentary rocks. Others are Red-Brown Earths. The average annual rainfall varies between 450 mm and 1,200 mm in various parts of the Division.

About 75 per cent of the Division is under primary production. The main agricultural industries are dairying, and beef and sheep raising, but there are also quite significant areas of cereal and oilseed crops as well as grass seed production, beekeeping, and pigs. Forestry is also important in and around the Otway Ranges.

There has been a tendency during recent years for farmers to go out of dairying. Beef and wool production are the main activities on the volcanic plains, and prime lambs are raised in the southern areas of the Division.

VICTORIA—BARWON STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | Total establishments |
|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41 + | |
| Milk cattle | 274 | 386 | 283 | 34 | 977 |
| Meat cattle | 731 | 53 | 22 | 10 | 816 |
| Sheep | 266 | 100 | 86 | 41 | 493 |
| Other | 495 | 197 | 199 | 163 | 1,054 |
| Total | 1,766 | 736 | 590 | 248 | 3,340 |

*(a)* See footnote to table above.
*(b)* See footnote to table above.

*South Western*

The South Western Statistical Division covers a large portion of the south-west of Victoria, being bounded on the south by the sea and the west by the State boundary with South Australia. It is mainly located on volcanic and coastal plains, with some rising country in the south-east of the Division. Rainfall varies from about 500 mm in the extreme north to 1,200 mm in the Otway ranges in the south-east corner. Temperatures

are generally cooler away from the coast where the sea has an ameliorating influence during the winter.

Few rivers flow through the area, and those that do show a considerable variation in the content of dissolved salts. Lakes in the basalt areas vary from fresh water to brine. Underground water is widely available at fairly shallow levels with salt content varying from 1,000 to 7,000 parts per million.

Many of the soils have developed from lava flows with acid grey loams and sandy loams coming from the older flows. Some of the more recent lava has not weathered greatly and the soils from it are skeletal with stony rises. The dominant soil type is the one which is derived from basalt and unconsolidated sediments. Sub-dominants are derived from sedimentary rocks and the miscellaneous soil group. Soils in the red gum areas have a sandy topsoil with clay below.

A large portion of the Division is farmed; the remainder is covered by natural forest or planted commercial forests. Substantial areas of the farmed land are under improved pasture.

The Western District, within this Division, is a traditional woolgrowing area. Sheep numbers fell during the early 1970s but are now recovering. Dairying is popular along the southern section and beef cattle are also raised. Numbers of the latter have begun to decline and the numbers of dairy farms and dairy cattle are also falling.

The main crops are oats, wheat, and barley. Oilseeds such as sunflowers, linseed, and rape, have gained popularity during recent years.

VICTORIA—SOUTH WESTERN STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establish-ments |
|---|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41–100 | 101 + | |
| Milk cattle | 478 | 1,062 | 845 | 145 | 4 | 2,534 |
| Sheep | 445 | 437 | 482 | 189 | 29 | 1,582 |
| Sheep and meat cattle | 412 | 374 | 456 | 250 | 71 | 1,563 |
| Meat cattle | 1,121 | 167 | 74 | 37 | 6 | 1,405 |
| Other | 286 | 86 | 122 | 94 | 19 | 607 |
| Total | 2,742 | 2,126 | 1,979 | 715 | 129 | 7,691 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*Central Highlands*

The Central Highlands are a very important statistical division, with Ballarat near its eastern boundary and Ararat near the west. The district is a mixture of extinct volcanic cores, basaltic plains, and uplifted sedimentary strata of Ordovician age. Elevation ranges from about 200 metres to 500 metres above sea level. The Great Dividing Range passes a few kilometres north of Ballarat, and the Pyrenees Range enters the north-west corner of the Division. The western section stretches into plains, and finishes near the Grampians.

The main soils are Podsolic, derived from basalt and sedimentary rocks; Kranozems are sub-dominant. Annual rainfall varies from 425 mm to 1,050 mm. The main streams which rise in the area are the Wimmera, Avoca, Loddon, and Campaspe Rivers, flowing north, and the Mt Emu, Fiery, Hopkins, Leigh, Woady Yallock, Moorabool, and Werribee flowing south.

About 75 per cent of the Division is farmed, the remainder being Crown land and forest. Most of the Crown land and forest is in the Daylesford-Trentham, Smythesdale, Enfield, and Mt Cole areas.

The main agricultural produce comprises wool, prime lambs, potatoes, beef, cereals, and oilseeds, with some dairying and small seeds production. The plains produce very heavy crops of oats and good crops of wheat.

Improved pastures have increased the carrying capacity of the plains greatly and have improved soil fertility, enabling productive clover ley farming to be undertaken.

VICTORIA—CENTRAL HIGHLANDS STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establishments |
|---|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41–100 | 101 + | |
| Sheep | 651 | 278 | 269 | 124 | 16 | 1,338 |
| Meat cattle | 729 | 42 | 16 | 5 | 3 | 795 |
| Sheep and meat cattle | 292 | 108 | 84 | 53 | 13 | 550 |
| Potatoes | 48 | 45 | 63 | 65 | 15 | 236 |
| Other | 533 | 178 | 212 | 141 | 27 | 1,091 |
| Total | 2,253 | 651 | 644 | 388 | 74 | 4,010 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*Wimmera*

The Wimmera is one of Victoria's largest and most productive statistical divisions. It stretches broadly from the South Australian border in the west to Stawell in the south-east and Hopetoun in the north-east. It is primarily a large plain, sloping gently to the north, but has the distinctive Grampians Range of mountains on its south-east border.

The dominant soils groups are Grey and Brown soils of heavy texture (alkaline clay loams and clays over clay subsoils—friable calcareous self-mulching grey soils) and Podsolic soils derived from unconsolidated sediments. The sub-dominant groups are Red-Brown Earths, Mallee soils, Podsolic soils derived from sedimentary rocks, and the Miscellaneous Soil Group. Rainfall ranges from 350 mm to 880 mm a year.

Most of the area, except the uncleared desert country in the north-west and south-west of the Division, is farmed.

Cereal growing is the dominant agricultural industry, with heavy crops of wheat being produced in good seasons. Barley is grown primarily on the Rosebery Ridge between Beulah and Hopetoun, while oats and rye, which are grown in the lighter soils, are also produced. Some sunflowers have also been grown in recent years.

Grazing, which encompasses both the running of some excellent medium to strong Merino sheep flocks in the south and of fat lambs in the north, is also important. A number of beekeepers also use the flowering eucalyptus to advantage.

VICTORIA—WIMMERA STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establishments |
|---|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41–100 | 101 + | |
| Sheep and cereal | 190 | 298 | 524 | 326 | 37 | 1,375 |
| Cereal grains | 193 | 297 | 714 | 680 | 67 | 1,951 |
| Sheep | 358 | 181 | 147 | 52 | 10 | 748 |
| Other | 478 | 107 | 124 | 82 | 24 | 815 |
| Total | 1,219 | 883 | 1,509 | 1,140 | 138 | 4,889 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*Northern Mallee*

This large Division extends along the Murray Valley from the Kerang area to Mildura and on to the South Australian border. It is essentially a vast plain, sloping to the north-west from about 100 metres above sea level in the south to 35 metres at Lake Cullulleraine. Low superficial land forms of ridges and dunes are also present.

The dominant soil group is the Solonised Brown Soils (Mallee Soils)—alkaline brown sandy soils over more clayey highly calcareous soils. Several sub-dominant groups occur. These are grey and brown soils of heavy texture, Red Brown Earths, and Alluvial Soils. This Division is relatively dry, with rainfall ranging from 240 mm to 370 mm a year.

Most of the Division has been cleared for agriculture except for two major tracts of country along the South Australian border—the Sunset Country, south-west of Mildura, and the Big Desert which extends south into the Wimmera Division.

The main broadacre farming is cereal growing, associated with wool, prime lambs, and beef cattle. Wheat is the principal crop, followed in order by barley and oats. Dairying is conducted primarily in the irrigated country around Swan Hill and Kerang.

Horticulture is concentrated around Mildura, Robinvale, and Swan Hill. A high proportion of Victoria's grapes, (for drying, table use, and wine), olives and citrus fruits are grown in this Division. Vegetables are also grown.

VICTORIA—NORTHERN MALLEE STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establish-ments |
|---|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41–100 | 101+ | |
| Grapes | 354 | 819 | 649 | 148 | 19 | 1,989 |
| Cereal grains | 106 | 132 | 351 | 639 | 129 | 1,357 |
| Sheep and cereal | 39 | 49 | 93 | 113 | 21 | 315 |
| Orchard and other fruit | 90 | 36 | 42 | 43 | 7 | 218 |
| Other | 616 | 264 | 218 | 72 | 34 | 1,204 |
| Total | 1,205 | 1,300 | 1,353 | 1,015 | 210 | 5,083 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*Loddon-Campaspe*

The Loddon-Campaspe Division stretches from the Central Highlands in the south to the Murray River. The hilly and woody country of the south gives way to flat treeless plains. Red-Brown Earths are the dominant soils. Sub-dominant groups are grey and brown soils of heavy texture (both friable and dense grey soils), Podsolic soils derived from sedimentary rocks, and alluvial soils. Rainfall ranges from about 350 mm to 650 mm a year.

Grazing in the south of the Division gives way to heavy cropping in the west and dairying on irrigated land in the north and east. Sheep are run in conjunction with cereal growing, and there are intensive poultry and pig raising industries in the Bendigo area.

VICTORIA—LODDON-CAMPASPE STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | Total establish-ments |
|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41+ | |
| Meat cattle | 1,272 | 87 | 29 | 19 | 1,407 |
| Sheep | 738 | 191 | 146 | 76 | 1,151 |
| Milk cattle | 223 | 396 | 368 | 71 | 1,058 |
| Sheep and cereal | 175 | 227 | 364 | 212 | 978 |
| Sheep and meat cattle | 307 | 109 | 82 | 33 | 531 |
| Pigs | 79 | 36 | 45 | 58 | 218 |
| Other | 773 | 189 | 224 | 201 | 1,387 |
| Total | 3,567 | 1,235 | 1,258 | 670 | 6,730 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*Goulburn*

The Goulburn Statistical Division, which occupies an area on the east side of central Victoria, encompasses a wide range of topography and agricultural activities. From the mountainous part of the Great Dividing Range in the south, it stretches to the Murray River as a wide plain, much of which is known as the Goulburn Valley. In the north-west corner, the principal landscape features are treeless plains, old watercourses, riverside woodland, and swamps. The Goulburn, Loddon, and Campaspe Rivers drain the area to the north.

The main soils are Red-Brown Earths (slightly acid brown loams over alkaline clay subsoils containing calcium carbonate) and Podsolic soils derived from sedimentary rocks (grey loams, silty loams, and fine sandy loams with a more or less bleached sub-surface over clay subsoils). A sub-dominant group of alluvial soils occurs. Rainfall varies from 430 mm to 1,400 mm a year.

Most of the area, apart from the wooded hills, is farmed. Farming activities range from dairying (in the river valleys and highly productive irrigated country) to cereal growing; orchards, especially in the Shepparton and Cobram districts; and grazing. Irrigated cash crops of wheat or oilseeds (principally sunflowers) are becoming important. Vegetables are also grown.

During recent years there has been a decline in dairying, especially in the dry country, and, in the early 1970s, an increase in cattle raising. However, cattle numbers have, until recently, declined with the fall in prices for beef.

VICTORIA—GOULBURN STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976-77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establishments |
|---|---|---|---|---|---|---|
| | <11 | 11-20 | 21-40 | 41-100 | 101+ | |
| Milk cattle | 437 | 1,084 | 884 | 142 | 4 | 2,551 |
| Meat cattle | 1,406 | 188 | 80 | 30 | 2 | 1,706 |
| Sheep and meat cattle | 367 | 294 | 173 | 50 | 5 | 889 |
| Orchard and other fruit | 106 | 114 | 167 | 97 | 30 | 514 |
| Meat cattle and cereal | 97 | 83 | 64 | 15 | 1 | 260 |
| Other | 1,189 | 520 | 495 | 227 | 50 | 2,481 |
| Total | 3,602 | 2,283 | 1,863 | 561 | 92 | 8,401 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*North Eastern*

The North Eastern Statistical Division is characterised by mountainous country and some highly productive river valleys. There is also some cultivable country in the north-west corner of the Division.

Two dominant soil groups occur—Podsolic soils derived from sedimentary rocks and a miscellaneous group comprised of Podsolic, peaty, and skeletal soils, and red loams of the mountainous regions. Rainfall varies from 500 mm to 1,900 mm.

Traditional agricultural industries have included cropping, particularly around Rutherglen and Yarrawonga; winegrowing in the Rutherglen-Wahgunyah district; dairying along the valleys; beef cattle, particularly in the upper reaches of the Murray River; and hop growing, stonefruits, walnuts, and a high proportion of Victoria's tobacco growing, in the Ovens Valley, centred around Myrtleford.

A recent innovation has been the attempt to grow oilseed crops, particularly lupins, in the higher rainfall area to the south and as an addition to the cereal rotation in the north. There have been increases in the area of vines, lucerne production, and the area irrigated; and a decline in hop gardens, due to higher yields from the currently recommended variety of hops.

VICTORIA—NORTH EASTERN STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976-77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establishments |
|---|---|---|---|---|---|---|
| | <11 | 11-20 | 21-40 | 41-100 | 101+ | |
| Meat cattle | 1,280 | 240 | 76 | 24 | 3 | 1,623 |
| Milk cattle | 138 | 231 | 224 | 39 | — | 632 |
| Tobacco | 37 | 21 | 104 | 142 | 40 | 344 |
| Sheep and meat cattle | 160 | 89 | 55 | 11 | — | 315 |
| Other | 412 | 139 | 181 | 79 | 21 | 832 |
| Total | 2,027 | 720 | 640 | 295 | 64 | 3,746 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*East Gippsland*

East Gippsland covers a large area of south-east Victoria with the Great Dividing Range in the north, the New South Wales border on the north-east, and Bass Strait on the south. The Division can be divided into five main areas: (1) The coastal plain from south of Sale to Lakes Entrance, including the Gippsland Lakes. Here there are mainly sandy to sandy loam soils over clay or gravel. Sheep and cattle are the main industries in this area; (2) the foothills, undulating country which carries mainly sheep and cattle; (3) the highlands, carrying sheep and cattle on undulating to steep country; (4) the river valleys beginning in the west at the sources of the La Trobe and McAlister Rivers, and running east along the Tambo, Snowy, Cann, and other rivers; and (5) the productive irrigation district around Sale and Maffra.

Soils are mainly Podsolic, derived from sedimentary rocks, and the Miscellaneous Soil Group. The sub-dominant group comprises Podsols derived from unconsolidated sediments. This Division has quite a wide range of annual rainfall varying from 520 mm west of Bairnsdale to 1,150 mm in the mountains.

Apart from major areas of development in the plains in the western part of the Division which includes the irrigated area around Sale and Maffra, and the Omeo and Gelantipy districts, most agriculture is confined to the river valleys.

Beef cattle, sheep, and dairying are the most important livestock industries in the area. There is little broadacre cultivation. Vegetables are grown on the river flats at Lindenow and Orbost. The main crop, beans, is harvested green and sent to Melbourne to be frozen. Other crops include edible beans, sweetcorn, capsicums, and gherkins.

VICTORIA—EAST GIPPSLAND STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | Total establish-ments |
|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41+ | |
| Meat cattle | 841 | 127 | 67 | 21 | 1,056 |
| Milk cattle | 164 | 210 | 230 | 58 | 662 |
| Sheep and meat cattle | 160 | 148 | 105 | 40 | 453 |
| Other | 267 | 80 | 64 | 41 | 452 |
| Total | 1,432 | 565 | 466 | 160 | 2,623 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*Central Gippsland*

Central Gippsland is bounded on the south by Bass Strait, on the north by the mountains, on the west by an irregular line running north from near Wonthaggi, and on the east by a diagonal line passing just east of Sale. The main part of the area consists essentially of two mountain systems—the foothills of the Great Dividing Range and the Strzeleckis—separated by an east-west trough known as the Great Valley of Victoria. The remainder consists of low-lying hills and coastal plains.

The average rainfall ranges from 900 mm to 1,150 mm over most of the area, falling to about 700 mm at Yarram and 760 mm in the vicinity of Western Port Bay. The Division has a large number of soil-types ranging from sands to clays and loams, with some acid swamp soils and calcareous sand dunes. The dominant group is the Podsols, derived from sedimentary rocks and unconsolidated sediments. Kranozems also occur.

There are about 6,000 rural establishments, a substantial portion of which are under pasture. The main improved pasture species are perennial ryegrass, cocksfoot, white clover, and subterranean clover.

The main agricultural and pastoral industries are potato growing, fruit growing, vegetables, dairying, beef raising, and fat lamb production. Other industries include forestry, coal mining, and sand mining. There are several milk processing factories and an important paper mill in the Division.

VICTORIA—CENTRAL GIPPSLAND STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | | Total establishments |
|---|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41–100 | 101 + | |
| Milk cattle | 701 | 1,532 | 1,057 | 164 | 4 | 3,458 |
| Meat cattle | 1,378 | 185 | 101 | 22 | 3 | 1,689 |
| Other | 502 | 161 | 168 | 153 | 29 | 1,013 |
| Total | 2,581 | 1,878 | 1,326 | 339 | 36 | 6,160 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*East Central*

The East Central Statistical Division forms a very narrow corridor between what is virtually Melbourne's metropolitan area and Central Gippsland which has Moe as its approximate geographic centre. The East Central Division stretches from Bass Strait to the Upper Yarra area of the Great Dividing Range.

The soils are mainly Podsolic, derived from sedimentary rocks and unconsolidated sediments (sandy loams over clay subsoils and deep sands). Other groups include peaty soils and Kranozems (red loams). Rainfall is fairly uniform at about 900 mm to 1,000 mm a year. Some of the Division is still under forest, scrub, and Crown land. There is a relatively small orchard industry around Pakenham, some berry growing in the hills, and dairying in some of the valleys. There are a number of small farms engaged in potato growing and flower production, and some stud properties.

VICTORIA—EAST CENTRAL STATISTICAL DIVISION: NUMBER OF AGRICULTURAL ESTABLISHMENTS *(a)*, 1976–77 *(b)*

| Main activity of establishment *(a)* | Estimated value of agricultural operations ($'000) | | | | Total establishments |
|---|---|---|---|---|---|
| | <11 | 11–20 | 21–40 | 41 + | |
| Meat cattle | 653 | 57 | 14 | 5 | 729 |
| Milk cattle | 212 | 253 | 135 | 18 | 618 |
| Other | 288 | 80 | 85 | 79 | 532 |
| Total | 1,153 | 390 | 234 | 102 | 1,879 |

*(a)* See footnote to table on page 326.
*(b)* See footnote to table on page 326.

*Pasture improvement*

A substantial proportion of Victoria's beef, sheep, and dairy farming is conducted on improved pastures, which can support much higher rates of stocking than native pastures. During the past 40 years, the area of improved pasture in Victoria has increased from about 2 million to 7 million hectares. Much of this increase has resulted from widespread use of superphosphate and subterranean clover. At present, improved pastures are based on introduced clovers, medics, and perennial grasses, such as ryegrass, cocksfoot, and phalaris.

There are still about 4 million hectares of unimproved (or "native") pasture in Victoria. These pastures consist mainly of unproductive indigenous grasses such as wallaby grasses, kangaroo grass, weeping grass, and spear grasses, with no leguminous species of any value. They do not respond to fertiliser, and have a low carrying capacity.

Where annual rainfall is 750 mm or more, mainly south of the Divide, improved pastures of perennial grasses, white clover, and subterranean clover are used for intensive dairying and beef production. In the medium rainfall areas (500 mm to 750 mm) of north-east through to south-west Victoria, beef and sheep are run on pastures of perennial grasses and annual clovers, particularly subterranean clover. The remaining pastoral areas (250 mm to 500 mm rainfall) grow pastures of annual medics or clovers, with volunteer annual grasses such as barley grass, Wimmera ryegrass, and bromes, which are suitable mainly for sheep.

Irrigated pastures, based on highly productive perennial grasses and clovers, are grown on about 400,000 hectares of the northern plains, and about 40,500 hectares in southern Victoria, mainly Gippsland. They are primarily used for dairying.

In the past 20 years, the use of fertilisers such as potash, nitrogen, molybdenum, and copper, as well as superphosphate, has contributed greatly to increased pasture productivity. A rise in the price of superphosphate in 1974–75 resulted in an initial large decline in its use on pastures (to about one third of previous use). There has been a subsequent slow recovery in the amount used. Other developments have included a more informed approach to pasture management and the introduction of improved cultivars of cocksfoot and phalaris grasses, and white and subterranean clovers.

The advent in 1977 of new and potentially devastating aphid pests of lucerne and other pasture legumes has stimulated the importation and local development of legume cultivars which are resistant to these and other problems.

### *Fertilisation*

James Cuming, who arrived in Victoria in 1862, established the superphosphate industry in Australia, using bones and guano as a source of phosphate. Later, rock phosphate was imported from the United States of America. Since the First World War, supplies of rock phosphate from Nauru, Ocean Island, and Christmas Island have provided almost all of the requirements for superphosphate manufacture in Australia. Recently, Christmas Island has become the major supplier, with Nauru remaining important, but Ocean Island providing little. Most of the sulphur used in the industry comes from Canada.

Since the 1920s, the need to topdress pastures with superphosphate for high productivity has become generally accepted, and soil fertility has been much improved by the practice. Although superphosphate is designed to supply mainly phosphorus, its contents of sulphur and calcium are also essential for plants in certain areas of Victoria. In 1976–77, 500,492 tonnes of superphosphate were used in Victoria of which 294,497 tonnes were applied to pastures. This represented an extraordinary fall in use and was associated with unfavourable conditions in the pastoral industries and, to some extent, with the rapid increase in the cost of superphosphate. Re-introduction of the Government bounty early in 1976 partly offset the increases in the cost of superphosphate.

While phosphorus and, to a lesser extent, nitrogen are the most important nutrients in Victorian agriculture generally, in certain areas potassium and sulphur are no less important. The use of nitrogenous fertiliser has become almost static in recent years and, despite the wide range of forms available, requirements are met mainly by ammonium nitrate, calcium ammonium nitrate, urea, and sulphate of ammonia. However, since the 1950s, there has been a rapid and continuing expansion in the use of potassic fertilisers in southern Victoria. Usually, potassium is applied to pastures as mixtures of muriate of potash and superphosphate. In Victoria, the trace elements molybdenum, copper, zinc, and cobalt are also supplied in a variety of mixtures with superphosphate.

Since the Artificial Manures Act was introduced in 1897, the law has required fertilisers to be sold according to a guaranteed analysis. Under the *Fertilizers Act* 1974 manufacturers must register the brands and analyses of their products with the Department of Agriculture. A list of registrations is published in the *Victorian Government Gazette.*

In 1976–77, 593,746 tonnes of artificial fertilisers were used on 1,012,298 hectares of wheat; 582,165 hectares of other cereal crops; 17,758 hectares of vegetables; 18,581 hectares of vineyards and orchards; 23,889 hectares of other crops; and 2,229,059 hectares of pastures. Superphosphate is the main fertiliser used on both crops and pastures and in 1976–77 amounted to 500,492 tonnes, or 84 per cent of the total artificial fertiliser used on all crops, and 294,497 tonnes or 83 per cent of that used on pastures.

VICTORIA—ARTIFICIAL FERTILISERS

| Year (a) | Crops | | | Pastures | | |
|---|---|---|---|---|---|---|
| | Number of holdings | Area fertilised | Quantity used | Number of holdings | Area fertilised | Quantity used |
| | | '000 hectares | '000 tonnes | | '000 hectares | '000 tonnes |
| 1972-73 | n.a. | 1,565 | 232 | 34,274 | 4,277 | 782 |
| 1973-74 | n.a. | 1,547 | 240 | 35,374 | 4,488 | 869 |
| 1974-75 | n.a. | 1,383 | 223 | n.a. | 3,487 | 654 |
| 1975-76 | n.a. | 1,473 | 223 | n.a. | 1,953 | 323 |
| 1976-77 | n.a. | 1,655 | 241 | n.a. | 2,295 | 353 |

*(a)* See footnote *(b)* to table on page 326.

**Further references: Superphosphate, *Victorian Year Book* 1971, pp. 302-3; Forest clearing, 1978, pp. 358-60**

### *Irrigation*

Information about water supply and land settlement can now be found in Chapter 13 of this *Year Book*, but previous references to this material when it appeared in this Chapter are as follows:

**Further references: Irrigation, *Victorian Year Book* 1962, pp. 479-83; Wimmera-Mallee region water supply, 1963, pp. 499-501; Flood protection, river improvement, and drainage, 1963, pp. 501-2; Underground water, 1964, pp. 544-5; Water supply in Victoria, 1964, pp. 535-44; Goulburn-Murray Irrigation District, 1965, pp. 477-9; Spray irrigation in agriculture and dairying, 1965, p. 502; Private irrigation development, 1966, pp. 477-9; Water Research Foundation, 1966, pp. 479-80; River improvement, 1967, p.298; Rivers and streams fund, 1967, p.298; Dandenong Valley Authority, 1968, pp. 300-1; Water conservation, 1969, pp. 309-10; Water supply to Western Port, 1971, pp. 288-90; Lake William Hovell dam, 1972, pp. 294-5; River Murray Agreement and the River Murray Commission, 1972, pp. 296-301; Ten year plan, 1974, pp. 298-304; Millewa pipeline project, 1974, pp. 296-7; Snowy Mountains Hydro-Electric Scheme, 1974, pp. 298-304; Millewa Scheme, 1975, pp. 403-6; Tarago-Western Port pipeline, 1975, pp. 406-7**

### *Private storage dams*

Early Victorian pastoralists commenced constructing small private dams and weirs in the 1850s. Sir Samuel Wilson became one of the first developers of farm water supplies, when he built private weirs on creeks near his property at Longerenong and so diverted water, primarily for stock purposes. By the turn of the century small dams were being built throughout the State, particularly in areas near highly populated cities. Doncaster orchardists, for example, had built a vast network of dams by this time.

Due to the concentration on large-scale public irrigation schemes by successive Victorian Governments, the later development of private dams did not progress as rapidly as it did in other States. However, a start was made in 1944, when the Victorian Government passed the Farm Water Supplies Act, which established a scheme under which advances were made to farmers to finance farm water supply projects. The Act was administered by the Department of Lands. The State Rivers and Water Supply Commission formed a Farm Water Supplies Branch for the special purpose of providing advice to all farmers interested in taking advantage of its provisions.

In 1965, the Soil Conservation (Water Resources) Act was passed, which permitted the Soil Conservation Authority of Victoria to ". . . provide for landholders an advisory service with respect to the development and use of the water resources available to them". Under this Act, the Authority provides advisory, survey, and design services. A loan scheme to finance private soil and water conservation projects (the latter not to be located within declared irrigation districts), including the construction of private farm dams, was initiated in 1971. The Soil Conservation Authority assesses the technical feasibility of the projects and the Rural Finance and Settlement Commission of Victoria administers the financial aspects of the scheme. By the end of June 1976, over $1m had been advanced to Victorian landholders on a long-term, low interest basis.

Originally, in the 1850s, private dams were erected with a centre core of puddle clay. These dams were built up gradually from thin layers of materials set in place by using horse-drawn carts or barrows. Compaction of these thin layers was effected by the combined traffic of feet, both human and animal and vehicle wheels. Later contractors, using horse teams and scoops, developed successful techniques of placing layers of soil, which were trodden down and compacted by the horses.

Horse power was gradually replaced by mechanised earth-moving plant during the Second World War. With the adoption of this equipment in private dam construction, it was reasonably assumed that improved compaction would result, but unfortunately this progress did not automatically follow. A major problem was that, when a bulldozer alone was used, many small dams suffered from inadequate compaction, because the tracks of bulldozers are designed to spread and not concentrate their load. In the absence at the time of suitable rollers, such as the modern sheepsfoot roller, many private dams failed because of insufficient compaction.

Today, Victorians spend about $1.5m each year on private dam construction, and government engineers and agricultural officers ensure that contractors are aware of the need for correct compaction and moisture content when building dams. However, the costs of this work have risen steeply over recent years, and private dams for irrigation are now costing farmers about $200 per megalitre.

One current problem in Victoria, particularly in the semi-arid regions, is the poor run-off from small catchments into private dams. The Soil Conservation Authority, in conjunction with the Agricultural Engineering Section of the University of Melbourne, is at present conducting a joint investigation into methods of developing low cost treatment of small catchments to provide an improved yield or run-off.

*Control of insect pests and plant diseases*

The work in plant pathology and entomology, now done at the Plant Research Institute, Burnley Gardens, owes its origins to concern felt during the 1880s over the near destruction of the vine industry by phylloxera and the depredations of other pests and diseases.

The vine industry was eventually saved by using resistant root stocks, but there was little development in pesticides, apart from petroleum sprays, until the introduction of synthetic organic insecticides after the 1940s. Although expensive, they were highly lethal to pests, and products such as DDT and parathion were rapidly adopted. For the first time, a wide range of fruit and vegetable pests could be readily controlled at a low cost and broadacre treatments became practicable. Pastures could be protected against the devastations of cockchafers and other pests, and field crops against noctuid caterpillars.

However, the very efficiency of the new products caused problems. Pests became resistant to them, or had their parasites and predators killed off, while the toxicity and persistence of many chemicals posed risks to users, consumers, and the environment. As a result official concern and public disquiet over pesticides forced changes in their use, with a growing emphasis on integrated control of pests and diseases and the use of all possible control methods, including appropriate pesticides, based on full understanding of the pest's biology.

Although pesticides still remain the leading weapon against pests and diseases, their registration is now approved only for specific uses following a full review of efficiency, toxicity, and environmental hazards. The assembled data is stored in computer files and possible environmental pollution from pesticides is continually monitored.

This new approach is proving successful. The introduction of biological control has saved citrus growers from having to spray regularly for red scale, virtually eliminated green vegetable bug, and achieved substantial control of two-spotted mite on deciduous fruits.

Insect damage and pesticide residues in stored grain can be minimised by good farm hygiene, and the new technique of aeration with cool air.

The use of insect diseases for the control of codling moth, noctuid caterpillars, and various orthoptera is under study as is the use of various growth regulatory chemicals, and sex-attractant scents. Genetic manipulation of populations has been investigated for cricket control and fruit fly outbreaks can now be suppressed with attractant bait spraying, thus reducing the need for costly quarantining of interstate fruit.

As with insecticides, the range of fungicides now available, combined with sanitation, resistance breeding, and clean seed schemes, has greatly helped the production of sound produce.

A major advance has been the mass culture of pathogen-free plants, based on specialised propagation techniques. The strawberry industry was quite changed as a result

of the release of virus-free varieties, while the pathogen-tested seed potato industry has become the basis for international scientific co-operation, and a developing export trade. Vine varieties are being freed of virus, and nematode tolerance is being bred into new wheat varieties. Pathogen tested ornamentals have also been released.

Despite quarantine screening, overseas pests and diseases enter occasionally. Ornamental trees are affected by several new problems, and two species of destructive aphid have completely upset lucerne pasture production, necessitating Australia-wide co-operation on biological control and resistance breeding programmes.

*Phytophthora cinnamomi*, now recognised as the cause of widespread die-back problems in native forests, is also a serious problem with urban ornamental plants. Nurseries now sterilise potting soils against this and other pathogens.

As part of the Victorian Government's "Victoria—The Garden State" campaign, the Department of Agriculture, in 1977, set up a special Garden Advisory Service to help home gardens and nurseries with their plant and pest problems. The Fly Suppression Unit handles fly problems.

### *Livestock disease eradication*

Victoria is free of many of the most serious livestock diseases as a result of successful Government quarantine and other disease control measures and its favourable climate. The nature of many livestock diseases makes their eradication difficult or practically impossible, but control measures can minimise their impact.

The Department of Agriculture conducts several major programmes to control and eradicate animal disease. Meat inspection is used to ensure a high quality of meat for human consumption and to detect disease in slaughtered animals. Traceback procedures are used to identify the properties of origin of diseased cattle and pigs. Animal Health field staff, supported by Regional Veterinary Laboratories, investigate disease in livestock and conduct control and eradication procedures.

As part of the National Brucellosis and Tuberculosis Eradication Programme, all Victorian breeding cattle are being tested for brucellosis by Department of Agriculture staff and by private veterinarians under contract. Infected animals are slaughtered, and the owners are compensated. Herds free of disease can become accredited, allowing them to be advertised and to profit by their disease-free status. Victoria is expected to be declared provisionally free of bovine brucellosis by 1 January 1984. The State is already provisionally free of bovine tuberculosis.

An ovine brucellosis ram-flock accreditation scheme is also conducted to encourage stud breeders to have rams examined and tested annually. A Footrot Control Area has been declared in western Victoria in which sheep footrot is subject to rigorous control. The impact of the disease has been greatly reduced and it is hoped that it can be eliminated. Various other diseases are also subject to control under the Stock Diseases Act.

Through its research and extension activities the Department of Agriculture assists the livestock industries overcome disease problems and keep abreast of new developments in control and eradication.

### *Vermin and noxious weeds control*

The control of pest animals and plants affects both the agricultural and pastoral industries of Victoria, as well as the forests and natural bushlands environments, such as wildlife and game reserves. The Vermin and Noxious Weeds Destruction Board, which was established in 1959 to work with the Department of Crown Lands and Survey, is responsible for intensifying the control of vermin and noxious weeds and implementing a philosophy of pest control.

The targets of the Board's operation are the 95 plants which are proclaimed noxious weeds, under the *Vermin and Noxious Weeds Act* 1958, throughout Victoria except in the Melbourne metropolitan area, and the eight proclaimed vermin animals, such as rabbits and foxes. Two birds, the sparrow and the starling, are also considered vermin. Blackberries, ragwort, and rabbits are the most serious pests in Victoria.

Noxious weeds and vermin control policy decided on by the Board is implemented throughout Victoria by 142 Departmental Land Inspectors under the supervision of eighteen regional Senior Land Inspectors. Each Land Inspector has a team of workmen

together with appropriate equipment to carry out weed and vermin control, and is backed up by workshop and research facilities. The annual cost of maintaining this service to the rural community in Victoria is more than $10.5m.

As well as being responsible for maintaining a good working relationship with landholders, the Land Inspector is also responsible for the control of vermin and noxious weeds on Crown land, and as the Board has agreements with many other government departments concerned with agriculture, forestry, national parks, roads, railways, municipalities and so on, he may also be called upon to carry out control work in these areas.

### *Land cultivation*

The following table shows details of the broad utilisation of land under occupation in Victoria for agricultural and pastoral purposes for the season 1976-77:

VICTORIA—LAND IN OCCUPATION FOR AGRICULTURAL AND PASTORAL PURPOSES, 1976-77 *(a)*

| Statistical division | Number of holdings *(b)* | Area of crops | Area of sown pasture and lucerne | Balance of holding *(c)* | Total area of holdings |
|---|---|---|---|---|---|
| | | hectares | hectares | hectares | hectares |
| Melbourne | 3,266 | 29,195 | 154,820 | 91,357 | 275,372 |
| Barwon | 2,672 | 49,113 | 323,750 | 135,532 | 508,395 |
| South Western | 6,902 | 64,135 | 1,355,119 | 411,155 | 1,830,409 |
| Central Highlands | 3,017 | 76,489 | 574,610 | 234,314 | 885,413 |
| Wimmera | 4,419 | 651,685 | 983,652 | 800,606 | 2,435,943 |
| Northern Mallee | 4,678 | 584,591 | 600,311 | 1,400,225 | 2,585,127 |
| Loddon-Campaspe | 5,053 | 252,507 | 683,268 | 689,535 | 1,625,310 |
| Goulburn | 7,042 | 168,264 | 766,790 | 575,447 | 1,510,501 |
| North Eastern | 3,106 | 47,935 | 326,804 | 462,543 | 837,282 |
| East Gippsland | 2,111 | 8,686 | 231,798 | 955,565 | 1,196,049 |
| Central Gippsland | 5,330 | 11,819 | 466,519 | 215,812 | 694,150 |
| East Central | 1,398 | 3,585 | 81,390 | 29,839 | 114,814 |
| Total | 48,994 | 1,948,004 | 6,548,831 | 6,001,930 | 14,498,765 |

*(a)* See footnote *(b)* to table on page 326.

*(b)* A rural holding is an area of land of 10 hectares or more in extent, used for the production of crops or for the raising of livestock and the production of livestock products. Rural holdings of less than 10 hectares operated by a legal entity with $1,500 or more estimated gross value of agricultural operations are also included. In general, a holding corresponds to an establishment; however, an establishment can comprise more than one holding if their operational financial records are combined. (See also footnote *(a)* to table on page 326).

*(c)* Balance of holding includes fallow.

## Economic contribution

### *Gross value of agricultural production*

The gross value of agricultural commodities produced provides a measure of the output from farming. The gross value of commodities produced is the value placed on recorded production at the wholesale prices realised in the principal markets. In general, the "principal markets" are the metropolitan markets in each State. In cases where commodities are consumed locally or where they become raw materials for a secondary industry, these points are presumed to be the principal markets.

Quantity data is, in the main, obtained from the Agricultural Census held at 31 March each year, and from supplementary collections which cover crops that have not been harvested at the time of the Census. Information covering such commodities as livestock slaughterings, dairy produce, and bee farming is obtained from separate collections and from organisations such as the Department of Primary Industry. Price data for commodities is obtained from a variety of sources including statutory authorities responsible for marketing products, e.g., the Australian Wheat Board, marketing reports, wholesalers and brokers, and auctioneers. For all commodities, values are in respect of production during the year, irrespective of whether or when payments are made.

The gross value of agricultural commodities produced in Victoria during 1976-77 ($1,363m) contributed 20.4 per cent of the Australian total of $6,771m.

VICTORIA—VALUE OF PRIMARY COMMODITIES PRODUCED
(EXCLUDING MINING)
($'000)

| Particulars | Year ended 30 June— | | | |
|---|---|---|---|---|
| | 1974 | 1975 | 1976 | 1977 |
| Crops— | | | | |
| Cereals for grain | 199,053 | 276,873 | 224,404 | 219,742 |
| Hay | 79,598 | 67,025 | 61,378 | 78,263 |
| Industrial crops | 20,558 | 22,491 | 23,168 | 28,156 |
| Vegetables | 61,064 | 62,371 | 73,270 | 70,067 |
| Grapevines | 38,555 | 37,453 | 37,477 | 55,386 |
| Fruit | 53,993 | 54,961 | 47,382 | 48,899 |
| Other | 23,081 | 19,245 | 17,120 | 21,895 |
| Livestock slaughterings and other disposals— | | | | |
| Cattle and calves | 245,661 | 114,309 | 184,873 | 222,730 |
| Sheep and lambs | 103,958 | 58,410 | 75,225 | 89,533 |
| Other | 64,943 | 71,334 | 71,440 | 81,803 |
| Livestock products— | | | | |
| Wool | 248,232 | 193,623 | 174,055 | 176,732 |
| Dairy products | 239,767 | 266,659 | 220,867 | 230,020 |
| Other | 42,038 | 45,869 | 45,353 | 39,853 |
| Total | 1,420,501 | 1,290,623 | 1,256,012 | 1,363,079 |

## RURAL PRODUCTION

### Introduction

In the following pages some detailed descriptions and statistical information about all the main crops, livestock, and livestock products produced in Victoria are given. The section deals, first, with the field crops including wheat, barley, and oats; and then with the intensive crops including fruit and vegetables. The section then discusses livestock including sheep, cattle, pigs, poultry, bees, goats, and deer, together with the various livestock products.

It should be noted that the statistical information is in terms of Statistical Divisions, *not* Agricultural Districts as in previous *Victorian Year Books* (see page 324 for further details).

### Field crops

The cereals wheat, barley, and oats, are the principal field crops in Victoria. These, together with hay production, represent about 90 per cent of the total area sown, although there is some variation from year to year.

#### *Wheat*

Wheat is Victoria's largest crop. The average area sown in the ten-year period 1967–68 to 1976–77 was 1.20 million hectares, about 60 per cent of the State's total cropping area. The area under wheat is normally subject to fairly minor fluctuations. The 1968–69 season produced a Victorian record harvest of 2.47 million tonnes of wheat from 1.6 million hectares. However, this production coincided with a large Australian harvest and a saturated world wheat market. As only about 20 per cent of Victorian production is used for home consumption, the difficulties in marketing export wheat in 1969 led to considerable storage problems. To reduce production levels, the *Wheat Marketing Act* 1969 implemented the Wheat Delivery Quota Scheme which allocated deliveries in accordance with market demand and storage capacity. Quotas effectively reduced the area of wheat sown in 1970–71 to 760,000 hectares. Effective quota restrictions were removed by 1973–74 in response to a world demand for wheat, and the legislation ceased to operate from 30 September 1975. In 1976–77, 1.8 million tonnes of wheat were produced from 1.1 million hectares.

More than 90 per cent of Victorian wheat is grown in the Northern Mallee, Wimmera, and Loddon–Campaspe Divisions. The average annual rainfall in the main wheat belt varies from about 300 mm in the north-west to about 500 mm to 750 mm in the eastern

and southern areas. With the exception of a small area of intensive cropping in the Wimmera, wheat is grown under a ley system of farming in which it is produced in rotation with fallow, pastures, and other crops, principally oats and barley. Surveys of the Wimmera have shown that many paddocks are under-cropped and that the potential exists to increase cropping intensity without risk to the stability of the farm system. Levels of soil nitrogen in the region are highly correlated with the ability to support cereal crops, and a soil nitrogen testing service introduced by the Department of Agriculture in 1974 now adds precision to the complex decision on cropping rotations within the ley farming system of the Wimmera.

Since the adoption of legume based pastures (subterranean clover or medic) into Victorian cropping rotations, nitrogenous fertilisers have found only limited application. Nitrogen is applied only in specific circumstances, namely, on light sandy soils and land infested with skeleton weed in the Northern Mallee, and on intensively cropped land in the Wimmera and southern areas. Superphosphate is applied at seeding to virtually all crops to correct a phosphorus deficiency inherent in nearly all Australian soils.

Diseases of wheat are not normally a major problem but in 1973–74 heavy losses were incurred through attack by stem rust, Septoria leaf spot, and root diseases.

During the 63 years from 1911 to 1973, stem rust occurred in some part or parts of Victoria in varying degrees of severity, in sixteen seasons. In only four of these years, 1934, 1947, 1955, and 1973, did the disease cause heavy losses of production, 1973 being the heaviest on record. The only effective control is to breed disease-resistant varieties, a continuing project in Victoria since 1950. The main variety, Kalkee, which was released in 1976, is currently resistant to all known rust strains. Another disease problem, the ball smut fungus, is effectively controlled by fungicide, applied when the seed is graded. Crop failures following the use of seed which had been treated with fungicide in 1973 and carried over to be sown in 1974, and field experiments by the Department of Agriculture, emphasised the fact that treated seed should not be carried over from one season to the next as seed viability is greatly reduced and re-sowing costs are high.

The most serious problem facing the cereal industries, wheat in particular, is the control of insect pests in grain storage, as the loading of wheat and other cereals for export is prohibited if insects are present. Strains of insects have developed which are resistant to rates of insecticides approved for the international grains trade. The grain insect campaign initiated by the Department of Agriculture in 1973 has improved awareness of farmers to the problem of ensuring the delivery of insect-free grains to the export terminal. Processors and retail outlets have also been encouraged to improve their standards of grain hygiene.

Wheat marketing in Australia is controlled by the Australian Wheat Board under the provisions of the present *Wheat Industry Stabilization Act* 1974 operating until 1978. This legislation provides for a guaranteed "stabilisation" price, adjusted annually on the basis of movements in export markets. When average export prices are higher than the stabilisation price, growers are required to contribute to a fund (subject to a minimum and maximum level.) These moneys are used to maintain returns to growers should export prices fall below the stabilisation price. In the event of the fund being exhausted, the Commonwealth Treasury will provide an interest-free loan, up to a maximum of $80m, to operate the plan.

Most wheat varieties grown in Victoria are of the soft white class. The environment generally does not favour the production of wheat of the harder types, although large areas of the newer hard variety Condor are now sown in north-west Victoria where wheat with protein content above the Victorian average is usually produced.

VICTORIA—PRINCIPAL VARIETIES OF WHEAT SOWN

| Variety in order of popularity in season 1976–77 | Season 1974–75 | | Season 1975–76 | | Season 1976–77 | |
|---|---|---|---|---|---|---|
| | Hectares sown | Percentage of total area sown | Hectares sown | Percentage of total area sown | Hectares sown | Percentage of total area sown |
| Halberd | 520,043 | 45.2 | 494,707 | 45.8 | 429,846 | 38.5 |
| Olympic | 302,574 | 26.3 | 323,061 | 29.9 | 331,587 | 29.7 |
| Condor | *(a)* | *(a)* | 15,023 | 1.4 | 139,263 | 12.5 |
| Summit | 122,199 | 10.6 | 109,521 | 10.1 | 75,185 | 6.7 |

VICTORIA—PRINCIPAL VARIETIES OF WHEAT SOWN—*continued*

| Variety in order of popularity in season 1976–77 | Season 1974–75 | | Season 1975–76 | | Season 1976–77 | |
|---|---|---|---|---|---|---|
| | Hectares sown | Percentage of total area sown | Hectares sown | Percentage of total area sown | Hectares sown | Percentage of total area sown |
| Zenith | *(a)* | *(a)* | 2,861 | 0.3 | 30,468 | 2.7 |
| Insignia | 67,683 | 5.9 | 36,266 | 3.4 | 27,073 | 2.4 |
| Pinnacle | 32,921 | 2.9 | 29,566 | 2.7 | 23,685 | 2.1 |
| Egret | *(a)* | *(a)* | *(a)* | *(a)* | 22,985 | 2.1 |
| Emblem | 38,112 | 3.3 | 24,589 | 2.3 | 14,337 | 1.3 |
| Heron | 34,503 | 3.0 | 22,975 | 2.1 | 8,009 | 0.7 |
| Insignia 49 | 13,283 | 1.2 | 6,916 | 0.6 | 4,870 | 0.4 |
| All other including mixed and unspecified | 18,778 | 1.6 | 14,934 | 1.4 | 8,875 | 0.9 |
| Total | 1,150,096 | 100.0 | 1,080,419 | 100.0 | 1,116,183 | 100.0 |

*(a)* Included with "All other".

## VICTORIA—WHEAT FOR GRAIN

| Season | Holdings growing wheat | Area | Production | Average yield per hectare | A.S.W. *(a)* wheat standard |
|---|---|---|---|---|---|
| | | '000 hectares | '000 tonnes | tonnes | kg/h.l. |
| 1972–73 | 10,428 | 1,087 | 1,405 | 1.29 | 82.3 |
| 1973–74 | 9,524 | 1,258 | 1,490 | 1.18 | 77.5 |
| 1974–75 | 9,156 | 1,141 | 2,091 | 1.83 | 81.2 |
| 1975–76 | 9,265 | 1,073 | 1,579 | 1.47 | 76.9 |
| 1976–77 | 9,310 | 1,103 | 1,780 | 1.61 | 81.2 |

*(a)* Australian Standard White.

**Further references: Australian Wheat Board, *Victorian Year Book* 1977, pp. 439–40; Grain Elevators Board of Victoria, 1977, pp. 440–1**

### *Oats*

Oats are sown for grain production, winter grazing, and hay production. The average annual area sown between 1971–72 and 1976–77 was 332,942 hectares of which about 73 per cent was harvested for grain, some of it after being grazed during the winter. During the last decade, oats have been displaced by barley as Victoria's second most widely grown cereal crop. This change has been most evident on the lighter soils where winter waterlogging is not a problem.

The predominance of oats in the higher rainfall areas has been maintained by the greater tolerance shown by oats to wet conditions and by the demand for oats for stock feed. About half of the oats produced in Victoria is held on farms or used as stock feed, especially during periods of seasonal shortage or in drought conditions. About a quarter of the crop goes to mills, but only a small fraction of this is processed for human consumption. The bulk of the "milled" oats is destined for incorporation in proprietary stock feeds or as unkilned oats for export. The remaining 25 per cent of the crop is exported as grain.

Unlike wheat and barley which are marketed through the Australian Wheat Board and the Australian Barley Board, respectively, oats are sold on the free market. Domestic prices are markedly affected by the size of the crops and pasture conditions during winter and spring.

Since 1972, the world feed grains market production base has been eroded by land being redirected to wheat production. As the U.S.A. provides 50 to 60 per cent of the total world trade in feed grains, the U.S.A. crop decisively influences the market. Other factors which can influence export markets include the general level of economic activity and the demand for coarse grains for lot-fed livestock enterprises. The dominant export market for oats is Japan which accounts for almost 80 per cent of Australian exports. Italy is another significant importer of feed oats. Oats are also supplied to a speciality market in West Germany for baby food production.

VICTORIA—OATS FOR GRAIN

| Season | Area | Production | Average yield per hectare |
|---|---|---|---|
| | '000 hectares | '000 tonnes | tonnes |
| 1972–73 | 255 | 238 | 0.93 |
| 1973–74 | 271 | 233 | 0.86 |
| 1974–75 | 198 | 186 | 0.94 |
| 1975–76 | 243 | 282 | 1.16 |
| 1976–77 | 241 | 309 | 1.28 |

*Barley*

Barley is now the second largest crop grown in Victoria. Barley production in Victoria (95 per cent of which is of the two-row type) increased significantly between 1965–66 and 1975–76. In 1975–76, a record 344,000 hectares of barley produced a record 445,000 tonnes harvest. By comparison, production in 1965–66 was only 73,000 tonnes from 78,000 hectares. So far, the Australian Barley Board in Victoria has been successful in selling this large increase in production.

During this period, impetus was added to an already established trend of increased production by the introduction of the Wheat Delivery Quota Scheme in 1969–70, which had the effect of reducing the area of wheat sown in the cereal belt. Barley proved to be the most popular alternative crop to wheat, particularly in the Northern Mallee. In other areas, oilseeds, such as rapeseed and safflower, were also prominent.

Increased wheat quota allocations in 1972–73 and 1973–74 resulted in a slight fall in the area sown to barley as land was diverted back into wheat. However, the general trend for increased production of barley in Victoria is well established and seems unlikely to suffer further significant reduction in the absence of a marked shift in the price ratios between the cereal crops. The provision of bulk handling facilities for barley by the Grain Elevators Board of Victoria since 1963 has contributed to the increased production of this grain.

While some barley is grown in all divisions, production has been traditionally centred in two distinct areas where high quality grain is produced. The largest production is in the south-west of the Northern Mallee and the adjacent north-western Wimmera where the best quality barley is grown on the sandier soil types. The crop is sown either on cultivated ley ground without fallow or on wheaten stubble land. Until 1970, the variety Prior was almost exclusively sown in this area.

A new variety Weeah, was introduced in 1968 and steadily displaced Prior to a significant extent. However, another barley variety, Clipper, is now recommended to replace Weeah for sowings in the Northern Mallee and Wimmera. The barley industry is moving toward a changeover to Clipper in the malting grades by 1979. Clipper has a 5 per cent greater yield than Weeah and is less susceptible to wind damage. The Victorian malting industry processes most of Victoria's barley production for both the local brewing industry and export to overseas breweries. Clipper is better for malting than Weeah, and is being sought by overseas markets.

The second source of high quality barley grain is in an area between Melbourne, Geelong, and Bacchus Marsh in southern Victoria. In this area, barley is the principal crop and it is normally sown with superphosphate on fallowed land. Yields of barley in this region average about 1.7 tonnes/hectare compared with about 1.0 tonnes/hectare in the northern Mallee-Wimmera. The area has the further advantage of proximity to the main barley shipping terminals. Consequently, freight costs are much lower than for northern areas.

The variety Lara, which was introduced in 1971, has displaced Research types as the main variety grown in this area. Lara suffered some initial resistance to its acceptance by growers, in spite of its inherent higher yielding potential than the Research type varieties. Its small grain led to a number of samples being refused classification as suitable for malting, and being declared unsuitable for handling in mixed bulk samples with Research types. Lara has since gained acceptance with both growers and maltsters, and has been declared compatible with Research for the purposes of bulk handling.

The substantial increase in barley production has meant that, in normal seasons, Victoria is self-sufficient in barley for malting, food, and manufacturing in the distilling, pearling, and prepared stock feed industries. It also contributes to Australian export markets. Barley is received and marketed in Victoria through the Australian Barley Board on a pool basis. The Board is responsible for setting prices for sales to domestic users. The price received for exports is determined by the world supply and demand situation, and can vary greatly from year to year. Japan provides the main export market; smaller quantities go to the United Kingdom and Europe. In 1973–74, the Australian Barley Board negotiated its first direct sale to the U.S.S.R. and is hopeful of developing this market in the future. However, Australia is a minor contributor to the world barley market, which is determined by climatic and economic conditions in the principal exporting countries, namely, Canada and France.

VICTORIA—BARLEY PRODUCTION

| Season | Area | | Production | | Average yield per hectare | | |
|---|---|---|---|---|---|---|---|
| | 2-row | 6-row | 2-row | 6-row | 2-row | 6-row | Total |
| | '000 hectares | '000 hectares | '000 tonnes | '000 tonnes | tonnes | tonnes | tonnes |
| 1972–73 | 269 | 9 | 207 | 7 | 0.77 | 0.78 | 0.77 |
| 1973–74 | 217 | 4 | 281 | 5 | 1.29 | 1.25 | 1.29 |
| 1974–75 | 238 | 5 | 314 | 5 | 1.32 | 1.00 | 1.31 |
| 1975–76 | 337 | 7 | 436 | 9 | 1.29 | 1.29 | 1.29 |
| 1976–77 | 362 | 4 | 397 | 5 | 1.10 | 1.25 | 1.10 |

**Further reference: Australian Barley Board, *Victorian Year Book* 1976, pp. 404–5**

*Maize*

Maize is grown on a small scale in Victoria, both for grain and for green fodder, and is cultivated mainly in Gippsland. Lower values in the late 1960s and other more profitable alternatives in vegetables and livestock, led to a substantial decline in the production of maize grain. The area and yield of maize for each of the five seasons 1972–73 to 1976–77 were:

VICTORIA—MAIZE PRODUCTION

| Season | For green fodder | For grain | | | | | | Average yield per hectare |
|---|---|---|---|---|---|---|---|---|
| | | Area | | | Production | | | |
| | | Hybrid | Other | Total | Hybrid | Other | Total | |
| | hectares | hectares | hectares | hectares | tonnes | tonnes | tonnes | tonnes |
| 1972–73 | 636 | 493 | 3 | 496 | 1,490 | 16 | 1,506 | 3.04 |
| 1973–74 | 536 | 646 | 8 | 654 | 1,873 | 17 | 1,890 | 2.89 |
| 1974–75 | 485 | 536 | 10 | 546 | 1,891 | 36 | 1,927 | 3.53 |
| 1975–76 | 359 | 521 | 5 | 526 | 2,510 | 3 | 2,513 | 4.78 |
| 1976–77 | 389 | 411 | 22 | 433 | 1,685 | 25 | 1,710 | 3.95 |

*Rye*

Cereal rye is of minor importance in Victoria and is not usually grown as a cash crop. European migrants to Australia have created a small demand for this cereal for human consumption, thus helping to stabilise the market for rye grain. The chief purpose for which rye is grown is the stabilisation of loose sand or sandhills in the Northern Mallee Statistical Division. There is also some interest in it for winter grazing in cold areas during the winter months.

VICTORIA—RYE FOR GRAIN

| Season | Area | Production | Average yield per hectare |
|---|---|---|---|
| | hectares | tonnes | tonnes |
| 1972–73 | 2,615 | 975 | 0.37 |
| 1973–74 | 2,956 | 882 | 0.30 |
| 1974–75 | 1,750 | 671 | 0.38 |
| 1975–76 | 1,471 | 648 | 0.44 |
| 1976–77 | 1,401 | 936 | 0.67 |

*Fodder*

The stability of livestock production on Victorian farms depends largely on fodder conservation. Natural irregularities in the diet of grazing animals are met by conserved fodders, fed as supplement, when the paddock ration of crop or pasture is deficient in quantity or quality. Such deficiencies occur regularly with seasonal changes, e.g., spring lush growth contrasts with winter-short or summer-dry pastures. Deficiencies also occur when the unexpected turns up, such as extended dry, or excessively cold or wet periods; ravishment of pasture by pests or disease; failed crops; floods or fire. All or any of these events may result in feed shortages for grazing animals. Fodder conservation provides a means of overcoming such shortages.

VICTORIA—HAY PRODUCTION, SEASON 1976–77

| Variety | Area | Production | Average yield per hectare |
|---|---|---|---|
| | hectares | tonnes | tonnes |
| Pasture | 405,104 | 1,599,513 | 3.95 |
| Oaten | 66,330 | 233,934 | 3.53 |
| Lucerne | 34,174 | 138,335 | 4.05 |
| Wheaten | 8,752 | 22,469 | 2.57 |
| Barley and other | 3,632 | 9,799 | 2.70 |
| Total | 517,992 | 2,004,050 | 3.87 |

VICTORIA—ENSILAGE MADE AND FARM STOCKS OF ENSILAGE AND HAY

(tonnes)

| Statistical division | Ensilage made, season 1976–77 | Stocks at 31 March 1977 | |
|---|---|---|---|
| | | Ensilage | Hay |
| Melbourne | 18,034 | 12,447 | 100,317 |
| Barwon | 9,168 | 9,980 | 168,150 |
| South Western | 17,679 | 18,806 | 562,764 |
| Central Highlands | 2,469 | 5,828 | 203,814 |
| Wimmera | 1,088 | 5,174 | 115,557 |
| Northern Mallee | 821 | 1,941 | 60,908 |
| Loddon-Campaspe | 3,899 | 7,264 | 205,345 |
| Goulburn | 4,906 | 10,262 | 365,411 |
| North Eastern | 5,448 | 8,727 | 135,899 |
| East Gippsland | 3,241 | 5,332 | 94,304 |
| Central Gippsland | 40,940 | 27,489 | 358,798 |
| East Central | 10,725 | 7,666 | 63,318 |
| Total | 118,418 | 120,916 | 2,434,585 |

*Oilseeds*

Demand for high-protein meals for livestock feed, together with a general world-wide trend to increased consumption of vegetable oils, has been reflected in Australia, where domestic oilseed prices rose in sympathy with prices on world markets and reached record levels during 1973–74. Aggregate oilseed production expanded rapidly between 1968–69 and 1971–72 in response to both increased oilseed prices and the introduction of wheat quotas. However, larger wheat quotas and higher prices for wheat and coarse grains, together with agronomic problems, resulted in an immediate decline in the production of rapeseed and safflower. The area sown to sunflower and safflower has increased rapidly between 1974–75 and 1976–77 due to abnormal sowing conditions for the more traditional cereal crops and attractive prices for these oilseeds. Sunflower production continued to increase in 1976–77 in both dry land and irrigation districts with an estimated area sown of 15,000 hectares.

VICTORIA—SELECTED OILSEED PRODUCTION

| Season | Area | Production | Average yield per hectare |
|---|---|---|---|
| | hectares | tonnes | tonnes |
| | LINSEED | | |
| 1972–73 | 5,843 | 5,471 | 0.94 |
| 1973–74 | 4,336 | 4,668 | 1.08 |
| 1974–75 | 4,924 | 3,812 | 0.77 |
| 1975–76 | 4,513 | 3,056 | 0.68 |
| 1976–77 | 4,694 | 5,393 | 1.15 |
| | RAPESEED | | |
| 1972–73 | 13,674 | 8,016 | 0.59 |
| 1973–74 | 5,967 | 3,498 | 0.59 |
| 1974–75 | 3,707 | 2,288 | 0.62 |
| 1975–76 | 4,681 | 2,907 | 0.62 |
| 1976–77 | 2,495 | 1,915 | 0.77 |
| | SAFFLOWER | | |
| 1972–73 | 556 | 328 | 0.59 |
| 1973–74 | 971 | 520 | 0.54 |
| 1974–75 | 2,813 | 1,269 | 0.45 |
| 1975–76 | 3,952 | 1,701 | 0.43 |
| 1976–77 | 3,698 | 1,405 | 0.38 |
| | SUNFLOWER | | |
| 1972–73 | 2,129 | 2,046 | 0.96 |
| 1973–74 | 3,325 | 2,526 | 0.76 |
| 1974–75 | 7,973 | 4,766 | 0.60 |
| 1975–76 | 7,815 | 5,725 | 0.73 |
| 1976–77 | 13,271 | 8,405 | 0.63 |

**Further reference:** ***Victorian Year Book*** **1977, pp. 444–5**

### *Grain legumes*

Interest in the production of cheap sources of protein for both human and livestock consumption is world-wide. The legumes, including soybeans, field peas, and lupins comprise a major group of high protein grains. Of these, field peas have been grown on a limited scale over much of the wheat belt since early settlement, and recent research by the Department of Agriculture and experience by growers has shown that lupins have much potential.

The average area sown to field peas in the decade 1966–67 to 1975–76 was about 5,000 hectares, with more than 60 per cent of this area and 55 per cent of the total production being in western and central Victoria. There was, however, renewed interest in field pea production in the Loddon-Campaspe Division in 1976. This was brought about by the increased awareness by farmers of the necessity of maintaining soil fertility and also the attractive prices being offered for field peas.

Lupins with 25 to 30 per cent protein are more readily acceptable than peas as a substitute for soybean meal in rations for poultry and pigs. A potential market also exists in the production of a meat substitute for human consumption. The lupin industry has expanded considerably in Victoria. Since 1973, the area sown to lupins has risen from about 100 hectares to about 3,000 hectares in 1977. Average yields are about 1.25 tonnes per hectare.

## Intensive crops

### *Fruit*

#### *Introduction*

When the members of the Henty family established the first settlement in Victoria at Portland in 1834, they were probably the first to plant apple trees in this State. The first vineyard, which was planted around 1837, was at Yering, near Lilydale, and the first orchard was started at Hawthorn on the banks of the Yarra River in about 1848. A variety of tree fruits, berries, and grapes carted to the Melbourne market provided the main source of income of many early settlers in the hills to the north, north-east, and east of Melbourne.

In the second half of the last century, fruit and vine growing gradually extended into the western, central, north-eastern, and Gippsland areas of the State. The foundation of Mildura in 1887, and the establishment of irrigation facilities there, marked the beginning of the development of one of the major horticultural districts in Victoria. With the extension of irrigation facilities in the Goulburn Valley and Murray Valley areas, a flourishing canning-fruit industry was developed after the First World War. Similarly to tree fruits, vine acreage increased steadily until the 1870s when Phylloxera devastated vineyards at Geelong, Bendigo, and Rutherglen. However, within a few years, new vineyards had been established in the Sunraysia district. After the First World War, the planting of dried vine fruit varieties extended along the Murray River to Robinvale and Swan Hill.

In Victoria in 1976-77, the area planted with fruit, nuts, and berries was almost 19,000 hectares, and the area of vineyards was just under 21,000 hectares. This total of approximately 40,000 hectares is hardly more than 2 per cent of the total area under crops in Victoria, yet fruit and vine growing make an important contribution to the economy of the State.

*Tree fruit*

(1) *Distribution.* In Victoria, the main fruit growing areas are in the Goulburn Valley-Murray Valley irrigation area, the Mallee, the eastern metropolitan area, the Mornington Peninsula, West Gippsland, Bacchus Marsh, and the North Eastern area.

Almost all the canning fruit is grown in the Goulburn Valley-Murray Valley irrigation area which also produces large quantities of dessert pears and Granny Smith apples. Dessert apples and stone fruit are the main crops in the southern areas, while early stone fruit is grown in the northern Mallee around Swan Hill. The main concentration of citrus fruit production is in the Northern Mallee Division with additional groves in the north-east. Lemons are also produced in the eastern metropolitan area.

VICTORIA—NUMBER OF ORCHARD FRUIT TREES (EXCLUDING CITRUS) BY STATISTICAL DIVISION AT 31 MARCH 1977

| Statistical division | Pears | Apples | Peaches | Apricots | Cherries | Plums | Olives | Nectarines | Other |
|---|---|---|---|---|---|---|---|---|---|
| Melbourne | 56,332 | 455,493 | 69,622 | 5,657 | 106,188 | 30,030 | n.p. | 13,991 | 2,938 |
| Barwon | 888 | 4,256 | 1,400 | n.p. | n.p. | 340 | — | n.p. | n.p. |
| South Western | 230 | 17,035 | n.p. | n.p. | n.p. | n.p. | — | — | — |
| Central Highlands | 2,785 | 43,638 | 3,580 | 1,483 | 993 | 310 | — | 2,835 | n.p. |
| Wimmera | 2,262 | 3,220 | 3,104 | 1,498 | — | 432 | 48,010 | n.p. | 725 |
| Northern Mallee | 2,211 | 8,628 | 9,392 | 61,206 | 636 | 45,694 | 43,263 | 17,778 | 3,805 |
| Loddon-Campaspe | 25,416 | 89,632 | 3,484 | 1,207 | 2,890 | 1,673 | n.p. | n.p. | 390 |
| Goulburn | 986,410 | 254,781 | 603,025 | 123,493 | 6,864 | 27,983 | 6,002 | 6,075 | 5,425 |
| North Eastern | 831 | 62,938 | 2,390 | 364 | 7,264 | n.p. | n.p. | n.p. | n.p. |
| East Gippsland | n.p. | 5,776 | n.p. | n.p. | — | n.p. | — | — | — |
| Central Gippsland | n.p. | 16,787 | — | — | n.p. | 222 | — | n.p. | — |
| East Central | 8,347 | 145,021 | 6,157 | — | 3,464 | 3,122 | n.p. | 2,987 | 415 |
| Total | 1,085,924 | 1,107,205 | 702,390 | 195,708 | 128,432 | 110,149 | 98,349 | 44,197 | 13,832 |

VICTORIA—NUMBER OF CITRUS TREES BY STATISTICAL DIVISION AT 31 MARCH 1977

| Statistical division | Oranges | Lemons and limes | Grapefruit | Mandarins |
|---|---|---|---|---|
| Melbourne | — | 30,530 | n.p. | — |
| Barwon | — | 223 | — | — |
| South Western | — | — | — | — |
| Central Highlands | — | n.p. | n.p. | — |
| Wimmera | n.p. | 86 | n.p. | n.p. |
| Northern Mallee | 585,473 | 65,080 | 60,637 | 51,886 |
| Loddon-Campaspe | — | 120 | — | — |
| Goulburn | 61,067 | 20,057 | 7,490 | 1,013 |
| North Eastern | 14,701 | 5,537 | 279 | 442 |
| East Gippsland | — | n.p. | n.p. | — |
| Central Gippsland | n.p. | n.p. | — | — |
| East Central | — | 5,098 | — | — |
| Total | 665,882 | 128,021 | 68,821 | 53,525 |

(2) *Size of production.* Since the early 1950s, many of the old lower producing or marginal orchards have been pulled out, and new orchards with a small number of higher yielding and more popular varieties of fruit trees have been planted on more suitable soils. These factors, as well as greatly improved technology, have increased production potential. During the 1950s and 1960s, there were only slight changes in the area of most types of fruit trees, yet production showed an increasing trend, particularly with canning fruits and dessert pears; here the Victorian production greatly exceeded local demand and increasing amounts were exported. This situation changed during the early 1970s. Following the wet winter in 1973, about 300,000 canning peach trees died, causing a significant drop in production. At about the same time, residential and industrial developments in the eastern metropolitan and Mornington Peninsula areas greatly reduced the area planted to apples. These changes coincided with the deterioration of overseas market prospects for Victorian fruit and many growers are now forced to limit production or leave the industry. In the citrus industry, the same economic pressures have not operated as keenly as in other fruit industries because of an eight-fold increase in the demand for orange juice on the local market over the last twenty years, and recent restrictions on the importation of low-cost citrus juice from overseas.

VICTORIA—TREE FRUIT PRODUCTION
(tonnes)

| Type of fruit | Year ended 31 March— | | | | |
|---|---|---|---|---|---|
| | 1973 | 1974 | 1975 | 1976 | 1977 |
| Pears | 154,247 | 132,781 | 125,496 | 103,429 | 103,675 |
| Apples | 97,213 | 61,604 | 81,357 | 51,836 | 61,139 |
| Peaches | 66,507 | 34,345 | 38,441 | 32,017 | 24,329 |
| Apricots | 12,835 | 9,308 | 8,949 | 7,598 | 6,712 |
| Cherries | 4,339 | 3,693 | 3,503 | 3,139 | 2,562 |
| Plums | 4,221 | 2,753 | 3,009 | 3,575 | 2,946 |
| Olives | 1,024 | 1,109 | 1,120 | 814 | 1,889 |
| Nectarines | 1,388 | 1,258 | 820 | 1,218 | 1,119 |
| Prunes | 348 | 266 | 266 | 169 | 306 |
| Quinces | 209 | 194 | 143 | 118 | 148 |
| Figs | 41 | 14 | 25 | 16 | 10 |
| Oranges— | | | | | |
| Valencias | 28,087 | 21,130 | 25,550 | 24,647 | 21,472 |
| Navels | 15,838 | 13,307 | 14,592 | 14,570 | 13,056 |
| Other | 450 | 594 | 579 | 371 | 764 |
| Lemons and limes | 5,772 | 5,417 | 5,666 | 5,365 | 6,000 |
| Grapefruit | 3,554 | 3,415 | 3,561 | 3,728 | 3,000 |
| Mandarins | 2,610 | 2,529 | 2,762 | 2,407 | 2,842 |

(3) *Marketing.* Most of the fruit grown in Victoria for the fresh fruit market is sold locally in Melbourne, as well as in Sydney and Brisbane. While in Melbourne up to half of the total crop sold as fresh fruit may be sold direct to supermarkets or at the orchard gate, the price established at the Melbourne Wholesale Fruit and Vegetable Market still provides the basis for all Victorian sales.

The Fruit and Vegetable Act and Regulations outline standards of produce and the size and marking of containers. Produce presented in accordance with this Act and within the provisions of the Health Act may be sold in Victoria. There are also restrictions on the introduction of fruit and certain vegetables from interstate to prevent the spread of pests and diseases and, in particular, fruit fly, into the main fruit growing areas of the State.

The development of cool storage techniques towards the end of the last century made possible the exporting of dessert apples and pears from Australia to Britain, during the off-season in the northern hemisphere. Since then, cool storage methods have improved constantly and with the general acceptance of controlled atmosphere storage by Victorian apple growers during the late 1960s, apples and pears can now be sold right through the year in Victoria.

While efficient cool storage techniques have extended the local market, they have also had an adverse effect on the northern hemisphere export market where the availability of locally grown fruit from cool stores has eroded the seasonal advantage of fruit from the

southern hemisphere. This has been one of several factors causing the decline in the prospects of Victorian fruit on traditional markets. Other important factors have been the phasing out of preferential treatment for Australian produce following Britain's entry into the E.E.C., disadvantages because of changes in the currency exchange rate, and greatly increased labour and freight charges in Australia. Alternative market outlets for Victorian pome fruit are being developed in the U.S.A., South East Asia, and the Middle East.

In order to help the apple and pear industry to overcome marketing problems, the Commonealth Government established the Apple and Pear Corporation in 1974. The Corporation has taken over the export control role of the former Apple and Pear Board and also has powers to trade in its own right and to promote the use of both fresh and processed apples and pears.

The establishment of the Citrus Marketing Board in Victoria in 1973 has enabled all citrus fruits to be marketed in an orderly manner. Sales of citrus fruit on export markets (mainly to New Zealand) have not been very significant and most of the crop is sold on the domestic market, either as fresh fruit or juice.

(4) *Financial assistance.* In 1971, the Commonwealth Government set up an Apple and Pear Stabilization Scheme to help pome fruit growers by lessening the effect of price fluctuations for different varieties on overseas markets. In 1972, the Commonwealth Government introduced the Fruit Growing Reconstruction Scheme to help growers who wanted to reconstruct or reduce their orchard area, or to leave the industry.

In recent years, citrus processors have been importing quantities of juice concentrate to overcome periods when the demand exceeds local availability of fresh fruit. The price of the imported juice was significantly lower than the local product, and in order to prevent excessive imports the Government has imposed a duty on citrus juice imported in excess of a certain maximum volume.

*Small fruit*

(1) *Distribution.* Climatic requirements have restricted the commercial production of strawberries, and cane and bramble fruits in particular, to the cooler southern regions of Victoria, and most of the fruit is grown in the hills of the eastern metropolitan and Mornington Peninsula areas which are relatively close to the Melbourne market. During the last few years, fruit growers in other parts of the State interested in diversification have considered strawberry production for local demand. With cane and bramble berries, the development of mechanised harvesting requires production on flat sites, and several plantations have now been established in river valleys north of the Dividing Range.

(2) *Size of production.* In the 1950s, practically all strawberry planting material available in Victoria was heavily infected with virus diseases and, as a result, the industry almost ceased to exist. The successful Runner Certification Scheme conducted by the Department of Agriculture revitalised the industry between 1960 and 1970 and total production increased tenfold. More recently there has been increasing demand for cane and bramble berries from the processors. As the use of mechanical harvesters replaces expensive hand picking, there will be a potential for the development of a viable cane and bramble berry industry in the State.

VICTORIA—SMALL FRUIT PRODUCTION
(kilograms)

| Type of fruit | Year ended 31 March— | | | | |
|---|---|---|---|---|---|
| | 1973 | 1974 | 1975 | 1976 | 1977 |
| Strawberries | 1,351,925 | 1,333,615 | 1,138,339 | 910,069 | 1,004,395 |
| Youngberries | 261,881 | 222,448 | 202,072 | 125,762 | 129,756 |
| Raspberries | 136,013 | 160,106 | 114,385 | 91,167 | 88,995 |
| Gooseberries | 48,163 | 26,816 | 14,494 | 13,669 | 11,096 |
| Loganberries | 11,259 | 9,425 | 5,417 | 2,189 | 5,511 |
| Other berries | 23,520 | 14,671 | 13,494 | 17,696 | 15,779 |
| Passionfruit | 16,224 | 16,100 | 25,169 | 11,968 | 5,377 |

(3) *Marketing.* Berry fruits are mainly sold on the fresh fruit market or sent to processors. Recently, several growers have introduced the "pick your own" system of sales where the general public is invited to pick the fruit for themselves. This method greatly reduces

harvesting and marketing costs, and growers with land on routes near holiday resorts, in particular, achieve a good public response and increased net returns.

Increased use of berry fruits in health foods (yoghurt), and cakes and tarts, is likely to produce a larger outlet for these fruits in the future.

*Nuts*

(1) *Distribution.* In Victoria a wide range of nuts can be grown such as almonds, walnuts, chestnuts, hazelnuts, macadamia nuts, pecans, and others. In the past, only a few of these trees have been grown in commercial plantings. In most cases they have been planted as windbreaks around orchards and vineyards (almonds) or in groups in the farm orchard.

Almonds were mainly planted in the northern areas; walnuts and chestnuts in situations with deep soil in the north-east, the Dandenongs, and Gippsland; and hazelnuts on shallower soils in the hills.

Since the early 1970s, many orchardists and farmers who wanted to diversify, have shown interest in planting nuts. Although it has been difficult to obtain young trees with proven capacity, several new plantations have been established in suitable localities. In the Northern Mallee Division, two large almond groves of about 150 to 300 hectares have been established. These groves are just starting to come into production.

(2) *Size of production.* The production of almonds decreased from 50,000 kilograms in 1960-61 to 10,400 kilograms in 1976-77. Once the newly established almond groves start bearing, almond production will increase again. There has not been much change in the quantity of other nuts produced. Because of the long establishment period for most of them, recent plantings have had little effect on production at this stage.

VICTORIA—NUT PRODUCTION

(kilograms)

| Type of fruit | Year ended 31 March— | | | | |
|---|---|---|---|---|---|
| | 1973 | 1974 | 1975 | 1976 | 1977 |
| Walnuts | 46,435 | 72,898 | 70,800 | 66,345 | 67,403 |
| Chestnuts | 14,053 | 17,105 | 13,234 | 20,028 | 18,172 |
| Almonds | 3,661 | 3,734 | 15,475 | 13,548 | 10,401 |
| Filberts | 662 | 355 | 73 | 586 | 100 |

(3) *Marketing.* Almonds and other nuts are keenly sought after by wholesalers who pre-pack the shelled or salted product for retail sale, and by confectioners who use nuts as ingredients for their products. To satisfy local demand, almonds and other nuts are being imported regularly. Thus there is an opportunity to increase local production as long as the price of local nuts can be kept at or below the level of the imported product.

*Grapes*

(1) *Distribution.* In Victoria, most vine grapes are grown under irrigation in the Northern Mallee Division, and in the Goulburn Valley and Murray Valley areas. Wine grape varieties are also being grown in the traditional non-irrigated areas in the north-east (Rutherglen) and in the west (Great Western) of the State. With the increasing interest in wine grapes over recent years, many vineyards of varying sizes have been established in other suitable areas throughout the State.

(2) *Wine.* During the 1960s and 1970s, the demand for grapes for winemaking increased quite significantly, and as a result, many new areas were planted both by established vine growers and by many others without previous experience. Further, to satisfy winery demand, large quantities of sultanas and grapes of other varieties suitable for drying and winemaking have been diverted to wineries. Between 1960 and 1977, the intake of grapes by wineries has increased from 11,000 tonnes to 62,000 tonnes. Many of these grapes are now mechanically harvested.

Until recently, wineries were able to absorb the greatly increased volume of grapes produced in Victoria, New South Wales, and South Australia. During the 1977 harvest, there were signs of over-production in red varieties. This became a serious problem in 1978. Due to a world wine surplus there seems little potential for developing the very small export trade in wine. Nevertheless imports are increasing.

(3) *Dried fruits.* The production of sultanas and other drying varieties has remained fairly steady at around 45,000 tonnes to 60,000 tonnes (dry weight). Only about one third of the

Victorian crop is marketed locally and the rest has to be exported. Thus growers' returns depend largely on prices established at world markets according to supply and demand. Recent increases in production of dried vine fruit, especially in Afghanistan, Greece, and Turkey, have increased the world supply. This fact and other factors concerning the export of fresh and canned tree fruits have had a detrimental effect on the export market. Currently, the diversion of sultanas to wineries provides a useful alternative outlet, but, in the long run, without improved efficiency, restriction of the production of drying varieties may be necessary.

(4) *Table grapes.* The traditional table grape production in closed containers, in recent years, has remained steady at around 8,000 tonnes. A direct sales market based largely on sultanas, Waltham Cross, and Black Muscats, and using open returnable cases, has developed in recent years. It is estimated to take around 20,000 tonnes annually. The table grape season is lengthening due to the introduction of new table grape cultivars, a number of which are earlier than traditional varieties, and also by improved handling and storage techniques. The above factors, combined with developing air and sea freighting facilities are leading to some development in the small table grape export trade.

VICTORIA—VITICULTURE: NUMBER OF GROWERS, AREA, AND PRODUCTION

| Season | Number of growers | Area | | Production for — | | |
|---|---|---|---|---|---|---|
| | | Bearing | Non-bearing | Wine making | Drying *(a)* | Table and other use |
| | | hectares | hectares | tonnes | tonnes | tonnes |
| 1972–73 | 2,485 | 20,036 | 1,582 | 33,192 | 185,021 | 9,592 |
| 1973–74 | 2,405 | 20,000 | 1,597 | 44,425 | 156,246 | 5,725 |
| 1974–75 | 2,338 | 20,541 | 1,807 | 53,021 | 220,560 | 8,682 |
| 1975–76 | 2,246 | 19,625 | 1,652 | 60,869 | 218,528 | 8,199 |
| 1976–77 | 2,202 | 19,598 | 1,197 | 63,252 | 201,090 | 8,246 |

*(a)* Production for drying is estimated fresh weight equivalent of dried weight.

**Further reference: *Victorian Year Book* 1977, pp. 461–6**

### *Vegetables*

Victoria is the leading State for vegetable production in Australia, closely followed by Queensland and New South Wales. The principal crops grown in Victoria are potatoes, tomatoes, carrots, cauliflowers, cabbages, peas, and onions.

VICTORIA—VEGETABLES FOR HUMAN CONSUMPTION

| Main type | Area sown | | Production | |
|---|---|---|---|---|
| | 1975–76 *(a)* | 1976–77 *(a)* | 1975–76 *(a)* | 1976–77 *(a)* |
| | hectares | | tonnes | |
| Potatoes | 10,940 | 9,892 | 244,467 | 243,625 |
| Onions | 754 | 843 | 15,011 | 18,807 |
| Carrots | 911 | 916 | 25,989 | 30,370 |
| Parsnips | 179 | 166 | 4,689 | 5,045 |
| Beetroot | 57 | 43 | 1,135 | 869 |
| Tomatoes | 2,406 | 2,649 | 66,490 | 65,971 |
| French beans | 1,352 | 1,137 | 8,294 | 5,048 |
| Green peas— | | | | |
| Sold in pod | 346 | 308 | 525 | 614 |
| Processing | 4,813 | 4,433 | *(b)*6,687 | *(b)*10,102 |
| Cabbage and Brussels sprouts | 943 | 941 | 25,037 | 29,520 |
| Cauliflowers | 959 | 884 | 28,835 | 27,770 |
| Lettuce | 796 | 783 | 14,852 | 23,990 |
| Pumpkins | 874 | 1,004 | 10,928 | 13,021 |

*(a)* See footnote to table on page 326.
*(b)* Shelled weight.

### *Tobacco*

Tobacco growing in Australia has traditionally been regarded as a rather speculative proposition, because of wide fluctuations in production and in market conditions. Technical advances in the use of fertiliser, disease control, and other cultural factors

influencing crop production, have in recent years led to marked improvements in the level and consistency of average yields.

The introduction of a Tobacco Stabilisation Plan in 1965 promoted further stability in the industry. This scheme, now in its fourth term, provides for the annual sale, at a guaranteed minimum price, of up to 15,422,000 kilograms of leaf which meets defined quality standards. This plan is operated by the Australian Tobacco Board together with a Tobacco Leaf Marketing Board in each producing State.

Australian tobacco is mainly used in the manufacture of cigarettes. The use of domestic leaf is encouraged by a statutory mixing percentage applied in conjunction with concessional rates of import duty. The statutory percentage is currently 50 per cent and, at this level, it is important that only leaf of high smoking quality is produced. This requires friable and well drained soils, appreciable summer rainfall, and freedom from high winds and extremes of temperature.

The Victorian tobacco crop is usually rather more than one-third of the total Australian production. While the crop is predominantly of the flue-cured or Virginia type, a significant area of burley, a light air-cured tobacco, has been grown in Victoria in recent years, and is increasing. Suitable growing conditions are found in north-east Victorian river valleys, the industry being concentrated along the Ovens, Kiewa, and King Rivers and their tributaries, with small outlying areas in the northern part of Victoria.

Most Victorian tobacco is produced under sharefarming agreements on the general basis that the landowner provides land, facilities, and equipment, the sharefarmer provides labour and operating costs, and the proceeds of sale of produce are shared equally.

The major proportion of tobacco production costs is accounted for by manual labour requirements, and in recent years, considerable attention has been given to the reduction of labour by mechanisation. As a result, equipment such as semi-automatic transplanters, topping machines, harvesting aids, stringing machines, and bulk curing units, is now replacing tedious manual operations on most Victorian tobacco farms.

The Department of Agriculture helps tobacco growers to increase yield and improve leaf quality by research in agronomy, plant pathology, and plant breeding at the Tobacco Research Station, Myrtleford, and by an intensive farm-to-farm tobacco advisory service in all producing districts.

The Department of Agriculture has released flue-cured varieties resistant to common strains of blue mould, and blue mould-resistant burley breeding lines currently show promise. Other advances in tobacco production include improved nursery practices to give more effective and economical control of blue mould in seedlings, identification of the effects of soil and climatic variables on tobacco crop production, the testing and development of mechanical harvesting and associated curing methods, and techniques of producing high quality burley tobacco.

VICTORIA—TOBACCO PRODUCTION

| Season | Area | Production | Average yield per hectare |
|---|---|---|---|
| | hectares | tonnes (dry) | tonnes (dry) |
| 1972–73 | 4,068 | 5,769 | 1.42 |
| 1973–74 | 3,940 | 5,634 | 1.43 |
| 1974–75 | 3,926 | 6,086 | 1.55 |
| 1975–76 | 3,755 | 5,683 | 1.51 |
| 1976–77 | 3,821 | 5,999 | 1.57 |

*Hops*

The hop is a summer-growing perennial plant. The rootstock produces vines which may grow up to 10 metres high each season before being cut back during the autumn.

Victorian hops are of high quality when measured against world standards and the area given over to hops in this State increased during the first half of the present decade. However, because of uncertain markets, production has tended to decline slightly since then.

Hops need a good rainfall, evenly distributed throughout the growing season, deep-well-drained soils, and protection from wind. In Victoria, the industry is confined to alluvial

soils in the valleys of the Ovens and King Rivers where the availability of liberal supplies of good quality irrigation water is essential to supplement the natural summer rainfall.

Hops are planted from root cuttings, or sets, on a square spacing to give some 2,200 plants per hectare, supported on a system of trellising about 6 metres above the planted area. The size of hop gardens in Victoria varies considerably from 2 hectares to about 70 hectares.

In all cases, production is by family and hired labour. The labour needs vary from month to month, being heaviest at pruning, training, and harvest time, and the average is about one man for each 3 hectares. Before the advent of mechanical harvesting, much more labour than this was needed.

Machine harvesting is practically universal in Victorian hops, the whole vine being cut down and brought to a stationary picker which separates the cones from the rest of the plant. Conveyor belts and mechanical loaders ensure that the passage of the hops through the drying kiln generally requires little manual effort.

In small gardens, harvesting is commonly done under contract or by neighbours sharing fully mechanised equipment. Other processes, such as pruning, are also becoming increasingly mechanised.

Hops are normally grown under annual contract to merchants, known as hop factors. Annual hop production in Australia currently exceeds the total quantity demanded by domestic brewers, leaving a substantial proportion of the crop for export.

The high quality Victorian bred variety Pride of Ringwood, which is now virtually the only variety grown in Victoria, has been well received on world markets but profitable export sales have nevertheless been difficult to negotiate in seasons of overall world surplus.

The Department of Agriculture conducts research and extension services in the Victorian hop industry, current emphasis being on improvement of hop quality and control of certain soil-borne-diseases. This work has been intensified, and additional investigations on long-term fertiliser requirements and control of weeds and insect pests have recently been introduced.

VICTORIA—HOPS PRODUCTION

| Season | Area | Production | Average yield per hectare |
|---|---|---|---|
| | hectares | tonnes | tonnes |
| 1972–73 | 453 | 662 | 1.46 |
| 1973–74 | 508 | 915 | 1.80 |
| 1974–75 | 478 | 831 | 1.74 |
| 1975–76 | 469 | 746 | 1.59 |
| 1976–77 | 424 | 809 | 1.91 |

*Plant nurseries*

In Victoria, in 1974-75, the total area of nurseries was about 950 hectares, including about 340 hectares of glass, plastic film, and bushhouses; the total value of sales of nursery products exceeded $16.5m.

A census of commercial Victorian nursery establishments covering the 1974-75 season resulted in the following information:

VICTORIA—NURSERIES *(a)*, 1974–75

| Item | Amount |
|---|---|
| Number of nurseries | 373 |
| Sales of nursery products ($'000)— | |
| Seeds and bulbs | 1,458 |
| Seedlings | 2,849 |
| Cut flowers (including orchids) | 3,758 |
| Cultivated turf | 167 |
| Fruit trees and vines | 642 |
| Rose bushes | 937 |
| Other shrubs and trees | 6,792 |
| Total nursery sales | 16,603 |

*(a)* For the purpose of the census, a nursery was defined as a location commercially engaged in growing or raising nursery products from seeds, bulbs, cuttings, etc., or significantly "growing-on" any of these items.

**Further reference:** ***Victorian Year Book*** **1977, pp. 471–2**

## Livestock and livestock products

### *Introduction*

The first significant development in Victoria, or as it was then known, the Port Phillip District, was the pastoral industry. Millions of hectares of lightly timbered land lay before the newcomers, and the quickest way to wealth was evidently by the division of the land into runs and the depasturing of sheep and cattle. Settlers and stock came at first from Tasmania and eventually from New South Wales.

According to early statistical records there were 26,000 sheep, 100 cattle, and 57 horses in the District on 25 May 1836. On 1 January 1841, as a result of five years of livestock importation and breeding, there were 782,283 sheep, 50,837 cattle, and 2,372 horses. By 1 January 1851, the livestock population had increased to 6,032,783 sheep, 378,806 cattle, 21,219 horses, and 9,260 pigs.

The following table shows the numbers of livestock in Victoria at decennial intervals from 1861 to 1971, and the numbers of livestock on rural holdings for each of the six years 1972 to 1977. From 1957, no allowance has been made for the small number of livestock not on rural holdings.

VICTORIA—SELECTED LIVESTOCK: NUMBERS *(a)*
('000)

| Year | Cattle *(b)* | | Sheep | Pigs |
|---|---|---|---|---|
| | Dairy | Beef | | |
| 1871 at 31 March | — | 721 | — | 10,762 | 131 |
| 1881 at 31 March | — | 1,286 | — | 10.360 | 242 |
| 1891 at 31 March | — | 1,783 | — | 12,693 | 282 |
| 1901 at 31 March | — | 1,602 | — | 10,842 | 350 |
| 1911 at 1 March | — | 1,548 | — | 12,883 | 333 |
| 1921 at 1 March | — | 1,575 | — | 12,171 | 175 |
| 1931 at 1 March | — | 1,430 | — | 16,478 | 281 |
| 1941 at 1 March | — | 1,922 | — | 20,412 | 398 |
| 1951 at 31 March | 1,489 | — | 727 | 20,012 | 237 |
| 1961 at 31 March | 1,717 | — | 1,147 | 26,620 | 319 |
| 1971 at 31 March | 1,974 | — | 3,086 | 33,761 | 520 |
| 1972 at 31 March | 1,927 | — | 3,508 | 29,496 | 590 |
| 1973 at 31 March | 1,957 | — | 3,488 | 24,105 | 585 |
| 1974 at 31 March | 1,933 | — | 3,906 | 25,787 | 424 |
| 1975 at 31 March | 1,939 | — | 4,235 | 26,411 | 383 |
| 1976 at 31 March | 1,871 | — | 3,996 | 25,395 | 393 |
| 1977 at 31 March | 1,681 | — | 3,423 | 21,925 | 397 |

*(a)* A table showing livestock numbers for each year from 1837 to 1971 is published in the *Victorian Year Book* 1973, pages 1090–1.
*(b)* Separate figures for beef and dairy cattle are not available for the years before 1943.

The following table shows details of the stock slaughtered in Victoria during each of the five years 1972-73 to 1976-77:

VICTORIA—LIVESTOCK SLAUGHTERED
('000)

| Particulars | Year ended 30 June — | | | | |
|---|---|---|---|---|---|
| | 1973 | 1974 | 1975 | 1976 | 1977 |
| Sheep | 7,856 | 3,134 | 4,147 | 5,677 | 4,956 |
| Lambs | 6,673 | 5,258 | 5,685 | 5,696 | 5,456 |
| Cattle | 1,895 | 1,696 | 1,814 | 2,253 | 2,398 |
| Calves | 665 | 564 | 684 | 1,044 | 1,197 |
| Pigs | 1,210 | 1,081 | 969 | 882 | 933 |

### *Sheep*

*Distribution*

Sheep are widely distributed throughout Victoria's grazing areas. The greatest densities of sheep are found in the Central Highlands and South Western statistical divisions (3.7 and 3.2 sheep per hectare of rural holdings, respectively, at 31 March 1977). The numbers of sheep in each division are shown in the table on page 353.

During 1976-77, the Victorian sheep population declined a further 13.5 per cent to 21.9 million head—35 per cent below the 1971 peak of 33.8 million; the lowest since the early

1950s. The greatest falls (17 per cent to 19 per cent) occurred in the north of Victoria, hardest hit by drought and poor lambings (Wimmera, Northern Mallee, Loddon-Campaspe, Goulburn, and North Eastern divisions). However, with the exception of Central Gippsland which enjoyed a relatively good season, all parts of Victoria showed declines of 8 per cent or more.

As well as poor lambing performances, heavy sales of sheep for slaughter and higher death rates on farms contributed to the decline. The decline was most evident in lambs and hoggets (down 28.5 per cent), so that its effects are likely to persist for some years.

VICTORIA—SHEEP AND LAMBS IN EACH STATISTICAL DIVISION AT 31 MARCH 1977 ('000)

| Statistical division | Rams | Ewes | Wethers | Lambs | Total |
|---|---|---|---|---|---|
| Melbourne | 4 | 116 | 88 | 34 | 242 |
| Barwon | 19 | 695 | 311 | 205 | 1,230 |
| South Western | 82 | 3,237 | 1,597 | 1,258 | 6,174 |
| Central Highlands | 37 | 1,645 | 1,267 | 523 | 3,472 |
| Wimmera | 41 | 1,753 | 1,073 | 549 | 3,416 |
| Northern Mallee | 14 | 644 | 125 | 228 | 1,011 |
| Loddon-Campaspe | 30 | 1,344 | 839 | 404 | 2,617 |
| Goulburn | 28 | 1,140 | 508 | 302 | 1,978 |
| North Eastern | 8 | 259 | 92 | 83 | 442 |
| East Gippsland | 7 | 360 | 198 | 129 | 694 |
| Central Gippsland | 9 | 349 | 93 | 140 | 591 |
| East Central | 1 | 41 | 1 | 15 | 58 |
| Total | 280 | 11,583 | 6,192 | 3,870 | 21,925 |

*Main sheep breeds*

Victorian sheep can be divided broadly into "wool" and "meat" breeds. The distinction is necessarily an arbitrary one, since wool is an important source of income from ewes kept for prime lamb production, while mutton is produced mainly from surplus or aged sheep from "woolgrowing" flocks.

The Merino is the most numerous breed in Victoria, although not as dominant as in the other mainland States. At 31 March 1977, the 12 million Merinos comprised 55 per cent of the Victorian flock, compared with 48 per cent in 1974.

The traditional Victorian Merino is a comparatively small framed Saxon type, producing fine to superfine wool. This type is now giving way to larger, heavier cutting, broader woolled strains, in response to reduced price margins for fineness, greater stress on carcase values, and sharp increases in production costs.

Other breeds derived from Merino crossbreds and kept mainly for wool production include the Corriedale, 11 per cent (half Merino, half Lincoln), and Polwarth, 3 per cent (one-quarter Lincoln). Comebacks (predominantly Merino, fine-woolled crossbreds) make up another 5 per cent. Other stronger woolled crossbreds are used mainly for prime lamb production. These contributed 19 per cent (4 million) to the total in 1977, compared with 25 per cent in 1974.

British meat breeds and Australasian breeds developed from them, such as the Poll Dorset, are widely used as sires in crossbreeding programmes, so that their influence is much greater than their contribution to total numbers (8.3 per cent in 1977) would suggest. British longwool breeds, such as the Border Leicester and the Romney Marsh, are commonly mated to Merino ewes to produce crossbred breeding ewes and prime lambs. Shortwool breeds, such as the Dorset Horn, Poll Dorset, and Southdown are used mainly as terminal sires, mated with crossbred, Corriedale, or Merino ewes to produce prime lambs.

VICTORIA—BREEDS OF SHEEP (INCLUDING RAMS) AT 31 MARCH *(a)*

| Breed | 1971 | | 1974 | | 1977 | |
|---|---|---|---|---|---|---|
| | Number | Percentage of total | Number | Percentage of total | Number | Percentage of total |
| Merino | 16,739,818 | 49.58 | 12,256,133 | 47.53 | 11,973,587 | 54.61 |
| Corriedale | 3,717,225 | 11.01 | 2,492,255 | 9.66 | 2,419,208 | 11.03 |
| Polwarth | 1,008,052 | 2.99 | 688,378 | 2.67 | 626,895 | 2.86 |

VICTORIA—BREEDS OF SHEEP (INCLUDING RAMS) AT 31 MARCH *(a)—continued*

| Breed | 1971 | | 1974 | | 1977 | |
|---|---|---|---|---|---|---|
| | Number | Percentage of total | Number | Percentage of total | Number | Percentage of total |
| Border Leicester | 615,620 | 1.82 | 431,096 | 1.67 | 782,107 | 3.57 |
| Cheviot | 9,574 | 0.03 | 9,797 | 0.04 | 4,687 | 0.02 |
| Dorset Horn | 464,249 | 1.38 | 491,367 | 1.90 | 389,699 | 1.78 |
| Poll Dorset | 161,445 | 0.48 | 215,328 | 0.84 | 209,465 | 0.96 |
| Perendale | 5,794 | 0.02 | 7,200 | 0.03 | 7,871 | 0.04 |
| Romney Marsh | 445,171 | 1.32 | 262,800 | 1.02 | 280,854 | 1.28 |
| Ryeland | 22,445 | 0.07 | 19,173 | 0.07 | 12,870 | 0.06 |
| Southdown | 133,302 | 0.39 | 115,559 | 0.45 | 89,612 | 0.41 |
| Suffolk (including South Suffolk) | 11,173 | 0.03 | 9,588 | 0.04 | 18,625 | 0.08 |
| Zenith | 70,722 | 0.21 | 50,670 | 0.20 | 40,912 | 0.19 |
| Comeback | 2,199,043 | 6.51 | 1,887,569 | 7.32 | 1,031,150 | 4.70 |
| Crossbreed (including half breed Merino and coarser) | 8,143,820 | 24.12 | 6,533,446 | 25.33 | 4,017,269 | 18.32 |
| Other (including unspecified) | 14,034 | 0.04 | 317,192 | 1.23 | 20,639 | 0.09 |
| Total | 33,761,487 | 100.00 | 25,787,551 | 100.00 | 21,925,450 | 100.00 |

*(a)* Not collected in 1972, 1973, 1975, or 1976.

*Lambing*

The lambing performance of the Victorian flock fluctuates according to seasonal conditions around a fairly static twenty year average of 83 lambs marked for each 100 ewes mated.

Poor seasonal conditions in the year ended 31 March 1977 contributed to the poorest lambing for many years. Only 6.6 million lambs were marked from 9.6 million ewes mated (69 per cent). Victoria's largest lambing occurred in 1970–71, when 12.7 million lambs were marked from 14.8 million ewes mated (86 per cent).

VICTORIA—LAMBING

| Season | Ewes mated | Lambs marked | Proportion of lambs marked to ewes mated |
|---|---|---|---|
| | '000 | '000 | per cent |
| 1972-73 | 11,381 | 9,452 | 83 |
| 1973-74 | 9,885 | 8,182 | 83 |
| 1974-75 | 10,622 | 8,823 | 83 |
| 1975-76 | 10,376 | 8,359 | 81 |
| 1976-77 | 9,551 | 6,566 | 69 |

*Wool production*

In 1976–77, Victoria produced 126 million kilograms of wool (greasy basis). Although 9 per cent lower than in 1975–76, this still represented 18 per cent of Australian production and 5 per cent of the world total.

Victoria reached a peak of 201 million kilograms in 1970–71, although the most valuable clip ($254m) was produced in 1972–73 during a brief period of boom prices. Since 1970–71, the size of the clip has declined in line with the continued decline in sheep numbers. The Victorian clip spans a very wide range of wool types, ranging from superfine Merino, through the stronger grades of Merino and Comeback, to coarse crossbred and Lincoln. A small number of speciality carpet wool sheep, which grow a proportion of hairy fibres, have recently been introduced from New Zealand.

VICTORIA—SHEEP SHORN AND WOOL CLIPPED

| Season | Shorn | | Wool clipped (including crutchings) | | Average | |
|---|---|---|---|---|---|---|
| | Sheep | Lambs | Sheep | Lambs | Per sheep | Per lamb |
| | '000 | '000 | '000 kg | '000 kg | kg | kg |
| 1972–73 | 27,455 | 6,390 | 121,220 | 7,855 | 4.42 | 1.23 |
| 1973–74 | 24,564 | 5,982 | 120,957 | 8,256 | 4.92 | 1.38 |
| 1974–75 | 26,385 | 6,591 | 128,614 | 9,887 | 4.87 | 1.50 |
| 1975–76 | 23,271 | 5,839 | 102,798 | 8,020 | 4.42 | 1.37 |
| 1976–77 | 21,734 | 4,404 | 91,378 | 5,769 | 4.20 | 1.31 |

VICTORIA—SHEEP AND LAMBS SHORN, SEASON 1976–77

| Statistical division | Shorn | | Wool clipped (including crutchings) | | Average | |
|---|---|---|---|---|---|---|
| | Sheep | Lambs | Sheep | Lambs | Per sheep | Per lamb |
| | '000 | '000 | '000 kg | '000 kg | kg | kg |
| Melbourne | 214 | 41 | 979 | 58 | 4.57 | 1.41 |
| Barwon | 1,241 | 233 | 4,663 | 297 | 3.75 | 1.27 |
| South Western | 5,982 | 1,448 | 24,713 | 1,966 | 4.13 | 1.36 |
| Central Highlands | 3,505 | 493 | 13,567 | 641 | 3.87 | 1.30 |
| Wimmera | 3,537 | 617 | 15,959 | 804 | 4.51 | 1.30 |
| Northern Mallee | 910 | 232 | 4,422 | 341 | 4.86 | 1.47 |
| Loddon-Campaspe | 2,733 | 479 | 12,099 | 596 | 4.43 | 1.24 |
| Goulburn | 1,978 | 409 | 8,205 | 481 | 4.15 | 1.18 |
| North Eastern | 423 | 103 | 1,695 | 120 | 4.01 | 1.17 |
| East Gippsland | 654 | 128 | 2,753 | 153 | 4.21 | 1.20 |
| Central Gippsland | 513 | 203 | 2,138 | 288 | 4.17 | 1.42 |
| East Central | 44 | 17 | 184 | 24 | 4.18 | 1.41 |
| Total | 21,734 | 4,404 | 91,378 | 5,769 | 4.20 | 1.31 |

VICTORIA—TOTAL WOOL PRODUCTION

| Season | Clip | Stripped from and exported on skins, etc. (greasy) | Total quantity (greasy) |
|---|---|---|---|
| | '000 kg | '000 kg | '000 kg |
| 1972–73 | 129,987 | 43,248 | 173,235 |
| 1973–74 | 129,212 | 26,143 | 155,355 |
| 1974–75 | 138,501 | 27,043 | 165,544 |
| 1975–76 | 110,818 | 27,152 | 137,970 |
| 1976–77 | 97,146 | 28,001 | 125,147 |

**Further reference: Australian Wool Corporation, *Victorian Year Book* 1977, p. 452**

*Mutton and lamb production*

Victoria is the leading State in the production of mutton and lamb. However, part of this production is derived from sheep and lambs originating in other States, especially from southern New South Wales.

Mutton, the meat from adult sheep, is mainly produced from surplus sheep from the wool industry so that production patterns correspond closely to expansions and contractions in that industry. In 1976–77, Victoria produced 96,000 tonnes of mutton (70 per cent for export), well down on the 1971–72 peak of 247,000 tonnes.

Prime lamb production fell 5 per cent to 90,000 tonnes, in 1976–77. Of this, 18 per cent was exported, a higher proportion than has been common in recent years and reflecting a rapid growth in markets in the Middle East, especially Iran. Prime lamb producers are found throughout the State. However, early to mid-season producers are distributed in a broad band across northern Victoria, including some irrigated areas in the Murray and Goulburn Valleys. In addition, a considerable number of early lambs are brought from southern New South Wales for slaughter in Victoria. Mid to late-season producers are located mainly in the South Western, Central Highlands, Central Gippsland, and parts of the North Eastern Divisions of the State.

*Export of live sheep*

Exports of Australian live sheep for slaughter in the country of destination have grown from approximately 150,000 head in 1965, mostly to Singapore, to 4.5 million head in 1977; 97 per cent of these were consigned to Middle East markets, notably Iran (2.6 million). In 1977, live sheep exports accounted for about 12 per cent of the total turn-off from Australian flocks.

Western Australia, the nearest source, has been the main supplier during this period of expansion, but shippers have recently had to look increasingly to the eastern States to fill their contracts. Victorian flocks contributed approximately 500,000 head to shipments from Victorian and South Australian ports during 1977.

Middle East demand for sheep meat has been enhanced by rapidly growing populations and increasing wealth from oil revenues. Local custom (and the lack of refrigeration) favours meat from freshly killed sheep. However, the high costs of importing live sheep and a growing demand for lamb and young mutton (not suitable for live transport) are among factors which have encouraged a parallel expansion in carcase meat imports. These have been built up as rapidly as suitable refrigerated storage and distribution facilities could be installed, and traditional habits modified. Opposition by Australian meat industry unions is another factor which will tend to limit live sheep exports to an essentially developmental role in these valuable markets.

Australia's long-established export trade in breeding sheep continued at a high level during the year ended 30 June 1977, taking 39,000 head. Of these, 30,000 head were consigned to Iran from Victorian ports (not necessarily all derived from Victorian flocks).

### *Beef cattle*

Cattle were introduced into southern Australia by the early settlers. These first cattle were poor stock from Africa intended to meet the needs of draught, milk, and meat, and were quickly replaced by herds of beef cattle imported from Britain.

In its early years, the beef cattle industry faced many natural hazards including drought, disease, and pests. More recently, changing economic conditions and patterns of land-use have been most important in determining the size and distribution of the beef cattle population. Refrigeration, pasture improvement, the relative prices received for other primary products, and the export markets for beef, have all been important factors.

In the early 1970s, high prices for beef, and marketing difficulties in sheep, dairy, and wheat industries, encouraged farmers to build up breeding herds. As a result, beef cattle numbers in Victoria rose from 1.5 million to 3.5 million from 1968 to 1973. There was no increase in the number of beef cattle from 1972 to 1973, reflecting the drought conditions prevailing in many areas during the summer of 1972–73; however, a further increase to 4.0 million occurred in 1974 because producers, who were retaining animals for slaughter at older ages when high prices were being paid for bullocks suitable for export, withheld these animals from sale when prices dropped. With the continuation of low prices during 1975, there was a further increase in beef cattle numbers to 4.2 million. However, a combination of dry conditions and low prices resulted in a drop in numbers from 4.0 million head to 3.4 million head in 1976 and 1977, respectively.

The Victorian environment is very favourable for beef production with cattle able to graze pasture throughout the year. The following table shows the numbers and types of beef cattle in each Statistical Division at 31 March 1977:

VICTORIA—DISTRIBUTION OF BEEF CATTLE AT 31 MARCH 1977
('000)

| Statistical division | Bulls for service | | Cows and heifers | Calves under 1 year | Other | Total |
|---|---|---|---|---|---|---|
| | 1 year and over | Under 1 year | | | | |
| Melbourne | 4 | 1 | 89 | 46 | 31 | 171 |
| Barwon | 3 | 1 | 86 | 43 | 32 | 165 |
| South Western | 18 | 4 | 398 | 187 | 142 | 749 |
| Central Highlands | 4 | 1 | 105 | 55 | 40 | 205 |
| Wimmera | 3 | 1 | 69 | 46 | 22 | 141 |
| Northern Mallee | 2 | 1 | 52 | 38 | 17 | 110 |
| Loddon-Campaspe | 5 | 2 | 129 | 81 | 48 | 265 |
| Goulburn | 11 | 3 | 234 | 136 | 90 | 474 |
| North Eastern | 6 | 2 | 178 | 97 | 75 | 358 |
| East Gippsland | 6 | 1 | 145 | 80 | 44 | 276 |
| Central Gippsland | 9 | 2 | 190 | 105 | 116 | 422 |
| East Central | 2 | 1 | 40 | 22 | 22 | 87 |
| Total | 73 | 20 | 1,715 | 936 | 679 | 3,423 |

Most of the Victorian breeding herd (bulls and cows) are in the South Western, Goulburn, North Eastern, and Gippsland Divisions, with a high proportion of "other" (steers and bullocks) in the Central Gippsland and East Central Divisions. There were

large decreases from 1976 in the total meat cattle populations of the Wimmera, Loddon-Campaspe, and Goulburn Divisions.

In the early 1970s, beef production increased rapidly. Producers withheld some stock in 1974 and 1975 and hence, production declined marginally. Production peaked in 1976 at 493,000 tonnes. Exports constituted about 44 per cent of Victorian beef and veal production in 1976–77 and the main markets were U.S.A., Japan, Soviet Union, and other Eastern European countries. The new Middle East and Asian markets continued to increase in importance during 1976–77.

The low prices for beef on the domestic market saw the estimated apparent consumption of beef and veal increase from about 40 kg per head per annum during the early 1970s, to peak at 70 kg in 1975–76 and remain just below this record level at 65 kg in 1976–77. Attention is drawn to the historical table of livestock numbers on page 352, and the table on livestock slaughterings on page 352.

**Further reference: Australian Meat Board, *Victorian Year Book* 1977, pp. 453–4**

### *Dairy cattle*

*Distribution*

Until recent years, dairy farming was conducted over a very large area of Victoria. However, in the past few years, the costs/prices squeeze on dairy farmers has resulted in dairying becoming more and more confined to those areas in the State that are most suitable for it. As a result, dairying is now mainly in the higher rainfall areas of Gippsland and the Western District, and also in the northern irrigation areas.

In general, the trend has been to milk more cows, but on fewer farms. In 1976–77, about 13,600 Victorian dairy farmers milked 1.2 million cows, with the average number of milking cows per farm being 88.

VICTORIA—DISTRIBUTION OF DAIRY CATTLE AT 31 MARCH 1977
('000)

| Statistical division | Bulls for service | | Cows and heifers for milk and cream | | | House cows and heifers | Total |
|---|---|---|---|---|---|---|---|
| | 1 year and over | Under 1 year | Cows in milk and dry | Heifers | | | |
| | | | | 1 year and over | Under 1 year | | |
| Melbourne | 1 | — | 39 | 10 | 6 | 1 | 57 |
| Barwon | 2 | — | 74 | 17 | 13 | 1 | 107 |
| South Western | 6 | 2 | 226 | 49 | 37 | 3 | 323 |
| Central Highlands | 1 | — | 14 | 4 | 3 | 1 | 23 |
| Wimmera | — | — | 5 | 2 | 1 | 2 | 10 |
| Northern Mallee | 1 | — | 26 | 7 | 5 | 1 | 40 |
| Loddon-Campaspe | 2 | 1 | 93 | 21 | 18 | 2 | 137 |
| Goulburn | 5 | 2 | 229 | 53 | 41 | 2 | 332 |
| North Eastern | 1 | — | 51 | 12 | 10 | 2 | 76 |
| East Gippsland | 1 | — | 62 | 15 | 11 | 1 | 90 |
| Central Gippsland | 7 | 2 | 300 | 63 | 47 | 1 | 420 |
| East Central | 1 | — | 47 | 9 | 7 | — | 64 |
| Total | 28 | 7 | 1,166 | 262 | 199 | 17 | 1,679 |

*Recent developments*

The capital value of a modern fully equipped and stocked dairy farm is at least $100,000. It is now necessary to milk 85 or more cows to meet all farm costs and gain a reasonable livelihood.

The high capital investment is largely a reflection of advances in dairy farming technology. These have been marked by progress in the mechanisation of milking, the introduction of farm refrigeration and tanker collection of milk from properties, and the improvement in systems of cleaning dairy shed equipment and of disposing of milking shed wastes. These advances have contributed towards expansion of dairy farm enterprises which one, two, or three people can operate. Improvements in pasture production and grazing management, and increased mechanisation in growing and harvesting fodder, have made it possible to carry more stock on farms.

Contract labor is used by dairy farmers mainly to meet peak labor demands such as hay making. Usually the contractor owns most of the equipment.

VICTORIA—MILK PRODUCTION AND UTILISATION
('000 litres)

| Purpose for which used | Year ended 30 June— | | | | |
|---|---|---|---|---|---|
| | 1973 | 1974 | 1975 | 1976 | 1977 |
| Butter | 2,652,225 | 2,652,686 | 2,435,763 | 2,186,791 | 1,804,081 |
| Cheese | 447,588 | 433,675 | 420,693 | 489,095 | 471,247 |
| Processed milk products | 358,993 | 342,568 | 415,585 | 410,504 | 496,463 |
| Other purposes | 485,793 | 487,599 | 472,591 | 431,373 | 440,456 |
| Total milk produced | 3,944,599 | 3,916,528 | 3,744,632 | 3,517,763 | 3,212,247 |

*Marketing*

The marketing function for manufactured products has been divided between the Australian Dairy Corporation and individual companies within the industry, while the Victorian Milk Board was responsible for marketing liquid milk until 30 June 1977.

The Victorian Government established the Victorian Dairy Industry Authority to replace the Milk Board from 1 July 1977. The purpose of the Authority is to streamline decision making within the Victorian dairy industry and allow greater emphasis to be placed on rationalising the industry and on marketing of dairy products, including liquid milk.

One of the Authority's tasks is to re-organise the purchase of all liquid milk used in Victoria. Unless surrendered or cancelled earlier, all milk contracts will cease on 30 June 1986. Compensation is being paid to farmers who surrender all or part of their contracts before the final date. With the surrender of many contracts, the Authority is now obtaining a large quantity of liquid milk from non-contract holders. Payment for this non-contract milk is being made each month to all Victorian non-contract holders whose milk meets the required standards. The payment they receive is proportional to the total quantity of milk they supply each month; irrespective of whether the milk is used for manufacturing purposes or for the liquid milk market.

**Further reference: Australian Dairy Corporation, *Victorian Year Book* 1977, p. 456**

*Pigs*

Victoria is a major pig-producing State in Australia. In the past, a substantial part of its supplies of pig meat came from other States, but as a result of the development of the pig industry, most of the pig meat consumed in Victoria is now produced in this State.

Australians are relatively large meat eaters, but they eat much less pig meat than most other nations. Pig meat provides about only 12 per cent of the total meat consumed by Australians. This is due partly to traditional eating habits and partly to the relative costs of sheep and cattle meat, produced on low cost pasture, and pig meat, produced from concentrated foods such as grain.

The pig industry was developed largely in conjunction with the dairy industry. Pigs were used to salvage separated milk, buttermilk, and whey — by-products of butter, cheese, and casein manufacture—and those foods provided the greater part of their diet. In the 1950s and 1960s more milk was used for human food, and less was available for pigs. Pig production then became less dependent on milk but more on grain feeding, protein foods, animal by-products such as meat and bone-meal, fish-meal, and whale solubles. With this change in the major source of food for pigs, the structure of the pig industry changed to fewer but larger pig herds.

Pigs mature early, are prolific, and grow fast. A sow can produce a litter when she is twelve months old; her pigs can be ready for pork when three and a half to four months old, or for bacon when five to six months old, at which time the sow can be producing her second litter.

The large variations in the annual production of pigs caused fluctuations in the prices farmers received for their pigs. The variations in supply are caused more by the rapid production potential of pigs, and the absence of adequate forward information on trends, than by changes in seasonal conditions.

In recent years, the increased demand for pig meat has resulted in a consistent upward trend in production, with prices remaining fairly stable. For example, between 1966 and 1972, production of pig meat increased by some 60 per cent, which was all consumed by the domestic market. However, during 1973, the situation altered. An oversupply of pigs

led to a sharp decline in prices at a time when food costs were rising. Many people left the industry and by March 1974 the Victorian pig population had fallen by 27 per cent. The resultant shortage of pigs caused pig prices to rise to record levels. During 1975, the pig population fell a further 10 per cent and stabilised with a slight increase of 2.5 per cent in 1976. Pig prices during this time stabilised just above the previous record levels. Despite this, high capital costs and escalating feed prices are tending to deter people from entering the industry. There is no scheme to support pig prices in Australia.

In the 1930s and early 1940s, Australia exported pig carcases, mainly to the United Kingdom, where it had a protected market. In 1941, more than one third of Australia's pig production was exported. Since then, production and local demand have come closer together and only an insignificant part of the country's production is exported. In 1972–73, as a result mainly of orders from Japan, exports amounted to only 6 to 7 per cent of production.

Pigs now provide the major part of the income from the farms on which they are kept. More capital and skilled management are involved in the individual units.

The number of pigs in Victoria at 31 March 1977 was 396,754. The following table shows classification (in Statistical divisions) of pigs, together with the numbers of pig keepers. The historical table on page 352 and the table on slaughtering on page 352 contain further information about the pig industry.

VICTORIA—PIGS AND PIG KEEPERS AT 31 MARCH 1977

| Statistical division | Boars | Breeding sows | All other | Total pigs | Pig keepers |
|---|---|---|---|---|---|
| Melbourne | 328 | 3,756 | 30,732 | 34,816 | 124 |
| Barwon | 151 | 1,512 | 7,352 | 9,015 | 91 |
| South Western | 377 | 2,429 | 12,715 | 15,521 | 260 |
| Central Highlands | 263 | 2,544 | 20,269 | 23,076 | 149 |
| Wimmera | 702 | 5,774 | 35,785 | 42,261 | 686 |
| Northern Mallee | 537 | 4,152 | 24,175 | 28,864 | 382 |
| Loddon-Campaspe | 1,229 | 14,909 | 97,427 | 113,565 | 571 |
| Goulburn | 846 | 10,573 | 61,739 | 73,158 | 447 |
| North Eastern | 337 | 3,579 | 22,720 | 26,636 | 233 |
| East Gippsland | 86 | 790 | 3,756 | 4,632 | 99 |
| Central Gippsland | 310 | 3,337 | 18,131 | 21,778 | 211 |
| East Central | 44 | 466 | 2,921 | 3,431 | 26 |
| Total | 5,210 | 53,821 | 337,722 | 396,753 | 3,279 |

*Poultry*

The trend in the Victorian egg industry has been towards large specialised farms, for example, egg producers, hatcheries, and pullet growers, all of which use modern poultry housing, equipment, and labour saving machinery.

The greater proportion of Victoria's estimated 3.4 million adult female fowls are now contained within the commercial egg industry. There are, however, small household flocks in suburban and country areas. The main areas of commercial production are centred on the outskirts of the Melbourne metropolitan area and in the Bendigo district, with large centres around Ballarat and Geelong, and substantial populations in the Wimmera, Goulburn Valley, and north-east.

Farms consisting of one man or one family usually manage 5,000 to 10,000 layers. There are, however, many larger farms employing labour with up to 30,000 layers, and a few much bigger establishments.

Housing is planned on the intensive principle, with deep litter pens or multiple bird cage units. Most of the new housing is based on the laying cage system. A proportion of layers are kept in fully enclosed, windowless houses in a fully controlled environment. Artificial lighting is used on almost all commercial egg farms to stimulate egg production.

Feeding is based on grains (wheat, oats, and barley) and their by-products (bran and pollard), with meatmeal used as the major protein supplement. A wide range of commercial, ready-mixed poultry rations is available.

Laying stock consists mainly of a specially produced cross between the White Leghorn and Australorp breeds. The average State egg production is estimated at approximately

225 eggs per bird per year. Commercial stock of the local breeding farms and hatcheries is tested for profitability using the Department of Agriculture's Random Sample Laying Test at Burnley.

Chicks are hatched continuously throughout the year, with an emphasis on the June to November period. Hatcheries are large and use modern incubators of about 65,000 egg capacity. Most commercial egg-type chicks are sexed at one day old by machine or hand methods, and the cockerels discarded. The main power source used in the brooding of chicks is electricity, but gas brooders and hot water brooders fired by oil burners are also used.

The marketing of eggs is controlled by the Victorian Egg Marketing Board. Flocks with over twenty adult female fowls come within the Board's jurisdiction. Victoria produces a surplus of eggs which is exported through the Australian Egg Board.

Advisory and research services to the egg industry are provided by the Department of Agriculture and by commercial firms concerned with the sale of feed, chickens, drugs, and equipment.

VICTORIA—HEN EGGS SET AND CHICKENS HATCHED
('000)

| Period *(a)* | Hen eggs set *(b)* | Chicks hatched *(c)* intended to be raised for— | | | | Total hatched |
|---|---|---|---|---|---|---|
| | | Meat production | Egg production | Breeding | | |
| | | | | Pullets | Cockerels | |
| | | MEAT STRAINS | | | | |
| 1972–73 | 36,487 | 27,746 | *(d)* | n.a. | n.a. | *(e)* 27,746 |
| 1973–74 | 41,902 | 32,089 | *(d)* | n.a. | n.a. | *(e)* 32,089 |
| 1974–75 | 34,772 | 27,306 | *(d)* | n.a. | n.a. | *(e)* 27,306 |
| 1975–76 | 40,738 | r33,219 | *(d)* | n.a. | n.a. | *(e)* 33,215 |
| 1976–77 | 42,615 | 34,694 | *(d)* | n.a. | n.a. | *(e)* 34,694 |
| | | EGG STRAINS *(f)* | | | | |
| 1972–73 | 14,354 | 489 | 4,875 | 146 | 14 | 5,524 |
| 1973–74 | 17,657 | 351 | 6,027 | 176 | 28 | 6,582 |
| 1974–75 | 14,924 | r316 | 5,005 | 196 | 39 | 5,556 |
| 1975–76 | 11,480 | r196 | 4,012 | 145 | 36 | 4,389 |
| 1976–77 | 11,482 | 173 | 3,804 | 141 | 28 | 4,146 |

*(a)* Year ended 30 June.
*(b)* Includes eggs which failed to hatch.
*(c)* Excludes chicks destroyed.
*(d)* Not applicable.
*(e)* Incomplete.
*(f)* Egg strain chicks reported as "unsexed" have been allocated half to chicks for meat production and half to chicks for egg production. The number so reported was 99,462 in 1971–72; 81,875 in 1972–73; 79,199 in 1973–74; 98,054 in 1974–75; 60,397 in 1975–76; and 34,692 in 1976–77.

### *Broilers*

The raising of chicks for meat on a large scale has emerged in Victoria since the mid 1950s. Chickens are most efficient in converting poultry feeds, grain, and protein supplements to meat, and are also multiplied cheaply and rapidly through scientific breeding and modern artificial incubation methods.

It now takes approximately 2.1 kilograms of poultry feed to produce 1 kilogram of poultry meat, and a 2 kilogram chicken is grown in ten weeks. This efficient conversion and rapid growth has been achieved by extensive breeding programmes, by the use of "high energy" poultry feeds, highly supplemented with vitamins, minerals, growth promoters, and disease control drugs, and by the development of enclosed, factory-like broiler houses with controlled temperature, humidity, ventilation, and light all of which are conducive to fast growth. Broiler houses are fully enclosed; each house grows a "crop" of about 20,000 to 50,000 broilers about five times a year. A one man or one family farm raises approximately 175,000 to 500,000 birds a year. Growers are usually contracted to supply large broiler organisations which hatch and supply the specially bred meat chickens and receive broilers back for processing and distribution.

The organisation of the broiling industry as a continuous, production-line, factory-type operation has been a major factor in the significant reduction in the price of poultry meat to consumers. Breeders, hatcheries, contract growers, poultry processors, and distributors have all been co-ordinated to ensure efficient and continuous production. Seasonal effects

are no longer a consideration and prices do not fluctuate. As a result, poultry meat, once a luxury, is now cheap and a normal part of the diet.

The main broiler production centres are near the processing works and the main centres of consumption on the Mornington Peninsula, in areas east and south-east of Melbourne, and in the Geelong area. Most of Victoria's production is consumed locally; very little is exported, but considerable numbers of interstate broilers are imported.

The Broiler Chicken Industry Act requires all commercial broiler growing to be under an agreement or contract approved by the Negotiation Committee of grower and processor representatives set up under the Act. The Committee negotiates and sets growing fees and conditions for the industry.

The following statistics have been compiled from statistical returns submitted by all known Victorian hatchers and all poultry slaughterers slaughtering more than 1,000 birds annually:

VICTORIA—POULTRY SLAUGHTERED FOR HUMAN CONSUMPTION ('000)

| Period *(a)* | Chickens (i.e. broilers, fryers, or roasters) | Hens and stags | Ducks and drakes |
|---|---|---|---|
| 1972–73 | 23,101 | 1,919 | 219 |
| 1973–74 | 27,256 | 1,752 | 124 |
| 1974–75 | 26,324 | 2,044 | 104 |
| 1975–76 | 29,233 | 1,646 | 84 |
| 1976–77 | 31,435 | 1,831 | 55 |

DRESSED WEIGHT OF POULTRY SLAUGHTERED *(b) (c)* ('000kg)

| Period *(a)* | Fresh and frozen | Fresh and frozen | Fresh and frozen |
|---|---|---|---|
| 1972–73 | 28,322 | 3,044 | 327 |
| 1973–74 | 34,333 | 2,754 | 188 |
| 1974–75 | 33,140 | 3,196 | 166 |
| 1975–76 | 36,332 | 2,610 | 131 |
| 1976–77 | 39,785 | 2,881 | 89 |

*(a)* Year ended 30 June.
*(b)* Dressed weight of whole birds, pieces, and giblets intended for sale as reported by producers.
*(c)* Fresh: sold immediately after slaughter or chilled for sale soon after. Frozen: frozen hard for storage of indefinite duration.

## Miscellaneous livestock

### *Bees*

Honey production in Victoria fell from 3,476 tonnes in 1975–76 to 1,713 tonnes in 1976–77 as a result of a poor season and little flowering of native eucalypts. The bulk of the honey produced from the 529 beekeepers with 40 or more beehives in Victoria, is sold to large processors who clarify and pack the honey. About half the annual production is exported, chiefly to the United Kingdom. In recent years, the United States has become a significant importer of Australian honey.

VICTORIA—BEE HIVES, HONEY, AND BEESWAX

| Season ended 31 May — | Beekeepers | Hives | Production | |
|---|---|---|---|---|
| | | | Honey | Beeswax |
| | number | number | tonnes | tonnes |
| 1973 | 1,342 | 104,235 | 3,769 | 50 |
| 1974 | 1,160 | 98,539 | 3,161 | 47 |
| 1975 *(a)* | r 468 | r 87,972 | r 2,788 | r 35 |
| 1976 *(a)* | 492 | 91,203 | 3,476 | 61 |
| 1977 *(a)* | 529 | 92,734 | 1,713 | 30 |

*(a)* Not comparable with figures for previous years. Information from beekeepers with 40 or more registered hives, instead of 5 or more as previously.

**Further reference:** ***Victorian Year Book*** **1977, pp. 460–1**

### *Goats*

The main breeds of goats in Victoria are the Angora (mohair producer) and the various milking breeds consisting of the Saanen, Toggenburg, British Alpine, and Anglo-Nubian. Angora goat numbers, although still small, have increased rapidly in recent years. In 1977, there were about 4,000 registered purebred and part Angora breeding animals in Victoria.

Goat milk production has declined in recent years because of a Commonwealth Government ruling on pharmaceutical benefits. In 1976, the upper age limit for subsidised goats milk for children allergic to cows milk was reduced from 6 years to 18 months. As a result, the main processor and outlet ceased production of canned goats milk in 1976–77.

Although Victoria has few feral goats, this State exports significant quantities of meat from goats caught in New South Wales. In 1976–77, Victoria exported 308 tonnes of goat meat valued at $1.6m.

### *Deer*

Deer produces two valuable products, namely, venison and antler velvet. Farming of deer has begun on a small scale, and in 1977 there were about 1,000 domesticated deer in Victoria. The main breeds of deer are the fallow and red deer.

## SERVICES TO AGRICULTURE

### Introduction

There are many organisations, both government, e.g. the Department of Agriculture, and private, e.g., pesticide contractors, engaged in providing services to the agricultural industries. One possible categorisation of these services is by function, and this section sets out the various regulatory, research, educational, and transport services to agriculture together with the bodies responsible for providing these services. The types of services listed here do not provide an exhaustive list of services to agriculture, and it is proposed to expand on the range of services discussed in future editions of the *Victorian Year Book*.

**Further references: Marketing, *Victorian Year Book* 1978, pp. 401–2; Financial services, 1978, pp. 403–7**

### Regulatory services

As farming is essentially based on the land, it is subject to the various regulations on land-use which apply in Victoria, as well as to regulations on farming activities. A number of government authorities exercise regulatory powers in such fields as planning, water supply, forestry, and environmental protection, while the Department of Agriculture is the major body regulating farming activities.

In this section, more detail is given about the activities of the Department of Crown Lands and Survey in issuing leases and licences for land occupation; the Vermin and Noxious Weeds Destruction Board in controlling vermin and noxious weeds; and the Department of Agriculture's role in regulating farm activities. Further reference to other organisations engaged in the regulation of land utilisation can be found elsewhere in this *Year Book*.

#### *Department of Crown Lands and Survey*

The present legislation dealing with Crown land in Victoria is the successor of some of the earliest legislation enacted for the then infant Colony of New South Wales. The legislation, which is mostly contained in the *Land Act* 1958, enables Crown land to be licensed, leased, or sold, or to be reserved from occupation or sale for a wide variety of public purposes.

The main types of licences fall broadly into three categories: those which simply entitle a licensee to enter Crown land, usually for a short-term and for a particular purpose; those which allow a licensee to occupy Crown land from year to year for a particular purpose; and those of a similar type to the latter, but with the added benefit that a Crown grant in fee simple may eventually issue.

Of the first type of licence, the most usual are those granted for the removal of material, such as gravel, sand, etc., and are issued upon payment of a fee and an amount of royalty per cubic measure of material taken.

The second category of licence covers a very wide range of purposes. Included are: the grazing of stock; the occupation of unused roads and rivers or lake frontages; the production of eucalyptus oil; the operation of bee farms and ranges; the construction of

jetties and slipways; the operation of market gardens; provision of car parks; and general industrial purposes. These licences require the payment of annual rentals and are granted subject to conditions appropriate to the purposes for which they are issued, including in some cases, limitation on the area to be licenced or on the number of stock to be grazed, and restrictions as to use or development.

The third form of licence mainly refers to those granted for purposes that require the establishment of improvements, often of a substantial nature. These licences may be for houses, factories, shops, warehouses, or other industrial purposes. They are also subject to a variety of appropriate conditions and call for the payment of annual rental, which is credited over a period of years towards the purchase of the licensed land.

Leases of Crown land are now granted either for terms ranging up to 50 years without the right of purchase, or for generally shorter terms with the right of purchase, upon the payment by instalments of the purchase money and the fulfilment of pre-determined conditions. These may demand residence on or close to the leased land, or the development of the land to a certain stage. The usual form of this latter type is known as an Improvement Purchase Lease.

Leases are granted without the right of purchase for the purpose of grazing stock; for many different sorts of amusement and recreation facilities, such as golf courses, bowling greens, rifle and pistol ranges, and car-racing tracks; for commercial and industrial purposes; for providing tourist accommodation and facilities; and for ski-lodges and ski-tows.

Leases with the right of purchase are granted for the commercial growth of trees, for general farming purposes, for residence in certain limited circumstances, and for industrial purposes outside the metropolitan area.

### *Department of Agriculture*

The Department of Agriculture is responsible for the administration of appropriate legislation within Victoria including the registration and inspection of dairy farms and dairies, and factories producing butter, cheese, and other dairy produce, to ensure proper standards of hygiene and equipment; the registration of manufacturers of margarine and the limitation of the quantity of table margarine which may be made by each manufacturer; the registration and control of farm produce merchants and commission agents; the inspection, packing, and grading of fruit and vegetables; the inspection of orchards and insistence on proper methods for preventing and controlling plant diseases and insect pests, including measures to be taken against outbreaks of fruit fly; the registration of fertilisers, pesticides, stock foods, stock medicines, and sheep branding fluids; the licensing of abattoirs, pet food manufacturers, and meat transport vehicles; the inspection of meat; the prevention, control, and eradication of stock diseases; the assessment and payment of compensation to owners of cattle, swine, and bees condemned because of infections with prescribed diseases; the elimination of bulls not of a reasonable standard in respect of type, conformation, and breeding; the control and regulation of the artificial breeding of stock; the control of processing of poultry intended for sale; the inspection and testing of seeds for sale to ensure compliance with prescribed standard of purity and germination; the conduct of seed certification schemes; the control of the spraying of agricultural chemicals from aircraft; the control of rain-making operations; and the control of agricultural colleges.

In addition, the Department undertakes on behalf of the Commonwealth Government the inspection of fruit and grain for export, and the inspection and quarantining of imported animals and plants to prevent the introduction of diseases.

**Further reference: Vermin and Noxious Weeds Destruction Board, *Victorian Year Book* 1978, pp. 392–3**

## Research

Research is undertaken into all phases of farm production ranging from research into the various farm processes, which aims to improve productivity, to research into agricultural products in either their raw or processed form.

A number of organisations, such as government departments, universities, and marketing boards, are involved in agricultural research. For example, the CSIRO undertakes a wide range of process and product research projects in the agricultural field,

while the Bureau of Agricultural Economics conducts various economic research studies, and the Australian Bureau of Statistics is prominent in the field of statistical information.

Research work is a very important function of the Department of Agriculture. Fundamental and applied research activities, mainly in conjunction with Victoria's primary industries, are conducted at a number of research institutes and laboratories and on many private properties throughout the State.

Agricultural research is also undertaken by other Departments such as the State Rivers and Water Supply Commission, Crown Lands and Survey, Fisheries and Wildlife, Soil Conservation, and the Forests Commission.

The University of Melbourne School of Agriculture and Forestry also conducts research as do several private companies which manufacture and sell agricultural chemicals and other products. These companies also engage in research into such aspects as hops and other foodstuffs.

The Department of Agriculture's research institutes and stations are:

*Animal Research Institute, Werribee*

This Institute, established in 1976, comprises what were previously the State Research Farm (1912) and the S.S. Cameron Laboratories (1960). It is situated at Werribee, 23 kilometres west of Melbourne. Research is done on reproduction, nutrition, growth, breeding, and management of dairy cattle, beef cattle, sheep, goats, pigs, and poultry. Plant breeding, irrigation research, and fodder conservation research are also undertaken.

*Pastoral Research Institute, Hamilton*

This Institute, established in 1959 as the Pastoral Research Station was renamed in 1976. It is 300 kilometres south-west of Melbourne. Research is done on reproduction, nutrition, breeding, and management of beef cattle and sheep; and on pasture maintenance and production.

*Rutherglen Research Station, Rutherglen*

The Station was established in 1912, 290 kilometres north-east of Melbourne. It carries out research on reproduction, nutrition, and management of cattle and sheep; and on cereal cropping, weed control, and alternative crops.

*Ellinbank Dairy Research Station, Warragul*

The Station was established in 1951 at Warragul, 90 kilometres east of Melbourne. It carries out research on dairy cow reproduction, nutrition, management, and lactation; calf growth and development; and on pasture productivity.

*Irrigation Research Station, Kyabram*

The Station was established in 1959, 200 kilometres north of Melbourne. Research is carried out on irrigated pastures and crops, salinity, and dairy cow nutrition, disease, and management.

*Veterinary Research Institute, Parkville*

This Institute was established as part of the Faculty of Veterinary Science at the University of Melbourne in 1906. In the late 1920s when the Faculty was discontinued, the Institute reverted mainly to a diagnostic laboratory, attached to the University of Melbourne. It was transferred to the Department of Agriculture in 1973.

*Regional Veterinary Laboratory, Hamilton*

This Laboratory was established in 1971 at Hamilton, some 300 kilometres south-west of Melbourne. It is engaged in diagnosis, research, and extension services, particularly in relation to the campaign to eradicate bovine brucellosis from Victoria.

*Regional Veterinary Laboratory, Bendigo*

This Laboratory was established in 1974 at Bendigo, about 150 kilometres north of Melbourne. It is engaged in diagnosis, research, and extension services, particularly in relation to the campaign to eradicate bovine brucellosis from Victoria.

*Regional Veterinary Laboratory, Benalla*

This Laboratory was established in 1976 at Benalla, about 200 kilometres north-east of Melbourne. It is engaged in diagnosis, research, and extension services, particularly in relation to the campaign to eradicate bovine brucellosis from Victoria.

*Regional Veterinary Laboratory, Bairnsdale*

This Laboratory was established in 1976 at Bairnsdale, 300 kilometres east of Melbourne. It is engaged in diagnosis, research, and extension services, particularly in relation to the campaign to eradicate bovine brucellosis from Victoria.

*Horticultural Research Institute, Knoxville*

This Institute was established in 1950 as a Horticultural Research Station, and renamed in 1976. It is located 27 kilometres east of Melbourne. Work has been concentrated on fruit tree physiology as a background to developmental and applied research in temperate fruit tree agronomy, supplementary irrigation methods, and cool storage and post-harvest handling of fruit. Current developments will encompass new fruit crops, ornamentals, and nursery operations, while continuing its expert work on pome, stone, and berry fruits.

*Irrigation Research Institute, Tatura*

This Institute was purchased for a Horticultural Research Station in 1929 and the first trees were planted in 1937. It became a research institute in 1976, and is located 180 kilometres north of Melbourne. The main research has been aimed at increasing productivity of canning fruits by breeding new varieties, or by using plant physiological factors such as light interception, and chemical growth regulators, or by evaluating practices such as pruning, closer planting, and trellis training. New developments include studies to increase the productivity of row crops and forage crops.

*Plant Research Institute, Burnley Gardens*

This Institute was established as the Biology Branch in 1929 and renamed in 1965 as the Victorian Plant Research Institute, and in 1976 as the Plant Research Institute. It is located about 7 kilometres east of Melbourne. It conducts research into the control of insect pests and plant diseases, and provides a diagnostic and advisory service to increase the efficiency of agricultural production while minimising hazards to the community. Services include a plant quarantine service run by the Chief Quarantine Officer (Plants) for the Commonwealth Department of Health. Other projects include the production of pathogen-tested elite planting material for fruits and ornamentals.

*Victorian Wheat Research Institute, Horsham*

This Institute was established in 1967 as a joint undertaking between wheatgrowers and the Department of Agriculture. It is located in the Wimmera, about 340 kilometres north-west of Melbourne. Research includes plant breeding, plant pathology, soil and cereal chemistry, and plant nutrition. Investigations have begun into alternate sources of phosphate for the time when existing materials used for making superphosphate are no longer available. The Institute also carries out agronomic research into crop rotation and weed control. The commercial sowing of sunflowers in the Wimmera arose from research conducted at this Institute.

*Mallee Research Station, Walpeup*

This Station, established in 1932, is located 510 kilometres north-west of Melbourne. The major functions include the selection and testing of superior varieties of field crops and pasture; studies with new crops and management of crop land; and investigations with sheep and cattle, as they fit in best with Mallee farming practices.

*Cereal Experimental Centre, Longerenong Agricultural College*

This Centre was established in 1912 at Longerenong Agricultural College, about 330 kilometres north-west of Melbourne. The major disciplines are agronomy, plant physiology, plant nutrition, weed science, and agrostology (the study of grasses).

*Vegetable Research Station, Frankston*

The Station was established in 1962, and the research work began in 1967. It is located 45 kilometres south-east of Melbourne. The wide range of applied research projects includes investigations into plant nutrition, pest disease and weed control, irrigation, and vegetable varieties.

*Potato Research Station, Healesville*

The Station was established in 1944 and the first experiments began in 1946. It is located 80 kilometres east of Melbourne. Initial research work was on the cultural aspects of potato growing, and the breeding and introduction of new varieties. Recent emphasis

has been on the production of pathogen-tested seed potatoes, potato quality and storage, and variety evaluation.

*Tobacco Research Station, Myrtleford*

This Station was established in 1950, and is located 310 kilometres north-east of Melbourne. The wide range of investigations includes the evaluation of varieties, crop nutrition, pest, disease and weed control, breeding new varieties, labour saving methods in the tobacco industry, and, recently, a hop research programme.

*Gilbert Chandler Institute of Dairy Technology*

This Institute was established in 1939 at Werribee, 23 kilometres west of Melbourne. It conducts research into dairy chemistry, chemical engineering, microbiology, and process technology.

*Turf Research Institute, Frankston*

This Institute was established in 1973, and is situated about 30 kilometres south-east of Melbourne. It carries out research and extension work on recreational turf such as lawn bowling greens and golf courses.

*Agricultural Engineering Centre, Werribee*

This Centre was established in 1976, 23 kilometres west of Melbourne. It carries out research and development into engineering as it affects agriculture, the testing of tractors, their fittings, and other machinery in relation to safety and standards, liaison with agricultural machinery firms, and extension in the field of agricultural engineering.

## Educational services

Agricultural information is disseminated to farmers through both formal education courses and a variety of information services such as the extension services of the Department of Agriculture and the media, particularly the Australian Broadcasting Commission and the rural press. A number of these sources of information are discussed below.

### *Courses*

*Department of Agriculture: Agricultural Colleges*

The Department of Agriculture administers five colleges through its Division of Agricultural Education: Dookie Agricultural College (est. 1886) in the north-east of the State; Longerenong Agricultural College (1889) in the Wimmera; Burnley Horticultural College (1891) on a bend of the Yarra River in the Melbourne metropolitan area, and the newer colleges—Glenormiston Agricultural College (1971) and the McMillan Rural Studies Centre (1977) which are situated in the Western District and Gippsland, respectively. The colleges are financed chiefly from Victorian Government funds.

The objectives of the colleges are to improve the skills, competence, and knowledge of people involved or interested in any aspect of agriculture and horticulture, by the provision of a flexible range of educational opportunities which are primarily concerned with post-secondary and recurrent education matched to State and regional needs.

While the colleges provide a total system of agricultural education in conjunction with the Extension Services Division of the Department of Agriculture, each has its own characteristics which reflect the needs of the community in its region. For example, since 1976 Dookie and Longerenong Agricultural Colleges have both offered three-year courses leading to a Diploma in Agriculture. These share common ground in that each emphasises farm management, but they are different and oriented towards the agricultural activities in their regions. Glenormiston Agricultural College offers a two-year course leading to the Diploma in Farm Management, and Burnley Horticultural College provides a three-year course for the Diploma of Horticultural Science. These four colleges are also heavily involved in providing short courses, seminars, field days, and part-time certificate courses for farmers and people involved in the horticultural industries.

The McMillan Rural Studies Centre, which opened in 1977, is unique in that it has no campus at this stage. Regional Education Officers at four centres—Bairnsdale, Leongatha, Maffra, and Warragul—provide educational programmes in response to district needs, using existing facilities. A principal, with support staff, is located at Warragul providing the co-ordinating centre for such on-going courses as are seen to be required by the region.

All of these activities are supported by the resources of the Department of Agriculture and take advantage of the personal contacts made by its extension officers with farmers, as well as the continuing contact maintained with agricultural industries.

*University of Melbourne—Faculty of Agriculture and Forestry*

The Faculty of Agriculture was established in 1905 by statute of the Council of the University, and the first Professor of Agriculture, Dr Thomas Cherry, was appointed in 1911. However, it was not until 1921, following the passing of the *Agricultural Education Act* 1920, that provision was made for a building to house the school and for the appointment of permanent staff. In 1973, the Department of Forestry, then a Department of the Faculty of Science, was amalgamated with the Faculty of Agriculture, and the Faculty of Agriculture and Forestry was established.

The purpose of the four-year Bachelor of Agricultural Science course is to give students a sound basic training in scientific principles as applied to agriculture. The first year is devoted to science subjects, and is followed by a year in residence at the University Field Station at Mount Derrimut, Deer Park, where students are introduced to the variety of farm operations involved in a mixed farming enterprise, while taking lectures and practical classes in various sciences applied to agriculture. They return to the University campus for more advanced training in economics and the soil, plant, and animal sciences in the third and fourth years of the course. In the final year, the students have a restricted choice of subjects, which ensures that all students receive a general training in all aspects of agricultural science, while allowing a measure of specialisation.

*University of Melbourne—Department of Civil Engineering—Agricultural Engineering Section*

The University of Melbourne also offers training in the more physical aspects of agriculture, leading to a degree in Agricultural Engineering. This course is the only one of its type at an Australian university, and is closely linked with complementary postgraduate and research programmes. Some of the specific field tasks handled are the interactions between soil, crops, and machinery in regard to function, safety, and economics; the control of natural and irrigation waters to achieve maximum production; the estimation of water resources and disposal of wastes; work study and organisation of farming systems; processing of farm products, such as refrigeration and drying; and mechanical handling and transport of a wide range of materials such as fruit, grain, and wool. The course is of four years duration and leads to a B.E.(Agr.).

*La Trobe University—School of Agriculture*

La Trobe University, which admitted its first students in March 1967, opened its School of Agriculture a year later. The emphasis of the course is on the sciences relevant to an understanding of the rural environment, covering the relation between the soil, the plant, the animal, and the environment. Substantial emphasis is also given to the study of the economic and social aspects of agriculture and farm management. The four-year course leads to a B.Agr.Sc. (pass or honours degree).

Some six hectares of the University campus are presently used by the School of Agriculture for field work involving crops, pastures, and livestock, enabling students to have day to day contact with agricultural experimentation as well as with the more applied aspects of crop and animal husbandry. At least twelve weeks practical experience on approved farms supplements these facilities on the campus.

*Marcus Oldham Farm Management College*

Founded privately near Geelong in 1961, the Marcus Oldham Farm Management College specialises in farm management education for the sheep, cattle, and cropping industries. Students with previous practical experience attend the College for three years, during which time they complete a "sandwich" course of an eight month academic period, a twelve month practical period on an approved property, and then a final eight month academic period. Thus while there are only 70 students in residence at one time, the College is dealing with about 105 students each year. About 35 students complete the course every year.

The College farm is used as a teaching laboratory rather than a training area for manual work. It covers 190 hectares in a 533 mm annual rainfall area, and is commercially self-

supporting from the income received from Merino sheep and Hereford cattle. Course work consists of lectures, demonstrations, and field trips, which provide the subject of extensive written reports on the farm, its management, financing, and budgeting. There are four broad subject groups in the lecture programme: plant and environmental sciences, animal science, farm management and economics, and agricultural engineering.

The entry requirements are a minimum age of 19 years, at least one year of practical experience since leaving school, and the completion of a full secondary course; a Higher School Certificate pass is not necessary. Preference is usually given to older students with more practical experience.

*Apprenticeships*

(1) *General farming and fruit growing.* Apprenticeships in general farming and fruit growing were offered for the first time in Australia in 1975. Courses were established in six technical schools by the Technical Schools Division of the Education Department, with active co-operation from farm industry organisations and the Department of Agriculture. The general farming courses incorporate instruction to cater for individual needs in such areas as grazing, dairying, and cropping. Also, advanced basic vocational and technician programmes have been developed for post-apprenticeship training together with middle level programmes designed to meet the needs of owner-operators of small farms.

(2) *Horticultural trade training.* Historically Australia relied on Britain for a steady stream of skilled gardeners to supply its gardening needs. From the 1930s, however, these tradesmen ceased to be attracted to the country so that by the 1950s there was a critical shortage of skilled gardeners. Following representations from the parks industry in the early 1960s, the Apprenticeship in Gardening was proclaimed in 1966 for municipal councils in the metropolitan area. Schooling commenced in 1968, and an evening course was established to train people already in the trade. In 1971, the proclamation was broadened to include all municipal councils, golf courses, racing clubs, and cemetery trusts in Victoria. Then in 1975, the horticultural trades were proclaimed as four separate trades: gardening, turf management, landscape gardening, and nurseryman, and training programmes were developed by the Education Department.

### *Information services*

*Agricultural extension services*

Advancing technology and increasing competition on world markets have intensified the need for farmers to be advised quickly about new developments so that they have the requisite knowledge on which to base the many decisions they have to take as a consequence of rapid change. Extension services to provide advice and training in these matters are conducted by several government departments and by commercial firms such as the manufacturers of agricultural chemicals, farm machinery, and stock foods and medicines. Some farmers employ professional consultants on a personal basis.

In Victoria, the major extension service is provided by the Department of Agriculture, which, in addition to its research and regulatory staffs, has a large group of extension workers throughout the State. Whereas the main emphasis of this service for many years was on the answering of farmers' questions and the dissemination of research results and other information, it is now devoting increasing attention to educational programmes which help to train farmers to make decisions according to their individual circumstances. Consequently, special emphasis is given to farm economics and financial management.

The Department's extension services are co-ordinated throughout Victoria by a regionalised Extension Services Division, administered locally by regional centres located at Ballarat, Bendigo, Benalla, and Warragul. There are 17 district offices in Victoria, each of which is under the leadership of a Senior District Officer who co-ordinates the activities of a group of extension specialists, according to the needs of his region, e.g., agronomy, dairy husbandry, sheep and wool, beef, or horticulture. A growing team of agricultural economists is serving at regional and district centres. Close relationships are maintained with the Department's research stations and other experimental centres, agricultural colleges, regulatory staff, the rural community, commercial firms that serve agriculture, and associated government departments.

The regional service occasionally has to divert its immediate activity to special campaigns such as the alleviation of drought or the consequences of other crises such as

floods and bushfires. Sometimes it is necessary for extension specialists to visit individual farms and to use other person-to-person methods such as office consultations, telephone discussions, and correspondence. However, to make the most efficient use of available resources and to serve as many farmers as possible, extension officers do much of their work with groups of primary producers and use media outlets such as publications, radio, television, and films.

More than 200 discussion groups of dairy farmers meet regularly in farm homes to exchange ideas on developments in their industry. Department of Agriculture specialists often visit these groups to provide information about the subject under discussion.

More formal group activities occur at regular field days on research stations, experimental plot sites, and other places of interest such as the winning farm in a soil conservation competition. Whereas field days on major research stations attract up to 800 visitors, smaller farm talks involving up to 20 farmers provide effective informal discussions about current methods and problems.

Occasionally groups within an area combine to hold schools for farmers or to tour together to other similar areas in Victoria, other States, and sometimes New Zealand. Subsequent discussions are helpful in assessing the potential local application of ideas which have been seen elsewhere. More formal schools for farmers are held in local halls, woolsheds, and Education Department classrooms. Emphasis is being given to financial management in courses which continue, one night a week, for several weeks. Between classes, farmers apply what they have learned to their individual circumstances and raise points for discussion at the next session. Meetings and conferences also provide opportunities for farmers to receive new information and discuss problems. Exhibits at agricultural shows are often focal points of discussion.

Both person-to-person activities and group work are complemented by articles in newspapers and magazines, specialised notes, industry digests for dairy farmers, fruit growers, and apiarists, a wide range of books and pamphlets, farm radio and television programmes, and films. Farmers often become aware of new developments through the media before seeking further advice to help them to decide on the adoption of new ideas. The Department of Agriculture's Media Services Branch in Melbourne has the printing facilities, studios, and other resources for providing this complementary information to, and through, extension workers in the field. In addition to its direct services, the Department of Agriculture provides much information which reaches farmers through other departments and commercial organisations, including consultants.

*Media services*

Victorian primary producers, and other persons who are interested in agriculture, have access to information from both government and commercial sources. In fact much information from government advisers reaches farmers through commercial newspapers and radio and television stations. In addition, many commercial organisations supply information direct to farmers, including market news and details of chemicals, such as insecticides and fungicides.

The main government agencies are the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Department of Agriculture, and the Australian Broadcasting Commission. Other agencies such as the State Rivers and Water Supply Commission, Soil Conservation Authority, and the Department of Crown Lands and Survey also provide considerable information. The CSIRO's main publications are *Rural Research* and *Ecos* which provide up-to-date interpretations of the Organisation's findings and background information on matters such as those affecting the environment.

The Department of Agriculture has a wide range of publications, as has been described in the previous section. The Department also has a wide-reaching radio service, and provides films and other information for television stations. Its weekly television session *On the Land* has been transmitted from STV-8 Mildura for more than ten years.

The Australian Broadcasting Commission's radio and television programmes are a major source of information for primary producers. They also provide a very important link between the rural and urban communities. Commercial stations also provide rural news and information programmes.

The ABC's regional radio stations at Horsham (3WV) and Sale (3GI) provide special sources of rural information and its State-wide *Country Hour* has a large audience. In

recent years, the ABC has produced a daily public affairs rural television programme, and has screened many educational documentaries. The advent of colour television has added to the value of this medium for farmers in such matters as the identification of pests and symptoms of diseases.

All the media noted above are especially valuable as disseminators of information during campaigns on such subjects as droughts and locust plagues; they also help to draw the community's attention to the achievements and problems of the State's primary industries.

## Transport in agriculture

### *Introduction*

Agriculture is one of Australia's leading income earners from other countries. Virtually all of Australia's agricultural exports are carried by ship. Likewise, materials, such as lubricating oil, rock phosphate for fertiliser manufacture, and agricultural machinery, such as some harvesters and tractors, come to Australia by ship. The cost of transport by ship is therefore important in deciding how competitive Australian farm products can be on world markets.

### *Internal transport*

The methods of transporting agricultural products have been steadily improved with the object of lowering carrying costs and preserving the quality of products more effectively.

In the past few years a great change has taken place in the transport of milk in Victoria. Milk was for many years stored and carried in 45 litre cans; more recently it was stored on the farm, after water-cooling, in non-refrigerated vats. However, most dairy farms now receive the milk from the milking machines into bulk refrigerated vats. Insulated tankers collect it regularly and carry it to factories for processing or to cities for distribution. The largest of these tankers hold about 18,000 litres, and the latest techniques have improved the quality of milk.

The largest quantities of agricultural material carried in Victoria have been the annual consignments of fertiliser, mainly superphosphate, to grazing and grain-growing areas, and of wheat and barley to city mills, maltsters, and export terminals. Many branch railway lines in the country used to carry mainly fertiliser and grain, but since some of these have recently been closed, and railway freight centres have been established, motor trucks now carry the consignments between these centres and farms.

### *External transport*

Wheat and barley are well suited to bulk transport and storage; they are augered from the harvesters into bulk bins on motor trucks (in many cases owned by the farmer) and carried to local silos. The grain is received, classified according to the standards of the Australian Wheat Board and the Australian Barley Board, and stored in segregation by the Grain Elevators Board until it is required by domestic or overseas buyers. Wheat is carried by railway wagons from country silos to shiploading facilities at Geelong and Portland for much of the year. Silos, harvesting machinery, trucks, and railway wagons are all regularly cleaned and treated with insecticides to prevent infestation of grain by pests.

Wool, has for many years, been transported in bales to selling centres in Melbourne, Geelong, and Portland, and then taken to ports for loading after sale. Recently, however, some wool has been sold by sample, or by a test certificate which describes the properties of the wool in a "lot" according to defined terms which give the measurement of the properties important to the buyers. In this case, the bales of wool may be transported, usually by motor truck, direct to the Melbourne container terminal and loaded into container ships after sale.

Sheep, pigs, and cattle are carried mainly by road transport to selling centres and processing works. The bigger trucks consist of a prime mover and a trailer, and are usually operated by transport specialists.

Meat is exported in either chilled or frozen form, the chilled form being preferred by consumers, but having a shorter storage life. Meat is carried in refrigerated bulk containers on ships. Chilled meat must be rapidly unloaded and distributed at the port of destination. The Middle East has recently taken increased quantities of Australian mutton and lamb. Because of delays and inadequate refrigerated storage in some Middle East

ports, containers with self-contained refrigeration have been used for shipping certain consignments of this meat. Sometimes chilled lamb has been exported to Iran by air direct to inland centres such as Teheran, thus avoiding delays in seaports.

About 20 ships carry live sheep from Australia to the Middle East for slaughter in places where refrigerated storage and transport facilities are not yet available and some of these sheep are from Victoria. As meat distribution facilities are improved in importing countries, it is expected that fewer live sheep will be shipped. Breeding animals, mainly sheep, are also occasionally exported from Australia, most by ship, but some by air, to save delays in overseas seaports. Some frozen semen of bulls is imported by air to Australia for artificial insemination.

### *Other aspects*

Aircraft have been used in agriculture for rainmaking experiments, spraying of diseases and plague locusts and other insect pests, and the application of fertiliser; in at least some of these applications the machine is being used as both a means of transport of materials and as an implement of distribution.

Fruit is a perishable agricultural product which, for many years past, has been stored in cool stores and exported in refrigerated ships. This technology has been extended to containers. "Clip-on" refrigerators keep the fruit cool in the container until it is loaded onto the ship and connected to the ship's refrigerator.

### *Quarantine*

One aspect of transport that is very important to Australian agriculture, even though it does not involve the transport of agricultural products, is quarantine. Australia has fewer known agricultural pests and diseases than other countries. For example, about 6,000 diseases of plants that are known to exist overseas have not been found here. Australia has 500 known economic insect pests; the United States of America has some 10,000. However, while Australia at present remains free of some important animal diseases, including foot and mouth disease, there is always the danger that overseas travellers arriving mainly by air, could bring pests and diseases with them. The quarantine service seeks to prevent this from happening.

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