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PRIMARY PRODUCTION

LAND SETTLEMENT AND IRRIGATION

Land utilisation

Introduction

The climatic conditions of Victoria (for details see pages 52 to 70), especially the varying incidence of rain, have resulted in the development of a wide range of farming practices, but at the same time have been largely responsible for restricting the number of enterprises on individual farms. Farming is generally carried out on a single enterprise basis, a major exception being the association of cereal growing and sheep grazing in the main wheat areas. Other exceptions occur on a less extensive scale with other forms of production.

Most farms in the State are owner operated and, with the exception of the larger holdings, the routine work on the farm is carried out by the farmer and his family, but at times of peak labour requirement, such as during shearing or harvest, additional labour is employed.

Considerable areas in the State are retained as forest reserves and for water catchments (see page 275).

The pattern of land use is more or less clearly defined in each of the statistical districts (see map on page 301). Thus the Mallee and the northern part of the Wimmera District are used almost exclusively for cereal production and sheep raising. The more intensive carrying of livestock in these districts has been made possible by a channel system of domestic and stock water supply originating in the mountainous areas of the Grampians to the south. The agriculture of the Northern District is based largely on irrigation and ranges from dairying to fruit production. The non-irrigated parts of the district are used for cereal and sheep production. In the Western, Central, North-Central, North-Eastern, and Gippsland Districts, the rainfall is heavier and more reliable; consequently, there is more diversity in land utilisation. In these districts, sheep grazing and dairying are the most important industries. Cultivation is generally limited. Some wheat is grown in the North-Eastern and Western Districts and there is some production of potatoes, vegetables, and other intensive cultivation crops on the more fertile soils in the higher rainfall parts.

Mallee District

This district is situated in the far north-west of the State and has a total area of 10·8 mill. acres. However, there are extensive areas in the north

and west which, because of water shortage and the liability to severe soil erosion, have not been settled, and the total area occupied is 7.7 mill. acres.

The soils of the district being light in texture are easily and cheaply cultivated and the main farming enterprise is cereal cropping, associated with wool, and prime lamb production. Wheat is the principal crop grown in addition to oats for grain, hay and grazing, and barley. Yields from cereal crops vary widely according to seasonal conditions. The following table gives the areas sown and average yields per acre for the season 1968-69:

MALLEE DISTRICT—CEREAL CROPS, SEASON 1968-69

Crop	Area	Average yield per acre
	acres	
Wheat	1,836,889	17.31 bush
Oats—grain	177,256	14.45 bush
hay	25,730	..
grazing	28,098	..
Barley	161,568	16.37 bush

In the past, lack of suitable pasture species was a major problem in pasture development, and the grazing was provided largely by native pastures, green cereal crops, and crop stubbles. The discovery and introduction into crop rotations of suitable medics has resulted in marked benefit to both crop production and grazing. The use of medics is now widespread in the district and has greatly improved the conditions for production of early prime lambs mainly for the Melbourne market. Dry land lucerne has also contributed to the vastly improved grazing afforded by the pastures.

In 1968-69 the district carried 1.7 mill. sheep and produced 12.7 mill. lb of wool in addition to the early lambs.

Irrigation areas located close to the Murray River, which marks the northern boundary of the State, produce most of the State's dried vine fruits and considerable quantities of citrus fruits.

Wimmera District

The Wimmera occupies the central western part of the State and has an area of 7.4 mill. acres, of which 6.2 mill. acres are occupied. Average annual rainfall in the north is about 16 inches per year, increasing in the south to 20 inches. The Grampians in the south of the district have a higher rainfall. This area is unsuited to agricultural production and is retained by the Crown as a watershed area and forest reserve.

There are wide variations in soil type, but the district includes substantial areas of fertile self-mulching clay loams, which are among the most productive wheat-growing soils in Australia. South and east of the Grampians the soils are podzols and in the south-west there is a large area of light-textured grey soils.

Wheat farming in association with fine-wool growing or prime lamb production is the main farm enterprise over the north and central Wimmera. Both climate and soils are suited to cereal cropping and yields obtained are high. In recent years the development of suitable strains of medics and

clovers has resulted in the inclusion of a pasture phase in crop rotations.

The table below shows the areas of the cereal crops sown and average yields for the season 1968-69:

WIMMERA DISTRICT—CEREAL CROPS, SEASON 1968-69

Crop	Area	Average yield per acre
	acres	
Wheat	1,293,617	28·69 bush
Oats—grain	284,904	33·04 bush
hay	29,893	..
grazing	12,977	..
Barley	86,173	24·09 bush

In addition to mixed sheep and wheat farming, there are extensive areas, particularly in the south and west of the district where rainfall is higher and pasture establishment easier, which are used solely for grazing. Almost three quarters of the sheep carried in the area are Merinos, and, although a number of early fat lambs come from the wheat growing areas, emphasis here is more generally on fine-wool production and breeding. In 1968-69 the district carried about 4·5 mill. sheep and produced 41·5 mill. lb of wool. As is the case in the Mallee, dairying and beef cattle production are only of minor importance.

Northern District

This is an area of plains country extending from the Central Highlands in the south to the Murray River in the north. The total area of the district is 6·3 mill. acres, of which 5·6 mill. acres are occupied for agricultural purposes. The soils vary from typical light Mallee soils in the north-west to fertile red-brown earths in the east. Average annual rainfall is 14 inches in the north-west and increases to 25 inches over the foothills of the ranges, which are on the eastern boundary of the district. The district includes the major irrigation areas of the State, and because of this several different farming enterprises are carried out.

Wheat growing is an important industry and because of climatic and soil differences, yields vary widely across the area. As in the other wheat producing districts, oat crops are an important feature in rotations and for grazing. In the 1968-69 season the following areas of cereal crops were sown:

NORTHERN DISTRICT—CEREAL CROPS, SEASON 1968-69

Crop	Area	Average yield per acre
	acres	
Wheat	607,436	23·96 bush
Oats—grain	195,493	25·31 bush
hay	68,238	..
grazing	16,855	..
Barley	73,958	20·97 bush

In 1968-69 the district carried about 4.2 mill. sheep, largely on wheat farms, and emphasis is on prime lamb production rather than fine-wool growing. Extensive irrigation has made it possible to establish highly productive perennial pastures which are used mainly for dairy production, but, in addition, the irrigation areas fatten sheep and lambs from the non-irrigated area in Victoria and New South Wales. The milk produced is mostly used for butter, cheese, and other manufactured products, but small quantities are used for city whole milk supply. In 1968-69 there were over 467,000 dairy cattle in the district.

Apart from dairying, irrigation has permitted the establishment of an important fruit growing industry. This area supplies fresh fruit to Victorian and interstate markets and also provides fruit, mainly apricots, pears, and peaches, for the important canneries operating in the district. Tomatoes are also produced on a large scale.

North-Central District

This district includes much of the Central Highlands area and the average annual rainfall is generally over 28 inches, but on the northern slopes it is as low as 22 inches. There is wide variation in topography and soils and much of the area is used for grazing sheep and beef cattle. However, the district is relatively small, containing only 2.9 mill. acres, of which 2.1 mill. acres are occupied and used for farming production.

Cereal cropping is unimportant, but potatoes in the volcanic hills east of Ballarat and pome fruits in the Harcourt area are the most important crops grown. Although dairy farms are scattered throughout the district, it is marginal for this form of production and emphasis is on sheep production associated with beef production. In 1968-69 the district carried about 2.4 mill. sheep and about 116,000 beef cattle.

North-Eastern District

The district has a total area of 7.2 mill. acres, but includes substantial areas of Crown lands, many of which are very steep and heavily timbered. The area occupied is 3.7 mill. acres. Annual average rainfall varies from 20 inches in the north-western corner of the district to well over 60 inches over the mountains. Almost all of the area used for rural production has a 20 to 30 inch rainfall.

Although cereal cropping is not general, there is an interesting development of ley farming based on subterranean clover pastures. However, areas concerned and production are small in relation to the State totals. The fertile river valleys are suited to specialty crop production, and in 1968-69, 9,300 acres of tobacco and small quantities of hops were grown in these areas. In 1968-69 the district carried 122,000 dairy cattle, mainly along the river valleys.

Prime lamb growing and crossbred wool production are the main sheep enterprises in the north-western and western parts of the district, but fine-wool growing is more common on the unimproved pastures along the Murray Valley and in the Omeo area. The district carries about 2 mill. sheep.

The North-Eastern District is an important beef cattle breeding and fattening area, and in 1968-69 over 330,000 head were carried. The cattle make good use of the rough pastures of the foothill country and the productive pastures of the flats make suitable fattening areas.

Western District

Most of the district falls in the 25–30 inches average annual rainfall belt, but an area north and east of the Otways is influenced by a rain shadow effect and the average annual rainfall is about 24 inches. In the Otway Ranges the average annual rainfall is as high as 70 inches. The soils of the district vary considerably in type and fertility. Basaltic soils cover the great bulk of the plains area. In the north the soils are similar to those of the southern Wimmera. The total area of the district is 8·8 mill. acres of which 6·8 mill. acres are occupied. There are substantial areas of forest reserve in the Otways, which are in the south-eastern part of the district.

The only cereal crop of importance grown is oats which are used as a fodder crop, cut for hay, or harvested for grain which is also used very largely to feed stock. The more fertile soils produce both potatoes and onions, and about 60 per cent of the State's onion acreage is located on volcanic tuff soils near Colac and Warrnambool. However, emphasis is placed on animal production, and climatically the district is well suited to the development of improved pastures. It is the major wool producing area of the State, and in 1968–69 there were 10·9 mill. sheep in the district. Almost half the total sheep population is Merino, and the fine-wool breeds—Merino, Polwarth, and Corriedale—make up nearly three quarters of the total sheep population. There are relatively few crossbreds, and prime lamb production does not have the same importance as in other districts. The Western District is an important beef cattle breeding and fattening area and in 1968–69 carried 462,000 head. Many of the State's leading stud herds are located in the district and in addition, many sheep properties carry beef cattle.

Dairying is an important industry and there is widespread distribution of dairy cattle. However, the main concentrations are in the following areas : Colac, Camperdown, Koroit, Allansford, and the Casterton–Coleraine region. A proportion of production is used as whole milk for town supply, but a considerable proportion of the State's processed milk products and butter is produced in the district, which in 1968–69 carried 439,000 dairy cattle.

Central District

Average annual rainfall varies from 24 inches within the rain shadow area, north of Geelong, to more than 35 inches over the ranges north and east of Melbourne. Topographically there is variation from plains country on the western side of Port Phillip Bay to the steep hill country north and east of Melbourne. There is also a wide variation in soil type and fertility. The total area of the district is 4·1 mill. acres and 2·7 mill. acres are occupied—the remainder being reserved as forest and watershed areas.

The climate is suited to the production of malting barley and in 1968–69 50,000 acres were grown—mainly on the plains to the west. Potatoes are grown in the Romsey–Ballarat area, on the Bellarine Peninsula, and the Koo Wee Rup Swamp.

Market gardening is important in the area extending from the south-eastern suburbs of Melbourne to the northern shores of Western Port, and also on the irrigation settlements near Werribee and Bacchus Marsh.

The district is the major producer of apples ; dessert types of pears and peaches and other stone fruits are also important. Orchards are located in the eastern metropolitan area, on the Mornington Peninsula, and near Bacchus

Marsh and Pakenham. Ninety per cent of the State's strawberry crop is grown in the Dandenong Ranges some 25 miles east of Melbourne.

In 1968-69 the district carried 2.4 mill. sheep and production is almost evenly divided between fine-wool growing and fat lamb production.

Beef cattle are grazed in conjunction with sheep over most of the area, but in the east they are run with dairy cows to produce vealers.

The major dairying area is in the east, and this forms part of the most important dairying area of the State. The area is an important supplier of whole milk for city supply and for butter and cheese manufacture. In 1968-69 there were 276,000 dairy cattle in the district. Pig production is also important.

Gippsland District

The total area of this district is 8.7 mill. acres, but the northern and eastern parts are mountainous and are reserved by the Crown. The area occupied is 4.4 mill. acres and the bulk of settlement is south of a line between Dandenong and Bairnsdale. Average annual rainfall varies from just under 22 inches within the rain shadow near Maffra and Sale to 60 inches and above in the highlands. An intensive irrigation scheme has developed around Maffra with highly productive dairying being important. Average rainfall over most of the settled areas in the west is sufficient for the development of highly productive perennial pastures. The soils range from poor sands to relatively fertile loams. The highly fertile alluvial soils of the river valleys are important sources of production.

With the exception of forage crops, cropping is not important in the area, although certain speciality crops, such as maize, beans, and potatoes, contribute substantially to the State's total production.

Gippsland is the most important dairying district of the State and dairying is by far the most important rural industry in the district. The highly productive pastures of the 30 to 40 inches average annual rainfall areas are the basis of the industry. The district supplies the greater part of the whole milk requirements for the Melbourne market, and in addition, plays an important part in the production of butter, cheese, and other processed dairy products. In addition, the dairy herds contribute to veal and beef production. The district carries about 526,000 dairy cattle. Pig raising is associated with dairy farming, and there are 65,000 pigs carried in the area.

In western and southern Gippsland sheep production is small and consists largely of fat lamb producing flocks run in conjunction with dairy cattle. In parts of the district east of Rosedale, fine-woolled sheep and beef cattle are valuable enterprises.

Alienation of land

The total area of the State is approximately 56,245,760 acres. On 31 December 1968 this comprised :

	Acres
Lands alienated in fee-simple	32,156,168
Lands in process of alienation	2,140,293
Crown lands	21,949,299
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Total	56,245,760

Crown lands comprise :

Reserved forest	5,668,197
State forest and timber reserves (under Land Act)	150,088
Water reserves	315,494
Reserves in the Mallee	410,000
Other reserves	701,121
Roads	1,707,565
Water frontages, beds of rivers, lakes, etc., unsold land in cities, towns, and boroughs	3,844,606
Land in occupation under—	
Perpetual leases	142,788
Leases of former agricultural college lands	9,559
Other leases and licences	1,407
Temporary grazing licences and leases	(a) 5,481,939
Unoccupied	3,516,535
Total	21,949,299

(a) In addition, 74,702 acres of land listed under Reserves are held under grazing licences.

In the following table are shown the area of Crown lands sold absolutely and conditionally, and the area of lands alienated in fee-simple during the five years 1964 to 1968. A portion of the area conditionally sold reverts to the Crown each year in consequence of the non-fulfilment of conditions by the selectors. The lands alienated each year include areas selected in previous years.

VICTORIA—ALIENATION OF CROWN LANDS

Year	Area of Crown lands sold			Crown lands alienated in fee-simple	
	Absolutely, at auction, etc.	Conditionally to selectors	Total	Area	Purchase money
	acres	acres	acres	acres	\$
1964	3,896	23,055	26,951	76,587	406,554
1965	4,705	20,757	25,462	76,965	280,839
1966	27,135	12,508	39,643	53,136	420,313
1967	18,120	48,239	66,359	40,780	566,717
1968	17,880	27,191	45,071	57,014	509,413

Information regarding the Assurance Fund is found on page 683 of this book.

Government Assistance to the Farming Industry, 1964

Soil Conservation Authority

Functions

The Authority is responsible for the mitigation and prevention of soil erosion ; promotion of soil conservation ; the determination of land use to achieve these objectives ; and the provision of an advisory service to landholders for the efficient use and development of their land and the water resources available to them. To perform these functions, it conducts surveys and investigations into the nature and extent of soil erosion and provides technical advice and assistance to landholders regarding water resources. It

investigates and designs preventive and remedial measures, and carries out soil conservation works, experiments and demonstrations of soil conservation, and reclamation of eroded lands. Its major field activity with landholders is the development of group conservation schemes in which the Authority engages in conservation projects in conjunction with groups of farmers having contiguous properties.

Principal aspects of current research are concerned with conservation hydrology, soil, ecological and land use surveys, conservation agronomy, soil analyses, and conservation economics.

The Engineering Division is responsible for the design and construction of concrete erosion control structures, and promotion of efficient use of farm water supplies.

Extractive industries

The *Extractive Industries Act* 1966 requires field inspections and submission of reports within 30 days by the Authority to the Secretary of Mines of those localities within proclaimed Water Supply Catchments for which applications have been made to the Department of Mines for lease or licence to carry on an extractive industry. The Extractive Industries Act amended the Soil Conservation and Land Utilisation Act so that Authority approval must be obtained to extract soil, sand, or other material to a depth not exceeding 6 ft from areas aggregating in excess of one half acre. The Authority is responsible for the necessary inspection, reporting, and notifying of applicants whether permission is granted and, if so, the conditions to be observed.

Soil Conservation Authority, 1961-70 ; Land Utilisation Advisory Council, 1962, 1967 ; Destruction of Vermin and Noxious Weeds, 1963 ; Soil, Land Use, and Ecological Surveys, 1966 ; Farm Water Supplies, 1968 ; Group Conservation, 1969

Rural finance facilities

Introduction

Australia's national policy for permanent land settlement has been based on the family unit farm. Financially this has seldom been easy because even in the early days settlers found it difficult to earn enough to maintain themselves while they were clearing and developing their blocks. The conditions of purchase were made very easy but considerable aggregation of holdings took place because settlers failed. Later, some of these large estates were re-purchased, subdivided, and the smaller farms made available to settlers under closer settlement schemes.

After each world war these schemes were expanded to enable ex-servicemen to acquire farms under generous terms of settlement. In addition, money was advanced to returned servicemen to enable them to buy their own "single unit" farms. Soldier settlers were also granted loans for the purchase of stock, plant, and equipment.

The State set up a Rural Finance Corporation with wide powers for assisting rural industry. This was later merged with the Soldier Settlement Commission into a Rural Finance and Settlement Commission.

The Commonwealth Bank has had a Rural Credits Department for many years. Its main function is to provide seasonal assistance in the marketing of products. Thus it cushions the effect of large interim payments at harvest time and provides credit for goods awaiting shipment or in transit. The Bank also administers the Farm Development Loan Fund, and assists in

financing research. The Commonwealth Development Bank is interested in making loans available for the improvement of approved properties.

The trading banks have many farmer clients who require finance mostly on a relatively short-term seasonal basis. Numerous pastoral finance companies act as agents for farmers and frequently provide credit for the purchase of properties or for their improvement or for the purchase of livestock. The State Savings Bank also makes limited financial advances to farmers.

Rural Finance and Settlement Commission

The Rural Finance and Settlement Commission was established by legislation passed in 1961, which began to merge the former Soldier Settlement Commission and the Rural Finance Corporation. The new Commission carried out the functions of the previous authorities temporarily in two separate branches, namely, those of Settlement and Finance, respectively, until further legislation passed in 1963 completed the merger by removing this division and co-ordinating the functions previously performed by the two separate authorities.

Rural Finance Act

The Rural Finance Corporation was established in April 1950. Its functions, which have since been taken over by the Commission, include the making of advances through loans at low rates of interest to existing or proposed country industries, both primary and secondary. The Commission is also empowered to advance moneys to, or for the benefit of, any farmer for carrying into effect a composition or scheme of arrangement between him and his creditors. The Commission is also empowered under the Act to carry out special lending as Agent of the Treasurer. Under these Agency provisions, the Commission administers relief lending to members of the rural community in times of adversity such as bushfires, floods, and drought. (See also page 280.)

VICTORIA—RURAL FINANCE ACT: REVENUE, EXPENDITURE, ETC. (\$'000)

Particulars	1964-65	1965-66	1966-67	1967-68	1968-69
Revenue					
Interest	1,237	1,346	1,447	1,559	1,689
Other	21	34	30	42	23
Total revenue	1,258	1,380	1,477	1,601	1,712
Expenditure					
Administration	143	169	185	247	230
Interest	947	1,021	1,108	1,169	1,295
Sinking fund	53	56	59	61	66
Other	63	61	49	92	8
Total expenditure	1,206	1,307	1,402	1,569	1,599
Net surplus	52	73	75	32	113
Loans and advances outstanding at 30 June	22,388	24,113	25,123	27,641	27,330
Loan indebtedness to State Government at 30 June	21,050	22,128	22,881	24,451	27,527
Government agency advances made	428	260	252	3,144	3,447
Part III advances made	4,051	3,559	4,236	5,289	2,699
Government agency advances outstanding	1,096	1,215	1,353	4,291	6,412

General settlement

Before the end of the Second World War, the Commonwealth Government and various State Governments made arrangements for the settlement of discharged soldiers on the land as part of a general scheme of rehabilitation of ex-members of the Services. In 1945 the Victorian Government completed an Agreement with the Commonwealth Government. The State Parliament ratified the Agreement and also passed legislation constituting the former Soldier Settlement Commission. Soldier settlement in all States has now reached the stage where no further allocations of blocks are proposed.

Under the Victorian legislation soldier settlement was carried out under two separate schemes. First, there was the general settlement scheme where the Commission acquired freehold land or Crown land for subdivision and development into holdings for application by ex-servicemen. Such holdings were allocated on a competitive basis, having regard to the merits of all applicants. The number of ex-servicemen settled under this scheme totalled 3,293. Second, there was the single unit farm scheme, where ex-servicemen were granted loans up to a maximum of \$18,000 to assist them in the purchase of existing farms of their own choosing. Under this scheme 2,878 ex-servicemen were granted loans amounting to \$23,917,338.

The Soldier Settlement Act enabled the Commission to make advances to general settlers and single unit farm settlers to assist them in the purchase of stock, plant, equipment, and shares in co-operatives. For this purpose \$12,568,333 has been advanced to settlers and at 30 June 1969, \$12,504,561 has been repaid and \$31,944 has been written off, leaving an outstanding balance of \$31,828. In addition to its functions under the Soldier Settlement Act, the Commission, on behalf of the Commonwealth Government, administered that portion of the *Commonwealth Re-Establishment and Employment Act 1945*, which related to agricultural loans and allowances.

With soldier settlement in its final stages, the following tables set out the particulars of rural rehabilitation of ex-servicemen in Victoria as at 30 June 1969 :

VICTORIA—LAND ACQUIRED AND COST OF DEVELOPMENT, 1945 TO 1969

Particulars	Land acquired and total expenditure to 30 June 1969		Balance outstanding at 30 June 1969
	acres	\$'000	
Freehold land	1,193,171 } 51,536 }	39,448 }	\$'000 ..
Crown land		53,877 }	
Development and improvement of holdings	Total realisations to 30 June 1969		
Sales of land not required for soldier settlement	65,046	(a) 3,303	(a) 277

(a) Sale price of land not required for settlement; balance outstanding represents instalments not yet due where terms were given to purchasers who are not necessarily ex-servicemen.

VICTORIA—ADVANCES TO EX-SERVICEMEN

Act	Total advances to 30 June 1969		Advances outstanding at 30 June 1969	
	No.	\$'000	No.	\$'000
Soldier Settlement Act—				
Advances for settlers' lease liability (a)	3,033	57,403	2,114	35,720
Advances to assist in acquiring and developing single unit farms	2,878	23,917	1,143	7,744
Advances for improvements, stock, implements, etc.	(b)	12,318	52	32
Advances for shares in co-operatives	327	250		
Commonwealth Re-establishment and Em- ployment Act—				
Advances to assist rehabilitation in farming industry	2,970	3,594	97	15

(a) The total number of settlers allocated holdings is 3,293 which includes 243 holdings re-allocated and 17 holdings disposed of.

(b) Not available.

Other land settlement

The *Land Settlement Act* 1959 extended the functions of the then Soldier Settlement Commission in that, under such Act, the Commission was given authority to administer a new land settlement scheme to cater for those men wishing to become farm owners—many of whom were too young to have been ex-servicemen and thus eligible for soldier settlement. The scheme generally is based on the same principles as the scheme for soldier settlement—the main differences being the interest rates payable and the basis of determining the capital liability of the settler for the farm. There is no provision in the Act for advances to buy single unit farms. The Commission is given authority to purchase privately owned land or set apart suitable Crown land for development and subdivision.

Any male British subject over the age of 21 years is eligible to apply for land made available, but the actual allocation is made on a competitive basis, having regard to a number of factors laid down in the Act, including the applicant's experience in farming and prospects of success. A feature of the legislation is that the farms are either brought to, or within sight of, production before allocation. Further details about the general principles of this legislation will be found on pages 494 to 496 of the *Victorian Year Book* 1963.

Up to 30 June 1969 the land being developed for allocation under this scheme has been on five developmental projects. These are at Heytesbury near Cobden, Yanakie on Wilsons Promontory, the East Goulburn Project near Shepparton, an irrigation project at Rochester, and Palpara in the south-western corner of Victoria.

The Yanakie and East Goulburn schemes have now been completed and all farms allocated to settlers.

The demand for all holdings allotted to date has been exceedingly keen and the 513 farms allocated (342 dairy farms under rainfall conditions, 92 irrigation dairy farms, and 79 soft fruit orchard holdings) attracted nearly 12,600 applications.

At 30 June 1969, the position of other land settlement in Victoria under the *Land Settlement Act* 1969 was as follows :

VICTORIA—OTHER LAND SETTLEMENT, 1959 TO 1969

Particulars	Land acquired and total expenditure to 30 June 1969		Balance outstanding at 30 June 1969	
	acres	\$'000	\$'000	
Land acquired—				
Freehold land purchased	24,425	2,068	8,964	
Crown land	126,752			
Development and improvement of holdings	..	24,482		
	Total realisations to 30 June 1969			
Sales of land not required for settlement	acres	\$'000		
	6,298	(a)639	(a)313	
	Total advances to 30 June 1969		Advances outstanding at 30 June 1969	
Advances to settlers under the Land Settlement Act	No.	\$'000	No.	\$'000
Liability of settlers granted purchase leases	(b)	1,444	78	141
	444	13,997	443	13,451

(a) Sale price of land not required for settlement; balance outstanding represents instalments not yet due where terms were given to purchasers.

(b) Not available.

Relief lending

In addition to its ordinary lending under the Rural Finance Act, the Commission is empowered to carry out special lending as Agent of the Treasurer. Under these Agency provisions it administers relief lending to the rural community in times of adversity such as bushfires, floods, and droughts. It was directed to do this during the 1967–68 drought. Special funds were provided to Victoria by the Commonwealth for various drought relief measures including lending to drought affected farmers for carry-on and re-stocking purposes where the farmers had exhausted their capacity to borrow through normal sources of finance. Advances were made at an interest rate of 3 per cent per annum with a repayment term of up to seven years. As at 30 June 1969 loans totalling \$5,802,495 had been made in 1,691 cases.

Other forms of drought relief carried out with the special funds provided by the Commonwealth were subsidies on the transport of fodder and water to farms and on the transport of livestock to agistment and later back to the home farm; provision of emergency communal water points in a number of country areas; and grants to municipalities and Government authorities to allow for works undertakings to alleviate unemployment arising from the drought.

In addition the Victorian Government passed legislation which allowed subsidies to be paid to farmers for purchasing fodder to maintain livestock and to buy wheat on terms under which farmers could use it as stock food. As at 30 June 1969 \$3,843,062 had been paid out. In addition, 756 farmers were sold 371,345 bushels of wheat on terms, with rebates amounting to \$125,041.

*Other rural finance facilities**State Savings Bank of Victoria*

State Savings Bank loans for rural purposes are available on the security of first mortgage over freehold property. Loans are repayable over periods varying between fourteen and a half and twenty years. Interest is charged at the rate ruling from time to time—at present ranging from 7 to 8·25 per cent per annum depending on the amount of the loan and whether the property is worked by the applicant. The maximum loan must not exceed two thirds of the value of the property.

Particulars for the year ended 30 June 1969 may be found on page 664.

Reserve Bank of Australia—Rural Credits Department

The Rural Credits Department was established in 1925 as a department of the Commonwealth Bank of Australia, now known as the Reserve Bank of Australia. Its function is to provide finance to statutory marketing boards and similar authorities and to co-operative associations of primary producers. Advances are used by borrowers principally for making payments to growers for their primary produce pending its sale and to finance marketing expenses which in some cases include processing and packing of the commodity.

Finance for the marketing of wheat, and to a lesser extent, dairy products, has comprised the major portion of credit provided, but the Department's operations have also covered such commodities as barley, cotton, canning fruits, dried fruits, meat, eggs, and superphosphate.

Interest rates since 8 August 1969 have been 5 per cent per annum, if against the security of a Commonwealth or State Government guarantee; and 5·25 per cent per annum against other securities.

Grants have also been made by the Rural Credits Development Fund for research and extension work to assist the development of primary industries. The Fund is financed by one half of the annual net profits of the Rural Credits Department.

Farm Development Loan Fund

The Farm Development Loan Fund was established in 1966 to provide loans to primary producers, at preferential rates and conditions, for drought relief and farm development purposes. Loans are made by the trading banks from their Farm Development Loan Fund Accounts with the Reserve Bank, and are designed to supplement other loans available from the banking system.

Commonwealth Development Bank

A brief outline of the functions of the Commonwealth Development Bank, together with particulars of rural loans outstanding at 30 June 1969, may be found on pages 658–9. Rural loans are made for a variety of purposes, e.g., clearing, fencing, pasture improvement, farm water conservation, erection of essential farm buildings, and the basic stocking of properties. Other aspects of assistance granted include aid to successful applicants in government sponsored rural development schemes and land ballots. Special attention is also given to providing finance to applicants opening up new areas. Particulars of rural loans approved in Victoria during the year ended 30 June 1969 are given in the following table:

VICTORIA—COMMONWEALTH DEVELOPMENT BANK
OF AUSTRALIA : RURAL LOANS APPROVED, 1968-69
(\$'000)

Type of rural activity	Value of rural loans approved
Sheep	1,171
Dairying	1,159
Cattle	1,192
Wheat and other grain crops	208
Fruit	333
Poultry	241
Other	356
Total	4,660

The average loan approved for rural purposes during 1968-69 was \$12,263.

Advances by major trading banks

The extent of rural lending in Victoria by the Commonwealth Trading and other major trading banks is illustrated by the following table which shows bank advances to borrowers outstanding at the end of June for the five years 1965 to 1969 :

VICTORIA—COMMONWEALTH TRADING BANK AND PRIVATE
TRADING BANKS : BUSINESS ADVANCES OUTSTANDING TO
RURAL INDUSTRY BORROWERS
(\$m)

Industry of borrower	Amount outstanding at the end of June—				
	1965	1966	1967	1968	1969
Sheep grazing	45.6	49.2	61.5	76.4	82.2
Wheat growing	12.2	15.2	18.6	27.5	26.5
Dairying and pig raising	31.2	31.9	40.8	51.0	54.2
Other rural	21.2	22.9	29.8	38.1	44.7
Total	110.2	119.2	150.7	193.1	207.6

Advances to rural industry borrowers represented 23.0 per cent of trading banks' business advances outstanding at the end of June 1969, and 18.5 per cent of all advances outstanding. The maximum rate of interest on bank overdrafts at 30 June 1969 was 7.50 per cent per annum but the average rate on rural loans would probably be below this level.

Advances of pastoral finance companies

The following table shows total rural advances outstanding to pastoral finance companies at the end of June for the five years 1965 to 1969 :

VICTORIA—RURAL ADVANCES (a)
OF PASTORAL FINANCE COMPANIES

(\$m)

At end of June—	Advances outstanding
1965	43·9
1966	40·9
1967	50·2
1968	54·8
1969	65·9

(a) Held by branches located in Victoria which is not necessarily the State of residence of the borrower.

Improvement purchase leases

Crown land can be made available for application under improvement purchase lease conditions and applications received are dealt with by a Local Land Board.

The essential conditions of an improvement purchase lease are as follows :

1. That the lessee will make such land improvements within the first six years as are specified. Land improvements means the clearing, draining, or grading of land, the preparation of land for the sowing of crops and pasture, and soil improvement and maintenance.
2. That the lessee will commence to carry out the land improvements within one year and will complete one quarter within three years.
3. That the lessee will not sell, assign, or part with possession of the leasehold during the first six years.
4. That the lessee will not mortgage his interest in the leasehold during the first six years without first obtaining the consent of the Department.
5. That the lessee will reside in person on or within twenty-five miles of the leasehold during the first six years.

The purchase money is payable in twenty annual instalments and on satisfactory compliance with the conditions of the lease and on payment of the balance of purchase money and fees, a Crown grant will be issued at any time after the first six years except where the lease contains a soil erosion prevention condition. The period is then twelve years or such further period as is provided in the lease.

Since the inception of improvement purchase leases in 1956 and up to 31 December 1968, 845 allotments comprising 281,279 acres of Crown land have been proclaimed available for settlement.

Water supply and land settlement

History

For practical purposes, the history of water supply in Victoria—outside the metropolitan area—can be taken up in the early 1880s when the miners who had left the goldfields to settle on the northern plains began to assess after a few exceptionally favourable years the true nature of the arid lands which they were pioneering. It was their agitation which led to the *Irrigation Act* 1886 providing for elected local trusts to construct water supply works with Government loan funds.

Between 1886 and 1900, about ninety Trusts were set up under this Act, but for a variety of reasons they all proved a failure. By 1900 the need for a State-wide approach to the water supply problem was apparent and in 1905 the Water Act was passed. This revolutionary Victorian Act, which has since provided the basis for practically all of the rest of Australia's water supply development, had three main features :

1. it abolished all but one of the Trusts (Mildura) and wrote off their debts ;
2. it set up the State Rivers and Water Supply Commission to develop and control water supply and conservation throughout the State, with the exception of the Melbourne metropolitan area ; and
3. it completed the nationalisation of water resources commenced in the 1886 Act and vested in the Crown the right to the use and control of the water in the State's rivers, streams, etc., thus avoiding the litigation which has clouded the history of water supply elsewhere.

Control of surface waters and other functions

One of the State Rivers and Water Supply Commission's main functions is to exercise the Crown's rights to the control and use of rural surface waters, and to act on any infringement of these rights. The Crown's interest is to see that limited resources are distributed fairly and productively between users. This is done by licences and permits for private diversions from streams, and by the apportionment of resources to authorities constituted under the Water Act.

The Commission also investigates water resources and plans works. It operates 390 gauging stations on streams and publishes the information obtained. Records of river flows date back to the 1860s. Investigation and planning require surveys, and there are thirty-five surveyors working from ten centres. Other Commission investigatory services are its Testing Laboratory and Irrigation Research Section at Head Office and its Hydraulic Research Station at Werribee.

Ten year plan

The Premier announced a comprehensive programme of storage works in July 1963, the construction of which would be spread over the period 1964-74. The estimated cost in 1964 was \$77m ; the equivalent in 1970 would have been \$110m. The original estimate included one quarter the share of Chowilla (\$11m 1964 base) and the second stage of Buffalo, estimated cost (\$56.5m).

The projects included in the original programme were :

Devilbend Reservoir	Complete
Lake Bellfield	Complete
Buffalo Dam—first stage	Complete
Corop Lakes	Complete
Tarago Dam	Completed to about 20,000 acre feet, Enlargement to about 30,000 acre feet will be carried out 1970-71
Chowilla (one quarter share)	Deferred
Nillahcootie	Complete

Lake Merrimu	First stage complete except for minor works. Second stage programmed 1971-73
Lake Mokoan	Became available for storage August 1970. Completion expected in 1971.
Buffalo—second stage	Deferred. Dartmouth proposal will take priority.

The original programme has been modified by the proposal to construct Dartmouth rather than Chowilla with additioned output available to Victoria and New South Wales as well as to South Australia. The construction of Dartmouth, if ratified by all Parliaments concerned, would make the inclusion of the second stage Buffalo project unnecessary for some years. Apart from the programmed storage at Chowilla on the River Murray, and the second stage Buffalo Dam, the last project to complete the 10 year plan, Lake Mokoan, was ready to receive diversions from the Broken River in 1970.

The Government has approved a further works programme which provides for the commencement of the following projects :

<i>Project</i>	<i>Estimated cost</i>
Lake Merrimu (second stage)	\$2.5m
Millewa Domestic and Stock Scheme—replacement of open channels by pipelines	\$2.5m
Lake Howitt Project (Mitchell River)	\$5.0m
Little Scotland Project (Jacksons Creek)	\$3.0m
Dartmouth Dam (one quarter share River Murray Commission Project)	\$57.0m
South Otway Pipeline	\$3.0m
Bungal Dam (West Moorabool River)	\$4.75m

Construction of the Millewa scheme, the south Otway Pipeline and the Bungal Dam has already begun.

These works will provide additional security for existing rural developments and will allow the fast increasing urban demands in areas to the west of Melbourne and in the Mornington Peninsula to be met.

Commonwealth aid project

A storage on the King River (Lake William Hovell) has received approval from the Commonwealth Government and a grant of \$4m will be made available for its construction. Work began in April 1969 and excellent progress has been made. It is expected that the 10,000 acre feet storage will fill during the winter of 1971.

The purpose of the dam is to provide assured supplies for irrigation, particularly of tobacco, in the King River Valley and will ultimately provide additional urban supply to the City of Wangaratta.

Groundwater Act

The Groundwater Act, which was passed in the autumn session of Parliament 1969 and proclaimed in September 1970, enables the Mines Department and the Commission to establish the administrative procedures necessary for the investigation, conservation, and utilisation of the groundwater resources of Victoria.

The Act gives the Mines Department authority to investigate the State's

groundwater resources so that the State's total water resources and their proper use can in the future be considered by the Government.

Substantial progress has been made in the appointment of staff to administer the Act. The Groundwater Appeal Board has been appointed and will serve to protect the rights of the individual in the equitable distribution and use of groundwater resources.

The Mines Department is required to record the construction details of every bore in the State and the Commission will administer the abstraction of groundwater by a licensing and recording system. To avoid unnecessary inconvenience to groundwater users the administrative procedures of the two Departments concerned will be dovetailed to ensure a minimum time-lapse in dealing with an application to use groundwater.

This is an Act which will rank in historical importance with the Irrigation Act of 1886 and the Water Act of 1905, which together laid a sound foundation for the exploration and development of Victoria's surface water resources.

Irrigation

Most irrigation is carried out in districts directly controlled by the Commission, although there is an increasingly large proportion of "private diverters", irrigators who are authorised to take water from streams, lakes, etc., but who do not come within the boundaries of an irrigation district. (See private irrigation below.)

A feature of the districts is the system of "water rights". Under this system a certain quantity of water is assigned to each district and allotted to the lands commanded and suitable for irrigation. The irrigators pay a fixed sum for this water each year, whether they use it or not, and also pay a general rate. The irrigators get this water right in all except the very driest years and they can also buy water in excess of the water right in most seasons. The water right system assures irrigators of a definite quantity of water each year, and the Commission can rely on fairly constant revenue to meet the cost of district operation. Water usage varies according to seasonal conditions and the water right system provides a constant minimum income.

A feature of Victorian irrigation policy has been the development of closer settlement by intensive irrigation, that is, by allocating relatively large quantities of water per holding instead of limiting the allocation of water to a portion of each holding. This has meant that Victorian irrigation is predominantly devoted to dairying, fruit, and vegetables, rather than to sheep raising. The advantage of intensive irrigation is that much higher returns are available from a given quantity of water and, consequently, a much greater rural population is supported.

Private irrigation

Private irrigation by diversion of water from rivers, lakes, etc., has increased in recent years. From 1942-43 to 1968-69, the area watered privately increased from 23,462 acres to 194,241 acres, the latter being 14 per cent of the total area irrigated. The number of private diversions authorised during 1968-69 was 13,249 and the water delivered was used mainly to produce annual and perennial pastures and fodder, as well as potatoes, tobacco, hops, citrus, and cotton. About half the area privately watered is supplied from streams regulated by storages, the other half being

VICTORIA—AREA OF SYSTEMS AND LANDS IRRIGATED, AND WATER DELIVERED, 1968-69

System or District	Total area within constituted district (acres)	Area irrigated (acres)								Water deliveries acre ft
		Pastures		Lucerne and sorghum	Vineyards	Orchards	Market gardens	Others	Total	
		Native	Sown							
River Murray System—										
Torrumbarry System (a)	382,162	23,097	233,038	13,026	4,272	1,751	815	14,913	290,912	271,542
Murray Valley Area	301,888	87	106,693	9,484	260	6,634	575	542	124,275	178,990
Pumped Supply Districts (b)	80,583	235	364	1,189	39,830	3,026	163	1,156	45,963	128,021
Total River Murray	764,633	23,419	340,095	23,699	44,362	11,411	1,553	16,611	461,150	578,553
Goulburn-Loddon System	1,352,081	21,103	488,347	36,924	328	24,624	4,554	33,248	609,128	716,798
Macalister District	130,501	2,202	61,569	652	..	..	160	90	64,673	96,126
Werribee-Bacchus Marsh	16,339		5,677	927		641	4,177	6	11,428	20,626
Other northern systems (c)		472	12,478	1,220	1	2,910	495	47	17,623	26,204
Other southern systems (c)							1,457	287	1,744	
Private diversions (c)		3,212	139,284	20,092	3,000	6,796	14,966	6,891	194,241	354,053
Grand total	(d) 2,263,554	50,408	1,047,450	83,514	47,691	46,382	27,362	57,180	1,359,987	1,792,360

Source : State Rivers and Water Supply Commission.

(a) Includes 12,721 acres irrigated by private diversion.

(b) Including First Mildura Irrigation Trust (17,045 acres irrigated), supervised by the Commission.

(c) Not available.

(d) Incomplete.

from streams wholly dependent on rainfall. Many private storage dams are being built, frequently at substantial cost, on individual properties to insure against low flows in the streams normally used.

Major storages devoted principally to irrigation are shown in the following table :

VICTORIA—MAJOR IRRIGATION STORAGES

River	Name	Capacity	Principal system or district served
		acre ft	
Goulburn	Lake Eildon	2,750,000	Goulburn-Loddon
	Waranga Reservoir	333,400	" "
	Greens Lake	26,550	" "
	Goulburn Reservoir	20,700	" "
Campaspe Loddon	Lake Eppalock	252,860	" "
	Cairn-Curran Reservoir	120,600	" "
	Tullaroop Reservoir	60,000	Maryborough town supply; private diverters; and Goulburn-Loddon System
Broken	Lake Nillahcootie	32,260	Broken River Valley; private diverters
Murray	Lake Hume	(a) 1,240,000	Murray
	River Murray Weirs	(a) 111,575	"
	Kow Swamp	40,860	"
Macalister Ovens	Lake Glenmaggie	154,300	Macalister
	Lake Buffalo	19,500	Wangaratta town supply; private diverters; Ovens Valley
Werribee	Pykes Creek Reservoir	19,400	Bacchus Marsh District
	Melton Reservoir	15,500	Werribee District
	Lake Merrimu	15,000	Bacchus Marsh District
		(b) 5,212,505	

(a) Victoria's half share under the River Murray Agreement, subject to certain obligations to South Australia.

(b) In addition to the storages named, there is a system of natural lakes in the Kerang-Swan Hill Area forming part of the Torrumbarry System. The Coliban River storages are used for both irrigation and town supply around Bendigo and Castlemaine. A limited irrigation area is also supplied from the Wimmera-Mallee System.

Town supplies

The Commission operates major works for town water supplies outside the Melbourne metropolitan area—the Coliban System supplying Bendigo, Castlemaine, and other towns in that area; the Mornington Peninsula System supplying towns extending from Longwarry to portion of Dandenong, the bayside towns from Seaford to Portsea, the Western Port towns from Hastings to Flinders, and the township of Wonthaggi; the Bellarine Peninsula System supplying water to the towns extending from Portarlington to Anglesea; and the Otway System supplying water from the Otway Ranges to Camperdown, Cobden, Terang, and Warrnambool. The total towns supplied by the Commission are 148 and their total population is 235,380. (For other town supplies and sewerage see page 219.)

Water supply to Western Port

Industrial development

The quiet orchard and grazing district of Western Port is being transformed into one of Australia's leading industrial centres. It is situated on the western shore of Western Port, 40 miles south-east of Melbourne.

Three industries are already established—the B.P. Refinery at Crib Point, Esso-BHP and Cresco Fertilisers at Long Island Point—but the largest will be the John Lysaght steelmills at Long Island Point which expect, by 1972, to employ 1,700 persons.

Water supply

These new industries, especially the steel works, will need large quantities of water. The Commission has already constructed works more than adequate to meet the estimated requirements of some 440 million gallons per annum to 1972.

Water for Western Port comes from the Tarago and Bunyip Rivers which rise in the hills 50 miles to the north-east and from Tarago Reservoir 12 miles north of Warragul. It is then delivered by way of the Beaconsfield Reservoir to the Bittern and Devilbend Reservoirs through the Cranbourne and Bittern pipelines. To supply Bittern-Crib Point, including the B.P. Refinery, a major portion of the existing main from the Bittern pipeline was replaced with a larger main in 1964. The remaining section was being duplicated in 1969 at an estimated cost of \$125,000.

However, the supply to Long Island Point and Hastings was a much bigger undertaking. About \$0.5m were spent on works completed by June 1969. This involved the construction of the 15 million gallons Western Port Storage and the installation of 4 miles of a 24 inch diameter pipeline from the Bittern pipeline to Long Island Point. The Western Port Storage maintains a continuous water supply to the area if the Cranbourne and Bittern pipelines are shut down for maintenance. At times of peak demand, water can be pumped from Devilbend and Bittern Reservoirs to Hastings, Long Island Point, and Crib Point.

A new stage will be reached when industrial and domestic demand reaches 8,000 million gallons a year. This will depend to a large extent on the future expansion of the steelworks. Additional works will then be constructed by the Commission to supply water to the area.

Devilbend and Tarago Reservoirs

Until 1964, water supplies for the Mornington Peninsula and the Western Port area were mainly obtained from the Bunyip and Tarago river catchments by aqueducts leading from a small weir on each stream. As these streams are very reliable, no major storages were required for the system, apart from the 3,400 acre ft storage at Lysterfield, which has its own catchment. However, as the rapidly increasing growth of population and industry in the Peninsula was expected to tax the existing water supplies fully within a few years, the 1963 Ten Year Water Conservation Plan provided for two major storages to meet this expansion. These now play an important part in the water supply system for Western Port.

The first of these, the 12,000 acre ft off-stream Devilbend Reservoir, was completed in 1964. This storage accommodates the winter flows from the headwaters for distribution during times of peak demand in the summer months. The second, the 20,000 acre ft Tarago Reservoir completed in 1968, now stores surplus winter and spring flows in the Tarago River. In conjunction with the duplication of syphons along the existing Tarago aqueduct to raise its effective capacity from 16 to 32 cu ft per second, and a new pumping station on the edge of the reservoir, the new storage

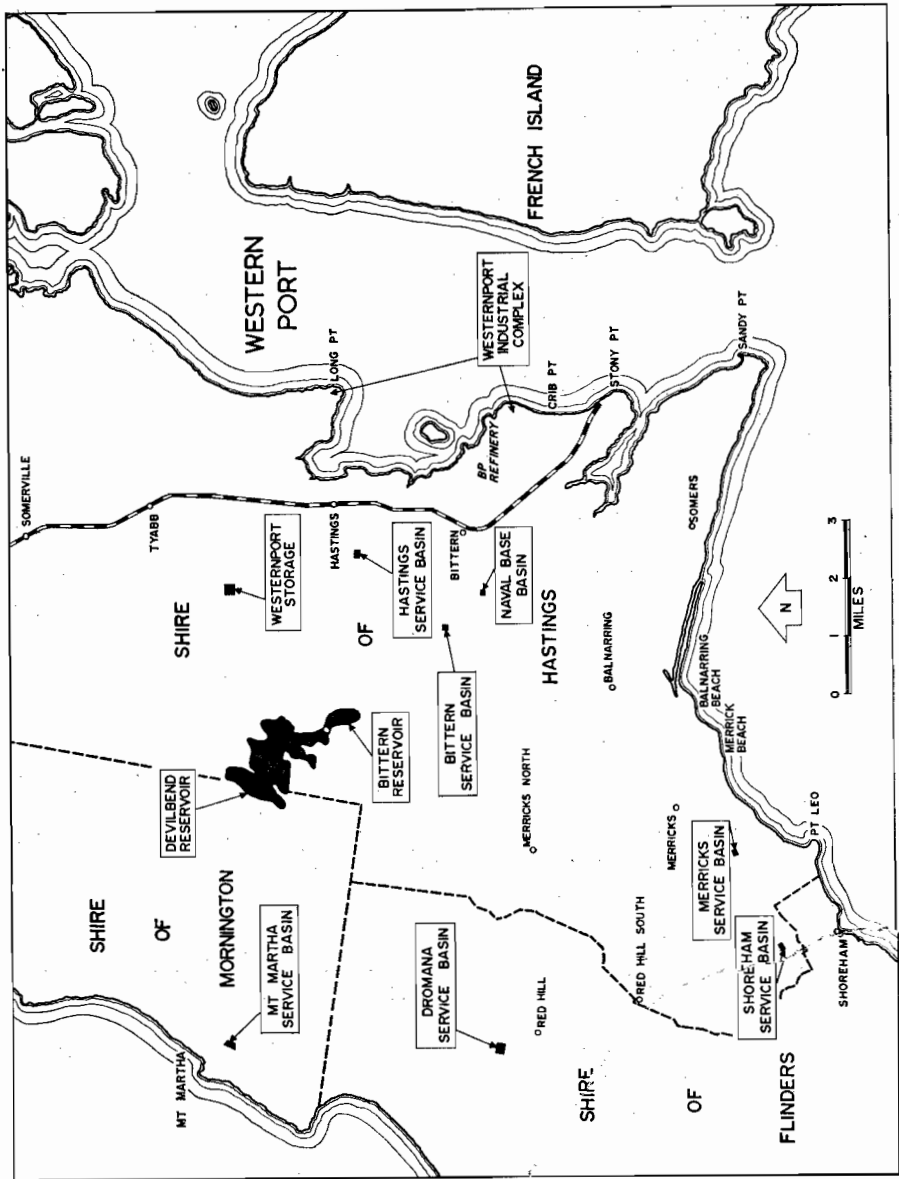


FIGURE 6. Western Port water supply.

enables additional water to be supplied to the Peninsula during periods of low river flow.

Finance

Acting as a Government authority, the Commission constructs its works with funds provided for the purpose by Parliament, amounting at 30 June 1969 to \$316m including contributions by the State of Victoria towards works carried out for the River Murray Commission. A further \$77m of Government loan moneys has been provided for expenditure by local

authorities under the supervision of the Commission. In recent years the rate of expenditure on construction of State works has been about \$13m annually, and the Commission also supervises the expenditure of about \$5.5m annually by local authorities.

The Commission administers, supplies water to, and collects revenue from nearly 120 separate districts, each of which is run financially as a separate undertaking. Revenue from its ten irrigation districts exceeds \$5m; from its urban districts about \$2.5m; from its ten rural waterworks districts about \$1m; and from its three flood protection districts about \$100,000; the total annual revenue, including other sources, is nearly \$9.2m.

Administration

The Commission is served by a decentralised organisation designed to carry out diverse functions all ultimately related to water. Central administrative, engineering, and clerical functions are carried out by a staff of 500 in the Head Office at Armadale. At the many country centres throughout the State there are 1,050 other officers and some 1,750 casual employees. Together they are engaged in planning, building, maintaining, and operating waterworks vital to the prosperity of rural Victoria.

Irrigation, 1962; Wimmera-Mallee Region Water Supply, 1963; Flood Protection, River Improvement, and Drainage, 1963; Underground Water, 1964; Water Supply in Victoria, 1964; Goulburn-Murray Irrigation District, 1965; Spray Irrigation in Agriculture and Dairying, 1965; Private Irrigation Development, 1966; Water Research Foundation, 1966; River Improvement, 1967; Rivers and Streams Fund, 1967; Dandenong Valley Authority, 1968; Water Conservation, 1969

AGRICULTURAL EDUCATION, RESEARCH, AND EXTENSION SERVICES

Tertiary agricultural education

Agricultural colleges

The legislation of 1884 which provided for the establishment of agricultural colleges set up a Council of Agricultural Education for their administration. Its revenue was derived from the rentals of endowment lands, sales of farm produce, and student fees, and it continued to administer the Colleges until 1944 when, with the passing of a new Agricultural Colleges Act, control was transferred to the Department of Agriculture in which a new Division of Agricultural Education was established. This move has provided adequate finance for maintenance and capital expenditure, the latter including a complete rehabilitation programme for both Dookie and Longerenong Agricultural Colleges in the period from 1959 to 1969.

The main purpose of the Colleges is to train agricultural technologists in the basic technical and scientific principles underlying all aspects of agriculture. Lectures on all topics are complementary with demonstrations, tours, laboratory work, and practical farm work, the latter being given on large farm areas attached to each College—6,048 acres at Dookie and 2,386 acres at Longerenong. Although the emphasis is placed on training technologists to assist in agricultural research and extension, intending farmers will gain a sound technical and scientific background to enable them to make use of modern agricultural and economic developments in operating their own properties.

In 1966 a revised syllabus was introduced at Dookie and Longerenong and after successful completion of the three year course, students gain a Diploma of Agricultural Science. The minimum entrance standard is a pass in five subjects including English and Chemistry at the Leaving or Leaving technical examination. In practice, however, it is found that most students have completed one year at Matriculation level.

The development of post-secondary education in all technical fields which has taken place since 1967 has made it desirable that the agricultural colleges raise the entrance standard to the Matriculation level, as has been done in other Australian States. The Colleges would then offer an Associate Diploma in Agricultural Science, but it is anticipated that this will not be effected before February 1971. The opening of a third agricultural college at Glenormiston will provide a two year course in production and management for the future practising farmer.

Short intensive courses for farmers, farmers' sons, and others engaged in rural pursuits are provided at Dookie Agricultural College.

In 1967 the three year course for the Diploma of Horticultural Science was introduced at the Burnley Horticultural College, with the same prerequisite entrance requirements as for the agricultural colleges. This replaced the Diploma of Horticulture course introduced in 1958. The new course is comprehensive, giving tuition and practical experience in fruit and vegetable production, ornamental horticulture, nursery management and landscape design, as well as training in the basic physical, biological, and applied sciences.

Part-time evening classes in horticultural, agricultural, and associated science subjects are also conducted at Burnley. The Agricultural Education Division also administers the Government grant to the Victorian Young Farmers.

University of Melbourne School of Agriculture

The Faculty of Agriculture was set up originally by the *Agricultural Education Act* 1920, which provided for permanent staff, for a building, and for the employment of graduates as scientific officers in the State Public Service. (There had been less permanent arrangements for teaching agriculture in the University earlier in the century.) The first full-time professor took up his appointment in 1926.

The primary purpose of the four year University course has been to give all students a common basic training in applied biology and agricultural economics. The first year is devoted to pure science subjects. This is followed by three years in which the scientific principles upon which agriculture is based, and their application to the practice of agriculture, are presented. The subjects of the later years include more advanced chemistry and biochemistry, plant physiology and pathology, soils, microbiology, genetics, animal physiology and husbandry, agronomy, economics, and land utilisation. The students in Agricultural Science also attend courses in engineering subjects, while a full-time degree in Agricultural Engineering is conducted elsewhere in the University.

The second year of the course is spent in residence at the University's field station at Mount Derrimut (near Deer Park). This is a property of 800 acres on which the students are shown the regular farm operations and live through a farming year, while spending their mornings on regular

lecture classes and coming to the University of Melbourne for one day a week.

Since the establishment of the Faculty of Agriculture almost 1,000 graduates have entered the profession. A quota of seventy is now placed on the numbers in the first year course, and the number of graduates is about fifty per annum. There are now twenty-four students working for higher degrees (M.Agr.Sc. and Ph.D.) either at the University or at Mount Derrimut. Substantial buildings have been established at Mount Derrimut from various industrial research funds for the study of beef and dairy cattle, pigs, poultry, sheep and wool, and wheat.

Further reference, 1969

Research Stations of the Victorian Department of Agriculture

Agricultural research began in Victoria more than 100 years ago with the establishment of an experimental farm at Royal Park by the Port Phillip Agricultural Society. The venture failed but, after the Department of Agriculture was formed in 1872, other experimental farms were established in the country at Rosedale, Whitfield, Wyuna, and Rutherglen. However, agricultural research as it is known today really dates from 1912 with the establishment of the State Research Farm, Werribee and the Rutherglen Research Station. At present, the Department owns seventeen research stations covering some 10,000 acres. Strategically located throughout the State, these research stations are equipped to conduct research on a wide variety of farming problems. The work is supported by a large number of experiments which are conducted on farms.

State Research Farm, Werribee

The State Research Farm, Werribee, has always been the central wheat and oat breeding station for Victoria and about 95 per cent of the wheat acreage is now sown to Werribee-bred varieties. The Alan Raw Laboratory, opened in 1965, provides modern facilities for this experimental programme. Irrigated pastures have also been closely studied at the Farm and the research findings have become the basis of irrigation farming in Victoria.

In 1939 a School of Dairy Technology was set up to train factory operatives and conduct research on cheese and butter. Now known as the Gilbert Chandler Institute of Dairy Technology, it has some of the best research and teaching facilities for this work in Australia.

Since 1940 plant breeding work has also been expanded to include such crops as barley, vegetables, tobacco, linseed, and pasture plants.

The S.S. Cameron Animal Research Laboratory is the headquarters for the Farm's livestock research programme. Organised animal research began at the Farm in 1944 with artificial breeding of cattle the first project. Later work also produced the HYPAR (hysterectomy produced artificially reared) process to breed pneumonia-free pigs. Independent units on the Farm include the Tractor Testing Station, a joint project of the Victorian and Commonwealth Governments, and the clinical centre of the University of Melbourne School of Veterinary Science.

Rutherglen Research Station

Rutherglen Research Station has a longer history than that of Werribee. A viticultural reserve was set up at Rutherglen in 1890 and a Viticultural

College was built there in 1897. Work done at the College enabled vineyards to be re-established on resistant rootstocks introduced from Europe and America after the disastrous outbreaks of phylloxera. In 1912 the experimental farm became a separate enterprise. The first permanent experimental plots concerned crop rotation, fertiliser and green manure on cereals, and the topdressing of pastures.

The achievements of the Rutherglen Research Station include the development of Wimmera ryegrass and subterranean clover pastures to form the basis of the clover ley farming system. These experiments showed that clover ley is more efficient in improving soil fertility than volunteer pasture. This type of farming has had far-reaching effects on wheat production throughout southern Australia. Extensive cereal research is still conducted at the Station, and includes testing of new varieties, fertilisers, chemical cultivation, resistance to diseases, and weed control. Pastures, beef cattle, prime lambs, and sheep are also subjects for considerable research.

At Myrtleford, also in the north-east of Victoria, studies are being conducted on tobacco culture, pathology, and breeding at the Tobacco Research Station. A substation at Gunbower, established in 1964, is used for studying tobacco agronomy.

North-central area

The Tatura Horticultural Research Station deals mainly with the problems of growing canning peaches, canning and export pears, apples, and apricots under irrigation. Experiments are carried out on varieties, irrigation, cultural systems and fertilisers, together with nutritional, pathological, and entomological studies.

Experimental work on irrigated pasture species, water efficiency and fertilisers is conducted at the Kyabram Irrigation Research Station. There are also experiments on vealer production, and wool and prime lamb production using crossbreds. Twenty-five acres are set aside for experiments on tomato culture and for developing and assessing new tomato varieties.

Cereal research in this area is centered at Dookie Agricultural College where (together with Longerenong), some of the earliest experiments in wheat breeding and cultivation in Victoria were carried out.

Mallee region

At Mildura, the Horticultural Research Station was established in 1954 after representation to the Victorian Government by growers' organisations for a site for long term research on citrus particularly with regard to rootstocks. The majority of plantings on this site are citrus, but in recent years work has also developed on other crops, including grapes. A new 140 acre property will also allow more intensive work on grape, tree-fruit, and vegetable growing as well as citrus.

A laboratory for research on insect pests and plant diseases of crops grown in the Sunraysia area was opened on the Research Station in 1967. The laboratory is a branch of the Victorian Plant Research Institute at Burnley.

At Walpeup, the Mallee Research Station was established in 1932 to investigate problems of Mallee agriculture. It is situated in a central

position and experiences average climatic conditions for the region. Many of the soil conservation and cereal growing practices used at present on Mallee farms were developed there. It also leads in work on prime lamb production in the Mallee. Present work includes experiments in all aspects of cereal growing, wheat breeding, fertilisers, cultivation, soil conservation, skeleton weed control, weed control, and medic pasture. There are also time of weaning and stocking rate experiments. The wheat seeding unit for the Mallee is also centred at Walpeup.

Wimmera region

For many years cereal research for the Wimmera was centred at the Longerenong Agricultural College. Some 275 acres at the College are used for experiments on soil fertility, crop rotation, pasture, and weed killers. Subsidiary experimental plots are operated through the district with co-operating farmers. The wheat seeding unit for the Wimmera is based at Longerenong.

However, the new Victorian Wheat Research Institute, built recently at Horsham with funds provided by the industry, will now become the centre for cereal research in the Wimmera. The Institute has laboratories for breeding, agronomy, pathology, and cereal chemistry. Large scale field experiments will be situated on private properties.

Western district

A Pastoral Research Station was established at Hamilton in 1959 with emphasis on sheep management and nutrition, and beef cattle. The Glenormiston Estate is also used as a site for some experimental work on cereals, fodder crops, and pasture improvement. Twenty-five acres on the property are used for experiments on onions and peas.

Research stations in the Melbourne area

Around Melbourne, the Department of Agriculture conducts research on stations at Werribee, Scoresby, Healesville, Burnley, and Frankston.

The Scoresby Horticultural Research Station, established in 1946, investigates problems associated with fruit growing in southern Victoria. The crops investigated include apples, pears, peaches, plums, cherries, apricots, and lemons.

The Sir George Knox Laboratories for cool storage experiments on fruit and vegetables are at Scoresby. The Station is the headquarters for the Department's berry fruit research. There is also some experimental work on vegetables and an Apicultural Research Unit is situated on the Station.

At Frankston, a Vegetable Research Station has been established to serve the sandy soil areas from which come over half of Melbourne's vegetables.

To the north-east at Healesville, the Potato Research Station deals with potato growing problems, breeding, the introduction of new varieties, and the storage of potatoes. This Station is also the centre for the multiplication of virus-free strains of strawberries.

The Victorian Plant Research Institute, formerly the Biology Branch of the Department of Agriculture, is located at Burnley. Research is conducted on applied mycology, plant virology, plant nematology, plant

bacteriology, and nutritional disorders of plants, while entomological research covers insect biology and physiology, insecticide resistance in insects and biological and insecticidal control. Facilities at the Institute have expanded since 1958. Laboratory facilities have been increased, and a modern insectary, a virus house, a radio-isotope laboratory, an electron microscope with associated equipment, and an ultra-microtome have been added.

In the Random Sample Laying Test, the egg production and economics of production of fowls raised from 300 eggs, sampled at random from the private poultry producers' flocks and kept under modern conditions and techniques, are being studied.

At the Plant Breeding Laboratory at Burnley, research is being done to improve varieties of vegetables, especially onions, beans, and tomatoes. Particular attention is paid to production of hybrid onions and disease resistance in beans and tomatoes. Another section at Burnley is the Seed Testing Laboratory where a new laboratory with facilities for seed testing and seed research were completed in 1966. The Department's College of Horticulture is also located at Burnley Gardens.

Gippsland region

Gippsland, one of the richest dairying areas in Australia, has a Dairy Research Station at Ellinbank about 70 miles east of Melbourne. Special attention is directed to the use of pasture by a grazing dairy herd. Other experiments cover calf rearing, pasture establishment, methods of silage conservation, and the use of spray irrigation in summer pasture production.

Farmer-owned research stations

Apart from these research stations there are also four research farms owned by local farmers and business men with the Department of Agriculture represented on a technical advisory committee. Other official bodies also co-operate in research on the farms. These farms are at Kerang, Maffra, Swan Hill, and Woorinen.

The Kerang Agricultural Research Farm has experiments covering reclamation of salt affected land, sheep husbandry, shade tree planting, and hydrology.

The Macalister Research Farm near Maffra in Gippsland is used for studies on irrigation problems under the local dairy farming conditions, particularly reclamation of salt affected land.

At the Swan Hill Irrigators' Research Farm the main aim is to carry out research on problems of salting and high water tables on irrigated pasture.

Woorinen Research Farm, 10 miles from Swan Hill, deals mainly with vines and deciduous fruits and includes drainage, trellising trials, and rehabilitation of old vine land and rootstock trials with deciduous fruit trees.

Bureau of Agricultural Economics, 1966; Farm Management, 1967; Agricultural Extension Services, 1968; Size Distribution of Rural Holdings, 1969; Research and Extension Activities of the Department of Agriculture, 1970; Application of Scientific Research to Agriculture, 1970.

FARMING

General

Collection of statistics

Before 1904 the statistics were collected by the municipal authorities who were required by statute to furnish information on such forms and in such manner as was required by the Governor in Council. During the period 1904 to 1966, police officers were required to collect agricultural, pastoral, and dairying statistics from land holders in Victoria. Commencing with the 1966-67 Farm Census, the collection of these statistics has been carried out on a direct postal basis.

The Bureau made an intensive coverage check of its listings of land holdings used in the collection of agricultural and pastoral statistics in Victoria, and these were reconciled with lists of rateable land of one acre or more in extent, as recorded by municipalities for rating purposes. As a result, 6,975 holdings totalling 1,462,229 acres were added to the annual collection as from the 1967-68 season. This change in coverage should be kept in mind when comparing figures for 1967-68 with those for previous years.

The rural statistics contained in this chapter are mainly compiled from annual returns of agricultural, pastoral, and dairying production collected from some 73,000 rural holdings in Victoria at 31 March each year. Statistics from these schedules are compiled for each county and municipality.

Every holding of 1 acre and upwards used for the production of agricultural products or for the raising of livestock and the production of livestock products is required to supply full particulars of the area occupied, the rural population, the number of persons employed, the area and yield of each kind of crop cultivated, artificial fertiliser usage, numbers of certain items of farm machinery, the number and description of livestock, the quantity of wool clipped, and other relevant matters.

Data relating to area sown, production, yield per acre, and number of holdings growing crops are for the season ended 31 March, thus including crops which are sown and harvested, or harvested, during the twelve months ended 31 March.

In cases where harvesting of certain crops has not been completed by 31 March (potatoes, fruit, vines, etc.), supplementary collections are made later in the year.

Livestock numbers, farm machinery on rural holdings, and the number of persons working are reported at 31 March, while wage and salary payments relate to the twelve months ended 31 March.

Summary of Australian statistics

The following table, which summarises the principal farming activities in Australia during the 1968-69 season, shows the position of farming in Victoria relative to other States :

AUSTRALIA—PRINCIPAL ITEMS OF FARM ACTIVITY, 1968-69

Particulars	N.S.W.	Vic.	Qld	S.A.	W.A.	Tas.	N.T. and A.C.T.	Australia
Rural holdings—								
Number	76,103	71,056	44,074	29,137	23,004	10,384	512	254,270
Area ('000 acres)	171,020	39,182	378,956	162,109	276,174	6,591	178,288	1,212,320
Principal crops—								
Wheat—								
Area ('000 acres)	9,962	3,984	1,789	3,748	7,295	17	4	26,799
Production ('000 bush)	215,119	90,728	42,000	83,160	112,450	410	84	543,950
Oats—								
Area ('000 acres)	1,185	991	55	516	1,092	31	1	3,872
Production ('000 bush)	27,454	30,230	1,119	11,895	22,942	583	27	94,250
Barley—								
Area ('000 acres)	486	409	427	1,413	553	26	..	3,314
Production ('000 bush)	11,211	8,885	12,870	29,551	9,187	884	..	72,587
Hay—all types—								
Area ('000 acres)	823	1,847	112	615	341	211	6	3,955
Production ('000 tons)	1,439	3,635	263	985	501	494	12	7,330
Tobacco—								
Area (acres)	2,190	9,727	13,837	..	..	..	..	25,754
Production (dried leaf '000 lb)	2,481	12,075	19,517	..	..	..	..	34,072
Onions—								
Area (acres)	1,520	3,634	3,756	1,883	359	155	(a)	(b) 11,307
Production (tons)	11,084	21,282	28,365	18,639	5,494	1,281	(a)	(b) 86,145
Potatoes—								
Area (acres)	29,236	39,979	18,515	7,643	6,588	11,461	15	113,437
Production (tons)	160,823	299,961	122,990	68,018	74,435	72,120	131	798,478
Other vegetables—Area (acres)	16,450	9,300	39,882	2,825	2,568	4,624	329	75,977
Fruit—Area (acres)	94,685	71,598	52,750	44,497	25,366	21,429	122	310,447
Vineyards—Area (acres)	22,749	48,970	3,508	60,574	7,270	..	..	143,071
Grapes for table (tons)	7,470	6,939	5,913	587	1,729	..	..	22,638
Wine made ('000 gals)	8,898	6,240	60	35,618	887	..	..	51,703
Currants (tons)	428	2,687	..	2,261	1,862	..	..	7,238
Sultanas and raisins (tons)	7,829	37,896	..	1,743	8	..	..	47,476
Livestock numbers, 31 March 1969—								
Sheep ('000)	68,153	30,185	20,324	18,392	32,901	4,395	253	174,602
Cattle ('000)	4,864	3,878	7,668	865	1,546	586	1,191	20,598
Pigs ('000)	690	422	535	288	220	95	2	2,253
Livestock slaughtered for human consumption—								
Sheep ('000)	5,806	5,609	2,075	1,555	2,373	577	61	18,056
Lambs ('000)	7,052	7,102	652	1,467	1,430	677	69	18,449
Cattle ('000)	1,035	1,010	1,511	175	347	134	89	4,301
Calves ('000)	388	462	329	48	22	46	..	1,294
Pigs ('000)	1,002	775	792	318	265	140	12	3,304
Wool production ('000 lb)	673,600	368,700	247,000	238,100	375,900	47,000	1,700	1,952,000
Whole milk production—								
All purposes ('000 gals)	278,930	815,791	171,686	102,808	58,222	102,164	996	1,530,597
Principal items of machinery on rural holdings—								
Tractors (No.)	86,341	82,059	70,238	36,574	35,005	12,750	629	323,596
Shearing machines (stands)	73,647	43,393	18,857	29,868	25,355	4,862	304	196,286
Milking machines (units)	39,557	112,618	35,401	17,908	9,036	17,057	121	231,698
Gross value of production—								
Agriculture (\$'000)	542,184	331,715	363,704	221,097	218,643	44,599	1,303	1,723,245
Pastoral (\$'000)	445,340	345,275	340,022	136,070	210,780	39,117	20,213	1,536,817
Dairying (\$'000)	154,840	202,245	64,267	39,016	25,101	27,713	560	513,742

(a) Not available for publication.

(b) Excludes N.T. and A.C.T.

Land occupied in different districts, 1968-69

For the season 1968-69 the number of occupiers of rural holdings was 71,056, the area devoted to agriculture 8,883,715 acres, and the total area occupied 39,181,537 acres.

It should be noted that statistics in this part of the *Year Book* have been compiled for statistical districts, which are groups of counties, namely, land areas with immutable boundaries. A map defining the boundary of each statistical district appears on page 301.

Classification of rural holdings by size and type of activity

Tabulations classifying rural holdings by principal characteristics have, in the past, been undertaken at irregular intervals. Since the Second World War they have been prepared for each of the years 1947-48, 1949-50, 1955-56, 1959-60, and 1965-66. The second detailed classification of

VICTORIA—LAND IN OCCUPATION IN EACH DISTRICT, SEASON 1968-69
(Areas of 1 acre and upwards)

Statistical District	Total area of Districts	Number of holdings	Area occupied				Total
			For agricultural purposes (a)	For pasture		Unproductive	
				Sown grasses, clover, or lucerne (b)	Natural grasses		
	'000 acres		'000 acres	'000 acres	'000 acres	'000 acres	'000 acres
Central	4,065	15,390	318	1,720	472	145	2,655
North-Central	2,930	4,504	132	1,208	672	86	2,098
Western	8,775	12,985	574	5,031	891	283	6,779
Wimmera	7,395	6,034	2,557	2,365	947	333	6,202
Mallee	10,784	6,062	3,594	1,449	2,163	502	7,708
Northern	6,337	11,697	1,470	2,726	1,337	104	5,637
North-Eastern	7,220	5,156	150	1,575	1,678	332	3,735
Gippsland	8,739	9,228	89	1,929	1,770	580	4,368
Total	56,246	71,056	8,884	18,003	9,930	2,365	39,182
PERCENTAGE OF ABOVE TO AREA OCCUPIED							
Central	..	..	11.98	64.78	17.78	5.46	100.00
North-Central	..	..	6.29	57.58	32.03	4.10	100.00
Western	..	..	8.47	74.22	13.14	4.17	100.00
Wimmera	..	..	41.23	38.13	15.27	5.37	100.00
Mallee	..	..	46.63	18.80	28.06	6.51	100.00
Northern	..	..	26.08	48.36	23.72	1.84	100.00
North-Eastern	..	..	4.02	42.17	44.93	8.88	100.00
Gippsland	..	..	2.04	44.16	40.52	13.28	100.00
Total	..	..	22.67	45.95	25.34	6.04	100.00
PERCENTAGE IN EACH DISTRICT OF TOTAL IN STATE							
Central	7.23	21.66	3.58	9.55	4.75	6.13	6.78
North-Central	5.21	6.34	1.49	6.71	6.77	3.64	5.35
Western	15.60	18.27	6.46	27.95	8.97	11.97	17.30
Wimmera	13.14	8.49	28.78	13.14	9.54	14.08	15.83
Mallee	19.17	8.53	40.45	8.05	21.78	21.23	19.67
Northern	11.27	16.46	16.55	15.14	13.47	4.39	14.39
North-Eastern	12.84	7.26	1.69	8.75	16.90	14.04	9.53
Gippsland	15.54	12.99	1.00	10.71	17.82	24.52	11.15
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

(a) Excludes area of clover and grasses cut for hay and seed.

(b) Includes oats and barley sown for grazing and lucerne fed off.

VICTORIA—HOLDINGS CLASSIFIED ACCORDING
TO SIZE OF HOLDING : NUMBER AND TOTAL
AREA OF HOLDINGS, 1965-66

Size of holding (acres)	Number of holdings	Total area of holdings
		acres
1- 99	21,340	805,121
100- 199	12,219	1,742,700
200- 299	6,693	1,623,245
300- 399	5,312	1,803,816
400- 499	3,297	1,470,439
500- 999	11,037	7,797,393
1,000-1,399	3,738	4,404,898
1,400-1,999	2,573	4,255,922
2,000-2,999	1,599	3,817,242
3,000-4,999	926	3,453,964
5,000 and over	465	6,668,863
Total	69,199	37,843,603

holdings by principal type of activity was carried out in conjunction with the size classification of rural holdings, 1965-66. The following tables show some of the information, in summary form, from the 1965-66 classification of rural holdings by size and type of activity :

VICTORIA—NUMBER OF HOLDINGS GROWING WHEAT, AND NUMBER OF HOLDINGS ON WHICH LIVESTOCK WERE DEPASTURED, CLASSIFIED ACCORDING TO SIZE OF HOLDING, 1965-66

Size of holding (acres)	Number of holdings with—				
	Wheat	Sheep	Cattle for		Pigs
			Milk production	Beef production	
1- 99	159	2,544	6,958	5,057	2,259
100- 199	327	3,199	8,521	4,037	2,031
200- 299	418	2,926	4,259	3,046	1,127
300- 399	781	3,245	2,703	2,716	849
400- 499	705	2,483	1,417	1,947	467
500- 999	4,311	9,615	3,577	6,866	1,341
1,000-1,399	1,998	3,472	1,045	2,348	414
1,400-1,999	1,494	2,423	654	1,644	272
2,000-2,999	1,031	1,529	} 621	{ 1,059	} 293
3,000-4,999	599	890			
5,000 and over	246	418	103	343	56
Total	12,069	32,744	29,858	29,701	9,109

NOTE. Individual holdings may appear in more than one category.

VICTORIA—HOLDINGS CLASSIFIED ACCORDING TO TYPE OF ACTIVITY :
NUMBER AND TOTAL AREA OF HOLDINGS AND AREA USED
FOR VARIOUS PURPOSES, 1965-66

Type of activity	Number of holdings	Total area of holdings	Area used for—				
			Fruit	Crops (exclud- ing fruit)	Fallow	Sown grasses and clovers	Balance of holding
		acres	acres	acres	acres	acres	acres
Sheep—Cereal grain	6,160	8,285,531	26	2,215,984	1,074,082	2,411,438	2,584,001
Sheep	13,093	13,039,405	536	483,573	122,617	6,871,486	5,561,193
Cereal grain	3,453	4,712,777	262	1,903,412	1,187,381	580,179	1,041,543
Beef cattle	3,111	3,497,707	193	38,122	16,082	929,783	2,513,527
Dairying	20,087	4,474,207	1,500	239,007	57,339	2,781,603	1,394,758
Vineyards	2,165	85,878	48,803	3,694	1,526	7,546	24,309
Fruit (other than vine)	2,131	144,005	64,244	3,891	2,845	27,125	45,900
Vegetables—							
Potatoes	923	140,138	228	37,444	5,225	56,408	40,833
Other and mixed	1,528	265,154	2,549	76,149	8,236	113,765	64,455
Poultry	1,008	53,321	683	5,798	2,915	18,674	25,251
Pigs	273	33,337	33	2,718	2,925	8,959	18,702
Tobacco	284	65,887	60	10,285	1,182	16,469	37,891
Other	353	27,370	504	5,006	2,075	6,158	13,627
Multi-purpose	2,193	1,525,082	2,368	227,300	68,613	668,373	558,428
Total classified holdings	56,762	36,349,799	121,989	5,252,383	2,553,043	14,497,966	13,924,418
Unclassified holdings—							
Sub-commercial	7,848	750,292	1,964	19,802	25,885	215,197	487,444
Unused, special, etc.	4,589	743,512	797	1,294	41,398	90,710	609,313
Total all holdings	69,199	37,843,603	124,750	5,273,479	2,620,326	14,803,873	15,021,175

FIGURE 7. Counties and Statistical Districts of Victoria.



Superphosphate and fertiliser development

Approximately 90 per cent of the annual tonnage of fertilisers used in Victoria is superphosphate, all of which is manufactured locally.

James Cuming, who arrived in Victoria in 1862, established the superphosphate industry in Australia. Earlier, his father had made superphosphate from sulphuric acid and bone dust and had conducted experimental trials with it on their farm in Scotland. In 1872, Cuming purchased a small sulphuric acid plant at Yarraville and constituted Cuming Smith and Co. Evidently he began manufacturing superphosphate as early as 1874, since the Chemist for Agriculture of the day reports having analysed several superphosphates of local manufacture. But it was not until some years later that local farmers accepted superphosphate, since in 1880 all of Cuming Smith and Co's production was shipped to Mauritius in exchange for sugar.

The phosphatic material used in the manufacture of this early superphosphate were bone char, ground bones, and guano, but subsequently rock phosphate was imported from Florida and Tennessee, USA. However, since the First World War, the high grade deposits of Nauru, Ocean, and Christmas Islands have provided almost all of the rock phosphate used for superphosphate manufacture in Australia.

Fertiliser trials on farmers' properties initiated by the Department of Agriculture in 1888 provided the direct proof of the effectiveness of superphosphate needed to stimulate farmers, and by 1898 the annual usage of artificial fertilisers, mainly superphosphate for wheatgrowing, had reached 16,052 tons. The continued expansion that has taken place since is illustrated by the following figures :

VICTORIA—ARTIFICIAL FERTILISERS USED
(90 PER CENT SUPERPHOSPHATE)

Year	Tons	Year	Tons
1901-02	23,535	1939-40	340,633
1909-10	77,579	1949-50	550,020
1919-20	115,627	1959-60	740,000
1929-30	269,967	1966-67	1,113,000

Since the 1920s there has been a growing consciousness of the need to topdress pastures with superphosphate for maximum productivity. This has led to a very large increase in the use of superphosphate. From approximately 276,000 tons, half of which was used on pastures in 1936-37, the quantity has risen in 1966-67 to 989,984 tons of which 778,269 tons were used on pastures.

Fertiliser developments

Next to phosphorus, nitrogen is the most important nutrient element in Victorian agriculture. For many years, animal manures such as blood and bone and dried blood, supplemented by nitrate of soda and sulphate of ammonia, were the only nitrogenous fertilisers available. Production of animal manures is now insignificant, but urea, ammonium nitrate, calcium ammonium nitrate, urea-formaldehyde, and anhydrous ammonia are additions to the list of manufactured fertilisers. Also, ammonia is now

made synthetically in Australia, while production of sulphate of ammonia is being increased as a by-product of developing industries.

Recognition during the 1930s of marginal potassium deficiencies in many soils of the pastoral areas in southern Victoria has been responsible for a rapid increase in potash usage. The quantity used increased from 9,458 tons in 1957 to 42,590 tons in 1967.

The trend in fertiliser marketing is to provide the farmer with a choice of nutrient mixtures to meet his particular requirements. Not only are there brands containing different proportions of phosphorus, nitrogen, and potassium, but superphosphate and some of the mixed fertilisers are marketed containing one or more of the trace elements, copper, molybdenum, zinc, and cobalt.

Increasing numbers of high analysis fertilisers are appearing on the market. These include a concentrated phosphate fertiliser manufactured from ground rock phosphate and phosphoric acid. Compared with superphosphate this fertiliser contains about twice as much phosphorus and negligible sulphur.

Legislation

Since the Artificial Manures Act was introduced in 1897, the law has required fertilisers to be sold according to a guaranteed analysis. Under the present *Fertilisers Act* 1958, manufacturers must register the brands, analyses, and prices of their product with the Department of Agriculture. A list of registrations is published annually in the *Government Gazette*. The number of registered brands has increased from 72 in 1900 to 344 in 1969.

In 1968-69 artificial fertilisers were used on 3,825,048 acres of wheat ; 1,511,209 acres of other cereal crops ; 82,932 acres of vegetables ; 79,334 acres of orchards ; 155,362 acres of other crops ; and 9,233,389 acres of pastures. Superphosphate is the main fertiliser used on both crops and pastures and in 1968-69 amounted to 262,865 tons of single strength equivalent or 83.0 per cent of the total artificial fertiliser used on all crops and 568,648 tons or 89.0 per cent of that used on pastures.

A summary of the area fertilised, quantity used, and number of holdings on which artificial fertilisers were used is shown below for each of the years 1964-65 to 1968-69 :

VICTORIA—ARTIFICIAL FERTILISERS

Year	Crops			Pastures		
	No. of holdings	Area fertilised '000 acres	Quantity used '000 tons	No. of holdings	Area fertilised '000 acres	Quantity used '000 tons
1964-65	31,181	4,703	248	40,291	11,496	741
1965-66	30,582	4,664	255	40,637	11,730	800
1966-67	29,771	4,772	267	40,658	12,502	846
1967-68 (a)	30,253	4,961	289	39,636	11,359	780
1968-69 (a)	n.a.	5,654	316	34,994	9,233	638

a) Not strictly comparable with previous years due to changing coverage as mentioned on page 297

Artificial Fertilisers, 1970

Aerial agriculture

The aerial agriculture industry in Victoria has grown rapidly and aircraft are now extensively used for topdressing and sometimes for seeding, crop spraying with weedicides and insecticides, and the control of rabbits by the dropping of poisoned carrot baits. A more recent phase of aerial development is the dropping of young fish into Victorian lakes and streams. A full description of aerial agriculture will be found on pages 494 and 764-5 of the *Victorian Year Book* 1966.

Before 1 January 1967 statistics on aerial agriculture were collected by the Department of Civil Aviation who developed the series in 1956. Since 1 January 1967 these statistics have been compiled from quarterly returns collected by the Bureau of Census and Statistics from operators of aircraft engaged in aerial topdressing, seeding, spraying, and allied activity such as rabbit and dingo baiting.

VICTORIA—AERIAL AGRICULTURE

Particulars	Unit	Year ended 31 March—				
		1965	1966	1967	1968	1969
Total area treated (a)	'000 acres	1,896	2,472	2,424	1,803	1,956
Topdressed or seeded	'000 acres	1,429	1,630	1,945	(b)	(b)
Sprayed or dusted	'000 acres	386	702	(b)	266	(b)
Materials used— Superphosphate	tons	92,213	110,550	(b)	(b)	87,225
Seed	'000 lb	162	56	139	310	157
Aircraft utilisation (flying time)	hours	14,649	19,832	19,109	15,124	15,536

(a) Areas treated with more than one type of material on one operation are counted once only. Includes 81,200 acres baited for rabbit destruction in 1965, 139,910 acres in 1966, and 45,000 acres in 1969. Figures for 1967 and 1968 not available for publication.

(b) Not available for publication.

Farm machinery

VICTORIA—FARM MACHINERY ON RURAL HOLDINGS

Particulars	Number at 31 March—				
	1965	1966	1967	1968 (a)	1969 (a)
Milking machines—Units	101,994	105,004	108,664	109,137	112,618
Shearing machines—Stands	41,112	41,689	43,510	43,596	43,393
Tractors—Wheeled type	71,950	73,668	76,678	78,721	79,101
Crawler type	2,574	2,493	2,888	3,045	2,958
Rotary hoes	11,757	12,016	12,305	13,112	12,915
Fertiliser distributors and broadcasters	29,212	28,219	30,948	30,560	30,383
Grain drills—Combine	19,442	19,604	20,392	20,380	20,217
Other	9,846	9,586	9,574	9,187	9,002
Maize planters	756	762	747	750	909
Headers, strippers and harvesters	14,177	13,963	14,319	14,556	14,179
Pick-up balers	11,405	11,972	12,965	13,173	14,106
Forage harvesters	1,305	1,625	1,913	1,951	2,080

(a) Not strictly comparable with previous years; see page 297 for explanation.

NOTE. Details of items which have not been collected since 1955 are published in the *Victorian Year Book* 1954-58, page 88.

Mechanisation of Farming, 1962

Progress of cultivation

The first Statistical Register of Victoria published in 1854 shows that in 1836 there were 50 acres of land under cultivation in the Colony of Victoria. By 1840 this figure had increased to 3,210 acres. This progress continued until 1852 when 57,471 acres were under cultivation. With the discovery of gold in Victoria, agricultural progress received a temporary setback, the area of land cultivated declining to 34,816 acres in 1854. However, with the influx of population came a demand for agricultural products and, by the end of 1860, the area of land under cultivation amounted to 407,740 acres.

The following table shows the annual average area under cultivation in each decennium from 1856 to 1965 and the actual area for each of the five seasons 1965 to 1969 :

VICTORIA—ACREAGE CULTIVATED ANNUALLY

Period or year (ended March)	Annual average area in each decennium, 1856 to 1965, and actual area each year 1965 to 1969, under—		
	Crop (a)	Fallow	Total cultivation (a)
	acres	acres	acres
1856 to 1865	325,676	12,146	337,822
1866 to 1875	624,377	57,274	681,651
1876 to 1885	1,306,920	137,536	1,444,456
1886 to 1895	2,109,326	364,282	2,473,608
1896 to 1905	3,022,914	524,197	3,547,111
1906 to 1915	3,756,211	1,276,148	5,032,359
1916 to 1925	4,594,244	1,852,145	6,446,389
1926 to 1935	5,233,894	2,501,357	7,735,251
1936 to 1945	4,435,645	2,142,953	6,578,598
1946 to 1955	4,635,982	2,311,401	6,947,383
1956 to 1965	4,222,393	2,191,000	6,413,393
1965	5,019,479	2,484,423	7,503,902
1966	4,969,436	2,620,326	7,589,762
1967	5,143,495	2,751,499	7,894,994
1968	(b)5,202,729	(b)2,646,502	(b)7,849,231
1969	6,156,483	2,727,232	8,883,715

(a) Until 1960 the area of crop included pasture cut for hay and seed. For the decennium 1956 to 1965 and 1961 onwards, area of pasture cut for hay and seed is excluded in the above table.

(b) Includes 135,574 acres under crop and 55,814 acres under fallow resulting from change in coverage referred to on page 297.

Crops and growers

The following table shows the area under, the yield from, and the gross value of each of the principal crops in Victoria for the season 1968-69 :

VICTORIA—AREA, YIELD, AND GROSS VALUE OF CROPS, 1968-69

Crop	Area	Yield	Gross value (a)
	acres		\$'000
Cereals for grain—			
Barley—			
2-row	387,165	8,393,913 bush	8,575
6-row	21,856	490,711 bush	293
Maize	1,161	72,161 bush	108
Oats	991,334	30,230,084 bush	13,029
Rye	11,689	70,239 bush	73
Wheat	3,984,084	90,727,726 bush	122,008

VICTORIA—AREA, YIELD, AND GROSS VALUE OF CROPS, 1968-69—continued

Crop	Area	Yield	Gross value (a)
			\$'000
	acres		
Hay—			
Barley and rye	13,801	23,634 tons	309
Lucerne	99,683	223,176 tons	6,450
Meadow	1,420,851	2,814,006 tons	61,176
Oaten	270,785	510,095 tons	10,304
Wheaten	41,492	64,408 tons	1,035
Green fodder	91,764	..	2,589
Grey and other field peas	14,143	268,257 bush	532
Grass and clover seed	37,630	59,046 cents	1,216
Industrial crops—			
Broom millet	337	1,757 cwt fibre	43
Linseed	14,304	1,132 cwt seed	7
Hops	797	101,570 cwt	658
Mustard	1,000	11,614 cwt	1,115
Tobacco	9,727	5,790 cwt	77
Tobacco		107,812 cwt	13,910
Vegetables—			
Onions	3,634	21,282 tons	905
Potatoes	39,979	299,961 tons	10,343
Other	52,030	216,742 tons	21,312
Stock fodder—			
Pumpkins and root crops	6,902	..	504
Vineyards—			
Grapes—			
Table	2,582	6,939 tons	1,355
Wine	7,908	29,450 tons	1,423
Drying	34,229	168,682 tons	..
Vines, unproductive	4,251	..	..
Vines, unproductive			
34,323 tons of sultanas			13,109
3,573 tons of raisins			1,567
2,687 tons of currants			1,182
Orchards—			
Productive	57,094	..	30,804
Unproductive	14,504	..	..
All other crops	13,367	..	5,703
Total crops	7,650,083	..	331,715

(a) The gross value is based on the wholesale price realised in the principal markets. The places where primary products are absorbed locally or where they become raw materials for a secondary industry are presumed to be principal markets.

VICTORIA—GROWERS OF CERTAIN CROPS, SEASON 1968-69

Crops grown	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	Northern	Northern-Eastern	Gippsland	
Grain crops—									
Wheat	648	398	916	3,916	2,720	3,242	409	48	12,297
Oats	647	558	2,498	2,945	1,299	2,352	743	34	11,076
Barley	615	114	514	1,057	1,061	963	83	79	4,486
Maize	4	..	..	..	1	4	25	59	93
Green fodder—									
Maize	278	27	85	5	..	12	28	368	803
All other	904	328	1,123	53	98	610	372	883	4,371
Other—									
Potatoes	1,407	380	504	8	20	19	103	379	2,820
Onions	240	1	199	4	23	12	..	7	486
Other vegetables	1,284	21	321	40	352	409	29	191	2,647
Orchards	1,629	143	56	73	1,152	968	121	55	4,197
Vineyards	7	3	1	3	2,264	143	22	..	2,443
Grass and clover seed	26	90	189	36	25	74	159	1	600
Tobacco	..	..	..	..	..	27	351	..	378

The preceding table shows the numbers of growers of certain primary products, in each statistical district of the State, for the season 1968-69.

The information has no relation to the number of rural holdings in the State, as numbers of occupiers are engaged in the cultivation of more than one of the crops enumerated.

A summary of the area under cultivation and yield of crops in each statistical district of the State for the season 1968-69 is given in the following tables :

VICTORIA—AREA UNDER CULTIVATION, SEASON 1968-69
(Acres)

Crop	Statistical District							Total	
	Central	North-Central	Western	Wimmera	Mallee	Northern	North-Eastern		Gippsland
Grain crops—									
Wheat	51,446	34,637	103,740	1,293,617	1,836,889	607,436	51,324	4,995	3,984,084
Oats	29,632	26,890	243,728	284,904	177,256	195,493	31,827	1,604	991,334
Barley	53,121	3,003	23,604	86,173	161,568	73,958	2,961	4,633	409,021
Maize	9				400	24	119	609	1,161
Field peas	5,076	399	2,722	2,491	3,010	103	144	198	14,143
All hay	237,919	103,677	547,329	196,007	76,954	369,576	119,783	195,367	1,846,612
Green fodder	17,819	6,367	28,925	1,308	2,651	11,875	7,016	15,803	91,764
Grass and clover for seed	1,018	4,694	11,726	1,687	3,042	4,830	10,593	40	37,630
Tobacco						430	9,297		9,727
Potatoes	20,798	5,948	6,161	20	174	134	770	5,974	39,979
Onions	1,293	3	1,982	5	113	193		45	3,634
All other vegetables	22,220	86	14,959	104	4,071	4,245		6,097	52,030
Vines	39	73	131	650	45,778	857	1,448		48,970
Orchards	21,901	1,994	516	2,130	8,529	34,241	1,799	488	71,598
All other crops	5,005	677	16,723	741	11,832	5,783	2,349	5,286	48,396
Total area under crop	467,296	188,448	1,002,246	1,869,837	2,332,267	1,309,178	239,672	241,139	7,650,083
Land in fallow	42,991	24,277	57,937	835,203	1,306,643	421,988	15,831	22,362	2,727,232
Total area under cultivation	510,287	212,725	1,060,183	2,705,040	3,638,910	1,731,166	255,503	263,501	10,377,315

(a) The total area under crop includes 1,420,851 acres of grass and clover cut for hay and 35,119 acres of double-cropping.

VICTORIA—YIELD OF PRINCIPAL CROPS, SEASON 1968-69

Crop	Statistical District							Total	
	Central	North-Central	Western	Wimmera	Mallee	Northern	North-Eastern		Gippsland
Grain crops—									
Wheat bush	1,242,426	830,653	3,718,340	37,112,586	31,788,329	14,554,217	1,363,951	117,224	90,727,726
Oats "	1,146,284	719,047	10,424,708	9,412,141	2,561,188	4,948,667	976,446	41,603	30,230,084
Barley "	1,646,259	76,187	733,396	2,075,976	2,645,322	1,551,173	63,768	92,543	8,884,624
Maize "	380				23,000	1,755	7,332	39,694	72,161
Field peas "	129,822	7,698	67,533	37,023	18,492	2,502	2,397	2,790	268,257
All hay tons	479,873	205,743	1,150,812	329,024	118,399	656,637	250,926	443,905	3,635,319
Grass and clover for seed centsals	1,715	7,684	18,603	2,025	4,055	6,590	18,282	92	59,046
Tobacco cwt						3,551	104,261		107,812
Potatoes tons	154,631	46,233	48,878	88	741	841	3,836	44,713	299,961
Onions "	7,357	15	11,959	8	583	1,033		327	21,282
Wine made gal	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	6,241,000
Dried vine fruit—									
Raisins ton	..	..	..	..	3,573	..	..	..	3,573
Sultanas "	..	..	..	..	34,323	..	..	..	34,323
Currants, "	..	..	..	..	2,687	..	..	..	2,687

(a) Details for individual districts are not available for publication.

Principal crops

General

The cereals wheat, oats, and barley are the principal crops grown in Victoria and these, together with hay, represent about 90 per cent of the total area sown, although there is some variation from year to year. The growing of potatoes, grapes, and apples is also important.

In the following section some detailed descriptive and statistical information is given of all main crops grown in the State including those mentioned above.

Wheat

The acreage sown to wheat in recent years has been more than 3 mill. acres. This is about half the total area under crop in the State. Virtually all the wheat crop is used for grain production, only about 1 per cent being cut for hay. The average annual production for the five years ended 1966-67 was about 71 mill. bush of which about 65 per cent was exported. Grain yields during these five years averaged about 22 bush (60 lb per bush) per acre, but yields as high as 60 bush per acre are harvested on individual farms in most seasons. The highest officially recorded yield is 78.8 bush per acre for 50 acres grown near Murtoa in 1960. However, in the 1967-68 drought, wheat production fell to 29 mill. bush and the average yield to 8.8 bush per acre.

Record production occurred in the year following the drought when a crop of just over 4 million acres produced about 91 million bushels. Similar increases in several other States led to a considerable surplus over the requirements for export. The Wheat Marketing Act proclaimed on 9 December 1969 implemented in Victoria the Wheat Delivery Quota Scheme proposed by the Australian Wheat Growers' Federation and provided the administrative machinery decided upon by the Victorian Farmers' Union for the operation of the scheme. In the 1969-70 season the quota for wheat grown in Victoria and in the adjacent regions which normally deliver to silos operated in the Victorian grain handling system was 65 million bushels or about 5 per cent below the average of receipts during the previous five seasons. Some of the production in excess of the quota was, however, received by the Grain Elevators Board where space was available as advance deliveries against the quota for the following year.

The main wheat belt lies in the northern part of the State, in the Mallee, Wimmera, and Northern Districts, where about 94 per cent of the crop is grown. The average annual rainfall varies from about 12 inches in the north-west of the State to about 20-30 inches at the eastern and southern margins. About three quarters of the wheat crop is sown on bare fallowed land.

Superphosphate is applied at seeding to virtually all crops. Zinc sulphate is added in the Wimmera District, applications normally being made to each third or fourth wheat crop. Nitrogenous fertilisers are used in particular circumstances, namely, on light sandy soils and land infested with skeleton weed in the Mallee and on heavily cropped land in the Wimmera and southern areas. Diseases are not normally a major problem, but heavy losses occur due to foot rot and cereal cyst nematode in some seasons. Stem rust rarely causes much loss. Ball smut is effectively controlled by pickling with fungicide powder which is done at the same time as the

seed is graded. Weeds are controlled by fallow cultivation or by crop spraying. The crop is harvested from mid-November in the early districts to January under late conditions.

Wheat is grown in rotation with fallow, other cereal crops, and pastures. The use of subterranean clover and medic leys has greatly improved soil fertility, with resultant benefit to wheat yields and quality. Sheep grazed on these, and on native pastures, contribute materially to the State's wool and prime lamb production, especially to the production of early prime lambs.

Wheat is grown on three major soil types : (1) Mallee soils referred to as solonised brown soils ; (2) self-mulching grey soils of heavy texture and high fertility in the southern Wimmera ; and (3) red-brown earths of varying texture in the northern Wimmera and the Northern District.

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, but limited areas of the hard variety Emblem are sown in the eastern Mallee where wheat with protein content above the Victorian f.a.q. (fair average quality) is usually produced. Substantial improvement in wheat quality has been achieved by plant breeding during the past 30 years, and one of the leading soft wheats at present is in the medium to strong class. The adoption of clover and medic ley rotation systems has led to a substantial improvement in the protein content, and thus the quality, of Victorian wheat.

Virtually the whole of the wheat crop is handled, stored, and transported in bulk. The crop is marketed through the Australian Wheat Board. The greater part of the crop is marketed as one grade known as f.a.q. (fair average quality). A small amount of the semi-hard wheat grown in the eastern Mallee is segregated for separate sale.

Grain Elevators Board

In 1934 an Act was passed to provide for the handling of wheat in bulk in Victoria. The Act gave the Government power to constitute a Board of three members to implement the provisions of the Act. As a result of submissions made by the Board to, and approved by, the Government, 226 country receiving elevators and a shipping terminal have been constructed, the necessary finance being obtained from loans totalling \$30,259,000. Repayment of the principal and interest are guaranteed by the Victorian Government. In 1963 the Act was amended to provide for the handling of barley in bulk by the Grain Elevators Board.

The Grain Elevators Board first received and shipped Victorian wheat in bulk for the 1939-40 season and first received barley in bulk for the 1963-64 season.

The Board's Geelong Terminal is operated by push-button remote control with operational indicator lights appearing on a diagram panel of the whole terminal. Grain can be received from rail trucks and can be shipped from the terminal at the same rate of 1,600 tons per hour, either direct from the terminal storage bins or by a combination of storage bins and rail receivals.

The Grain Elevators Board has under its control storage for 127 million bushels of wheat. In comparison with the season 1968-69, when the record quantity of 93,773,000 bushels of bulk wheat and 5,882,000 bushels of bulk barley were delivered to the Board, the receivals for the 1969-70

season were 81 million bushels of bulk wheat and 7.3 million bushels of bulk barley. Wheat quotas were introduced for the 1969-70 season, Victoria's quota being fixed at 65 million bushels and the balance of the receivals being over-quota wheat.

The following statement shows the revenue and expenditure of the Grain Elevators Board in Victoria :

VICTORIA—GRAIN ELEVATORS BOARD : REVENUE, EXPENDITURE, ETC.
(\$'000)

Particulars	Year ended 31 October—				
	1965	1966	1967	1968	1969
REVENUE					
Operating and maintenance expenses	1,763	1,731	1,974	1,435	2,108
Capital facilities allowance	1,946	2,205	2,401	2,544	2,546
Interest on investments	358	373	437	482	552
Other	..	..	..	3	..
Total revenue	4,067	4,309	4,812	4,464	5,206
EXPENDITURE					
Operating and maintenance expenses	1,362	1,317	1,517	1,093	1,651
Administration expenses	400	414	457	342	458
Depreciation and renewals	421	504	544	571	573
Interest on loans	1,058	1,230	1,348	1,420	1,516
Sinking fund charges	212	231	255	269	288
Appropriations to reserves	293	493	788	762	720
Other	3	45	2	6	..
Total expenditure	3,749	4,234	4,911	4,463	5,206
Net surplus	318	75	—99	1	..
Fixed assets (at 31 October)	23,880	26,611	28,909	30,700	31,823
Loan indebtedness (at 31 October)—					
State Government	1,755	1,729	1,706	1,683	1,672
Public	20,424	22,202	23,723	24,899	26,572

Australian Wheat Board

History

After the outbreak of the Second World War, the Australian Wheat Board was established in September 1939 under National Security legislation. When the war ended in 1945 the Board continued to operate until 1948 as an agent for the Commonwealth Government under "transitional legislation".

In 1948 agreement was reached between the Commonwealth and States for the first of the Wheat Industry Stabilisation Schemes. For constitutional reasons, it was necessary for each State to pass legislation accepting the Australian Wheat Board as the central marketing authority, and to permit it to operate within the States. Before the outbreak of the War progress had been made in Federal-State Conferences towards a comprehensive stabilisation scheme. The war intervened and full control over the sale of Australian wheat was given to the Board under the exigencies of war-time conditions.

The marketing experience of the Board, and the desires of the growers were finally combined in the wheat stabilisation legislation of 1948 and

renewed under successive five year schemes ever since. The Australian Wheat Board now functions under the present Wheat Stabilisation Act of 1968. This Act authorises the Board to market all wheat harvested between 1 October 1968 and 30 September 1975 (seven seasons) but limits the application of the revised guaranteed price provisions to wheat harvested between 1 October 1968 and 30 September 1973 (five seasons). Negotiations between the growers and the Government will be held before September 1973 to review the guarantee provisions.

Constitution

The Board comprises fourteen members, two growers from each of the five mainland States together with the chairman, a finance member, a millers' representative, and an employees' representative.

Functions and operations

Under complementary Commonwealth and State legislation :

1. the Board is the sole authority for the marketing of wheat in Australia and for both wheat and flour for export ;
2. growers are required to deliver to the Board all wheat grown by them except that required as seed or feed on the farms where it is grown ; and
3. the Board becomes the owner of all wheat delivered to it.

The Board employs the various bulk handling authorities and wheat merchant-shippers are employed by the Board for the receipt of bagged wheat.

The bulk of local sales of wheat is made to flour millers under agreements which provide for the Board to keep mills stocked with sufficient wheat to meet their trade requirements. The mills account to the Board for all wheat delivered to them. The local trade in wheat for stock and/or poultry feeding is arranged through distributing agents who lodge orders through the Board for their clients' requirements. The local price of wheat f.o.r. (free on rail) ports is a uniform home consumption price in all States established by legislation based on an annual review of the cost of production plus a surcharge to cover the cost of transporting the wheat from the mainland to Tasmania.

Export sales are negotiated by Head Office for all markets except those negotiated by the Australian Wheat Committee in London for the United Kingdom, European countries, and certain other markets in the Middle East. Sales of export flour are made by Head Office where the purchasers are government controlled instrumentalities, but mills and approved exporters are able to negotiate sales to private buyers subject to purchase of the flour from the Board. All export prices are determined by the Board on a competitive basis with other exporting countries, having due regard to the provisions of the International Grains Arrangement to which the Australian Government is a signatory.

The current five year Wheat Industry Stabilisation Plan commenced with the 1968-69 crop and provides for a guaranteed price to wheat growers on up to 200 million bushels of exports from each season's wheat. The guaranteed price is no longer linked with the cost of production but, for the 1968-69 season, was set at \$1.45 per bushel f.o.b. ; at the commencement of each of the remaining four seasons this price may be varied according to changes in relevant costs associated with the production, transport, handling, or storage of wheat.

Total deliveries by wheat growers to the Victorian Branch of the Australian Wheat Board during the 1968-69 season were 94,672,000 bushels including 6,230,000 bushels of southern New South Wales wheat delivered to storages at railway sidings operated by Victorian Railways in New South Wales, and 2,386,000 bushels of southern New South Wales wheat delivered to storages in Victoria.

The 1968-69 crop was sown on the largest acreage since 1930-31 and enjoyed adequate autumn and winter rainfall, with spring rains below average in the Mallee and Wimmera districts. Whilst Mallee yields were reduced, Wimmera eventually yielded on a par with its best years. Intended acreage in northern and north-eastern areas was reduced because of excess moisture in the growing period but yields were quite good.

The State yield per acre from the 1968-69 crop was 22.77 bushels. The f.a.q. standard was set at 65 lb per bushel.

Wheat standard

The fair average quality (f.a.q.) standard is determined each season by a State Committee and is the basis for sales of each crop.

Samples of wheat from various districts are obtained each year and mixed to obtain a representative sample of the whole crop. The f.a.q. weight is then determined by use of the Schopper 1 litre scale chondrometer.

Area of wheat for grain, production, gross value, f.a.q., and holdings growing 20 acres and over

In the following table the area of wheat for grain, production, average yield, gross value of production of wheat, the f.a.q. standard determined in Victoria and the number of holdings growing wheat (20 acres or more) for each of the seasons 1964-65 to 1968-69 are shown :

VICTORIA—WHEAT STATISTICS

Season	Area	Production	Holdings growing wheat (20 acres and over)	Average yield per acre	Gross value	Weight of bushel of wheat, f.a.q.
	'000 acres	'000 bush	No.	bush	\$'000	lb
1964-65	3,237	78,166	11,981	24.15	109,396	64
1965-66	3,074	60,591	10,714	19.71	89,939	63½
1966-67	3,138	70,896	11,202	22.59	104,471	63½
1967-68	3,224	28,317	11,056	8.78	43,856	65
1968-69	3,984	(a) 90,728	11,686	22.77	122,008	65

a) Record production.

Wheat breeding

The objective of wheat breeding in Victoria is to produce new varieties which will give higher yields of better baking quality grain than existing varieties. Included in the yield objective is the reduction of losses due to drought and various diseases which include cereal cyst nematode (eelworm), stem rust, leaf rust, septoria, and eye spot lodging. The breeding work is a function of the Victorian Department of Agriculture, which undertakes plant breeding, field testing, and quality evaluation. In current breeding programmes, selections are being made from crosses between semi-dwarf and dwarf imported varieties of high yielding ability, and Victorian varieties.

The wheat breeding activities of the Department are centred on the State Research Farm at Werribee and the Victorian Wheat Research Institute at Horsham where the hybridisation is carried out, the early generations raised, and the initial quality and disease testing done. This work is supplemented by regional selection centres in other wheat growing districts.

Field testing is undertaken in all districts at Departmental research stations and colleges and on farmers' properties. There are about thirty-five centres for varietal testing in Victoria. Disease testing is carried out at research stations in appropriate areas and at the Victorian Plant Research Institute at Burnley. After the early generation quality testing, which is done at the State Research Farm, Werribee, and the Victorian Wheat Research Institute at Horsham, final evaluations, including test baking, are undertaken at the Department's cereal laboratories in Melbourne.

The wheat breeding work of the Department has been very successful. During the past fifty years, over forty new varieties of wheat have been released for cultivation by farmers. The mostly widely grown of these have been Free Gallipoli (1923), Ghurka (1924), Rancee 4H (1930), Magnet (1939), Quadrat (1941), Insignia and Pinnacle (1946), Sherpa (1953), Olympic (1956), Emblem (1963), and Summit (1966). Almost 90 per cent of the wheat acreage in Victoria is sown to varieties bred by the Department, and for some years Insignia has been the most widely grown variety in Australia.

Since 1930, the baking quality of Victorian wheat has improved markedly. This has been due partly to varietal improvement and partly due to improved soil fertility by the use of legume leys with a resultant continuing effect on grain protein content.

The following table shows the areas under the principal varieties of wheat, including wheat for hay, for the seasons 1966-67, 1967-68, and 1968-69. Varieties are tabulated in order of popularity for the last mentioned season.

VICTORIA—PRINCIPAL VARIETIES OF WHEAT SOWN

Variety (in order of popularity, season 1968-69)	Season 1966-67		Season 1967-68		Season 1968-69	
	Acres sown	Percentage of total area sown	Acres sown	Percentage of total area sown	Acres sown	Percentage of total area sown
Insignia	1,531,146	48·34	1,562,248	46·84	1,940,328	48·20
Olympic	744,798	23·51	823,033	24·68	813,166	20·20
Pinnacle	522,294	16·49	473,854	14·21	507,223	12·60
Heron	112,102	3·54	152,488	4·57	253,611	6·30
Summit	1,684	0·05	63,371	1·90	205,304	5·10
Emblem	87,421	2·76	110,491	3·31	136,870	3·40
Insignia 49	61,729	1·95	55,226	1·66	72,460	1·80
Sherpa	33,426	1·06	30,864	0·93	32,205	0·80
Falcon	15,557	0·49	15,212	0·46	16,102	0·40
Beacon	16,257	0·51	14,969	0·45	12,077	0·30
Quadrat	12,546	0·40	9,415	0·28	8,051	0·20
Baldwin					3,079	0·08
Stockade	7,623	0·24	4,640	0·14		
All other varieties	20,899	0·66	19,059	0·57	25,100	0·62
Total	3,167,482	100·00	3,334,870	100·00	4,025,576	100·00

Oats

Oats are the second most widely grown crop in Victoria, and in recent years the area of this cereal has averaged about 1·3 million acres. Nearly

72 per cent of this is normally harvested for grain, some of it after winter grazing. Although oaten hay was important in the past, only about 15 per cent of the acreage is now harvested for this purpose, the remainder (13 per cent) of the area being used solely for grazing.

As the land on which oats are grown is normally not fallowed or as well prepared as that intended for wheat, oat production shows greater fluctuations than wheat production. This seasonal variability is particularly marked in the northern parts of the State. While the average annual grain production is about 20 million bushels (40 lb per bushel), it was 31 million bushels in 1966-67, 6.9 million bushels in 1967-68, and 30 million bushels in 1968-69.

Over half the oat grain produced in Victoria is held on farms or is used within Victoria for stock feed. Large quantities are retained for feeding during periods of seasonal shortage or in drought conditions. About a quarter of the crop goes to mills, but only a relatively small proportion is used to manufacture foods for human consumption. Milling quality oats usually command a premium of 2 cents to 10 cents per bushel above feed oats. The other uses of the grain by the mills are for the manufacture of stock foods and for the manufacture of unkilned rolled oats, mainly for export. The remaining quarter of the crop is exported as grain. More than 95 per cent of the oats exported are sold as "Victorian No. 1" grade. Oat grain is sold in an open market through merchants or through the voluntary oat pool, and prices fluctuate widely according to seasonal conditions and supplies available. The merchants and the oat pool provide facilities for bulk deliveries at most main centres.

During the past ten years, the area cut for hay has fluctuated around 200,000 acres in normal seasons with an average production of about 335,000 tons. About double the normal acreage was cut for hay during the 1967-68 drought and production increased by about 100,000 tons. In 1968-69 the area cut for hay was 271,000 acres and production was 510,000 tons. The hay may be cut either for farm use or for sale (mainly to chaff mills near Melbourne, Ballarat, and Maryborough).

Most of the area fed-off completely is grazed by sheep in the winter, but in dairying districts oats are sometimes sown for autumn and winter grazing to supplement pasture growth. About 30 per cent of the oats completely grazed are in the Mallee District.

The main oat grain producing areas are in the Mallee, Wimmera, Northern, and Western Districts. The popularity of varieties has undergone marked changes in recent years. After having held supremacy for more than 40 years, Algerian was superseded as the leading variety by Orient in 1962, while Avon now holds this position. The area sown to the five leading varieties—Avon, Orient, Algerian, Kent, and Irwin—is almost 87 per cent of the total oat acreage in the State.

The area harvested (season 1968-69) for hay was 270,785 acres, and for grain 991,334 acres, which produced 510,095 tons of hay, and 30,230,084 bushels of grain, respectively. The area of oats sown for grazing purposes amounted to 141,836 acres. The following table shows the area, yield, and gross value of oats for grain for each of the five seasons 1964-65 to 1968-69 :

VICTORIA—OATS FOR GRAIN

Season	Area	Production	Average yield per acre	Gross value
	'000 acres	'000 bush	bush	\$'000
1964-65	966	22,446	23·23	16,237
1965-66	966	17,784	18·42	15,287
1966-67	1,079	(a) 31,248	28·96	19,033
1967-68	723	6,859	9·49	6,723
1968-69	991	30,230	30·49	13,029

(a) Record production.

Barley

In 1968-69 both the area sown for barley (409,000 acres) and production (8·9 million bush) were a record. The previous highest barley production was in 1958-59 when about 362,000 acres (2- and 6-row) were sown with a production of approximately 8·6 million bush (50 lb per bush), but, after that, area and production declined until the mid 1960s when acreage increased from 187,000 in 1964-65 to 305,000 acres in 1967-68. The upward trend continued in 1968-69 when many wheatgrowers increased their barley planting as wheat deliveries were limited by the quota scheme. About 95 per cent of the barley grown in Victoria is of 2-row, or malting type. The remainder is sown with 6-row varieties, which are used primarily for stock feed.

Although some barley is grown in all districts, the production has been traditionally centred in two distinct areas where high quality grain is produced. The largest production is in the south-western Mallee and the adjacent area of the north-western Wimmera. While wheat is the main cereal throughout the cereal growing districts, the barley crop occupies second position in the areas noted above, whereas, in most other portions of northern Victoria, oats occupy this position.

In this northern barley growing area, the best quality barley is grown on the sandier soil types. The crop is sown either on ley land cultivated in the autumn just prior to sowing or on wheat stubble land. The variety Prior was almost exclusively sown in this area until recently. Now a smaller area in the northern Mallee is also sown to Noyep. A new variety, Weeah, produced by the Department of Agriculture, was introduced in 1968. Superphosphate is the standard fertiliser applied. Average district yields are about 19 bush per acre.

The other important area is in southern Victoria between Melbourne, Geelong, and Bacchus Marsh. Here, barley is the main crop, and the normal practice is to sow it with superphosphate on fallowed land. The main variety has been Research, but Resibee, released by the Department of Agriculture in 1962, is now being grown to an increasing extent. While Research produced very good malting quality grain in this area, the newer variety has slightly superior quality characteristics. Yields are considerably higher than those obtained in the north, the average yield being about 32 bush per acre. This region is close to the main barley shipping terminals, and growers' freight costs are much lower than in the northern areas.

The Victorian Grain Elevators Board has provided a bulk handling scheme for barley since 1963. The provision of extra facilities, including

special aerated storages at Hopetoun, Rainbow, and Jeparit, and terminal storages at Geelong and Sunshine, with the use of existing elevators on a throughput basis before the wheat harvest, has made it possible for the crop to be handled in bulk in almost all the districts where it is grown. The increased production in 1969-70 exceeded the storage space available and growers' deliveries were regulated pending disposal of part of the crop.

Barley is marketed through the Australian Barley Board, which operates in Victoria and South Australia and provides an orderly marketing system for barley grown in those States. The barley is classified to suit specific purposes on delivery. Classification is, first, on varietal type—Chevalier (Prior, Weeah, and similar varieties) and Research (Research, Resibee, Anabee)—and, second, on quality—Malting, Milling (No. 3), and Feed (Nos. 4 and 5). There are price differentials between each grade.

The Victorian malting industry takes most of the malting quality grain for malt for local use and also uses some of the lower grade grain for producing malt for export—principally to eastern Asia, the Pacific Islands, and Africa. Lower quality barley is used for stock feeding as whole grain and manufacturing in the distilling, pearling, and prepared stock feed industries. Barley surplus to these requirements is exported.

The following table shows the area, yield, and gross value of barley for each of the five seasons 1964-65 to 1968-69 :

VICTORIA—BARLEY PRODUCTION

Season	Area		Production		Average yield per acre			Gross value \$'000
	2-row	6-row	2-row	6-row	2-row	6-row	Total	
	'000 acres	'000 acres	'000 bush	'000 bush	bush	bush	bush	
1964-65	177	10	4,140	194	23·36	20·01	23·19	4,828
1965-66	181	11	3,038	179	16·77	16·16	16·73	3,662
1966-67	213	14	5,066	355	23·74	24·85	23·81	7,260
1967-68	287	18	2,550	158	8·89	8·81	8·88	3,261
1968-69	387	22	8,394	491	21·68	22·45	21·72	8,868

Maize

Maize is grown in Victoria both for grain and for green fodder and 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, yield, and gross value of maize for each of the five seasons 1964-65 to 1968-69 are given in the following table :

VICTORIA—MAIZE PRODUCTION

Season	For green fodder	For grain							Gross value \$'000
		Area			Production			Av. yield per acre	
		Hybrid	Other	Total	Hybrid	Other	Total		
acres	acres	acres	acres	bush	bush	bush	bush		
1964-65	5,793	2,148	205	2,353	107,911	6,271	114,182	48·53	213
1965-66	4,161	1,497	186	1,683	93,938	7,551	101,489	60·30	121
1966-67	3,421	1,261	146	1,407	67,044	5,074	72,118	51·26	115
1967-68	4,723	825	92	917	29,252	2,723	31,975	34·87	48
1968-69	3,588	1,059	102	1,161	68,553	3,608	72,161	62·15	108

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 Mallee District. There is some interest in it for winter grazing in cold districts during the winter months.

The following table shows the area, yield, and gross value of rye for each of the five seasons 1964-65 to 1968-69 :

VICTORIA—RYE PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	bush	bush	\$'000
1964-65	13,581	109,162	8.04	139
1965-66	13,409	65,821	4.91	87
1966-67	11,608	77,722	6.70	106
1967-68	9,578	42,351	4.42	57
1968-69	11,689	70,239	6.01	73

Hay

The pattern of hay production in Victoria changed considerably in the post-war period. More complete mechanisation and the virtual disappearance of the working horse removed the previous emphasis from cereal hay. The harvesting of large areas of cereal crops, particularly oats, grown specifically for the production of hay for the maintenance of horse teams, is no longer necessary and so there has been a marked decline in the amount of cereal hay produced.

On the other hand, there were spectacular increases in the production of other forms of fodder. The annual production of meadow hay increased from about 400,000 tons to over 2 mill. tons during this period. There was also a substantial increase in the amount of lucerne hay conserved. Ensilage made mainly from pasture growth increased from about 25,000 tons annually to over 300,000 tons in the post-war period, yet it still supplies something under 10 per cent of the dry nutrients in Victoria's fodder reserves.

This increase in fodder conservation has resulted in more efficient utilisation of the extra herbage grown as the result of pasture improvement in all districts. Large numbers of livestock are now being maintained with greater safety following the conservation of portion of the surplus spring growth for feeding out during periods of seasonal shortage or in drought.

As pastures have been improved and livestock production intensified, the provision of supplementary fodder has become an important factor in the Victorian grazing industry. The conservation of meadow hay fits in well with farm management routine and is a convenient method of ensuring continuity of fodder supplies.

Further information on fodder conservation will be found on pages 328 and 329.

Particulars of areas harvested and production of the several kinds of hay appear in the following table :

VICTORIA—HAY PRODUCTION, 1968-69

Kind	Area	Production	Average yield per acre
	acres	tons	tons
Wheaten	41,492	64,408	1.55
Oaten	270,785	510,095	1.88
Lucerne	99,683	223,176	2.24
Barley, rye, etc.	13,801	23,634	1.71
Meadow	1,420,851	2,814,006	1.98
Total	1,846,612	3,635,319	1.97

The following table shows, in respect of each statistical district of the State, the quantity of ensilage made during the 1968-69 season and the stocks of ensilage and hay held on rural holdings at 31 March 1969 :

VICTORIA—ENSILAGE MADE AND FARM STOCKS
OF ENSILAGE AND HAY
(Tons)

Statistical District	Ensilage made, 1968-69	Stocks at 31 March 1969	
		Ensilage	Hay
Central	94,205	68,532	368,804
North-Central	10,668	9,656	144,772
Western	41,856	29,375	889,674
Wimmera	8,152	8,930	266,669
Mallee	3,304	4,599	97,711
Northern	11,984	14,679	590,771
North-Eastern	36,501	34,156	235,752
Gippsland	130,690	93,263	393,695
Total	337,360	263,190	2,987,848

Potatoes

Victoria is the largest producer of potatoes in Australia, contributing a little more than one third of the total annual requirement. Potatoes are generally used as a fresh vegetable, but substantial quantities are processed into chips, crisps, and other prepared forms, as well as dehydrated flakes. Generally regarded as a summer crop, potato planting goes on in one district or another for ten months of the year, while harvest extends over the whole year.

Early crops are grown in favoured localities where the risk of frost is not great, such as in the Bellarine Peninsula and the market garden areas south-east of Melbourne. These are lifted from October (or sooner) to December. Mid-season crops come on the market in January, February, and March from districts such as Koroit, Gembrook, Koo Wee Rup, and parts of Gippsland. The late or main crop is produced in the Central Highlands (Ballarat to Trentham), Kinglake, the Otways, and the Gippsland hill country. Its harvest commences in April and runs on until October.

About half the total area of potatoes planted in Victoria is grown under spray irrigation. In most cases the water is derived from farm storages or from bores. Potato growing has become increasingly mechanised and

production has, therefore, tended to pass into the hands of specialist growers having larger individual areas.

The following table shows the area, yield, and value of potatoes for each of the five seasons 1964-65 to 1968-69 :

VICTORIA—POTATO PRODUCTION

Season	Area	Production (a)	Average yield per acre	Gross value
	acres	tons	tons	\$'000
1964-65	32,931	183,665	5.58	24,820
1965-66	34,333	240,786	7.01	11,050
1966-67	37,167	225,186	6.06	15,291
1967-68	40,329	215,941	5.35	18,566
1968-69	39,979	299,961	(b) 7.50	10,343

(a) Includes amounts held on farms for seed, stock feed, etc., as follows : 23,795 tons in 1964-65, 27,851 tons in 1965-66, 26,394 tons in 1966-67, 28,783 tons in 1967-68, and 36,328 tons in 1968-69.

(b) Record average yield.

Onions

The principal onion growing areas are in the Central and Western Districts. In the season 1968-69 these areas were responsible for 98 per cent of the total onion production of the State. The following table shows the area, yield, and gross value for each of the five seasons 1964-65 to 1968-69 :

VICTORIA—ONION PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	tons	tons	\$'000
1964-65	3,825	22,963	6.00	1,440
1965-66	2,955	17,115	5.79	1,814
1966-67	3,295	22,375	6.79	1,464
1967-68	3,617	11,339	3.13	1,427
1968-69	3,634	21,282	5.86	905

Linseed

Linseed is the major oil producing crop grown in Victoria. Its commercial production, which began in 1947, has increased to over 25,000 acres in suitable years, with an output in excess of 300,000 bushels. In wet seasons, however, such as 1963-64, weather and soil conditions seriously cut the intended acreage. Since 1964 acreage has been restricted following a reduction in demand due to the introduction of synthetic paints and floor coverings.

Linseed has proved to be well adapted to broad acre production over a wide area of mixed farming and pastoral country in the 20 to 30 inch rainfall zone in the western part of Victoria. Initially, the industry was developed on imported varieties, and, in the period up to 1955, yields were low because these varieties were not fully suited to Victorian conditions and because of their susceptibility to disease.

Greater stability has been given to the industry with the release by the Victorian Department of Agriculture of disease resistant and better adapted varieties.

Victorian linseed contains 38 to 40 per cent of oil of satisfactory quality. Linseed oil is one of the main components of paints, varnishes, and linoleum, and also has many other industrial uses. The meal or press cake which remains after the oil has been extracted is a valuable stock food.

The following table shows the area, yield, and value of linseed for each of the five seasons 1964-65 to 1968-69 :

VICTORIA—LINSEED PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	bush	bush	\$'000
1964-65	9,953	106,824	10·73	394
1965-66	7,370	101,536	13·78	358
1966-67	5,012	92,752	18·51	302
1967-68	9,365	32,176	3·44	104
1968-69	14,304	203,140	14·20	658

Tobacco

Flue-cured Virginia tobacco is the only type produced in quantity in Australia and is mainly absorbed 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 set at 50 per cent and at the present high level of usage it is important that only leaf of desirable smoking quality is produced. Such leaf can be grown with some certainty only in areas having sandy friable soils and, during the summer months, appreciable rainfall, moderate temperatures, and high atmospheric humidity.

The Victorian crop usually accounts for rather more than one third of the total Australian tobacco production. Suitable growing conditions are found in the north-eastern river valleys, and the industry is concentrated at present along the Ovens and King Rivers and their tributaries, with small outlying areas in the northern part of the State. Recent trends disclose a concentration of production in the higher parts of these valleys, with some contraction at certain climatically less favoured downstream centres and in the inundated area above the Buffalo River dam. The Mount Beauty district in the upper Kiewa Valley has also become established as a reliable centre for the production of good quality leaf.

Tobacco growing in Australia has traditionally been regarded as a rather speculative proposition due to wide fluctuations in production and market conditions, and it is only in the past decade that any degree of stability has become apparent due to a consistent upward trend in average yield which has resulted in the Victorian figure approaching a level comparable to that achieved by the world's major tobacco producing countries.

The fungus disease, blue mould, has often brought about drastic reduction of yield and has been the prime cause of most short Victorian crops in the past. At present growers are able to control this disease by implementing newly developed fungicidal spray programmes, and this is perhaps the main factor in current yield improvement.

The implementation in 1965 of a Tobacco Stabilisation Scheme, whereby a market is guaranteed for the annual sale of up to 28·5 mill. lb of leaf

meeting certain quality standards, has promoted further stability in the industry.

Victorian tobacco producers are assisted in their efforts to increase yield and improve leaf quality by the Department of Agriculture, which conducts research in agronomy, plant pathology, and plant breeding at the Tobacco Research Station at Myrtleford and its substation at Gunbower, and also provides an intensive farm to farm advisory service for growers.

The following table shows the area, yield, and gross value of tobacco in each of the five seasons 1964-65 to 1968-69 :

VICTORIA—TOBACCO PRODUCTION

Season	Area	Production	Average yield per acre	Gross value
	acres	cwt (dry)	cwt (dry)	\$'000
1964-65	9,720	107,855	11·10	11,678
1965-66	9,230	98,953	10·72	12,377
1966-67	8,455	97,792	11·57	11,938
1967-68	8,664	68,076	7·86	7,915
1968-69	9,727	107,812	11·08	13,910

Further reference, 1963 ; Marketing of Tobacco, 1969

Fruit industry

Victoria is a major producer of a wide variety of fruit and about 120,000 acres are used for orchards and vineyards. The three most important districts are the area within 50 miles of Melbourne (apples, dessert tree fruits, and berries), the Goulburn Valley (canning fruit), and the Mallee region (vine fruit and citrus).

Most of the fruit growing districts south of the Dividing Range receive an annual rainfall of between 25 and 35 inches. This rainfall is fairly evenly spread, but in many areas additional irrigation is essential from January to March. This water is supplied from natural catchments, rivers, or town supplies. The north-eastern section of the State has a rainfall of from 20 to 40 inches, but the average rainfall in the Goulburn Valley is 19 inches and in the Mallee only 10 inches. In these districts elaborate irrigation schemes of the Lower Murray Valley and of the Goulburn and Campaspe Rivers make possible the large scale development of the fruit industry. The distribution of water is effected mainly by gravity except for small areas of citrus under spray irrigation.

Because of the high capital expenditure invested in orchard land and equipment and with the keen competition for local and overseas markets, most Victorian growers realise that they have to produce increased quantities of better quality fruit without increasing costs. To achieve this, labour expenses are cut by high capacity spraying units for pest control and by bulk handling of the crop. Many orchardists use fruit thinning sprays to make hand thinning less time consuming. The increasing use of weedicides in orchards and vineyards has reduced the need for cultivation. Lighter pruning of apples is showing promising results in southern Victoria and this trend could also become an important factor in reducing labour costs.

Statistics on fruit growing are collected from all persons who grow fruit for sale (for all purposes). Particulars of fruit production (excluding vines) for the five seasons 1964-65 to 1968-69 are given in the following table :

VICTORIA—FRUIT GROWING

Particulars		1964-65	1965-66	1966-67	1967-68	1968-69
Number of growers		4,486	4,435	4,563	4,221	4,197
Area acres		75,509	75,001	73,519	71,158	71,598
Gross value of fruit produced \$'000		28,433	34,977	32,327	34,462	30,804
Kind of fruit—						
Apples	bush	4,394,197	4,206,028	4,356,989	3,874,995	4,857,746
Pears	"	4,025,455	5,453,339	4,700,818	5,341,706	3,419,992
Quinces	"	19,915	21,946	25,089	15,935	17,515
Apricots	"	293,497	545,547	529,551	503,965	440,205
Cherries	"	117,721	140,207	120,731	178,410	148,824
Nectarines	"	28,910	33,323	36,723	37,372	33,358
Peaches	"	2,362,620	2,602,822	2,731,525	3,344,333	2,721,995
Plums	"	144,069	154,453	147,643	145,202	124,591
Prunes	"	28,360	20,397	21,421	15,892	12,874
Lemons and limes	"	148,237	120,534	147,881	169,596	215,255
Oranges—						
Navels	"	541,371	437,318	454,929	452,903	527,480
Valencias	"	662,585	537,940	660,194	638,522	808,095
Other oranges	"	40,337	36,389	28,647	29,849	24,217
Mandarins	"	46,668	41,207	64,350	80,286	81,181
Grapefruit	"	83,630	82,399	73,273	86,954	95,498
Figs	"	1,362	1,314	1,127	602	1,049
Passionfruit	"	3,844	3,520	3,914	5,356	5,532
Olives	"	11,004	36,471	15,030	38,070	23,957
Gooseberries	cwt	722	735	872	599	380
Loganberries	"	1,193	1,098	909	819	641
Raspberries	"	2,827	3,268	2,859	3,091	2,138
Strawberries	"	20,112	19,247	24,387	30,464	33,473
Youngberries	"	4,221	4,711	4,044	4,403	2,695
Other berries	"	657	666	903	771	331
Almonds	lb	45,730	51,322	32,522	34,484	17,947
Filberts	"	11,420	12,060	11,680	5,840	2,935
Walnuts	"	99,270	138,930	69,606	158,272	182,889

Information on the number of trees of each variety is collected triennially ; the latest figures available are for the season 1967-68. The extent of cultivation of each important class of fruit and nuts of holdings of 1 acre and upwards during the seasons 1964-65 and 1967-68 is shown in the following table :

VICTORIA—FRUIT TREES, PLANTS, ETC., IN ORCHARDS AND GARDENS

Fruit and nuts	Number of trees, plants, etc.					
	1964-65			1967-68		
	Bearing	Not bearing	Total	Bearing	Not bearing	Total
Apples	1,622,392	642,444	2,264,836	1,637,939	523,087	2,161,026
Pears	1,269,225	491,594	1,760,819	1,437,252	356,080	1,793,332
Quinces	8,269	716	8,985	5,680	549	6,229
Plums	125,662	41,901	167,563	112,911	39,143	152,054
Prunes	21,652	6,086	27,738	15,496	2,642	18,138
Cherries	121,270	94,184	215,454	140,106	81,752	221,858
Peaches	1,176,184	291,910	1,468,094	1,140,965	279,718	1,420,683
Apricots	298,434	37,010	335,444	265,826	52,367	318,193
Nectarines	21,937	14,593	36,530	28,076	13,224	41,300
Oranges—						
Navels	180,459	82,914	263,373	202,853	64,590	267,443
Valencias	226,765	123,886	350,651	281,834	68,917	350,751
Other oranges	13,751	6,433	20,204	10,153	1,105	11,258
Mandarins	29,611	28,032	57,643	48,965	16,638	65,603
Grapefruit	20,988	5,640	26,628	25,795	6,940	32,735
Lemons and limes	71,284	26,531	97,815	71,497	30,266	101,763
Figs	1,830	842	2,672	1,733	916	2,649
Raspberries	221,500	30,000	251,500	200,000	46,000	246,000
Loganberries	72,146	1,590	73,736	24,645	795	25,440
Strawberries	8,302,500	495,000	8,797,500	8,475,000	1,350,000	9,825,000
Gooseberries	28,500	5,100	33,600	31,200	10,800	42,000
Youngberries	64,883	3,536	68,419	62,115	10,455	72,570
Other berries	10,106	10,106	20,212	13,650	1,950	15,600
Olives	86,032	51,830	137,862	62,847	20,174	83,021
Passionfruit	8,484	4,282	12,766	20,085	7,150	27,235
Almonds	15,307	1,264	16,571	8,148	1,070	9,218
Walnuts	5,895	1,623	7,518	5,061	1,574	6,635
Filberts	4,876	282	5,158	2,280	259	2,539

The production of the principal kinds of dried tree-fruits for each of the last five seasons is shown in the following table. Particulars in respect of dried vine-fruits appear on pages 324 and 325.

VICTORIA—DRIED TREE-FRUITS
(1b)

Season	Apricots	Peaches	Pears	Prunes	Others	Total
1964-65	27,170	28,125	16,665	380,803		452,763
1965-66	6,824	2,340	2,467	447,760	3,332	462,723
1966-67	16,175	716	250	306,958	215	324,314
1967-68	18,407	3,628	4,313	230,560	481	257,389
1968-69	29,832	3,038	9,916	164,909	70	207,765

The distribution of the fruit industry over the State is set out in the following table, where the number of trees of each kind in each statistical district is given for the season 1967-68 :

VICTORIA—NUMBER OF FRUIT TREES, PLANTS, ETC.,
SEASON 1967-68

Particulars	number acres	Statistical District							Total	
		Central	North-Central	West-ern	Wim-mera	Mallee	North-ern	North-East-ern		Gipps-land
Growers Area		1,686 22,295	145 2,039	59 526	75 2,258	1,121 8,226	970 33,683	114 1,672	51 459	4,221 71,158
Apples	trees	1,470,581	146,890	52,717	11,571	17,366	328,958	100,289	32,654	2,161,026
Pears	"	161,573	53,186	515	4,539	3,029	1,567,638	751	2,101	1,793,332
Peaches	"	233,612	2,588	268	10,726	19,285	1,150,598	878	2,728	1,420,683
Apricots	"	21,010	3,091	577	6,104	66,153	220,460	303	495	318,193
Plums	"	67,048	3,465	209	864	33,514	46,515	234	205	152,054
Prunes	"	411	61	17	5,816	4,272	7,542	9	10	18,138
Cherries	"	194,306	3,318	9	1,151	888	14,405	6,916	865	221,858
Quinces	"	3,773	43	13	131	216	2,037	12	4	6,229
Nectarines	"	21,230	264	92	200	12,680	6,295	344	195	41,300
Figs	"	639	2	8	43	77	1,856	14	10	2,649
Olives	"	286	380	..	43,426	35,509	866	2,494	60	83,021
Oranges	"	153	2	..	53	500,172	126,472	1,280	1,318	629,452
Mandarins	"	5	..	1	6	62,862	2,672	56	1	65,603
Grapefruit	"	84	..	1	1	22,733	9,877	33	6	32,735
Lemons and limes	"	56,781	8	2	262	21,190	21,887	1,255	378	101,763
Passionfruit	vines	8,475	270	..	..	2,174	3,235	4,785	8,296	27,235
Strawberries	plants	9,562,728	82,396	56,250	15,000	3,750	18,750	44,918	41,208	9,825,000
Raspberries	bushes	239,032	..	..	..	..	983	..	5,985	246,000
Loganberries	"	24,651	..	..	..	..	789	..	..	25,440
Gooseberries	"	37,500	3,600	..	..	..	900	..	..	42,000
Youngberries	"	17,336	..	773	..	..	461	..	..	72,570
Other berries	"	15,600	..	..	..	..	..	..	..	15,600
Almonds	trees	588	102	2	1,519	1,778	1,589	3,624	16	9,218
Walnuts	"	689	35	2	9	413	319	4,440	728	6,635
Filberts	"	173	..	..	..	9	1	2,346	10	2,539

Cool storage

The fruit industry has been well aware of the importance of refrigeration since the end of the last century. Before the First World War several co-operative and privately owned cool stores had been built, besides the first Government Cool Stores, at Flinders Street, Melbourne. The Government also built and operated five other stores situated in the fruit growing districts close to Melbourne. These have been gradually handed over to growers' co-operatives.

The extension of electric power to rural areas throughout the State has resulted in the construction of numerous small private cool stores. More efficient refrigeration techniques and insulating materials have also helped to spread the idea of cool storage. Since the Second World War there has been a rapid increase of cool store capacity in Victoria, mainly because

of the very rapid development of small cool stores built in individual orchards as illustrated by the following table :

VICTORIA—FRUIT GROWERS' COOL STORES,
1948 TO 1967

Year	Number	Capacity
		'000 bush
1948	72	600
1958	218	1,500
1961	311	1,800
1963	357	2,600
1967	392	3,100

Including co-operative and proprietary stores, the total for 1967 was 455 stores with a capacity of 7.3 mill. bushels.

Many of the small orchard cool stores are used to pre-cool highly perishable soft fruits (apricots, peaches, plums, and berries) and tomatoes before they are forwarded to Melbourne or interstate markets. These fruits ripen in the summer and at high summer temperatures often become over-ripe and worthless in the interval between picking and marketing, unless pre-cooled at the orchard within a few hours of picking.

Most of the orchard cool stores, situated within 50 miles of Melbourne, are used, together with the larger co-operative and proprietary stores, to achieve a more gradual marketing of Victoria's apple and pear crop. This supply of good quality fruit from store at regular intervals for a period of 6-9 months calls for considerable skill and knowledge. The fruit picked is still alive and it continues its living processes for a certain time, influenced by the variety, its ripeness at the time of harvesting ("picking maturity"), interval between harvesting and beginning of cool storage, temperature and humidity of cool chambers, and other factors. Cool storage behaviour of the fruit and the type of storage provided are also of great importance with the fruit exported to overseas markets.

To assist the industry with cool storage research, experimental cool chambers were set up at the Government Cool Stores, Victoria Dock, in 1923. In 1956 these were transferred to the Scoresby Horticultural Research Station, where large and better experimental chambers were constructed for this purpose.

Vine fruits

Most vine fruits grown in Victoria are marketed as dried fruits (currants, sultanas, and raisins). Smaller quantities are sold as fresh fruit or are used for wine production. Some 40,000 acres of vines are grown in the irrigated districts of the River Murray at Mildura, Robinvale, and Swan Hill. The climate at Mildura and Robinvale provides the high temperatures and clear sunny conditions during the growing season and drying period which are essential for the production of first quality dried fruit. In 1968-69 unseasonal rain and hail gently damaged the ripening fruit resulting in a 30 to 35 per cent reduction of the total harvest. The Swan Hill district with slightly lower temperatures and higher rainfall is less suitable than Robinvale and Mildura.

After dipping and sun drying by the grower, the dried fruit is processed and packed in packing houses. The production of dried fruits in Victoria

for the season 1968-69 amounted to 34,323 tons of sultanas, 2,687 tons of currants, and 3,573 tons of raisins. Approximately 70 per cent of this produce was exported to the United Kingdom, Canada, and New Zealand.

During recent years the growing of grapes for table use has expanded rapidly and with some growers has become a specialised industry. The main varieties are Waltham Cross, Purple Cornichon, Ohanez, Sultana, and Muscat. Melbourne and Sydney are the main market outlets, but Indonesia, Colombo, and Singapore may grow in importance as export markets.

Grapes are grown specifically for wine production at Rutherglen, Great Western, and Nagambie. While the wine growing area around Rutherglen is slowly expanding, increasing quantities of grapes for winemaking are produced in the River Murray irrigation districts. In 1968-69, 6.2 mill. gals of wine were produced.

Particulars of vine production for the five seasons 1964-65 to 1968-69, are given in the following table :

VICTORIA—VINE-FRUIT PRODUCTION

Season	Number of growers	Area		Production				
		Bearing	Not bearing	Grapes gathered	Wine made	Dried fruits		
						Raisins	Sultanas	Currants
acres	acres	'000 cwt	'000 gals	cwt	cwt	cwt		
1964-65	2,601	44,203	3,793	6,435	3,656	131,179	1,191,888	89,535
1965-66	2,561	44,788	3,829	5,660	3,152	141,206	1,047,149	62,545
1966-67	2,538	45,381	3,783	6,530	3,555	125,085	1,266,927	71,552
1967-68	2,490	44,802	3,923	5,975	5,180	101,014	1,083,418	63,314
1968-69	2,443	44,719	4,251	4,101	6,241	71,461	686,456	53,740

Growing of Grapes for Wine, 1964 ; Dried Fruits Industry, 1967 ; Wine, 1968

Vegetables

The climate of Victoria is such that practically every kind of vegetable can be grown in some part of the State during the favourable season in each area. Consequently, there is a plentiful supply of fresh vegetables on the market for the whole year in normal years. These vegetables (excluding potatoes and onions), worth about \$24m to Victoria, are harvested from about 50,000 acres.

Over half the area under vegetables is within 50 miles of Melbourne. Other vegetable producing centres south of the Dividing Range are in the Western District (the centre of processed pea production) and in Gippsland (the centre of the stringless bean growing industry for processing and also for seed bean production). These areas are fairly free of frosts and have a well distributed rainfall ranging from 20 to 35 inches. Vegetables are grown on a wide variety of soils (sand, sandy loam, clay loam, peat, and volcanic). Many vegetable growers use irrigation from town water supplies, storage catchments, streams, and dams to supplement rainfall.

North of the Dividing Range the summer is longer and hotter, but winter frosts are more frequent. Many areas along the lower Murray are ideal for growing early spring crops and efficient transport enables produce to be shipped to both Melbourne and Sydney. In some instances intercropping in orchards and vineyards is practised. Tomato production for processing is now largely concentrated in the Goulburn Valley but other important

production areas are situated along the Murray and Loddon Rivers and in the Maffra irrigation district in Gippsland. The greatest part of the Victorian crop comes from the Goulburn Valley.

Returns from vegetable growing can fluctuate greatly according to weather and market conditions and production methods have to be highly efficient. Market gardens near Melbourne may grow two and sometimes three crops in the one year. While a number of hand operations are still essential, mechanisation and the use of selective weedicides have greatly reduced labour costs. Peas, beans, and onions can be harvested mechanically and a number of mechanical aids are used for harvesting other crops. New varieties and improved storage and transport techniques have also increased production efficiency.

While most crops reach the consumer as fresh vegetables, an increasing amount of produce is being processed and a feature of the Victorian industry is the rapid increase in the production of peas and beans for freezing.

Details of the area, production, and gross value of vegetables are given in the table below for all the more important types, including potatoes and onions which are shown in greater detail under separate headings on pages 318 and 319.

VICTORIA—VEGETABLES FOR HUMAN CONSUMPTION,
1968–69

Type	Area sown	Production	Gross value
	acres	tons	\$'000
Potatoes	39,979	299,961	10,343
Onions	3,634	21,282	905
Carrots	2,116	28,384	3,218
Parsnips	577	6,427	1,167
Beetroot	198	1,900	247
Tomatoes	4,753	63,500	5,154
French beans	3,155	5,646	876
Green peas—			
Sold in pod	4,482	3,946	637
Canning, etc. (pod equivalent)	23,424	(a) 36,312	1,382
Cabbages	1,789	22,224	749
Cauliflowers	2,211	22,600	1,264
Brussels sprouts	642	2,817	757
Lettuce	2,150	8,503	1,455
Pumpkins	2,284	11,002	887
Other vegetables	4,249	23,467	3,518
Total	95,643	557,971	32,560

(a) Shelled weight 16,326 tons.

Minor crops

There are other crops cultivated in Victoria in addition to those enumerated on pages 305 to 307. The most important of these are nursery products, cut flowers, Japanese millet, sunflowers, agricultural seeds, vegetable seeds, and safflower.

Pastoral and dairying

Progress of stock breeding

The first great development in Victoria, or as it was then known, the district of Port Phillip, was the pastoral interest. Millions of acres 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, at first from Tasmania and eventually from New South Wales, came from the very first year of settlement.

According to early statistical records, there were 26,000 sheep, 100 cattle, and 57 horses in the Colony 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 number of livestock in Victoria at decennial intervals from 1861 to 1961 and the numbers of livestock on rural holdings for each of the five years 1965 to 1969. As from 1957 no allowance has been made for the small number of livestock not on rural holdings.

VICTORIA—LIVESTOCK
(‘000)

Year	Horses (including foals)	Cattle (b)		Sheep	Pigs
		Dairy	Beef		
1861 at 31 March	77	722		5,781	61
1871 " "	167	721		10,762	131
1881 " "	276	12,86		10,360	242
1891 " "	436	1,783		12,693	282
1901 " "	392	1,602		10,842	350
1911 at 1 March	472	1,548		12,883	333
1921 " "	488	1,575		12,171	175
1931 " "	380	1,430		16,478	281
1941 " "	318	1,922		20,412	398
1951 at 31 March	186	1,489	727	20,012	237
1961 " "	64	1,717	1,147	26,620	319
1965 " "	56	1,901	1,415	30,437	378
1966 " "	(a)	1,921	1,416	30,968	384
1967 " "	55	1,968	1,560	31,239	351
1968 " "	(a)	1,963	1,511	27,909	377
1969 " "	(a)	1,960	1,918	30,185	422

(a) Not collected.

(b) Separate figures for beef and dairy cattle are not available for years before 1943.

A table showing the sizes of holdings and the numbers of holdings depasturing stock at March 1966 appears on page 300. Dot maps showing the distribution of livestock on rural holdings in Victoria at 31 March 1962 appear on pages 577 to 580 of the *Victorian Year Book* 1964.

Following an investigation into the adequacy of the wording and layout of the cattle sections of the Agricultural, Dairying, and Pastoral Statistics form, changes were introduced to the 1963-64 form.

Before 1964 farmers were asked to classify their herds as either "beef cattle" or "dairy cattle". As these two terms tended to confuse breed and purpose, farmers were asked in the new design to classify their cattle, with the exception of bulls, according to the two main purposes of (i) milk production and (ii) meat production, irrespective of breed, and to report separately the number of cows and heifers kept for their own domestic milk supply; bulls were to be reported according to their breed and age, i.e., dairy or beef and over or under one year of age. Consequently, the detailed statistics of cattle for 1969 set out in the following table are not comparable with those for years prior to 1964.

VICTORIA—DISTRIBUTION OF LIVESTOCK AT 31 MARCH 1969
(’000)

Particulars	Statistical District							Total	
	Central	North-Central	West-ern	Wim-mera	Mallee	North-ern	North-East-ern		Gipps-land
Cattle—									
Bulls for service—									
Bulls, 1 year and over—									
Dairy breeds	6	1	8	1	1	8	2	10	37
Beef breeds	6	3	12	2	1	6	6	8	44
Bull calves—under 1 year—									
Dairy breeds	2	(a)	3	(a)	(a)	3	1	3	13
Beef breeds	3	1	5	1	(a)	2	2	2	16
Cows and heifers for milk and cream—									
Cows in milk	130	12	175	5	11	249	43	290	915
Cows—dry	45	7	97	4	3	36	34	67	294
Heifers—1 year and over	52	7	85	3	4	87	23	98	359
Heifer calves—under 1 year	41	6	70	3	5	84	20	89	317
House cows and heifers	4	2	5	4	2	4	2	2	25
Other cattle and calves for meat production—									
Cows and heifers	144	59	259	30	16	103	165	172	949
Calves—under 1 year	87	35	125	19	13	86	93	115	572
Other	51	19	61	8	6	47	67	77	336
Total cattle	571	151	906	79	63	716	457	934	3,878
Pigs	67	11	36	32	28	147	43	58	422
Sheep	2,429	2,447	10,937	4,498	1,713	4,176	2,019	1,965	30,185

(a) More than nil but less than 500.

Changing Patterns in Animal Husbandry, 1963

Fodder conservation

The intensification of fodder conservation has been a natural development in farm management following pasture improvement and increased capacity for the carrying of livestock.

Even the best pastures do not provide a full ration for grazing animals throughout the year because of seasonal variations in their growth. In addition, droughts and other circumstances, such as floods or fires, have serious effects on the amount of grazing available. In most cases these feed shortages must be met by fodder conservation and hand feeding. Fodder conservation is, therefore, a highly important farm activity without which stable livestock production could not be maintained at high levels.

In Victoria, meadow hay is the main fodder conserved, being cheaply and readily available from surplus spring pasture growth in most seasons. In fact, this source of fodder is not fully exploited, since, while individual farms may cut 25 per cent or more of their farms for hay, on average less than 10 per cent of the State's improved pastures are cut each year. Nevertheless, Victoria produces some 60 per cent of Australia's meadow hay, although it has only about 30 per cent of Australia's sown grasses and clovers. Cereal hay (mainly oaten) is also made in large quantities, especially in drier districts and in drier years, i.e., in circumstances where good pasture production may be irregular, or low due to poor spring rains.

Lucerne hay is generally produced as a quality fodder intended for cash sale, and considerable quantities are conserved, especially in irrigated areas. However, the excellent quality of much of the clover and grass hay made from improved pastures has lessened interest in this fodder. Oat grain, which is easily stored, transported, and rationed, is an important livestock fodder favoured for sheep in both cereal growing and grazing districts.

Silage occupies a relatively minor position in the fodder conservation of the State, although important to dairy farmers meeting wholemilk supply contracts in dry farming areas. Silage is also used successfully for feeding beef cattle, and has special value as a drought reserve.

Most hay in Victoria is made with the mower, side-delivery rake, and pick-up baler. About one in six farms has a baler. After mowing, the crop dries for a time in the swath, and is then raked for further drying in the windrow before it is baled. Some farmers are using systems of loose hay handling and self-feeding based on simple low cost equipment, especially in northern areas or where short-term storage of hay is involved for early feeding needs.

Sometimes baled hay intended for summer or early autumn feeding is left in the paddock for self-feeding by the stock. Provided the hay is well made and, preferably, stored in stooks, there is little wastage in such temporary storage, especially if feeding is controlled. Long-term storage requires adequate protection, such as is given by a well constructed shed.

In recent years, increasing interest has been taken in new machines and techniques aimed at faster drying of hay. This is a most significant development, since it makes possible further increases in hay production as well as the production of higher quality hay because better use is made of the limited drying time available when the crop is at its best. The types of machines used include tedders, which loosen and aerate the hay lying in swath or windrow ; conditioners, which crush or crimp fresh hay between rollers and enable internal moisture to move faster through the fractured cuticle of the plants ; and rotary slashers and flail mowers, in which cutting by high speed impact replaces conventional mowing and the drying rate may increase as a result of the bruising and cuticle damage that the crop experiences.

Ensilage

Most ensilage is still made in open stacks using a mower and buckrake. This is simple, but wastage is high. The flail-type forage harvester is popular because of simple cutting action and relative cheapness. It consists of swinging blades which rotate at high speed on a horizontal shaft. The crop is thrown or blown into an accompanying trailer or truck for transport for storage. Flail cutting has opened the way to more effective ensilage making because the process may be better controlled. Improved storage and feeding techniques are leading to more effective use of ensilage, generally, than is possible with high wastage open stack methods.

Further references, 1963, 1964, 1966, 1967

Dairying industry

Victoria continues to increase its dairy cow population and now produces more than half the Australian output of milk. It is the major producer of dairy products for export.

Within the State a significant re-orientation has been taking place in the industry. From 1964 until 1969 the numbers of registered dairy farms decreased by 3,700, but the number of milking cows rose by 125,000. Cow numbers are increasing in three main areas: Gippsland, the northern irrigation districts, and the coastal fringe of the Western District. Elsewhere they are declining. The average herd size rose from 45 to 60 cows, partly

because farm carrying capacities had been increased, but also because those who left the industry were, in general, keeping smaller herds.

On the farm, increases in herd size without any change in the labour force have been made possible by the evolution of better, more efficient milking systems and by the application of machinery to other high labour demand tasks such as silage and hay making and irrigating. In order to gain economies of scale and to afford dairy farmers some of the leisure time enjoyed by those in other occupations, the one-man or one-family dairy farm is giving place to the unit operated by two men and supporting two families. The second man is generally a partner or share farmer rather than a worker on wages.

The following table shows the number of dairy herds in Victoria, grouped according to the number of cows, for each of the years 1961 to 1965 and 1967 :

VICTORIA—DAIRY HERDS, CONTAINING FIVE COWS OR MORE,
GROUPED ACCORDING TO SIZE

At 31 March—	Number of herds—							Total
	5 to 9 cows	10 to 14 cows	15 to 19 cows	20 to 29 cows	30 to 49 cows	50 to 99 cows	100 cows and over	
1961	4,213	2,149	1,545	2,738	5,915	8,723	1,549	26,832
1962	4,092	2,064	1,454	2,712	5,667	9,271	1,838	27,098
1963	3,660	1,904	1,405	2,537	5,486	9,569	2,015	26,576
1964 (a)	2,459	1,596	1,183	2,507	5,660	9,339	1,646	24,390
1965	2,281	1,462	1,025	2,202	5,342	9,462	1,759	23,533
1967	1,705	1,154	796	1,804	4,550	9,753	2,091	21,853

(a) Details from 1964 onwards are not comparable with those for earlier years. See last paragraph on page 327.

In the licensing year 1969–70 there were 101 licensed dairy factories in the hands of 61 separate managements, of whom seventeen were holders of restricted licences to manufacture only varieties of cheese other than cheddar. This is indicative of the widening interest of consumers in the so-called “continental” varieties of cheese. The remaining eighty-four factories are managed by only forty-four companies, and there is still a trend towards closure of some of the smaller factories with diversion of supplies by road tanker to larger plants. However, some companies with several plants now tend to devote some of their factories to single lines of manufacture.

The use of stainless steel in four main components of milking machines became mandatory in 1970. The elimination of copper-containing parts in accordance with this regulation has proceeded very rapidly and has gone beyond the components actually specified. As copper had been already virtually eliminated from processing plants, the industry has gone far towards overcoming defects in milk flavour and butter quality which are catalysed by traces of copper in milk.

The search for continuous manufacturing processes and eventual automation continues, but problems remain in the mechanisation of cheese making. Container handling offers further economies in labour, especially in the newer factories specifically designed to pack products in containers. Special efforts have been made towards product development, “tailor-making” products for specific markets, and methods of enabling butter to be spread more easily at low temperatures.

The following table shows the numbers of cow keepers and cows, the estimated total production of milk, and the gross value of dairy produce for each of the last five years :

VICTORIA—DAIRYING

At 31 March—	Number of cow keepers	Number o dairy cows	Estimated total production of milk for all purposes (year ended 30 June)	Gross value of dairy produce (a)
		'000	'000 gals	\$'000
1965	27,704	1,187	745,896	194,988
1966	(b)	1,192	751,564	190,141
1967	(b)	1,211	790,941	210,345
1968	(b)	1,200	734,451	181,541
1969	27,061	1,209	816,447	202,245

(a) Includes subsidy.

(b) Not collected.

Milk Board

In Victoria the liquid milk industry is administered by the Milk Board consisting of three full-time members appointed by the State Government. The Board was originally appointed in 1934 under the provisions of the *Milk Board Act* 1933. The Board's main function is to provide an adequate and regular daily supply of milk to the metropolitan area of Melbourne and to other areas which have been proclaimed as "milk districts" by the Governor in Council. While the initial area proclaimed in 1934 covered the metropolitan area of Melbourne, proclamations over the years have extended these areas to the stage where approximately 94 per cent of the population of Victoria is in proclaimed areas. In August 1951 an amending Act was passed to vest in the Board ownership of all milk distributed in proclaimed milk districts and to provide the Board with powers to operate as a milk marketing authority.

The Board has entered into contracts with some 6,000 dairy farmers and its annual purchases from them currently exceed 81 million gallons. The Board has a lien on the full production of contract suppliers (approximately 243 mill. gals) which provides it with a reserve for emergency conditions.

Authorised agents appointed by the Board receive, accept, and deal with milk on its behalf, and this milk is sold by the Board for sale in milk districts. Board milk sales for the year ended 30 June 1969 totalled \$35m. The Board specifies the dairies from which milk may be sold or distributed, determines whether additional licences for dairies are necessary, and licenses milk carriers. Since September 1958 the Board has also been responsible for the licensing and supervision of milk shops in milk districts.

Board price determinations fix the prices at which the Board purchases milk from dairy farmers, the retail and other prices to be charged by dairymen, and the rates for cartage of Board milk. In connection with these functions the Board conducts investigations into the production, collection, transport, treatment, and distribution of milk. It also conducts a continuous survey for the purposes of obtaining up to date information on the cost of producing milk for the liquid milk market.

The Milk Board is the authority which administers the Commonwealth Free Milk Scheme in Victoria. It also engages in promotion on behalf of the industry.

The quantities of butter, cheese, condensed and powdered full-cream milk, and casein produced during the last five years were as follows :

VICTORIA—BUTTER, CHEESE, CONDENSED AND POWDERED MILK,
AND CASEIN MADE
(*000 lb)

Year ended 30 June—	Butter (a)	Cheese (a)	Condensed milk	Powdered full-cream milk	Casein
1965 (a)	247,924	60,975	146,167	25,291	36,685
1966	251,268	58,158	122,650	24,506	48,531
1967	266,907	67,753	113,559	24,188	38,509
1968	241,245	75,553	95,064	24,258	37,399
1969	280,206	75,262	90,716	30,608	(b)

(a) Commencing with the year ended 30 June 1965, small quantities of butter and cheese made on farms are excluded from the above table.

(b) Not available.

Further reference, 1970 ; Eradication of Tuberculosis, 1962 ; Sharefarming in the Dairying Industry, 1967

Pig industry

Victoria is one of the major pig producing States of Australia, but has a lower than average ratio of pigs to people, and therefore draws a substantial part of its supplies of pig meat from other States.

Australians are relatively large meat eaters but eat much less pig meat than most other nations. Pig meat provides only about 10 per cent of the total meat consumed by Australians. That 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 concentrate foods such as grain. Pigs have a limited capacity for consuming pasture. Pigs have always been used to salvage waste and by-products from the production, processing, and eating of human foods. The low cost of such foods enables pigs to be raised and sold profitably. When the supply of salvage fed pigs is insufficient to satisfy demands, grain and other foods are fed to pigs in increasing quantities, either with the salvaged foods or separately. Such pig production is more costly and is therefore sensitive to variations in the selling price of pigs. The pig industry was developed largely in conjunction with the dairy industry. Pigs were used to salvage separated milk, buttermilk and whey, the 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 based more on grain feeding and depended less on milk. 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 of eight pigs when she is twelve months old, her pigs can be ready for pork when four months old, or for bacon when six months old, and then the sow can produce her second litter. There are large variations in the annual

production of pigs and this causes fluctuations in the prices farmers receive 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. There is usually ample grain to maintain pig production. There is no scheme to support pig prices in Australia.

In the 1930s and early 1940s Australia exported pig carcasses, mainly to the United Kingdom, where it had a protected market. In 1941 over one third of Australia's pig production was exported. Since then, production and demand have come closer together and only an insignificant part of the country's production is exported.

Most pig raising units now provide the major part of the income from the farms concerned. More capital and skilled management are involved in the individual units.

The number of pigs in Victoria at 31 March 1969 was 421,655. About 70 per cent of these are held in the Central, Western, Northern, and Gippsland districts. The following table shows classifications (in statistical districts) of pigs, together with the numbers of pig keepers :

VICTORIA—PIGS AND PIG KEEPERS, 31 MARCH 1969

Statistical District	Boars	Breeding sows	All other	Total pigs	Pig keepers
Central	998	10,013	55,982	66,993	909
North-Central	247	1,646	8,912	10,805	350
Western	755	5,928	29,548	36,231	918
Wimmera	744	4,606	26,321	31,671	1,068
Mallee	651	4,324	23,371	28,346	869
Northern	2,094	22,229	122,410	146,733	1,550
North-Eastern	834	6,687	35,696	43,217	830
Gippsland	1,021	8,737	47,901	57,659	958
Total	7,344	64,170	350,141	421,655	7,452

The following table shows the latest statistics available of the number of dairy herds (in size groups) separated into those where pigs are held, and those where no pigs are held. The sizes of pig herds are also shown.

VICTORIA—PIG KEEPING IN CONJUNCTION WITH DAIRYING :
NUMBER OF HOLDINGS AT 31 MARCH 1966

Size of dairy cattle herd (numbers)	Size of pig herd (numbers)								Holdings with pigs	Holdings with no pigs	Holdings with dairy cattle
	1-4	5-9	10-14	15-19	20-29	30-49	50-99	100 and over			
1-4	241	58	54	18	47	46	37	20	521	3,611	4,132
5-9	177	78	41	31	42	33	28	8	438	1,853	2,291
10-14	103	58	34	22	28	30	26	10	311	1,133	1,444
15-19	79	39	41	17	22	27	17	8	250	804	1,054
20-29	139	92	74	41	52	53	30	19	500	1,269	1,769
30-49	167	149	144	109	144	141	82	25	961	2,195	3,156
50-69	106	137	114	95	184	254	128	39	1,057	2,477	3,534
70-99	83	102	128	123	252	364	356	105	1,513	4,063	5,576
100-149	44	45	50	53	124	243	396	179	1,134	3,724	4,858
150 and over	12	14	12	13	37	72	178	164	502	1,542	2,044
Total	1,151	772	692	522	932	1,263	1,278	577	7,187	22,671	29,858

*Sheep industry**Sheep breeds*

The first sheep to arrive in Victoria were Tasmanian Saxon Merinos which were brought to the Portland area by Edward Henty in December 1834. In the following year William Furlonge landed Saxon Merinos at Port Phillip, and so shared with Henty the distinction of founding the sheep industry in Victoria. Sheep numbers increased rapidly until the early 1840s, largely because New South Wales pastoralists brought their flocks southwards and John Batman's Port Phillip Association landed Saxon Merinos from Tasmania. In November 1836 there were only 41,000 sheep in Victoria, increasing to 310,000 by 1838; two years later the sheep population was 782,000. By 1851 Victoria had over six million sheep. At this time, most of the available pastoral land had been taken up and was being used for grazing.

Despite periodic droughts, Victorian sheep numbers have shown a steady trend upwards. At the census of 31 March 1968 the State had nearly 28 million sheep which was 17 per cent of the total Australian sheep population. The geographical distribution of all sheep and rams in Victoria is shown on pages 335-6.

Relative to other States (except Tasmania) the most noticeable feature of Victorian sheep numbers is the smaller proportion of Merinos (46 per cent) and the larger proportion of crossbred and comeback sheep (29 per cent) and breeds other than Merino (25 per cent). By comparison the Australian flock consists of Merinos (73 per cent); comebacks and crossbreds (15 per cent); and of other recognised breeds (12 per cent). These figures indicate the importance to Victoria of the prime lamb industry which is largely based on first cross ewes (Border Leicester X Merino) and British breed rams.

Although Victoria has relatively fewer Merinos, they produce the finest quality wool. In particular, wools from the Western District enjoy a world wide reputation for their colour, style, fineness of spinning count, and their high yielding properties. With the exception of the Mallee and Wimmera and parts of the Northern District, where the South Australian types of Merino are more numerous, a majority of Merinos found in Victoria are fine- and medium-woolled types.

Corriedales comprise 14 per cent of the sheep population of Victoria. The breed is noted for its production of high quality, fine crossbred wool, and its meat producing ability. The breed originated in 1874 in New Zealand. However, it was not until 1882 when Henry Corbett mated Merino rams to Lincoln ewes, and fixed this "half-bred" type, that the breed was established in Australia. Corriedales are found throughout most of Victoria with a heavier concentration in the Western District.

Like the Corriedale, the Polwarth is regarded as a dual-purpose animal and is based on Lincoln ($\frac{1}{4}$) and Merino ($\frac{3}{4}$) blood lines. The breed was developed in Victoria for those areas which were believed to be too wet and cold for Merino wool growing. It comprises 3.5 per cent of the total sheep numbers and is concentrated in the southern parts of the Western District, the Central District, and North-Eastern District.

The main British breeds of sheep in Victoria are the Romney Marsh, Border Leicester, Dorset Horn, Poll Dorset, and Southdown. Romney

VICTORIA—GEOGRAPHICAL DISTRIBUTION OF BREEDS OF SHEEP (INCLUDING RAMS) AT 31 MARCH 1968

Statistical District	Merino	Corriedale	Polwarth	Dorset Horn	Border Leicester	Romney Marsh	Southdown	Merino Comeback	Crossbred	All other	Total
Central	591,295 24·50	423,699 17·56	140,365 5·82	58,433 2·42	60,686 2·51	25,741 1·07	26,101 1·08	156,177 6·47	895,393 37·10	35,416 1·47	2,413,306 8·65
North-Central	1,287,137 52·86	272,433 11·19	28,473 1·17	32,784 1·35	52,683 2·16	12,624 0·52	11,771 0·48	153,099 6·29	567,810 23·32	16,159 0·66	2,434,973 8·72
Western	4,245,429 43·38	2,208,984 22·57	688,627 7·04	60,282 0·66	73,587 0·75	441,687 4·51	22,266 0·27	710,894 7·26	1,287,367 13·15	47,873 0·41	9,786,996 35·07
Wimmera	2,972,874 78·27	340,273 8·96	7,357 0·19	19,683 0·52	54,865 1·45	32,958 0·87	1,699 0·04	63,641 1·68	288,254 7·59	16,485 0·43	3,798,089 13·61
Mallee	602,586 49·37	61,718 5·06	3,675 0·30	35,049 2·87	50,492 4·14	1,736 0·14	476 0·04	54,238 4·44	399,779 32·76	10,697 0·88	1,220,446 4·37
Northern	1,437,295 36·33	316,892 8·01	31,571 0·80	121,265 3·07	106,312 2·69	17,205 0·43	18,340 0·46	181,144 4·58	1,675,830 42·36	50,128 1·27	3,955,982 14·17
North-Eastern	798,873 37·93	236,111 11·24	71,785 3·44	49,972 2·37	49,398 2·35	19,166 0·91	8,223 0·31	136,527 6·48	716,442 34·01	19,954 0·96	2,106,451 7·55
Gippsland	874,676 39·89	221,718 10·10	9,778 0·45	32,306 1·47	61,206 2·79	46,835 2·14	19,632 0·90	128,474 5·86	774,083 35·31	23,803 1·09	2,192,511 7·86
Total	12,810,165	4,081,828	981,631	409,774	509,229	597,952	108,508	1,584,194	6,604,958	220,515	27,908,754
Percentage of total sheep	45·90	14·63	3·52	1·47	1·82	2·14	0·38	5·68	23·67	0·79	100·00

NOTE. Percentages refer to total number of sheep in each District.

VICTORIA—GEOGRAPHICAL DISTRIBUTION OF RAMS ACCORDING TO BREED AT 31 MARCH 1968

Statistical District	Merino	Corriedale	Polwarth	Dorset Horn	Border Leicester	Romney Marsh	Southdown	Merino Comeback	Crossbred	All other	Total
Central	4,521	5,345	1,554	9,044	1,508	709	5,434	42	197	3,721	32,075
North-Central	7,822	3,013	390	5,498	3,137	338	2,419	..	138	1,907	24,662
Western	50,984	31,199	9,712	7,802	2,967	13,088	3,954	373	536	5,084	125,699
Wimmera	23,778	5,814	73	2,932	4,454	1,290	82	178	43	1,558	40,202
Mallee	3,846	961	34	5,678	4,416	25	53	48	59	2,214	17,334
Northern	9,775	3,319	314	20,483	9,100	296	1,806	114	147	5,176	50,530
North-Eastern	4,540	2,082	678	8,762	3,354	703	1,351	29	147	2,860	24,506
Gippsland	6,433	2,493	152	4,475	2,420	1,561	3,672	7	180	3,504	24,897
Total	111,699	54,226	12,907	64,674	31,356	18,010	18,771	791	1,447	26,024	339,905
Percentage of total ram numbers	32·9	16·0	3·8	19·0	9·2	5·3	5·5	0·2	0·4	7·7	100·0

NOTE. Percentages refer to total number of sheep in each District

Marsh and Border Leicester rams are often joined with Merino ewes to produce prime lamb dams. Southdown, Dorset Horn, and Poll Dorset rams are the most important sires for prime lamb production.

The numbers of each of the breeds are continually changing as a result of seasonal conditions throughout the State, the relative prices of wool, meat, and cereal grains. In a poor season sheep numbers may decrease as a result of lower lambing percentages and increased slaughtering of "fat" stock. There is often a large seasonal variation in sheep numbers because of movement of fat and store sheep between Victoria and New South Wales and South Australia.

VICTORIA—BREEDS OF SHEEP (INCLUDING RAMS)

Breed	31 March 1962		31 March 1965		31 March 1968	
	Number	Percentage of total	Number	Percentage of total	Number	Percentage of total
Merino	12,115,368	44·00	14,148,138	46·48	12,810,165	45·90
Dorset Horn	519,265	1·89	423,600	1·39	409,774	1·47
Corriedale	4,009,470	14·56	4,581,697	15·05	4,081,828	14·63
Border Leicester	396,845	1·44	394,872	1·30	509,229	1·82
Southdown	171,008	0·62	108,588	0·36	108,508	0·39
Poiwarth	1,247,412	4·53	1,224,100	4·02	981,631	3·52
Romney Marsh	507,127	1·84	592,460	1·95	597,952	2·14
Ryeland	35,955	0·13	28,076	0·09	18,816	0·07
Poll Dorset	15,990	0·06	30,811	0·10	106,562	0·40
English Leicester	15,398	0·06	13,415	0·05	8,144	0·03
Cheviot	18,554	0·07	16,551	0·06	10,152	0·04
Zenith	36,584	0·13	45,938	0·15	56,493	0·20
Suffolk	3,995	0·02	2,912	0·01	4,365	0·02
Shropshire	1,333	(a)	426	(a)	1,708	0·01
Lincoln	9,255	0·04	18,765	0·06	6,881	0·02
Other (including Merino come-back and other crossbreds)	8,427,991	30·61	8,806,805	28·93	8,196,546	29·34
Total	27,532,550	100·00	30,437,154	100·00	27,908,754	100·00

(a) Less than 0·01 per cent of total.

The numbers of sheep in Victoria in selected years since 1861 are shown in the table on page 327. The distribution of all livestock is shown in the table on page 328.

The increase in sheep numbers in recent years has been due to pasture improvement and intensification of stocking rates on established improved pastures.

However, factors such as seasonal conditions, prices of wool, mutton, lamb, and to a lesser degree, wheat, affect the number of sheep in the State in any given year. In an adverse season flocks may be reduced by lack of fodder or water, by the increase in the slaughtering of fat stock, or by the decrease in lambing. Decreased imports from other States are another factor. In addition to the seasonal movements of sheep from New South Wales and South Australia for agistment, there is a regular importation of sheep from those States for slaughtering purposes.

Lambing

Climatic conditions also play a large part in determining the proportion of lambs marked to ewes mated, and thus the natural increase from season to season may vary considerably. The following table shows the number of ewes mated or intended to be mated, the number actually mated, and lambs marked, in each of the five seasons 1965 to 1969 :

VICTORIA—LAMBING

Season	Ewes intended for mating	Ewes actually mated	Lambs marked	Proportion of lambs marked to ewes mated
	'000	'000	'000	per cent
1965	12,560	12,501	10,556	84
1966	12,674	12,605	10,626	84
1967	13,205	12,476	10,101	81
1968	11,797	11,557	9,255	80
1969	14,037	13,910	12,266	88

Sheep and lambs in Statistical Districts

The following tables set out the number of rams, ewes, wethers, and lambs depastured in each statistical district of the State at 31 March 1969, and the numbers of ewes mated classified according to whether the progeny is intended for wool or for fat lamb production :

VICTORIA—SHEEP AND LAMBS IN EACH STATISTICAL DISTRICT AT
31 MARCH 1969
(^{'000})

Particulars	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Rams	31	25	136	45	20	56	25	25	364
Ewes	1,316	1,109	5,675	2,066	1,072	2,381	1,086	1,086	15,792
Wethers	677	941	2,969	1,563	236	872	594	465	8,317
Lambs	404	372	2,156	825	385	867	313	389	5,712
Total sheep and lambs	2,429	2,447	10,936	4,498	1,713	4,176	2,019	1,965	30,185

VICTORIA—LAMBING, 1968 SEASON

Particulars	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Ewes mated '000	1,006	850	3,875	1,334	726	1,980	880	907	11,557
Lambs marked '000	850	708	2,887	1,008	589	1,713	719	782	9,255
Percentage	84	83	75	76	81	87	82	86	80

VICTORIA—LAMBING FORECAST, 1969 SEASON
(As advised by farmers at 31 March 1969)
(^{'000})

Breed of rams used	Ewes mated or intended to be mated (for lambing during 1969 season)								Total
	Statistical District								
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Merino	211	360	2,041	1,044	168	415	238	264	4,740
Corriedale or Polwarth	231	101	1,522	209	57	147	94	100	2,459
Shortwool breeds	662	400	787	244	529	1,272	518	479	4,891
Longwool breeds	69	136	560	282	246	383	133	138	1,947
Total	1,173	996	4,910	1,778	1,001	2,215	983	981	14,037

Production of wool

Statistics of wool production are obtained direct from growers, from fellmongeries and, for wool exported on skins, from the Department of Customs and Excise.

VICTORIA—SHEEP AND LAMBS SHORN, SEASON 1968-69

Statistical District	Shorn		Wool clipped (including crutchings)		Average	
	Sheep	Lambs	Sheep's	Lambs'	Per sheep	Per lamb
	'000	'000	'000 lb	'000 lb	lb	lb
Central	2,292	462	21,648	1,410	9·45	3·05
North-Central	2,521	421	24,905	1,228	9·88	2·91
Western	10,407	2,298	100,774	6,962	9·68	3·03
Wimmera	4,200	900	44,009	2,697	10·48	3·00
Mallee	1,283	333	13,192	1,035	10·29	3·11
Northern	3,859	956	38,617	2,849	10·01	2·98
North-Eastern	2,105	365	18,805	937	8·93	2·57
Gippsland	1,985	491	18,562	1,354	9·35	2·76
Total	28,653	6,227	280,511	18,471	9·79	2·97

VICTORIA—SHEEP SHORN AND WOOL CLIPPED

Season	Shorn		Wool clipped (including crutchings)		Average	
	Sheep	Lambs	Sheep's	Lambs'	Per sheep	Per lamb
	'000	'000	'000 lb	'000 lb	lb	lb
1964-65	28,315	7,024	285,407	20,871	10·08	2·97
1965-66	29,668	8,003	285,564	21,779	9·63	2·72
1966-67	29,553	7,605	292,627	22,080	9·90	2·90
1967-68	28,304	6,940	257,042	17,787	9·08	2·56
1968-69	28,653	6,227	280,511	18,471	9·79	2·97

VICTORIA—WOOL PRODUCTION AND VALUE

Season	Clip	Stripped from and exported on skins, etc. (greasy)	Total quantity (greasy)	Gross value	Average price per lb
	'000 lb	'000 lb	'000 lb	\$'000	cents
1964-65	306,278	55,252	361,530	176,041	48·69
1965-66	307,343	59,601	366,943	193,797	52·81
1966-67	314,707	63,750	378,457	180,946	47·81
1967-68	274,829	57,598	332,427	133,213	40·07
1968-69	298,983	65,364	364,347	155,547	42·69

Sheep and Wool Growing Districts, 1967; Wool Marketing, 1963; Pastoral Industry, 1963

Meat industry

The farm lands of Victoria have proved most suitable for meat production and about 30 per cent of Australia's red meat is produced in this State.

The American market has brought big changes to the beef industry since the United States is interested mainly in lean meat. The demand created to supply this market has lifted the prices of bulls, dairy and beef cows, and

what are known to the trade as store cattle. The prices for these cattle are close to the prices paid per 100 lb dressed weight (chilled carcass) of the traditionally prime cattle used extensively in supplying the local trade.

The local market for lamb has always been good but the demand for export lamb is irregular largely because of variations in quality and supply affecting price. Grading is largely a matter of fatness and the leaner, meatier types used locally are the most profitable to produce in areas where lambs can be carried through for marketing from February to September. The supply of lambs is less from areas where the season favours marketing from February to September and growers have more control over lamb selling at prices above export parity.

Boneless mutton exports mainly to the United States and Japan have provided a good market for old sheep which at one time brought low prices for canning and small goods.

Pig production varies every few years but the trend is generally upward, in line with the human population. Almost all the pig meat produced is eaten in Australia. Although the consumption of pig meat per head of population in Australia is increasing slowly, it is only 10 per cent of the total meat consumption and is low in relation to that of other nations. There is considerable interstate trade in pig meat, as Victoria and New South Wales are net importers from the other States.

Table poultry production has changed dramatically in Victoria in recent years. The development of large modern production units has resulted in a big increase in broilers, turkeys, and ducks and consequent reduction in prices. Few people are keeping poultry for their own domestic requirements and consequently more poultry is purchased.

Australian Meat Board

Organisation

The Australian Meat Board was first established by Federal Parliament in 1936 and reconstituted in 1946. In addition to the chairman, six of the Board's members are chosen from organisations of primary producers, two from exporters' organisations, and there is a representative of the Commonwealth Government. The purpose of the Board is to protect the long-term interests of Australia's meat industry through a policy of orderly domestic and overseas marketing. The Board operates under the *Meat Industry Act 1964-1969*.

Funds

The Board's operations are financed by a levy on animals slaughtered in Australia for human consumption. The levy is 45 cents per head on cattle and 3.75 cents per head on sheep. Of this 25 cents and 1.75 cents per head, respectively, are allocated to research in each section of the industry. A further levy payable from 1 January 1969 of 1 cent per head on cattle and 0.10 cent on sheep helps finance C.S.I.R.O. research into the industry.

Exports

Although the Board advises meat processors and essential regulations control livestock diseases, the meat industry operates on a private enterprise basis. Domestic consumption on a per capita basis averages about 220 lb of red meats each year. While this is considered high by world standards about 35 per cent of Australia's meat production must be exported. In 1968

and 1969 meat exports were valued at about \$270m but were \$409m in 1970. Victoria exported 108,000 tons shipped weight of an Australian total of 397,000 tons in the year ended June 1969. Victorian exports in 1970 were 178,000 tons shipped weight of an Australian total of 546,000 tons.

The Board advises the Commonwealth Government on the meat export industry and works closely with the Government in negotiating agreements with other countries. Late in 1968 the Board designed a scheme to end the need for United States' quotas, which in 1964 had set a limit on total imports of beef and mutton. This was implemented through a voluntary agreement between major meat suppliers of the United States. Meat is Australia's top earner of American currency; in 1968-69 exports to the U.S. were worth \$A 189.4m and \$A 248.6m in 1969-70.

Promotion

The Board has representatives in London, New York, Tokyo, and Tehran to observe the local meat trade and to act in the best interests of the Australian trade. To promote Australian meat overseas visits may be made by Board members, some promotional activity is carried out in conjunction with the Department of Trade and Industry, and some Australian export firms act on their own initiative. Expenditure on overseas promotion in 1969-70 totalled \$210,400, of which the largest amount, \$137,600 was spent in Japan and Asia.

Research

The Board also engages in research providing facilities and staff for the Australian Meat Research Committee. This body co-ordinates research expenditure. Funds are divided between the C.S.I.R.O., State and Federal government departments, and universities. Of particular importance is the C.S.I.R.O. Meat Research Laboratory at Cannon Hill, Queensland, on which the Committee has spent about \$930,000. An annual contribution of \$405,000 is made to research at the laboratory. In the nine years to June 1971 the Committee has allocated nearly \$15m on cattle and beef research, and the recently established mutton programme has been allocated some \$2.7m since 1968.

Broiler industry

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

It now takes approximately 2.5 lb of poultry feed to produce 1 lb of poultry meat, and a 3.5 lb chicken is grown in ten weeks. This efficient conversion and rapid growth has been achieved by extensive breeding programmes; the use of "high energy" poultry feeds, highly supplemented with vitamins and 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 conducive to fast growth.

The organisation of the broiler industry as a continuous, production-line, factory-like operation, has been a major factor in the great reduction in price to consumers. Breeders, hatcheries, contract growers, poultry processors, and distributors have all 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. Turkey meat is also cheap and plentiful.

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

Broiler houses are fully enclosed; each house grows a "crop" of about 10,000 to 15,000 broilers, about four times a year. Chickens are stocked at a rate of 0.6 to 0.8 sq ft of floor space per bird. A one-man or one-family farm raises approximately 120,000 to 160,000 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.

Egg industry

The trend in the Victorian egg industry is towards large specialised farms—egg producers, hatcheries, and pullet growers—utilising modern poultry housing, equipment, and labour saving machinery.

The greater proportion of the State's estimated 4 million adult female fowls are now part of the commercial egg industry. There are, however, large numbers of small household flocks in suburban and country areas. The main areas of commercial production are centered 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.

One-man or one-family farms usually manage 4,000 to 6,000 layers. There are, however, many larger farms employing labour, with up to 20,000 layers, and a smaller number of much larger farms.

Housing is planned on the intensive principle, with deep litter pens or multiple bird cage units. Most of the new housing is on the laying cage system. A small proportion of layers is kept in fully enclosed, windowless houses under 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). Meatmeal is the major protein supplement. Wide ranges of commercial, ready-mixed poultry rations are also available.

Laying stock consists mainly of a specially produced crossbred between the White Leghorn and Australorp breeds. The average State egg production is estimated at approximately 210 eggs per bird per year. Commercial stock of the local breeding farms and hatcheries is tested for profitability at the Department of Agriculture's Random Sample Laying Test at Burnley. Chicks are hatched continuously throughout the year with an emphasis on the June–November period. Hatcheries are large and use modern incubators from 5,000 to 90,000 egg capacity. Most commercial egg-type chicks are sexed when a 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 and Egg Pulp Marketing Board. Flocks with over twenty adult female fowls come within the Board's jurisdiction, and owners of flocks with over forty adult female

fowls are required to market their eggs through the Board. 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, commercial firms concerned with sale of feed, chicken drugs, and equipment, and by the University of Melbourne.

Egg marketing

A monthly collection of statistics on chicken hatchings and poultry slaughterings was commenced in Victoria in January 1966 and the following table summarises the results for each of the years 1965-66 to 1968-69 :

VICTORIA—CHICKEN HATCHINGS AND POULTRY SLAUGHTERINGS (‘000)

Period	Hen eggs set and chickens hatched					Total hatched	
	Hen eggs set (a)	Chicks hatched (b) intended to be raised for			Breeding		
		Meat production	Egg production	Pullets			Cockerels
			MEAT STRAINS				
1965-66	18,758	13,705	(c)	20	3	13,727	
1966-67	19,626	14,486	(c)	7	1	14,494	
1967-68	20,655	15,806	(c)	1	1	15,809	
1968-69	20,120	15,546	(c)	..	..	15,546
			EGG STRAINS (d)				
1965-66	10,956	2,135	3,710	202	41	6,087	
1966-67	12,206	1,509	4,114	217	30	5,869	
1967-68	12,578	1,567	4,251	209	31	6,059	
1968-69	13,104	880	4,455	184	26	5,545	

(a) Includes eggs which failed to hatch.

(b) Excludes chicks destroyed.

(c) Not applicable.

(d) 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 907,295 in 1965-66, 486,340 in 1966-67, 410,129 in 1967-68, and 223,321 in 1968-69.

VICTORIA—POULTRY SLAUGHTERED FOR HUMAN CONSUMPTION (‘000)

Period	Chickens (i.e. broilers, fryers or roasters)	Hens and stags	Ducks and drakes	Turkeys				
1965-66	12,039	1,013	326	67				
1966-67	13,570	911	253	166				
1967-68	15,519	990	248	95				
1968-69	13,832	1,327	272	114				
DRESSED WEIGHT OF POULTRY SLAUGHTERED (a), AND INTENDED FOR SALE (b) (‘000 lb)								
	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen
1965-66	19,487	9,508	2,556	820	793	536	105	565
1966-67	20,020	14,742	2,520	449	728	169	131	1,487
1967-68	19,053	22,333	2,963	355	635	248	145	818
1968-69	21,093	18,393	3,791	882	830	192	204	844

(a) Dressed weight of whole birds, pieces and giblets as reported by producers.

(b) Fresh: Sold immediately after slaughter or chilled for sale soon after.

Frozen: Frozen hard for storage of indefinite duration.

The preceding statistics have been compiled from returns submitted by all known Victorian hatchers and all poultry slaughterers slaughtering more than 1,000 birds annually. It is considered that they give a high level of coverage of chicken hatchings and poultry slaughterings in Victoria.

Stock slaughtered

The following table shows the number of slaughtering establishments and details of the stock slaughtered in the State during each of the five years 1964-65 to 1968-69 :

VICTORIA—STOCK SLAUGHTERED (a)

Particulars	Stock slaughtered in establishments and on farms and stations				
	1964-65	1965-66	1966-67	1967-68	1968-69 (b)
	'000	'000	'000	'000	'000
Sheep	7,136	8,160	7,310	9,227	5,609
Lambs	5,433	5,205	5,875	5,816	7,102
Bulls and bullocks	295	270	244	237	270
Cows	577	558	485	516	401
Young cattle	365	359	361	337	339
Calves—Bobby	675	622	570	673	433
Other		44	77		29
Pigs	601	705	699	701	775
Number of slaughterhouses	270	262	263	240	247

(a) Includes numbers of livestock condemned as being unsuitable for human consumption.

(b) Average dressed weights per carcass during 1968-69 were: sheep 49·09 lb, lambs 37·50 lb, bulls and bullocks 608·49 lb, cows 532·56 lb, young cattle 335·45 lb, bobby calves 43·88 lb, other calves 105·93 lb, and pigs 107·31 lb.

Frozen Meat Exported, 1969

Honey industry

Victoria's hardwood forests each year provide an important contribution to the wealth of the State by virtue of timber production for various purposes. However, one little known facet of forest productivity is the annual harvest of honey and beeswax collected by bees from many species of eucalypts in all parts of the State. Today, Victoria ranks second among the States in apicultural activities. Eucalyptus species provide the bulk of the honey crop—up to 95 per cent of the total—with the balance made up of ground flora species such as clover and Paterson's Curse.

In recent years some concern has been felt in the industry at the increasing pressure for alienation of some types of Crown land for agricultural purposes. Much of this land has in the past been reliable bee keeping country because of its natural tree and shrub flora. These lands are generally cleared after alienation and so are lost for honey production. Parts of the Mallee, Wimmera, Western District, and north-east are areas most affected.

There are some 1,240 apiarists in Victoria with five or more hives. These apiarists produce an average of 8 mill. lb of honey per annum. Hive yields are relatively good and range from 90 to 150 lb per annum. The larger commercial enterprises would average 200 lb per annum.

The industry is, of necessity, migratory, whole apiaries with attendant plant being moved by road transport from one part of the State to another, following the flowering of various species of honey flora in the forests and

on the farm lands. Hives, trucks, and plant have been designed and modified to suit the requirements of mobility demanded by the industry.

Pollination of agricultural crops is a further aspect of the industry which has received considerable attention. Each year in the past, thousands of colonies have been hired out to fruit and seed growers to ensure profitable sets of seed and fruit. However, in recent years the advent of the newer types of insecticides and their increasing popularity, especially with fruit growers, has caused concern amongst apiarists, many of whom are no longer prepared to lease hives of bees for pollination because of serious bee losses following spray application of certain types of insecticides. It is anticipated that, with the increasing use of some of these chemicals, pollination of agricultural crops may become a serious problem in Victoria and elsewhere. The application of insecticides with the spreading of superphosphate on pastures, especially in irrigation areas, is also causing concern.

Marketing has always been a great problem to the industry. Violent fluctuations in the annual honey crop are always, in the absence of any organised marketing scheme, attended by similar fluctuations in prices. Considerable carry-overs occasionally aggravate this. However, late in 1962 Federal Parliament passed enabling legislation for the establishment of the Australian Honey Board. The functions of the Board are to regulate export of, and export prices for, honey. The activities of the Board are financed by means of a levy on domestic consumption of honey and a publicity and research programme is being undertaken.

In 1967 the Australian Honey Board established a finance scheme to enable apiarists to hold stocks of honey off the market in times of glut or poor prices. In 1968 the Department of Primary Industry developed an equalisation proposal for stabilising home and export market prices. The scheme is presently being considered by the industry.

State interest in the industry is authorised by the *Bees Act* 1966 and extends to disease control, advisory services, research into the problems of the industry, and hygiene in the production and processing of honey. An Apicultural Research Unit is in operation at the Scoresby Horticultural Research Station.

Particulars relating to apiculture for the five years 1965 to 1969 are given in the following table. Since 1958 bee keepers with less than five registered hives have been excluded from the collection.

VICTORIA—BEE HIVES, HONEY, AND BEESWAX

Season ended 31 May—	Bee keepers	Hives	Production		Gross value	
			Honey	Beeswax	Honey	Beeswax
	No.	No.	'000 lb	'000 lb	\$'000	\$'000
1965	1,276	99,345	9,181	105	1,377	52
1966	1,243	101,387	9,608	115	1,403	55
1967	1,158	96,274	7,160	88	1,045	44
1968	1,298	95,108	7,580	92	1,114	67
1969	1,240	99,953	3,638	50	520	37

PRIMARY INDUSTRIES OTHER THAN FARMING

Forestry

Forest estate

Of the 56,245,760 acres in Victoria, the forest estate consisted of 5,670,009 acres of reserved forest at 30 June 1969 and over this area the Forests Commission had full control. Only a proportion of this reserved forest produces commercial timber, as large areas come within the category of protection forests and are of value in safeguarding the State's water catchments. In addition, the State Forests Department has partial control over some 9 mill. acres of unoccupied Crown land which must, therefore, be included in the forest estate. These Crown lands include areas of mallee scrub and alpine grasslands as well as good timbered country.

The Forests Commission of Victoria was established by the *Forests Act* 1918 and consists of a chairman and two commissioners. Subject to the *Forests Act*, the Commission has the exclusive control and management of all matters of forest policy, the granting of leases, licences, permits and authorities, and the collection of rents, fees, royalties, and other revenue. It is the duty of the Commission to carry out plans and works for the establishment, maintenance, improvement, and renewal of natural forests and plantations of indigenous and exotic trees. It is also responsible for the prevention and suppression of fires, the training of forest officers, conduct of research work, provision of facilities for public recreation, and the protection of native flora and fauna in State forests.

Forest timber

The following table summarises the total output of all species from all forests in the State (including privately owned lands) for the years 1964-65 to 1968-69 :

VICTORIA—FOREST TIMBER
(⁰⁰⁰ cu ft)

Item	1964-65	1965-66	1966-67	1967-68	1968-69 ^p
Logs for sawing, peeling, slicing, or pulping—					
Hardwoods	68,159	69,499	68,880	70,129	75,157
Softwoods—					
Indigenous forest pines	2				
Plantation grown pines	12,398	14,377	15,325	14,037	16,107
Total logs	80,559	83,876	84,205	84,166	91,264
Hewn and other timber (not included above)					
estimated volume—					
Firewood (a)	18,602	18,572	14,990	12,293	10,718
Other (b)	4,805	5,475	4,793	4,677	4,194

(a) Excludes mill waste used as firewood.

(b) Includes telephone and electric supply transmission poles, bridge and wharf piles and beams, fencing timbers, railway sleepers, and mining timbers from Crown lands. Similar information for private lands is not available.

p: Preliminary

The demand for sawn timber for house construction was very strong in 1968-69 and the volume of logs removed from State forests was one of the highest on record; but a decline in the output of softwood logs from State plantations was recorded for the second year in succession.

There was a sharp increase in the volume of hardwood pulpwood used in manufacture of paper and hardboard, and proposals to export hardwood chips to overseas paper industries are under consideration; but there has been a steady decline for several years in the output from State forests of softwoods for papermaking.

Trends in the output of other forest products were varied. A record volume of softwood logs was used for veneer, but hardwood log output for veneer was lower than previously. Poles for power transmission and telephone lines are now produced by preservative treatment of timbers which are not naturally durable. Poles of the durable timbers are not in demand. Fencing timbers have not been in good demand since the severe drought of 1967, and fewer railway sleepers were produced in 1968-69 than in previous years.

Softwood plantations

In recent years large scale plantings have been concentrated in the north-east and south-west adjacent to the South Australian border, where 5,000 and 3,000 acres, respectively, are being planted each year. The total net area of State softwood plantations at 31 December 1969 was 97,456 acres, the total annual planting being approximately 10,000 acres. It is proposed to increase this annual planting rate to 12,000 acres by 1971 under the Commonwealth-States Softwood Forestry Agreement.

Pinus radiata has proved itself adaptable to the sites available; it makes rapid growth; is hardy and relatively immune from insect and fungus attack; and produces a good quality timber. While *Sirex noctilio*, the wood wasp, has been found within commercial plantations in Victoria, good management techniques have so far prevented it causing any losses of consequence in softwood plantations. The area planted in *Pinus radiata* comprises 86,926 acres or 89 per cent of the total softwood planting. Many of the unsatisfactory areas originally planted with other conifers are now being converted to this species.

The older stands are mainly fifteen to forty years old. Although larger areas are now being clearfelled and replanted, the bulk of the timber being utilised is coming from silvicultural thinnings in the form of logs for peeling and sawing and pulpwood for paper manufacture.

Privately owned softwood plantations were estimated to comprise 115,014 acres at 31 March 1969, and the areas are steadily increasing. Large industrial companies are planting *Pinus radiata* to provide sustained yields of softwood for sawmilling and wood-fibre industries. Private individuals plant small areas as long-term investments and many State schools maintain small endowment plantations.

The *Land (Plantation Areas) Act 1959* is designed to encourage private establishment of softwood plantations by providing that Crown lands suitable for commercial plantations and unsuitable for agriculture may, with certain safeguards, be leased for timber growing purposes and subsequently sold to the lessee.

During 1964-65 an amendment to the *Forests Act 1958* was passed enabling loans of up to \$50 per acre to be advanced to landowners for planting softwood species on land approved by the Commission as being capable of producing an economic crop. The basic intention is to

encourage farmers to establish farm woodlots by providing funds interest free for the first twelve years to cover expenses.

The output from State plantations is summarised below:

**VICTORIA—OUTPUT FROM STATE PLANTATIONS
OF SOFTWOOD LOGS AND PULPWOOD**
(’000 cu ft)

Year	Sawlogs and peeling logs	Pulpwood
1964-65	4,026	2,037
1965-66	4,412	2,408
1966-67	4,830	2,323
1967-68	4,618	1,968
1968-69	4,425	1,589

Telecommunications

The Commission maintains a fire equipment workshop and a radio laboratory. The radio system consists of forty-six base stations, 190 mobiles, 180 hand held portables, and 450 portable/mobile radios. In addition, twenty stations are equipped with receivers for receipt of weather information and three trailer mounted base stations are held for use in fire emergencies. Three hundred and sixty-five miles of telephone lines erected by the Commission are maintained each year prior to and during the fire season.

Fire protection

The Forests Commission is responsible for the prevention and suppression of fires in all State forests and National Parks and in certain alienated lands within one mile of State forest or National Park. This area of responsibility is legally designated the Fire Protected Area. Legislation provides strict control over the lighting of fires, power to prohibit the use of fire, and to close down certain operations in the Fire Protected Area during any period of extreme fire danger.

The causes of fires attended by Forests Commission personnel in the period 1964-65 to 1968-69 were as follows:

VICTORIA—CAUSES OF FOREST FIRES

Cause	Number of fires				
	1964-65	1965-66	1966-67	1967-68	1968-69
Grazing interests	..	1	..	4	..
Landowners, householders, etc.	91	115	90	169	64
Deliberate lighting	38	57	104	167	74
Sportsmen, campers, tourists	41	63	33	51	20
Licencees and forest workers	14	20	15	56	18
Smokers	43	50	36	61	15
Lightning	153	83	41	67	95
Tractors, cars, trucks, locomotives, and stationary engines	28	16	35	50	25
Children	25	21	9	19	13
Sawmills	11	8	8	15	7
Miscellaneous known causes	41	32	44	53	45
Unknown origin	72	63	71	75	15
Total	557	529	486	787	391

Forest fires (1968-69)

Summer in Victoria is frequently a long period of dry conditions with many days of high temperatures and strong dry winds which cause severe fire danger.

The summer of 1968-69 was short and mild in general, but acute fire danger developed on 8 January 1969 causing many severe fires in rural areas with extensive damage and loss of life. One fire spread rapidly through grassland near the township of Yea and into the forest on the Black Range, where a fire tornado developed. Pieces of burning material were carried aloft by the storm, causing several dangerous spot fires from 10 to 12 miles ahead of the main fire, and one 25 miles distant.

Air attack on fires

The importance of aircraft for fire fighting is increasing. A helicopter is maintained on immediate call for reconnaissance of fire edges. The helicopter is now also used with great success for backburning, an indispensable but difficult technique used to stop the spread of wildfires. The backburn is ignited from the helicopter with special incendiary devices. The location and timing of ignition of the unburnt fuels can be controlled very accurately to ensure that the backburn develops steadily and safely, within the established control lines.

The normal Forests Commission work force is augmented by two mobile support crews, each comprising eighteen university students, who are able to work on fires in any part of the State.

The areas of State forest burnt in the period 1964-65 to 1968-69 were as follows:

VICTORIA—AREAS OF STATE FOREST BURNT
(Acres)

Year	Commercial area	Non-commercial area	Total
1964-65	386,815	420,761	807,576
1965-66	20,313	50,733	71,046
1966-67	7,830	30,689	38,519
1967-68	306,350	240,698	547,048
1968-69	36,969	34,638	71,607

Forest management

The volume of timber to be harvested from the forests is carefully regulated to maintain the long-term productivity of the forests and to ensure steady output for the industries which use their products. The allowable rate of harvesting is determined by measurements of the forest and predictions of the rates of growth.

In the native forests which have been under close management for many years the rates of growth and harvesting are monitored by making periodical remeasurements of the trees on several hundred sample areas which are taken to represent the whole forest.

The vigorous young trees in the softwood plantations and the regrowth forests of mountain ash are growing so rapidly that their productivity is predicted by projecting their development far into the future. Comprehensive information on growth of these forests has been assembled in computer

programs which will calculate their future growth and production under many different plans of management. This enables the development of the forests to be simulated for study purposes so that the best plan of management may be selected.

Laboratory and field research

Studies of fire behaviour in a wide range of types of forests under various weather conditions are contributing to improvements in fire fighting methods, and also in methods of using controlled fire for protection of the forests, regeneration of new crops, maintenance of suitable habitats for wildlife, and other forestry purposes.

Aerial techniques have been developed for regeneration of logged areas of natural forest. Chemicals applied from agricultural aircraft desiccate scrubby growth to prepare the ground for seeding. Good control of drift during applications is obtained by using invert spray emulsions. An efficient system has been developed to spread the fine eucalypt seed evenly at the required rate.

The rapid increase in area of forests of radiata pine is supported by a vigorous research program. The nutrition of the pine is being studied in the nurseries and on new plantation sites, and the early growth of the pines is being improved also by new methods of controlling wattles, and other competing vegetation. A tree improvement research program has been in progress for some years, and a study of the wood grown in various types of plantations on various sites is in hand.

Entomological studies are being carried out to control some serious insects including the sirex wasp, the phasmatid, and other defoliators and boring insects. Pathological studies have concentrated on various tree diseases and the mycorrhizal associations on the roots of *Pinus radiata*. Forest hydrology studies are being carried out in relation to quality and quantity of water from forested water supply catchments. The Commission has undertaken laboratory studies of the viability and dormancy of tree seeds.

Further references, 1965 to 1970 ; Forestry Laboratory Research and Field Research, 1965 ; Economic Aspects of Forests, 1967 ; Commonwealth-State Reforestation Agreement, 1969 ; Forest Fires (1967-68), 1970

Fisheries and wildlife

General

Practical management of the fish and wildlife resources of Victoria is vested in the Department of Fisheries and Wildlife, which is responsible to the Chief Secretary for the administration of the Fisheries Act and the Game Acts, and for conservation, management, and research on native and introduced fishes, birds, and mammals.

The State Freshwater Fisheries Research Station and Native Fish Hatchery are located at Snobs Creek, near Eildon. A wildlife research centre is being developed at Lara, near Geelong. Fisheries and Wildlife officers (enforcement staff) are stationed at eighteen district centres throughout the State, and eight more district stations are proposed.

Economic aspects

Populations of fish are valuable as sources of food ; their exploitation creates employment and generates cash flows between fishermen, processors,

consumers, suppliers of boats and fishing gear, insurance agents, etc. A characteristic of most fish populations is that they are both self-renewing and the shared property of the fishermen who exploit them. The latter characteristic indicates that the fishing activities of each fisherman have a direct effect on the quality and quantity of subsequent catches made by other fishermen; and in fisheries where the entry of additional fishermen is not restricted, it is common that more fishermen enter the fishery than is desirable for the welfare of those already engaged. This state of "over-manning" has occurred in the Victorian fisheries for scallops, abalone, and rock lobster.

During December 1968 a revised Fisheries Act was passed by Parliament. This included the very unusual provision that the Minister has the right to grant or refuse an application for a licence, while having regard to the welfare of the fishery concerned and the persons engaged in the fishery. This provision implied that the Minister receives information relevant to both the biological state of the fish populations and the economic state of the fishery and its participants. The desired economic information includes the incomes from the catch, the associated costs, and the capital structure of the enterprises involved in making the catch. The fishing enterprise is regarded as the combination of physical components which operate to harvest the catch.

Information of the above type has been collected on an average per boat basis for the Port Phillip Bay scallop fishery and is summarised below for the years 1964-65 and 1968. This information, with biological information, enabled formulation of the management controls implemented in May 1968. In addition, the information collected was made available to the industry, and enabled the participants to determine their relative efficiencies, as well as assist them in making their business decisions. It was shown that the smaller, less expensive boats were economically the most efficient, and that considerable savings could be made by reducing crew numbers. Fishermen were also provided with a model designed to assist them rationalise their activities if prices or the availability of scallops changed.

A similar economic study has been undertaken for the southern rock lobster fishery, and is planned for the Victorian abalone fishery.

PORT PHILLIP BAY—SCALLOP FISHERY: AVERAGE
INCOME AND EXPENDITURE PER ENTERPRISE
(\$)

Particulars	1964-65	1968 (a)
Gross income	12,862	8,094
Costs—Operating costs	3,363	2,069
Depreciation	1,298	948
Crew costs	2,926	1,366
Total costs	7,588	4,383
Net income	5,274	3,711
Capital value	13,375	12,356

(a) Due to the seasonal type of activity in the scallop industry these figures are comparable although they relate to different twelve-monthly periods.

Fisheries statistics

The statistics of production shown in the following tables are in terms of live weight for fish, crustaceans, and molluscs. In interpreting fisheries statistics, allowance should be made for the incomplete coverage. Returns are collected from licensed professional fishermen only, and as a result the published totals fall short of total fish production to the extent of the catch by amateur fishermen, the commercial catch by persons not licensed as professional fishermen, and unrecorded catch by professional fishermen.

The following table shows the catch of fish, crustaceans, and molluscs for the years 1964-65 to 1968-69 landed at Victorian ports irrespective of the waters in which they were caught. Also included are fish, etc., landed by Victorian fishermen in South Australia.

VICTORIA—CATCH OF FISH, CRUSTACEANS, AND MOLLUSCS
(‘000 lb live weight)

Species	1964-65	1965-66	1966-67	1967-68	1968-69
Freshwater fish					
Eel	168	175	221	235	288
Perch	87	124	165	152	53
Other	37	43	34	36	53
Total	292	342	420	423	394
Marine fish					
Anchovy	275	375	441	343	2,395
Bream	204	235	490	726	709
Flathead	1,527	1,482	1,603	1,568	2,024
Flounder	231	135	151	160	130
Garfish	281	276	371	371	510
Morwong	426	427	272	167	291
Mullet	919	679	629	536	539
Pike	76	100	107	133	93
Salmon, Australian	1,223	1,805	1,252	1,303	943
Shark	5,076	5,266	5,694	5,810	6,616
Snapper	414	343	349	374	423
Snoek (barracouta)	4,134	5,268	2,790	3,676	5,360
Whiting	267	213	481	462	528
Other	1,340	1,520	997	964	2,614
Total	16,393	18,124	15,627	16,593	23,175
Crustaceans					
Rock lobster	1,291	1,681	1,723	1,533	1,581
Prawns	8	11	10	5	5
Total	1,299	1,692	1,733	1,538	1,586
Molluscs					
Abalone	393	961	3,379	7,470	5,950
Scallops	21,371	27,956	28,726	27,895	9,885
Other	468	591	569	524	392
Total	22,232	29,508	32,674	35,889	16,227
Total all species	40,217	49,667	50,456	54,441	41,380

The following table shows certain particulars about the fishing industry in Victoria for the years 1964-65 to 1968-69 :

VICTORIA—FISHERIES : MEN, BOATS, AND
EQUIPMENT EMPLOYED

Year	Number of men	Boats employed		Value of nets and other equipment
		Number	Value	
			\$'000	\$'000
1964-65	1,518	897	4,174	798
1965-66	1,566	910	4,432	821
1966-67	2,057	1,108	5,903	1,078
1967-68	2,053	1,084	6,808	1,153
1968-69	1,571	871	5,363	1,047

VICTORIA—FISHERIES : QUANTITY AND GROSS VALUE OF TAKE

Year	Recorded production							
	Fish		Rock lobster		Prawns		Molluscs	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	'000 lb	\$'000	'000 lb	\$'000	'000 lb	\$'000	'000 lb	\$'000
1964-65	16,685	2,030	1,291	903	8	5	22,232	695
1965-66	18,466	2,231	1,681	1,177	11	6	29,508	989
1966-67	16,048	1,959	1,723	1,034	10	6	32,674	1,981
1967-68	17,016	2,253	1,533	1,027	5	3	35,889	2,432
1968-69	23,568	2,678	1,581	1,455	5	3	16,227	1,695

Further references 1961-1970; *Wildlife in Relation to other Natural Resources, 1962*; *Introduced Fish, 1963*; *Commercial Fisheries, European Carp, 1964*; *Freshwater Research, 1965*; *Marine Fisheries, 1966*; *State Wildlife Reserves System, 1966*; *Scallop Fishery, 1967*; *Serendip Wildlife Research Station, 1968*; *Tower Hill State Game Reserve, 1969*; *Rehabilitation of Species, Arthur Rylah Fish and Wildlife Research Institute, 1970*.

Mining

The most notable recent development in Victoria's mineral industry besides the exploitation of natural gas and oil discoveries offshore, is the continued expansion of the non-metallic minerals and the decline of the metallic minerals, especially gold. Significant progress has been made in open cut mining, especially in the extraction of brown coal and construction materials. Exploratory offshore drilling on the Gippsland Shelf in Bass Strait has revealed the presence of considerable quantities of oil and natural gas. The principal oil and natural gas discoveries and plans for their development are described on pages 364-366 of the *Victorian Year Book 1968*. The major mineral resources of the State are described on pages 366-7 of the *Victorian Year Book 1967*. A further article on the State's minerals appears on pages 1-27 of the *Victorian Year Book 1970*.

Further reference, 1970

Natural gas and crude oil development 1969-70

The development of natural gas and crude oil in Victoria from 1964 to October 1969 is set out on pages 372 to 375 of the *Victorian Year Book 1970*.

The period between October 1969 and December 1970 was highly significant for Victoria. Two oilfields in waters off the east Gippsland coast began production, crude oil commenced being supplied to Victorian refineries, a large plant started producing liquefied petroleum gas, and the

appliance conversion programme was completed with all customers in Melbourne being connected to natural gas.

Exploration

Both on and offshore the exploration for gas and oil continued. Fourteen wells were drilled offshore in the Gippsland Basin in Victorian waters; some gas shows were encountered; and a confirmatory step-out well in the Snapper field proved that it was a commercial gas discovery with estimated reserves of 3.2 trillion (million million) cubic feet of recoverable gas. No offshore wells were drilled in the Otway Basin in Victorian waters but three onshore wells proved to be dry holes. Six wells were drilled onshore in the Gippsland Basin and two in the Murray Basin, but these also proved to be dry holes. Generally, apart from the earlier discovered Snapper field, the drilling for oil and gas proved to be disappointing throughout Victoria, and only in the Batfish 1 offshore well were shows of oil encountered.

Production

Natural gas. This commenced flowing from the Barracouta field on 7 March 1969 and from the Marlin field on 21 January 1970. Both of these fields are now the joint producers of gas for the Victorian market. To the end of 1970 the Barracouta field produced 16,027 million cubic feet of raw gas and Marlin 15,059 million cubic feet. This was conveyed to the Gippsland Gas Processing and Crude Oil Stabilisation Plant at Longford through 30 mile, 18 inch diameter and 67 mile, 20 inch diameter, half undersea and half onshore pipelines, respectively, for processing into dry, pipeline quality gas.

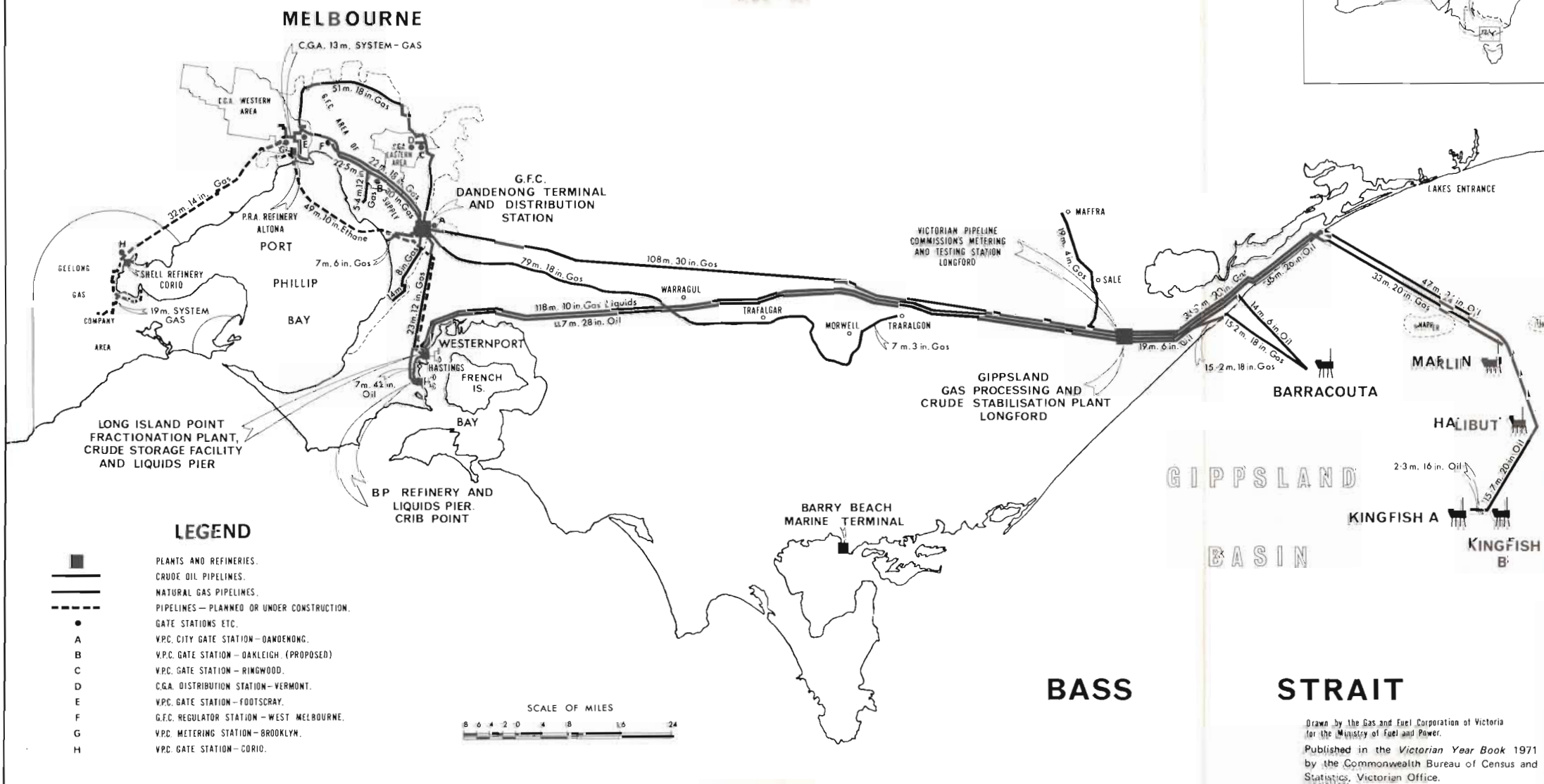
Construction of the gas processing facilities at the \$47m plant at Longford was substantially completed during the period under review and may be considered as being fully operational.

To the end of December 1970 the Victorian Pipelines Commission, which takes the treated gas from the plant, had conveyed 19,695 million cubic feet of gas to the Victorian gas utilities through its 108 mile, 30 inch diameter pipeline to Dandenong. The average rate of supply during the winter months of May to August 1970, was 55.7 million cubic feet a day.

Crude oil. Following the completion of the laying of the 33 mile, 6 inch diameter, general purpose pipeline in October 1969, the Barracouta oilfield came on stream on 8 October 1969, and has maintained a steady flow at the rate of 5,500 barrels a day from the 7 million barrel reserve reservoir. Early in March 1970, the laying of the 82 mile Halibut crude oil pipeline from the platform to Longford was completed and crude oil commenced flowing through it on 13 March. Development drilling on the Halibut platform was completed in August 1970, and production has progressively risen to a rate of 223,000 barrels a day. To the end of December 1970, Barracouta has produced a total of 2,831,561 barrels of unstabilised crude and Halibut 47,088,269 barrels, making a total of 49,919,830 barrels.

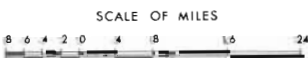
At Longford, construction of the crude oil stabilisation facilities at the Gippsland Gas Processing and Crude Oil Stabilisation Plant are well advanced; two processing trains each with a capacity of 100,00 barrels a day

MINISTRY OF FUEL AND POWER
VICTORIA
GIPPSLAND FIELDS
NATURAL GAS AND CRUDE OIL
DEVELOPMENT AND DISTRIBUTION
1966 - 1970



LEGEND

- PLANTS AND REFINERIES.
- CRUDE OIL PIPELINES.
- NATURAL GAS PIPELINES.
- - - PIPELINES - PLANNED OR UNDER CONSTRUCTION.
- GATE STATIONS ETC.
- A V.P.C. CITY GATE STATION - DANDENONG.
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- F G.F.C. REGULATOR STATION - WEST MELBOURNE.
- G V.P.C. METERING STATION - BROOKLYN.
- H V.P.C. GATE STATION - CORIO.



GIPPSLAND
BASIN

BASS STRAIT

Drawn by the Gas and Fuel Corporation of Victoria for the Ministry of Fuel and Power.
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have been completed, and the third one is nearly complete. When these have been fully commissioned the plant will be able to treat up to 350,000 barrels of unstabilised crude oil a day by removing the dissolved gases from the crude recovered from the oilfields, in particular Kingfish, prior to piping to Long Island Point through a 117 mile, 28 inch diameter pipeline, to ensure safe handling and storage at atmospheric pressure. To the end of August 1970 this pipeline had conveyed 47,360,070 barrels of stabilised crude to the eight 268,000 barrel capacity storage tanks at the Long Island Point storage and shipping terminal near Hastings.

Distribution of oil and LPG

The first load of Gippsland crude oil comprising 105,000 barrels of Barracouta oil left the Long Island Point liquids pier on 24 March 1970 in the tanker *Hemiglypta* bound for the P.R.A. refinery at Port Adelaide. Since then the Crib Point liquids pier, originally built in 1966 to service the BP refinery, has been connected to the Long Island Point Crude Oil Storage facilities by a 7.2 mile, 42 inch diameter pipeline laid during the first four months of 1970. To the end of December 1970, 114 tankers had been loaded with Gippsland crude at the Long Island Point jetty and 37 tankers at the Crib Point jetty, making a total of 151. These tankers loaded a total of 39,649,937 barrels for Australian refineries. A further 6,324,595 barrels have been conveyed by pipeline to the BP refinery at Crib Point making a total of 45,974,532 barrels transported to refineries.

In April 1970 construction of the first stage of the liquefied petroleum gas processing facilities at Long Island Point, comprising primarily a plant and three 135,000 barrel capacity refrigerated storage tanks, was completed. This plant, which fractionates gas liquids (remaining after processing at the Longford plant of the raw field gas from the Barracouta and Marlin fields) into saleable ethane, butane, and propane, commenced production in May 1970.

The first load of LPG comprising 16,342 metric tons (8,983 metric tons of butane and 7,359 metric tons of propane) left Long Island Point for Japan on 4 July 1970, in the refrigerated carrier *Bridgestone Maru 1*, as part of the Broken Hill Proprietary's contract with Bridgestone Liquefied Gas Co. Ltd, of Japan. The second load, comprising 12,577 metric tons of LPG (8,490 metric tons of butane and 4,087 metric tons of propane) left Long Island Point in the refrigerated carrier *Antilla Cape* for Japan as part of Esso Standard Oil's contract with Sumitomo Chemicals of Tokyo, Japan. To the end of December 1970 a total of 148,812 metric tons of LPG had been shipped from the Long Island Point liquids jetty.

Crude oil production rates

There is enough gas in the fields to supply Victoria's requirements for over 30 years but the currently known oil reserves will provide only about 60 to 65 per cent of Australia's total crude oil requirements for up to three years during the peak production period. It is expected that a production rate of up to 330,000 barrels a day of unstabilised crude will be reached by the end of 1971, when the large Kingfish field comes on-stream. This is expected to occur in April 1971. Peak production of 320,000 to 350,000 barrels a day of unstabilised crude from all fields, is expected to occur during 1972.

The announced recoverable reserves of natural gas and crude oil in the five commercial fields discovered offshore by B.H.P. and Esso in east Gippsland are as follows :

GIPPSLAND FIELDS—RESERVES OF GAS AND OIL

Field	Natural gas	Crude oil	Years field discovered and proved
Barracouta	trillion cubic feet 1.8	million barrels 7	1965 (gas) 1968 (oil)
Marlin	3.5	..	1966
Halibut	0.3	440	1967
Kingfish	} dissolved gas in crude	1,060	1967-68
Snapper		..	1968-69
Total	8.8	1,507	..

Source : Oil and Gas Division, B.H.P., August 1970.

Exploration and production wells

The following tables summarise Victorian petroleum exploration for the years 1964 to 1970 :

GIPPSLAND BASIN—OFFSHORE EXPLORATION WELLS DRILLED FROM FIXED PLATFORMS OPERATED BY ESSO AND HEMATITE

Well	Date spudded	Platform	Total depth	Status
A-3	20.4.68	Barracouta	feet. 11,775	Oil discovered. Well completed as oil producer No commercial discovery of oil. Well completed as gas producer
A-6	11.8.68	Marlin	11,068	

GIPPSLAND BASIN—OFFSHORE PRODUCTION WELLS DRILLED FROM FIXED PLATFORMS

Platform	Date drilling commenced	Number of wells drilled	Number of wells producing	Well capacity of platform
Barracouta	8.3.68	10	9	10
Marlin	2.8.68	(a) 6	4	24
Halibut	22.3.69	(b) 20	(c) 19	24
Kingfish A	31.3.70	19	..	21
Kingfish B	22.10.70	6	..	21
Total	..	61	32	100

Source : Esso Standard Oil (Aust.) Ltd., January, 1971.

(a) Includes two wells plugged and abandoned (A-2 and A-7). Drilling ceased after blowout on A-7 well on 2.12.68.

(b) Includes one well (A-2) abandoned due to mechanical difficulties.

(c) Total number to be drilled in current programme.

GIPPSLAND BASIN—OFFSHORE EXPLORATION WELLS
DRILLED FROM MOBILE RIGS

Well	Classification	Date spudded	Rig	Company	Total depth	Date completed	Status
					feet		
Barracouta 1	Wildcat	27.12.64	GIII	H/E	8,701	5.6.65	Gas discovery
Barracouta 2	Step-out	8.6.65	GIII	H/E	4,015	16.7.65	Confirmation gas discovery
Cod 1	Wildcat	20.9.65	GIII	H/E	9,540	2.12.65	Dry hole
Marlin 1	"	5.12.65	GIII	H/E	8,485	10.4.66	Gas discovery, oil shows
Marlin 2	Step-out	31.5.66	GIII	H/E	10,007	3.11.66	Confirmation gas discovery
Marlin 3	"	16.12.66	GIII	H/E	5,845	5.2.67	Confirmation gas discovery and oil shows
Golden Beach 1	Wildcat	3.4.67	Inv	BOC	1,226	2.5.67	Abandoned, mechanical difficulty
Kingfish 1	"	6.4.67	GIII	H/E	8,451	15.6.67	Oil discovery
Golden Beach 1A	"	3.5.67	Inv	BOC	9,534	29.8.67	Gas discovery
Halibut 1	"	20.6.67	GIII	H/E	10,011	26.9.67	Oil discovery
Dolphin 1	"	28.9.67	GIII	H/E	9,461	25.11.67	Oil shows, non-commercial
Kingfish 2	Step-out	28.11.67	GIII	H/E	8,021	31.1.68	Confirmation oil shows
Kingfish 3	"	2.2.68	GIII	H/E	8,299	5.3.68	Confirmation oil shows
Perch 1	Wildcat	13.3.68	GIII	H/E	9,416	1.5.68	Oil shows, non-commercial
Tuna 1	"	7.5.68	GIII	H/E	11,944	27.10.68	Gas and oil shows
Snapper 1	"	8.5.68	DII & OD	H/E	12,320	7.1.69	Gas discovery, oil shows
Flounder 1	"	10.7.68	OD	H/E	11,740	11.10.68	Oil shows
Tuna 2	Step-out	30.10.68	GIII	H/E	9,060	9.12.68	Confirmation gas and oil shows
Groper 1	Wildcat	18.12.68	GIII	H/E	3,379	7.1.69	Dry hole
Salmon 1	"	11.1.69	OD	H/E	9,865	15.2.69	Dry hole
Mullet 1 (a)	"	9.1.69	GIII	H/E	2,463	19.1.69	Dry hole
Bream 1	"	20.1.69	GIII	H/E	790	22.1.69	Abandoned, new location
Flounder 2	Step-out	19.2.69	OD	H/E	9,321	24.3.69	Confirmation oil shows
Bream 2	Wildcat	24.2.69	GIII	H/E	10,657	24.4.69	Gas shows
Mackerel 1	"	27.3.69	OD	H/E	10,003	23.4.69	Oil shows
Flounder 3	Step-out	24.4.69	OD	H/E	8,634	14.5.69	Confirmation oil shows
Flathead 1	Wildcat	25.4.69	GIII	H/E	3,494	26.5.69	Oil shows
Turrum 1	"	15.5.69	OD	H/E	10,029	27.6.69	Gas shows
Wahoo 1	"	27.5.69	GIII	H/E	2,446	12.6.69	Dry hole
Snapper 2	Step-out	16.6.69	GIII	H/E	10,010	2.8.69	Confirmation gas discovery
Barracouta 3	"	3.8.69	GIII	H/E	9,651	8.9.69	Confirmation gas discovery
Groper 2	"	9.9.69	GIII	H/E	2,870	24.9.69	Dry hole
Bluebone 1 (a)	Wildcat	26.9.69	GIII	H/E	1,984	2.10.69	Dry hole
Bonita 1	"	15.10.69	OD	H/E	4,146	21.10.69	Abandoned, mechanical difficulties
Gurnard 1	"	3.10.69	GIII	H/E	9,724	3.10.69	Dry hole
Bonita 1A	"	22.10.69	OD	H/E	10,430	15.11.69	Dry hole
Tailor 1	"	4.11.69	GIII	H/E	8,498	23.11.69	Dry hole
Bream 3	Step-out	16.11.69	OD	H/E	11,012	10.1.70	Confirmation gas discovery
Snapper 3	"	24.11.69	GIII	H/E	10,536	27.1.70	Confirmation gas discovery
Trevally 1	Wildcat	28.1.70	GIII	H/E	7,493	17.2.70	Dry hole
Tuna 3	Step-out	18.2.70	GIII	H/E	9,250	5.4.70	Confirmation gas and oil shows
Batfish 1	Wildcat	6.4.70	GIII	H/E	9,761	27.5.70	Gas shows
Albacore 1	"	6.5.70	OD	H/E	10,686	8.6.70	Dry hole
Emperor 1	"	5.6.70	GIII	H/E	6,545	29.6.70	Gas shows
Albatross No. 1	"	30.6.70	GIII	End	4,124	18.7.70	Dry hole
Gannet No. 1	"	18.7.70	GIII	End	4,786	29.7.70	Dry hole

Sources : Esso Standard Oil (Aust.) Ltd, and Oil and Gas Division, B.H.P., August 1970. Woodside Oil N.L. and Endeavour Oil Co. N.L., August 1970.

(a) Drilled in Tasmanian waters.

Abbreviations—GIII : Glomar III.
Inv : Investigator.
DII : Discover II.
OD : Ocean Digger.
H/E : Hematite and Esso.
BOC : Burmah Oil Co.
End : Endeavour Oil Co.

OTWAY BASIN—OFFSHORE EXPLORATION WELLS DRILLED FROM
MOBILE RIGS

Well	Classification	Date spudded	Rig	Company	Total depth	Date completed	Status
					feet		
Pecten No. 1	Wildcat	26.3.67	S135E	SD	887	11.4.67	Abandoned, mechanical difficulties
Pecten No. 1A	"	12.4.67	S135E	SD	9,352	14.6.67	Dry hole
Nerita No. 1	"	1.7.67	S135E	SD	6,700	17.8.67	Dry hole
Voluta No. 1	"	25.8.67	S135E	SD	13,037	21.12.67	Dry hole
Crayfish 1(a)	"	24.9.67	OD	H/E	10,497	24.12.67	Dry hole
Prawn 1	"	29.12.67	OD	H/E	10,477	9.4.68	Dry hole
Nautilus 1	"	13.4.68	OD	H/E	6,597	9.5.68	Dry hole
Argonaut 1 (a)	"	14.5.68	OD	H/E	12,163	4.7.68	Dry hole
Clam 1 (b)	"	19.7.69	OD	H/E	5,323	15.8.69	Dry hole
Mussel 1 (b)	"	18.8.69	OD	H/E	8,038	15.9.69	Dry hole
Chama 1 (a)	"	16.1.70	OD	H/E	4,227	25.1.70	Abandoned, mechanical difficulties
Chama 1A (a)	"	26.1.70	OD	H/E	9,015	2.3.70	Dry hole
Whelk 1 (b)	"	6.3.70	OD	H/E	4,800	17.3.70	Dry hole

(a) Drilled in South Australian waters.

(b) Drilled in Tasmanian waters.

Abbreviations—S 135E ; SEDCO 135E.

OD : Ocean Digger.

SD : Shell Development.

H/E : Hematite and Esso.

VICTORIA—ONSHORE EXPLORATION WELLS

Well	Basin	Date spudded	Company (operator)	Total depth	Status
				feet	
South Longford No. 1	Gippsland	14.12.63	Arco	2,450	Dry hole
Fergusons Hill No. 1	Otway	24.12.63	Frome B. Hill	11,625	Dry hole
Seaspray No. 1	Gippsland	20.1.64	Arco	5,556	Dry hole
Duck Bay No. 1	Gippsland	15.2.64	Arco	4,235	Dry hole
Heathfield No. 1	Otway	6.3.64	Planet	7,500	Dry hole
Port Campbell No. 4	Otway	10.6.64	Frome B. Hill	8,500	Dry hole
Tulloch No. 1	Otway	4.8.64	Planet	5,360	Dry hole
North Seaspray No. 2	Gippsland	2.2.65	Woodside	5,358	Dry hole
Casterton No. 1	Otway	13.2.65	Planet	8,185	Dry hole
Lake Reeve No. 1	Gippsland	23.3.65	Woodside	6,635	Dry hole
Woodside South No. 1	Gippsland	30.5.65	Woodside	5,819	Dry hole
Tarwin Meadows No. 1	Gippsland	7.6.65	Alliance	3,948	Dry hole
Golden Beach West No. 1	Gippsland	11.9.65	Woodside	7,512	Dry hole
Sunday Island No. 1	Gippsland	19.11.65	Woodside	6,003	Dry hole
St Margaret Is. No. 1	Gippsland	29.1.66	Woodside	4,666	Dry hole
Dutson Downs No. 1	Gippsland	8.3.66	Woodside	6,113	Dry hole
Lakes Entrance No. 1	Gippsland	28.3.66	Woodside	1,386	Dry hole
Casterton No. 2	Otway	20.10.67	Planet	5,008	Dry hole
Woolsthorpe No. 1	Otway	18.5.68	Interstate	6,467	Dry hole
Garvoc No. 1	Otway	21.6.68	Interstate	5,035	Dry hole
Purrumbete No. 1	Otway	13.7.68	Interstate	6,005	Dry hole
Hindhaugh Creek No. 1	Otway	21.8.69	Pursuit	7,781	Dry hole
Moyne Falls No. 1	Otway	2.11.69	Shell	3,308	Dry hole
Milton No. 1	Gippsland	12.11.69	Ashburton	4,098	Dry hole
Hawkesdale No. 1	Otway	2.12.69	Shell	5,820	Dry hole
Colliers Hill No. 1	Gippsland	9.1.70	Woodside	5,612	Dry hole
Sunset No. 1	Murray	8.3.70	Assoc. Aust. O	3,284	Dry hole
Wellington Park No. 1	Gippsland	16.3.70	Woodside	4,127	Dry hole
Morkalla No. 1	Murray	20.3.70	Assoc. Aust. O	2,570	Dry hyle
Salt Lake No. 1	Gippsland	12.4.70	Woodside	5,395	Dry hole
Spoon Bay No. 1	Gippsland	10.10.70	Woodside	4,594	Dry hole
Seacombe South No. 1	Gippsland	1.11.70	Woodside	3,890	Dry hole

Sources : Company reports and press releases.

Mineral production

The mineral production of the State, as recorded by the Mines Department, from lands occupied under the Mines Act (excluding stone produced in quarries and salt) for the years ended December 1966, 1967, and 1968, is as follows :

VICTORIA—MINERAL PRODUCTION

Minerals	1966		1967		1968	
	Quantity	Value	Quantity	Value	Quantity	Value
	fine oz	\$'000	fine oz	\$'000	fine oz	\$'000
Precious metals—						
Gold	21,005	(a) 688	10,996	(a) 468	11,069	(a) 431
Silver	29	(b)	99	(b)	260	(b)
Other minerals—	ton		ton		ton	
Bauxite	..	.. 55	2,020	11	..	.. 162
Tin concentrates	.. 26	.. 55	47	90	.. 92	.. 209
Coal, black	35,519	497	32,066	251	26,314	209
Coal, brown	21,782,977	20,064	23,383,607	20,686	22,970,653	21,555
Copper concentrate	36	4	74	4	162	6
Fireclay	30,978	69	34,581	57	18,897	24
Gypsum	111,293	244	224,065	355	77,472	167
Kaolin and other clays	1,679,968	3,096	1,808,598	3,127	2,008,000	3,342
Limestone	1,807,298	2,191	1,992,158	2,671	1,819,517	2,379
Iron ore	422	6	480	6	174	1

(a) Includes gold subsidy \$73,750 for 1966, \$125,332 for 1967, and \$87,824 for 1968.

(b) Value of silver production in Victoria \$13 in 1966, \$71 in 1967, and \$500 in 1968.

The following table shows the average annual production and value of black and brown coal for each of the five year periods from 1926 to 1960 and the production and value for each of the years 1961 to 1968 :

VICTORIA—COAL PRODUCTION AND VALUE (a)

Period	Black coal		Brown coal	
	Production	Value	Production	Value
	ton	\$'000	ton	\$'000
1926-1930	668,177	1,786	1,515,592	386
1931-1935	472,030	888	2,445,215	512
1936-1940	324,903	568	3,608,751	712
1941-1945	286,277	818	5,010,555	1,052
1946-1950	156,290	722	6,648,430	2,404
1951-1955	143,535	1,590	8,728,116	7,186
1956-1960	100,893	1,050	12,193,625	11,302
1961	66,363	718	16,279,168	15,444
1962	56,721	632	17,137,438	15,682
1963	50,481	588	18,456,445	16,158
1964	47,058	544	19,034,792	17,304
1965	42,247	515	20,658,856	18,436
1966	35,519	497	21,782,977	20,064
1967	32,066	251	23,383,607	20,686
1968	26,314	209	22,970,653	21,555

(a) Value of output at the mine.

Brown coal

The Latrobe Valley contains one of the largest single deposits of brown coal in the world. From 1889 to 1969 it has yielded about 371 mill. tons out of a State total of nearly 384.8 mill. tons. The remaining 13.8 mill. tons have been won from Bacchus Marsh 10 mill. tons, Winchelsea-Dean Marsh 3 mill. tons, Anglesea, 560,000 tons, Lal Lal 57,000 tons, Altona

31,500 tons, Gelliondale 14,500 tons, Thorpdale-Narracan 58,000 tons, and others, 29,000 tons. The Latrobe Valley coal reserves are a national asset which will yield about another 10,000 mill. tons of coal based on 1970 costs. The coal belt extends about 30 miles eastward from Yallourn and ranges from 5 to 10 miles in width. The seams range in thickness from 200 to 450 ft and are covered with sand and clay overburden from 30 to 60 ft thick.

Victorian brown coal is Tertiary in age compared with the Mesozoic black coals of the south Gippsland area. The brown coals vary from about 3,250 to 5,500 BTU's per lb gross in calorific value compared with black coal of about 12,000 BTU's. When dried and briquetted it makes a useful fuel with a calorific value of about 9,500 BTU's per lb.

Early developments

Brown coal was discovered in a shaft at Lal Lal in 1857. By 1864 it was being sent to Ballarat, Geelong, and Melbourne. Sales were few because it was an untreated solid fuel that burnt with a smoky flame and powdered easily when handled. Attempts were made to use brown coal from McKirleys Creek near Neerim, Haunted Hill near Morwell, and Elizabeth Creek near Childers from 1869 to 1874. Again the fuel was unpopular. People were used to burning the better quality imported black coals.

In 1889 a Royal Commission on Coal was appointed and the Government offered a bonus for the first company to make 100,000 tons of briquettes. In 1889 the Mirboo Collieries mined 5,400 tons from a shaft near Boolarra. In the same year the Great Morwell Coal Mining Company commenced operations at the open cut just north of the Latrobe River (now Yallourn North). During the next few years seams were found at Wonwron, Yarragon, Boolarra, Darlimurla, Hernes Oak, Morwell, and Altona.

The first briquette works was built near the Latrobe River in 1894 but was destroyed in a bush fire in 1895. After rebuilding, it operated until 1899 when the company was liquidated. In 1900 the Government Metallurgist examined the possibility of using brown coal at Morwell to generate electricity for transmission to Melbourne. However, the distance to Melbourne was too great to make the scheme economic because only low voltage transmission was then available.

When the black coal field at Wonthaggi was opened in 1909 the urgency for more fuel subsided and little exploration was done.

War-time fuel crisis: 1914-1919

A strike by New South Wales miners in 1916 created renewed interest in local fuels. The Great Morwell Company's open cut was reopened by the Mines Department and systematic drilling commenced nearby. Fundamental chemical and physical research on brown coal was also undertaken. The Government appointed a Brown Coal Advisory Committee to investigate power generation. Their report in 1917 forecast an industrial power shortage and recommended a power house on the Morwell coalfield. At this time an unsuccessful attempt was made to promote the use of Altona coal for power generation.

Establishment of State Electricity Commission

In October 1920 Sir John Monash became Chairman of the new State

Electricity Commission of Victoria. A new open cut south of the Latrobe River was planned to supply both the new briquette factory and the power houses. The operation soon became extensively mechanised. In 1921 an open cut was developed at Winchelsea South and coal was delivered by aerial ropeway to the railhead at Wensleydale. Fifteen thousand tons were produced from 1923 to 1932 and 2,875,000 tons from 1943 to 1959.

The Yallourn North open cut operations were transferred to the State Electricity Commission in 1924 and continued to supply coal until 1930 when operations were suspended. A severe flood in 1934 filled the Yallourn open cut with water and again coal was won from the more elevated Yallourn North pit. Improved methods of mining using electrically operated bucket dredges for both coal and overburden removal and the disposal of overburden in worked out sections of the pit all helped to make the operations efficient.

Cheap power was reticulated to industry and briquettes became common as an industrial and household fuel. At the same time as the Government sponsored fuel and power undertakings were achieving notable success at Yallourn, private ventures at Parwan, Altona, and Gelliondale, however, were less successful.

Second World War

Following the outbreak of war in 1939 more fuel and power was required for industry. Yallourn North was re-opened to supply some of this need and a few miles east the Yallourn North Extension cut was opened up on the same seam to supply local demand. The Wensley Bray open cut at Winchelsea was re-opened and tunnels and pits were opened up near Bacchus Marsh to supply Western Victoria.

During the immediate post-war fuel shortage, a small amount of brown coal was won from tunnels in the Benwerrin, Dean Marsh, and Thorpdale-Narracan areas.

Following intensive drilling in the Morwell area production of coal began in 1955 and increased to 18 mill. tons per annum in 1970 to supply

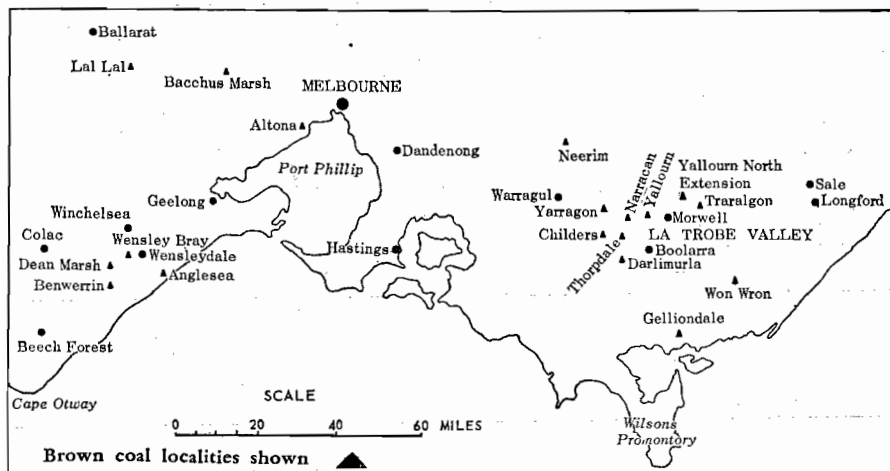


FIGURE 8. Known brown coal deposits in Victoria.

the needs of the Hazelwood Power Station. Associated with the Morwell Project was the Lurgi High Pressure gasification plant capable of producing 15 mill. cu ft per day of town gas from brown coal briquettes. This was opened in 1956. Now that natural gas has supplanted the need for the Lurgi gas, the manufacture of a hard char metallurgical coke is planned at Morwell. Following the exhaustion of economical coal at Wensley Bray in 1955 the Mines Department began exploratory drilling in the Otways. In October 1958 a workable deposit of good quality brown coal was located near Anglesea. Whilst small by comparison with the Latrobe Valley deposits, the reserves are sufficient to base a thermal power plant on them to supply an aluminium smelter and fabricating works at nearby Geelong.

Further references, 1965-1970; Mining in Victoria, 1964; Underground Water, 1964; Groundwater in Victoria, 1969; Victorian Clays, 1970

Quarrying

Information in the following table has been obtained from "regular" quarries which are known to have a fixed plant and which are in permanent production, and from mines producing construction materials as by-products of their main activity :

VICTORIA—CONSTRUCTION MATERIALS

Year	Number of returns	Production					Local value of production \$'000
		Sand	River gravel and gravel boulders	Dimension stone	Crushed and broken stone	Other quarry products	
		'000 cu yd		ton	'000 cu yd		\$'000
1964	223	2,442	526	10,268	8,685	932	19,886
1965	221	2,956	664	14,347	9,827	728	22,736
1966	209	3,148	492	9,546	11,198	754	24,206
1967	213	3,009	596	10,530	12,869	602	27,251
1968	217	3,687	570	7,149	12,255	1,022	28,374

In addition to the production set out in the preceding table, a considerable quantity of material is won by contractors operating shallow pits for or on behalf of local government authorities. Some of these work mine tailings. This itinerant activity was first covered by statistical returns for 1961. However, the statistics are available only from 1962. Reported production data for the years 1964 to 1968 are :

VICTORIA—CONSTRUCTION MATERIALS: ITINERANT ACTIVITIES

Type of material	1964	1965	1966	1967	1968
Sand	240	244	266	422	384
Gravel and gravel boulders	2,582	2,072	1,994	2,156	1,856
Crushed and broken stone	1,469	2,123	1,537	678	883
Other quarry products	1,241	1,040	818	875	435
Local value	1,648	1,710	1,698	1,813	1,582

Further reference, 1966-1970

VALUE OF PRODUCTION

The value of production as estimated in the following tables is based to a large extent on returns received annually from individual producers throughout the State. As a measure of total production it is incomplete, as it does not include the building and construction industry. It also omits factories employing less than four hands (unless power-driven machinery is used) and excludes agriculturists with holdings of less than one acre.

A detailed account of the period covered for individual rural industries is given on page 297. Except in the case of mining and quarrying, statistics for the non-rural industries refer to the year ended 30 June. Statistics for mining and quarrying relate to the year ended 31 December of the first year shown.

Gross value

Gross value is defined as the value placed on recorded production at the wholesale price realised in the principal market. In cases where primary products are absorbed locally, or where they become raw material for secondary industry, these points are presumed to be the principal markets. Care is taken to prevent, as far as possible, all overlapping or double counting. The primary value of dairy production, in accordance with the above definition, is the price paid at the factory for milk or cream sold by the farmer; the value added by the process of manufacturing into butter, etc., is included in manufacturing production.

VICTORIA—GROSS VALUE OF PRIMARY PRODUCTION
(\$'000)

Industry	1964-65	1965-66	1966-67	1967-68	1968-69
Agriculture	295,013	262,852	325,461	221,960	331,715
Pastoral	373,501	413,558	376,196	355,318	345,275
Dairying (a)	194,988	190,141	206,638	181,541	202,245
Poultry and bees	47,776	51,975	57,658	51,316	47,377
Trapping	5,830	5,785	4,244	3,621	3,623
Forestry	29,167	29,691	29,675	27,845	29,920
Fisheries	3,731	4,403	4,980	5,725	5,851
Mining	44,892	48,926	53,156	57,339	59,026
Total primary industries	994,899	1,007,331	1,058,008	904,665	1,025,033

(a) Includes subsidy : 1964-65 \$14,642,000, 1965-66 \$14,569,000, 1966-67 \$14,575,000, 1967-68 \$14,913,000, 1968-69 \$16,667,000.

Local value

The gross value of production, less costs of marketing (freight, cartage, brokerage, commission, insurance, and containers), represents the gross production valued at the place of production, that is, local value, details of which are shown in the following table :

VICTORIA—LOCAL VALUE OF PRIMARY PRODUCTION
(\$'000)

Produce	1964-65	1965-66	1966-67	1967-68	1968-69
Agriculture—					
Barley	3,808	2,938	6,174	2,606	6,470
Maize	203	99	111	39	180
Oats	12,345	12,555	14,498	6,229	10,560

VICTORIA—LOCAL VALUE OF PRIMARY PRODUCTION—*continued*
 (\$'000)

Produce	1964-65	1965-66	1966-67	1967-68	1968-69
Agriculture—<i>continued</i>					
Wheat	91,950	75,456	87,279	36,735	95,832
Onions	1,140	1,507	1,188	1,266	649
Potatoes	22,705	7,763	12,649	16,132	6,891
Other vegetables for human consumption	17,350	19,425	21,862	20,713	19,668
Hay and straw	41,580	39,350	73,108	48,307	71,956
Fruit	22,047	27,654	24,302	26,940	23,469
Vineyards	19,806	17,670	18,688	19,496	16,160
Other crops	21,515	21,295	22,095	17,527	24,688
Total	254,449	225,713	281,954	195,992	276,423
Pastoral—					
Wool	150,987	168,613	167,123	124,143	145,557
Sheep, slaughtered	51,297	57,113	57,081	71,981	56,192
Cattle, slaughtered	130,201	145,403	119,187	128,648	118,882
Total	332,484	371,130	343,391	324,772	320,631
Dairying—					
Whole milk used for—					
Butter	87,345	87,544	96,922	72,345	95,110
Cheese	14,537	11,201	14,792	15,756	13,727
Condensing, concentrating, etc.	16,379	16,365	16,552	14,027	14,409
Human consumption and other purposes	34,348	35,410	37,731	39,925	37,844
Subsidy paid on wholemilk for butter and cheese	14,642	14,569	14,575	14,913	16,667
Pigs, slaughtered	20,165	17,513	17,540	16,905	16,392
Total	187,416	182,601	198,111	173,871	194,148
Poultry and bees—					
Eggs	30,183	33,914	35,173	33,535	31,163
Poultry	11,196	11,546	15,423	11,995	11,731
Honey and beeswax	867	989	758	782	396
Total	42,245	46,449	51,354	46,311	43,291
Trapping, etc.—					
Rabbits and hares	4,599	4,826	3,470	3,051	2,875
Rabbit and hare skins, etc.	870	595	506	359	524
Total	5,469	5,421	3,976	3,409	3,400
Forestry—					
Sawmills	22,391	22,494	23,798	23,235	25,865
Hewn timber	2,587	2,928	2,516	2,477	2,231
Firewood	3,232	3,278	2,554	1,586	1,371
Bark for tanning	90	108	89	80	63
Other	58	62	77	70	48
Total	28,358	28,870	29,036	27,448	29,577

VICTORIA—LOCAL VALUE OF PRIMARY PRODUCTION—*continued*
(\$'000)

Produce	1964-65	1965-66	1966-67	1967-68	1968-69
Fisheries—					
Fish	1,702	1 871	1,643	1,933	2,257
Crayfish	797	1,040	909	1,012	1,436
Oysters	2	(a)	1	(a)	(a)
Scallops	656	789	1,344	1,503	875
Other	57	96	409	874	697
Total	3,212	3,797	4,307	5,153	5,265
Mining—					
Gold	737	687	688	468	451
Coal—					
Black	544	515	497	251	209
Brown	17,304	18,436	20,064	20,686	21,555
Other metals and minerals	4,772	4,841	6,002	6,870	7,006
Quarrying	21,534	24,446	25,905	29,064	29,805
Total	44,892	48,926	53,156	57,339	59,026
Total primary industries	898,526	912,906	965,284	834,296	931,761

(a) More than nil, but less than \$500.

Net value of production

Net value of production is computed by subtracting from local value the cost of materials used in the process of production. These materials include stock feed, seed, manures, power, petrol, kerosene, other oils, dips, sprays, and other costs. No deductions have been made for depreciation or certain maintenance costs. The net value of production is the only satisfactory measure to use when comparing or combining the value of primary industries with those of other industries. Details for primary industries and manufacturing are shown in the table below :

VICTORIA—NET VALUE OF PRODUCTION
(\$'000)

Division of industry	1964-65	1965-66	1966-67	1967-68	1968-69
Rural—					
Agriculture	232,775	202,674	255,016	169,501	247,194
Pastoral	309,668	346,230	315,142	254,187	262,707
Dairying	136,097	135,601	145,567	140,097	166,117
Poultry	24,407	28,192	32,464	27,705	25,675
Bee farming	867	989	758	782	396
Total rural	703,814	713,686	748,947	592,272	702,089
Non-rural	74,091	78,046	80,757	83,561	86,118
Total primary	777,906	791,733	829,704	675,833	788,207
Manufacturing	1,949,665	2,027,685	2,237,159	2,394,801	n.a.
Total all industries	2,727,571	2,819,418	3,066,863	3,070,634	n.a.