

# Part 7

## PRIMARY PRODUCTION

### *Land Settlement and Irrigation*

#### **Land Utilization**

##### *Introduction*

The climatic conditions of Victoria (for details see pages 49 to 64) and especially the 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 pages 488 and 498).

The pattern of land use is more or less clearly defined in each of the statistical districts (see map on page 508). 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 area 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 utilization. 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 used for agricultural production is 7·6 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 fat lamb production. The principal crop grown is wheat and about 1 mill. acres is sown to this crop each year. In addition, some 300,000 acres of oats, and 150,000 acres of barley are usually grown. Yields from cereal crops vary widely, according to seasonal conditions. The average district yield per acre for wheat in recent years has been 18 bushels.

The lack of suitable pasture species has been a problem in pasture development and, in the past, grazing has been provided largely by native pastures, green cereal crops, and crop stubbles. More recently, wider use has been made of dry land lucerne and medics in rotation with crops, with benefit to both crop production and grazing. The district carries about 1·8 mill. sheep and produces about 16 mill. lb. of wool as well as a substantial number of early fat lambs for the Melbourne market.

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

#### *Wimmera District*

The Wimmera occupies the central western part of the State and has an area of 7·4 mill. acres, of which 6·1 mill. acres is used for agricultural purposes. Rainfall in the north is about 14 in. per year, increasing to 25 in. in the south. The Grampian Range in the south of the district has 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 fat 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. About 700,000 acres are sown to wheat each year, the average yield being close to 24 bushels per acre. Other major crops are oats (200,000 acres), and barley (60,000 acres). In recent years the development of suitable strains of medics and clovers has encouraged the inclusion of a pasture phase in crop rotations.

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. The district carries over 4 mill. sheep and

produces more than 40 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 River Murray in the north. The total area of the district is 6.3 mill. acres, of which 5.5 mill. acres is 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 in. in the north-west and increases to 25 in. 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 a number of different farming enterprises is carried out.

Wheat growing is an important industry. The area sown averages about 320,000 acres, and because of climatic and soil differences yields vary widely across the area, the district average being 24 bushels per acre. As in the other major wheat-producing districts, oat crops are an important feature in rotations and for grazing. In the Northern District over 200,000 acres of oats are sown each year.

The district carries over 4 mill. sheep, largely on wheat farms, and emphasis is on fat 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 areas 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. There are about 330,000 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.

### *North-Central District*

This district includes much of the Central Highlands area and the rainfall is generally over 30 in., but on the northern slopes it is as low as 22 in. 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 area north-east of Ballarat and fruit 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. The district carries over 2 mill. sheep and about 66,000 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 in. in the north-western corner of the district to well over 60 in. 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 some 9,000 acres of tobacco and small quantities of hops are grown in these areas. The district carries about 150,000 dairy cattle, mainly along the river valleys.

Fat 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 2 mill. sheep.

The North-Eastern District is an important beef cattle breeding and fattening area, and over 200,000 head are 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 inch rainfall belt, but an area north and east of the Otways is influenced by a rain shadow effect and the average annual rainfall is 20 to 25 in. In the Otway Ranges the average annual rainfall is as high as 70 in. The soils of the district vary considerably in type and fertility. The great bulk of the plains area consists of basaltic soils. 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 6·6 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 are oats which are used as a fodder crop, cut for hay, or harvested for grain which is used very largely to feed stock. The more fertile soils produce both potatoes and onions, and some 60 per cent. of the State's onion acreage is grown in the district. 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, carrying about 9 mill. sheep. Almost half the total sheep population is Merino, and the fine wool breeds—Merino, Polwarth, and Corriedale—make up more than three-quarters of the total sheep population. There are relatively few crossbreds, and fat 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 carries close to 300,000 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 are produced in the district, which carries close to 400,000 dairy cattle.

### *Central District*

Rainfall varies from 20 in. in the rain shadow area, north of Geelong, to more than 50 in. 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 about 40,000 acres are grown—mainly on the plains to the west. Potatoes are grown in the Romsey—Ballarat area and market gardening is important close to Melbourne, Geelong, and Bacchus Marsh.

The district carries about 2·3 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. There are just under 300,000 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 3·7 mill. acres and the bulk of settlement is south of a line between Dandenong and Bairnsdale. Rainfall varies from just under 25 in. in the rain shadow area near Maffra and Sale to 60 in. and above in the highlands. Average annual rainfall over the most part of the settled areas is 30 to 40 in., and climatically the district is well suited to 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 specialty 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 inch 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 460,000 dairy cattle. Pig raising is associated with dairy farming, and there are about 60,000 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. However, in the 22-30 inch rainfall area near Sale, fat lamb production on improved pastures is a major enterprise. In the foothills, fine-woolled sheep and beef cattle are carried.

#### Alienation of Land

The total area of the State is approximately 56,245,760 acres. On 31st December, 1960, this comprised :—

	Acres
Lands alienated in fee-simple .. ..	31,431,316
Lands in process of alienation .. ..	1,434,365
Crown lands .. ..	23,380,079
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Total .. ..	56,245,760
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The Crown lands comprise :—

	Acres
Permanent forests (under Forests Act) ..	4,860,056
Timber reserves (under Forests Act) ..	709,777
State Forest and timber reserves (under Land Act)	151,499
Water reserves .. ..	316,261
Reserves in the Mallee .. ..	410,000
Other reserves .. ..	551,388
Roads .. ..	1,643,284
Water frontages, beds of rivers, lakes, &c., un- sold land in cities, towns, and boroughs ..	3,845,921
Land in occupation under—	
Perpetual leases .. ..	1,093,349
Leases of former agricultural college lands	30,244
Other leases and licences .. ..	1,935
Temporary grazing licences and leases ..	*5,986,713
Unoccupied .. ..	3,779,652
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Total .. ..	23,380,079
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\* In addition, 75,587 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 1956 to 1960. 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 Ended 31st December—	Area of Crown Lands Sold			Crown Lands Alienated in Fee-simple	
	Absolutely, at Auction, &c.	Conditionally to Selectors	Total	Area	Purchase Money
	acres	acres	acres	acres	£
1956.. ..	3,475	4,901	8,376	96,010	130,775
1957.. ..	2,070	1,120	3,190	123,726	141,545
1958.. ..	5,480	23,763	29,243	51,396	151,672
1959.. ..	30,972	51,075	82,047	123,202	310,895
1960.. ..	3,740	38,532	42,272	129,939	281,173

### Transfer of Land Act and Assurance Fund

Information on these topics will be found on pages 451–452 of the Victorian Year Book 1961.

### Soil Conservation Authority

#### Functions

The Authority is responsible for the mitigation and prevention of soil erosion; promotion of soil conservation; and the determination of land use to achieve these objectives.

To perform these functions, the Authority conducts surveys and investigations into the nature and extent of soil erosion. 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.

It co-ordinates the policies and activities of Government departments and public authorities for the alienation and use of Crown lands and has powers to remove stone, gravel, and soil. The Act provides wide powers for soil conservation works with penalties for failure to comply. Grants and loans to assist in the carrying out of approved specific projects may be made to any Government department, public authority or private individual on such terms as the Authority may decide.

The Chairman of the Authority is also Chairman of the Land Utilization Advisory Council, which operates under the same Act. The Council consists of the Director of Agriculture, Secretary for Lands, Chairman of the Forests Commission and the Chairman of the State Rivers and Water Supply Commission. The Secretary of the Authority is also Secretary of the Land Utilization Advisory Council.

The Council's functions are to make recommendations to the Authority on the constitution and definition of catchment areas and to advise the Minister and the Authority concerning policy of all land use in any catchment area.

After consultation with the Land Utilization Advisory Council, the Authority determines the most suitable use in the public interest of all lands in catchment areas, and which lands should be permanently used for forests, pasture, agriculture, and other purposes.

### *Soil Conservation Competitions*

The Soil Conservation Authority of Victoria conducts a series of six competitions annually as part of its responsibility to encourage soil conservation throughout the State.

Each soil conservation competition circulates around four districts so that every landholder has an opportunity to compete for the honour of being the winner every fourth year.

The conditions of entry are simple. Any property worked as a farm unit is eligible and the principal awards are made for the "best effort towards soil conservation, having regard to the erosion hazard on each competing property". The best farm is therefore not necessarily the winner, although many of the best farmers in the State compete.

The oldest of the competitions has been conducted annually for over twenty years, and the newest is in its second year.

Every property entered is visited by the judge, who is a qualified District Conservation Officer. The basis of judging is the general farm lay-out which should be designed to ensure permanent production consistent with soil types, topography, aspects, water supply, and efficiency in farm operations. General farming practices are examined closely and the results are observed. Judging is carried out in the autumn, a time when it is difficult to conceal the effects of incorrect land use.

There is intense competition to win a Hanslow Cup which the winner holds only for one year. The awards are made at Field Days following a tour of inspection of the property when the winning features are explained by Soil Conservation Authority officers and the owner of the property.

Field Days are an important soil conservation event in the rural calendar, and attendances of over 500 are common. They have had considerable influence in encouraging correct land use and in many

districts improved farming practices have been adopted widely, following field days on winning properties where their benefits have been demonstrated.

### **Further References**

Further information about the Authority is set out on pages 62 to 65 of the Victorian Year Book 1962, and pages 452 to 454 of the Victorian Year Book 1961.

### **Land Utilization Advisory Council**

The activities of this Council are described on pages 473-474 of the Victorian Year Book 1962.

### **Destruction of Vermin and Noxious Weeds**

The control of vermin and noxious weeds in Victoria is conferred by the *Vermin and Noxious Weeds Act* 1958, which gives the Department of Crown Lands and Survey wide powers of enforcement.

Action against the rabbit pest is being taken along three main lines: by myxoma virus, by poison, and by the fumigation and destruction of burrows and places of harbour.

The disease myxomatosis is introduced into the rabbit by inoculation and has achieved a good rate of mortality. Field days are organized by the Department at which rabbits are inoculated with the virus and released to spread the disease, mainly through the agency of the mosquito. Departmental scientists are engaged in experiments ascertaining the virulence of various strains of myxoma virus and in investigating other avenues of biological research.

A recent State-wide campaign using the poison sodium fluoroacetate, known as "1080", met with considerable success, an innovation being the distribution of poisoned baits by aircraft. This aerial baiting is particularly suited to the rougher type of country where the usual method of distribution by poisoned trail is unsatisfactory. The poison "1080" is a very deadly one, necessitating the strictest control and supervision of the preparation of the poisoned baits. The medium of conveyance of the poison is, in the main, oats, though carrots and apples are also used. Landholders are fully advised of the deadly nature of the poison and of the required precautions.

The close co-operation of the landowner is an essential requirement for the success of a campaign and, to this end, advisory committees have been formed throughout the State. The function of these committees, of which the local departmental inspector is a member, is to meet in consultation at regular intervals and discuss methods of approach to the problems of vermin control.

Noxious weeds present a great threat to the agricultural land of the State and continuous scientific research is being carried out in an endeavour to combat this menace. Some 75 plants have been

declared, by proclamation under the Act, to be noxious weeds for the whole of Victoria, with the exception of the Metropolitan Area where the responsibility for control rests with the municipalities. In addition, some 50 plants have been declared noxious weeds for certain specified areas of the State. The weeds Ragwort, Skeleton Weed, St. John's Wort, and Cape Tulip are among those most difficult to control, and constant vigilance and action are required to prevent their spreading. An interesting project currently in progress is an effort to destroy under-water growth.

Employees in the field number approximately 825, the number varying to some extent according to seasonal conditions. Departmental machinery and equipment may be hired to landowners at moderate charges, and advances may be made to assist farmers in carrying out the work of vermin and weed destruction.

### **Soldier Settlement**

#### *Soldier Settlement Commission*

Prior to 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.

An Agreement was finally concluded between the Commonwealth and the various States in 1945 on this matter. This Agreement provided that Victoria, New South Wales, and Queensland, would act as principal States, and that Western Australia, South Australia, and Tasmania would act as agents for the Commonwealth Government.

In 1945, the Victorian Government completed an Agreement with the Commonwealth Government. The State Parliament ratified the Agreement and also passed legislation constituting the Soldier Settlement Commission which was to have three full-time members and was given the necessary authority to appoint staff.

Soldier settlement in all States has now reached the closing-down stages and the achievements of Victoria in this form of land settlement have been most satisfactory.

Under the Victorian legislation, soldier settlement was carried out under two separate schemes. Firstly, there was the general settlement scheme where the Soldier Settlement Commission acquired freehold land or Crown land for subdivision and development into holdings for application by ex-servicemen and such holdings were allocated on a competitive basis, having regard to the merits of all the applicants.

Secondly, there was the Single Unit Farm Scheme where ex-servicemen were granted loans up to a maximum of £9,000 to assist them in the purchase of existing farms of their own choosing. Under this scheme 2,883 ex-servicemen were granted loans amounting to £12,006,650.

Up to the 30th June, 1961, the Commission had purchased 1,193,171 acres of alienated land at a cost of £19,542,329, and had also set apart under the Soldier Settlement Act, 51,536 acres of Crown lands. The total area of 1,244,707 acres was dealt with as follows :—

VICTORIA—SOLDIER SETTLEMENT COMMISSION : LAND ALLOCATION, 1945 TO 1961

Particulars	Area
	acres
Allocated for General Settlement purposes covering 3,048 farms	1,180,669
Sold or disposed of as unsuitable for settlement purposes for reasons such as over-capitalized homestead areas or appropriation for public purposes .. .. .	64,038
Total .. .. .	1,244,707

The Soldier Settlement Act made provision for the Commission to make advances where required to both general settlers and Single Unit Farm settlers to assist them in the purchase of stock, plant and equipment. For this purpose £5,880,405 has been advanced to settlers, and of this amount, £4,923,269 has been repaid.

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.

Summary

With soldier settlement in its final stages, the following summary sets out the position in Victoria as at the 30th June, 1961 :—

VICTORIA—RURAL REHABILITATION OF EX-SERVICEMEN, 1945 TO 1961

Act	Number of Ex-Servicemen
<i>Soldier Settlement Act</i> —	
Number allotted a holding under the general subdivisional scheme	3,048
Number allotted a holding under the general subdivisional scheme but for various reasons such as ill health, death, compulsory forfeiture, &c., have relinquished the holdings granted to them .. .. .	226
Number granted Single Unit Farm loans .. .. .	2,883
<i>Commonwealth Re-Establishment and Employment Act 1945</i> —	
Number granted agricultural loans for purchase of land ..	548
Number granted agricultural loans for purchase of stock, plant, &c., to work properties .. .. .	979
Total .. .. .	7,684

**Other Land Settlement***General*

The *Land Settlement Act* 1959, extended the functions of the 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 ineligible for soldier settlement.

The scheme, generally, is based on the same principles as the general scheme for soldier settlement—the main difference 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.

Generally speaking, 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.

*Tenure*

After a settler is allocated a holding, he may, in the first instance, be employed by the Commission on wages and he may be granted a temporary lease of his holding. It has been necessary to provide for a wide range of contingencies in the temporary lease stage to cover a wide range of circumstances, such as the allocation of a more or less ready-made farm as compared with a farm where considerable developmental work is still required. The minimum period for a temporary lease is one year and the maximum period is five years. A settler under temporary lease will be required to pay such rent as the Commission thinks fit and reasonable, taking into account differing circumstances, particularly those connected with production.

When a farm has been developed to a stage where the settler of average efficiency can successfully carry on, provision is made for the grant of a purchase lease. This purchase lease provides for the determination of a capital liability on which the settler pays 5 per cent. per annum, which includes interest at 4 per cent. per annum on the liability from time to time outstanding. This means that in about 41 years a settler would freehold his farm although it can be freeholded earlier if larger amounts are paid against the capital liability. The purchase lease is not negotiable for a period of six years, but this six-year period may be reduced by up to three years if the settler has been in occupation under temporary lease up to three years. In determining the capital liability under the lease, the Commission

is required to have regard to market values of the holdings, but to disregard any abnormality in seasonal or economic conditions which may affect current market value.

### *Settlers' Credit Account*

Under the Act settlers will be encouraged to make additional payments in excess of those required under the lease. These excess payments would earn interest in a special credit account at a rate equal to long-term bond rates for the time being applicable (at present  $5\frac{3}{8}$  per cent. per annum).

### *Advances to Settlers*

Advances may be made to settlers for stock, plant, seasonal requirement, living and working expenses, and for permanent improvements. Interest at the rate of 4 per cent. per annum is charged on the amount of the advance from time to time outstanding, and the repayment of the advance with interest is made over such period and in such manner as is determined by the Commission in any particular case.

### *Developmental Projects*

Up to the 30th June, 1961, the land being developed for allocation under this Scheme has been on three developmental projects. These are Heytesbury near Cobden, Yanakie on Wilson's Promontory, and the East Goulburn Project in the Parish of Dunbulbalane.

The progress of each of these projects at the 30th June, 1961, is shown below:—

#### *Heytesbury*

Total area cleared to 30/6/61	..	41,914 acres
Total area ploughed to 30/6/61	..	38,850 acres
Total area sown to pasture to 30/6/61		34,411 acres

Sixty-four new farmhouses have been constructed whilst a further 43 are under construction. Fencing, water-points, and shedding have been provided on the same scale and over 60 miles of new roads have been constructed with a further 30 miles under construction.

At the 30th June, 1961, 56 settlers were in occupation of their holdings and engaged in dairying activities, and further blocks were reaching the stage of development necessary before being made available for application.

#### *Yanakie*

At 30th June, 1961, a total of 5,050 acres had been sown to pasture including 300 acres of a rich peat swamp area on which considerable drainage works have been undertaken to allow its development into improved pasture land. A further 760 acres of the swamp have been rotary-hoed preparatory to sowing in the 1961-62 season when the balance of the swamp (500 acres) will be rotary-hoed. The development of this area gives promise of very rich land but naturally its development has taken longer than the higher ground around the swamp.

Eight settlers are in occupation of their holdings on which new houses and all essential improvements have been effected, and these settlers have commenced dairying activities.

#### *East Goulburn*

This project will provide for 80 soft fruit orchards and approximately 100 dairy farms, all under irrigation.

At the 30th June, 1961, 72 orchards had been planted to a basic area of 17 acres peaches, 5 acres pears and 3 acres apricots, in all a total of 1,800 acres. The remaining eight orchards have been planted to various areas of these kinds of fruit totalling 142 acres, making the total area planted to 30th June, 1961, 1,942 acres over the 80 orchards. To complete the overall target of 2,000 acres, an average planting of 7½ acres per block over eight blocks will be required in 1962.

Of the first orchards planted in 1958, 22 have now been allocated to applicants and all these settlers are in occupation of their holdings.

At 30th June, 1961, development of nine holdings for dairying under irrigation had been completed. An initial area of 65 acres on each of these had been ploughed, graded, checkbanked and sown to permanent pasture mixture, houses were under construction and contracts let for the erection of dairies and other shedding.

Applications have been called for these holdings under the provisions of the *Land Settlement Act* 1959 and the successful applicants will occupy their holdings during the Spring of 1961.

Work has been commenced for the development of a further fourteen holdings for dairying under irrigation and their sowing in 1962.

In addition to the above developmental work, the Commission, as at the 30th June, 1961, has erected 41 houses and a further fifteen are under construction.

It has also erected 34 miles of fencing and excavated 22 dams.

#### *Conclusion*

The demand for all holdings allotted to date has been exceedingly keen and 62 holdings allocated during the 1960-61 financial year attracted over 3,000 applications.

### **Water Supply and Land Settlement**

#### *History*

For practical purposes, the history of water supply in Victoria can be taken up in the early 1880's when the miners who had left the goldfields to settle on the northern plains began to realize, 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 90 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 attack on the water supply problem was

apparent and in 1905, the Water Act was passed. This revolutionary Act, which has since provided the basis for practically all of Australia's water supply development, had three main features :—

- (1) It abolished all but one of the trusts 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 ; and
- (3) it vested in the Crown the right to the use of the water in all of the State's rivers, streams, &c., thus avoiding the litigation which has clouded the history of water supply in the U.S.A.

### *Irrigation*

One of the Commission's most important functions is to promote the development of irrigation, and at 30th June, 1961, it had spent on this work about £70 mill. or 60 per cent. of its total capital expenditure on water supply and conservation generally.

Most irrigation is carried out in districts directly controlled by the Commission, although there is an increasingly large proportion of "private diverters", i.e., irrigators who are licensed to take water from streams, lakes, &c., but who do not come within the boundaries of an irrigation district.

A feature of the districts is the system of "water rights" in operation. Under this system a certain quantity of water is assigned to each district and allotted to the lands 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, but they can also buy water in excess of the water right in the great majority of seasons.

This method assures irrigators of a definite quantity of water each year, and the Commission can rely on fairly constant revenue to meet its costs of operation. Since water usage varies greatly from year to year according to the weather, paying solely in accordance with water used would bring in widely fluctuating returns.

Another 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 block instead of limiting the allocation of water to a portion of each block. This has meant that Victorian irrigation is predominantly devoted to dairying, fruit and vegetables rather than sheep-raising. The advantage of intensive irrigation is that much higher returns are available from a given quantity of water and, consequently, a much bigger rural population can be supported.

The use of the water of the River Murray is shared equally with New South Wales after certain quantities have been reserved for the use of South Australia. This vital principle was established after many years of controversy by the River Murray Agreement of 1915, under which a Commission comprising representatives of the three States and the Commonwealth was formed to administer the Agreement. The four parties share equally the cost of all works on the River Murray.

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

VICTORIA—MAJOR IRRIGATION STORAGE SYSTEMS

River	Name	Capacity	Principal System or District Served
		acre-feet	
Goulburn ..	Eildon Reservoir .. ..	2,750,000	Goulburn-Loddon
	Goulburn Weir .. ..	20,700	Goulburn-Loddon
	Waranga Reservoir .. ..	333,400	Goulburn-Loddon
Loddon ..	Cairn Curran .. ..	120,600	Goulburn-Loddon
	Tullaroop .. ..	60,000	Diverter
Murray ..	Hume .. ..	1,250,000*	Murray
	Murray River Weirs .. ..	111,420*	Murray
Macalister ..	Glenmaggie .. ..	154,300	Macalister (Gippsland)
Pykes Creek ..	Pykes Creek .. ..	19,400	Bacchus Marsh
Werribee ..	Melton .. ..	15,500	Werribee
	Total .. ..	5,047,480†	

\* Victoria's half share of River Murray storages under the River Murray Agreement. When completed, Hume will have a total capacity of 2,500,000 acre-feet.

† In addition to the storages named, the total includes a system of natural lakes in the Kerang-Swan Hill area and the Coliban River storages used for both irrigation and town supply around Bendigo.

The following table compiled by the Commission shows the total areas of the various irrigation systems and the areas under irrigated culture during 1960-61 :—

VICTORIA—AREAS OF SYSTEMS AND LANDS IRRIGATED,  
1960-61  
(Acres)

System or District	Total Area	Area Irrigated							Total
		Pastures		Lucerne, Sorghum, &c.	Vineyards	Orchards	Market Gardens	Other	
		Native	Sown						
Goulburn-Loddon System ..	1,288,880	18,934	358,661	20,948	218	21,662	3,923	7,861	432,207
River Murray System—									
Torrumbarry System ..	340,975	33,435	180,715	7,680	5,192	983	951	9,392	238,348
Murray Valley Area ..	274,123	1,412	91,722	8,356	29	5,465	535	311	107,830
Pumped Supply* ..	80,754	207	571	677	36,243	2,578	398	916	41,590
Total River Murray ..	695,852	35,054	273,008	16,713	41,464	9,026	1,884	10,619	387,768
Macalister District (Gippsland)	130,933	1,491	47,329	1,218	..	..	144	7	50,189
Werribee-Bacchus Marsh ..	16,327	1,632	4,219	786	..	587	4,326	237	11,787
Other Northern Systems ..	19,735	835	8,860	1,433	..	3,710	746	107	15,691
Other Southern Systems ..	§	..	..	..	..	..	1,114	203	1,317
Private Diversions‡ ..	§	9,068	62,246	9,013	3,135	5,289	9,598	9,872	108,221
Total .. ..	†2,151,727	67,014	754,323	50,111	44,817	40,274	21,735	28,906	1,007,180

\* Including First Mildura Irrigation Trust (13,722 acres irrigated) supervised by the Commission.

† Area authorized to be irrigated, excludes 37,529 acres irrigated by private diverters in the Torrumbarry Irrigation System.

§ Not available.

‡ Incomplete.

The most important works under construction are the £15 mill. channel enlargement and remodelling programme in the Goulburn-Loddon Irrigation System. This has been necessitated by the enlargement of Eildon Reservoir and the construction of Cairn Curran and Tullaroop Reservoirs, which have enabled more than twice as much water to be supplied to the System as was previously available. Half of the new channel works have been finished, and at the present rate of progress the programme should be finished in six years, subject to the availability of funds.

An important addition to storage capacity at present under construction, is the enlargement of Eppalock Reservoir on the Campaspe River, from 1,200 to 250,000 acre-feet. This will provide 12,000 acre-feet annually for pumping to the Bendigo Urban Area (at present wholly dependent on the Coliban River storages) and some 55,000 acre-feet, for irrigation and domestic and stock use, along the Campaspe River and in the Goulburn and Torrumbarry Irrigation Systems.

Victoria will also benefit greatly by enlargement works being carried out for the River Murray Commission at Hume Reservoir.

### **Further References**

The history of State irrigation is described on pages 479 to 483 of the Victorian Year Book 1962.

### *Water Supply of the Wimmera-Mallee Region*

#### *Introduction*

The need for an adequate and reliable supply of water has always been the primary consideration in the development of the Wimmera and Mallee regions of north-western Victoria. This need, and the difficulty in meeting it satisfactorily, has resulted in the construction of the most extensive scheme of its kind in the world, and has provided one of the most interesting chapters in the history of Victoria's water supply.

#### *System Today*

The Wimmera-Mallee System has been developed and is operated by the State Rivers and Water Supply Commission. The area served with water extends over some 10,000 square miles, or one-ninth of the total area of Victoria\*, and its annual output of primary products returns the farmers about £30 mill., which is approximately one-tenth of the State's total farm production.

Water is supplied principally from reservoirs in the Grampian Ranges. Of these, Rocklands and Toolondo Reservoirs, the largest and most recently constructed, regulate the flow of the Glenelg River,

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\* Other areas in the Mallee, served by pumping from the River Murray, are not included in the system referred to in this article.

while Lake Lonsdale, Wartook, Fyan's Lake, Taylor's Lake, and Pine Lake are in the catchment of the Wimmera River.

Individual storage capacities are as follows :—

Name				Acre-feet
Rocklands	..	..	..	272,000
Toolondo	..	..	..	86,000
Lake Lonsdale	..	..	..	53,300
Wartook	..	..	..	23,800
Fyan's Lake	..	..	..	17,100
Taylor's Lake	..	..	..	30,000
Pine Lake	..	..	..	52,000
Others	..	..	..	29,600
				563,800

Average annual requirements of the system are approximately 100,000 acre-feet at headworks, of which about 10,000 acre-feet are needed for supply to 50 cities and towns with a combined population of 60,000 served by urban pipe reticulation.

Each farm is entitled to receive annually 5 acre-feet of water per square mile of the rated property. Rates are levied on the basis of the valuation of each property served, with a minimum amount of rate on each property based on its area. Total revenue from rural lands amounts to approximately £300,000—an average of £45 per farm—while the State bears a similar sum in the form of interest charges on total capital expenditure of £7,500,000.

### *Early History*

The first attempt at water conservation in the Wimmera occurred some time in the 1840's, when the Wilson brothers dammed the Wimmera River to divert water down the Ashens and Yarrambiack Creeks. It was not until the severe drought of 1877, however, that it became apparent that a major water conservation scheme was needed to overcome the water supply problem. An expert investigation resulted in the Water Conservation Act of 1881, which was the first major legislation relating to water supply in Victoria. The Act provided for the establishment of separate local authorities (Trusts) to carry out water supply works using Government funds. The first reservoir to be constructed in the area, Wartook, was completed in 1887, but was proved to be quite inadequate by the severe drought of 1895 to 1902. During those years, practically all the stock in the area commanded by the system had to be transported to the Western District and Gippsland.

The need to co-ordinate the activities of the many Trusts set up under the 1881 Act led to the establishment of the State Rivers and Water Supply Commission, and by 1909, all developmental works were being administered by the Commission. One of the immediate tasks to be faced was the intensification of the programme to replace

inefficient natural carriers with artificial channels, and this project, although not complete at the time, saved the country from disaster in the 1914 drought. Following the 1914 experience, construction of both Fyan's Lake and Taylor's Lake was authorized, and authorization for Pine Lake followed after another very dry year in 1919.

A further dry period began in 1927 and, as an emergency measure, the Waranga Western channel was extended 130 miles from the Loddon River to Beulah East. This relieved the situation in the northern section of the system, but the position in the south was still critical and to overcome this problem the Government authorized the construction of a channel through the Divide to bring water from the Glenelg catchment into the Wimmera catchment.

#### *Rocklands Reservoir*

The danger of failure of supplies in drought was virtually removed with the completion in 1953 of Rocklands Reservoir near Balmoral, on the Glenelg River, and the associated Toolondo Storage. These two headworks storages have a combined capacity of well over half of the total capacity available to the system.

Construction of Rocklands was started in 1941, but was suspended in 1942 because of war conditions and not resumed until after the war ended in 1945. Rocklands is the latest of the major concrete dams so far built by the State Rivers and Water Supply Commission.

#### *Channel Cleaning*

A major problem in maintenance of the Wimmera-Mallee System, particularly in the Mallee, has always been the removal of sand drift from channels. In 1945-46, expenditure on removing sand was as high as £320,000, whereas expenditure in recent years has averaged £60,000. This tremendous improvement has come about largely by better farming methods and a greater appreciation of the dangers of erosion, partly by the planting of rye corn on channel banks and the ban on fallowing near channels, and partly by development of more efficient means of cleaning channels. A further factor, and one not so readily apparent, has been the amalgamation of holdings in recent years, since this has made sounder crop rotation possible.

#### *Flood Protection, River Improvement and Drainage\**

The major flood protection work in Victoria has been the drainage of the Koo-wee-rup Swamp, a depression of 80,000 acres along the seaboard of Westernport Bay, south of the main Gippsland railway. Once useless, this area supports a population of about 4,000 and yields primary production worth approximately £3 mill. annually.

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\* Drainage works are also needed in most irrigation districts.

Another important area controlled by the Commission is the Carrum Drainage District comprising 30 square miles of low-lying land extending four to five miles inland from Port Phillip Bay and separated from the sea by a broad sand ridge on which are established six bayside towns from Aspendale to Seaford. About 7,000 persons benefit to some degree from flood protection works in this district and construction works, estimated to cost £500,000 over a period of years, are being carried out to bring in further areas and provide still greater assurance against flooding.

A comparatively recent development has been in the field of river improvement—the removal of obstructions and the prevention of erosion and siltation. Under the *River Improvement Act* 1948, provision was made for the formation of local trusts operating under the supervision of the Commission with power to carry out works and levy rates. Nineteen trusts have since been established and are assisted by grants from the Government amounting to about £175,000 annually. In addition, river improvement work is helped by grants from the Rivers and Streams Fund (about £40,000 annually) which comprises mainly licence and permit fees paid for the right to divert water from streams.

A major work recently completed at a cost of about £500,000 is the Lake Corangamite project, north-west of Colac. About 12,500 square miles of private land were flooded between 1952 and 1956 and as there is no outlet from the Lake, it would have been necessary to rely on evaporation for relief by natural agencies. Accordingly, work was undertaken to divert floodwaters, which would otherwise have entered Lake Corangamite, by a channel leading 24½ miles into the Warrambine Creek, which is a tributary of the Barwon River. Besides relieving flooding, this scheme is intended to free a large part of the area around the lake for agricultural use in most years.

### *Spray Irrigation in Agriculture and Dairying*

Spray irrigation in Victoria, for the growing of pastures and fodder crops, is mainly used in connection with private irrigation schemes, and consequently the area irrigated by this method is very small compared with that irrigated by flood systems.

Of the three types of spray irrigation equipment available (low pressure, medium pressure, and high pressure), the medium pressure (35 to 50 pounds per square inch) is the most popular. The normal delivery of water from the spray heads is equal to 20 to 30 points of rain per hour. Various automatic systems have been devised to eliminate the shifting of portable spray lines, which requires three-quarters of an hour's work per acre per irrigation. These automatic systems are more expensive to install and may cost up to £200 per acre compared with a figure around £40 per acre for manually shifted lines.

Some large individual areas of over 100 acres of spray irrigation per farm can be found in Victoria, but the vast majority of private schemes employing this method are of 10 to 20 acres only. This area is generally all that the available water supply can irrigate.

The main crop irrigated is perennial pasture, in which the main species employed (in varying proportions) are perennial ryegrass, cocksfoot, paspalum, white clover and strawberry clover. However, some maize, Japanese millet, saccaline, and cruciferous fodder crops are also grown.

The expense attached to a small private irrigation scheme is high, and consequently efficient utilization of the fodder produced is necessary if the full benefit of the scheme is to be obtained. Rationing of the feed by subdivision, strip grazing or restriction of time allowed for grazing, is usually considered necessary. Using such methods, one acre of irrigated perennial pasture can maintain the lactation of up to four cows throughout the whole of the summer, and this is profitable. The employment of an expensive private irrigation scheme for fodder conservation alone is not by any means as profitable.

## *Agricultural Research, Extension, and Education*

### **Department of Agriculture**

#### *Research*

The high standard of Victoria's agriculture, which produces more than one quarter of Australia's primary produce (measured in terms of value) from less than one-thirtieth of the nation's area, is due in no small measure to the programme of research and advisory services undertaken in recent years.

The Department of Agriculture, which has expanded greatly in recent years, has concentrated on strengthening its existing research stations with new and up-to-date facilities, establishing new research centres, promoting new research projects, and intensifying advisory services.

Recent developments have included a new animal husbandry research laboratory and extensions to the plant breeding laboratory at the State Research Farm, Werribee; considerable additions to the Plant Research Laboratory, Burnley; new buildings at the Biology Branch, Burnley; new laboratories at the Scoresby and Tatura Horticultural Research Stations; and additional research facilities at the Mallee Research Station, Walpeup, Rutherglen Research Station, Tobacco Research Station, Myrtleford, Dairy Research Station, Ellinbank, and the Potato Research Station, Healesville.

Two new research stations—the Pastoral Research Station, Hamilton, and the Irrigation Research Station, Kyabram—have been established and land has been bought adjoining Scoresby and Rutherglen Research Stations to ensure the expansion of research at these stations.

At research centres strategically located in Victoria's rural areas, highly trained scientists are seeking the answers to a wide range of problems which face the primary producer trying to improve the efficiency of his farm. These scientists have already made many notable discoveries which have benefited Victorian agriculture. Outstanding results during the last few years include:—

- (1) Release of the following new plant varieties to growers—

*Wheat*: Olympic, Beacon, and Stockade.

*Oats*: Alpha.

*Medic*: Harbinger.

*Linseed*: Hazeldean and Bonnydoon.

*Flax*: Currong and Standard.

*Tobacco*: Golden Crest.

*Peaches*: Tatura Sunrise, Tatura Dawn, Tatura Sunset, Tatura Aurora.

New varieties of beans, brussels sprouts, cauliflowers and strawberries, have also been made available to farmers.

- (2) A new technique for crossing previously incompatible species of tomatoes. This was done for the first time in the world.
- (3) A new cool storage technique to reduce brown rot damage on peaches.
- (4) Further progress in controlling cool storage rot in Granny Smith apples.
- (5) A storage technique to control black spot in potatoes.
- (6) A cool storage technique to provide high quality pears for the market throughout the year.
- (7) A method of controlling bitter pit of apples.
- (8) Techniques for the eradication of swine plague and the establishment of pneumonia-free piggeries.
- (9) A new method of identifying milk from cows which have been treated with penicillin.
- (10) Field tests for ovine brucellosis.

Extensive progress has also been made in protecting Victoria's horticultural industries from fruit fly, and in eradicating tuberculosis from dairy herds.

#### *Extension*

To speed these research results to the farming community, the Department of Agriculture appoints each year additional trained advisory officers throughout rural Victoria. Recruitment of this

staff has been greatly stimulated by scholarships in agricultural science at Melbourne University, in veterinary science at Sydney and Queensland Universities, and in dairy science at Massey Agricultural College, New Zealand.

These advisory officers use every method of communication to channel technical facts to farmers. Much of their time is taken up with on-the-farm advice, but they also speak at field days and hold discussion group meetings. Their work is also backed by the Department of Agriculture's intensified production of publications, films, and radio services.

The monthly *Journal of Agriculture*, once the Department's only major publication, is now accompanied by the regular industry digests and bulletins. Specially prepared to cater for specific industries (livestock, dairying, potato, horticulture, vegetable and beekeeping) these publications have a total distribution of about 250,000 copies a year. Many advisory pamphlets and bulletins are also available.

Agricultural films produced by the Department and other organizations are screened to farmers by touring mobile projection units. These films are shown to many thousands of primary producers each year. Many favourable comments on the educational value of the Department's farm radio programme—the *Voice of Agriculture*—have been received from primary producers. This programme emanates weekly from every commercial station in rural Victoria. Total broadcasting time is over four hours a week.

Advisory officers have already made considerable use of country television since it began in Victoria.

### **Agricultural Education**

#### *Department of Agriculture*

The Victorian Department of Agriculture through its Division of Agricultural Education has the responsibility for agricultural education at the diploma level in the residential agricultural colleges at Dookie and Longerenong and the non-residential horticultural college at Burnley Gardens.

The main purpose of the colleges is to teach the principles and practice of agriculture and horticulture to those who intend to adopt practical farming or horticulture as a vocation and require a more intimate knowledge of agriculture or horticulture than can be acquired only through practical experience. In addition to achieving this main purpose, the diploma courses also provide a basic training for technical officers who are later employed by government instrumentalities and by firms which manufacture or distribute farmers' requisites or handle farm produce. Some diploma holders engage in teaching agricultural science in schools and others in agricultural journalism. From the horticultural college, some diploma holders proceed to a career in the administration of municipal parks and gardens as well as to such occupations as orchardist, nurseryman, florist, and landscape gardener. Each college offers a diploma course of three years' duration.

Since the completion of new main buildings in 1962, the college at Dookie has accommodation for 260 students, including about 50 second-year University degree students. Longerenong accommodates 70 students. Buildings now being erected will shortly increase the accommodation at Longerenong to 100 students. Burnley Horticultural College has accommodation for 60 diploma students, but also conducts numerous part-time evening classes for persons engaged in horticultural industry and for home gardeners.

As well as training in the vocational subjects, the students are given a good grounding in the related sciences—chemistry, soil science, physics, botany, zoology, entomology, bacteriology, plant pathology and genetics, and in elementary mathematics and agricultural engineering, including surveying. English is taught to Matriculation standard and a good grounding is given in book-keeping and rural economics and management. Students who do well in the diploma course and pass in Matriculation English Expression can, if they so desire, proceed to a degree course in agricultural science and other courses at the University of Melbourne.

Short intensive courses of from one to three weeks' duration in specialized farm subjects are conducted regularly at Dookie Agricultural College for the benefit of members of the farming community. These include a special class each year for country women and a junior young farmers' course.

The Agricultural Education Division is also closely associated with the Royal Agricultural Society of Victoria in the administration and fostering of the Senior Sections of the Young Farmers' Clubs in Victoria and, through a representative Advisory Council, administers an annual government grant for this purpose. The Division also takes a prominent part in the organization of training of visiting Fellows who have been awarded fellowships for training in Australia either through the Colombo Plan or the Food and Agricultural Organization.

#### *Melbourne University School of Agriculture*

The School of Agriculture of the Melbourne University provides a four year degree course for undergraduates leading to the Degree of B.Agr.Sc. and postgraduate work for higher degrees in Agricultural Science. The undergraduate course is based on a first year devoted to pure science subjects; this is followed by three years in which the scientific principles upon which the practice of agriculture is based are presented and the more intensive training is given in those scientific disciplines required by research workers in agriculture. During the second year of the course, the students are in residence at Dookie Agricultural College, where they have the opportunity of combining the advantages of communal college life with close observation and contact with the practice of agriculture.

Research activities at the School of Agriculture cover a wide field including agronomy, agrostology, and animal nutrition and physiology, with basic work in the fields of soil chemistry and agricultural biochemistry as related to both the plant and the animal. Research

into various aspects of agricultural economics and farm management, together with studies of the sociological relationships of the farming community and of the farmer himself, are also undertaken.

The graduates from the School find employment over a wide range of positions. Many join such departments as the Department of Agriculture, the State Rivers and Water Supply Commission and the Soil Conservation Authority. The more academic students after taking postgraduate training go to research positions in the Commonwealth Scientific and Industrial Research Organization or the Universities, but a number with more commercial interests are taking positions in industrial organizations related to agriculture.

## *Farming*

### **Introduction**

#### *Collection of Statistics*

Since the year 1904, police officers have been required to collect agricultural, pastoral, and dairying statistics from land holders in Victoria. Prior to 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.

The rural statistics contained in this chapter are in the main compiled from annual returns of agricultural, pastoral, and dairying production collected from some 70,000 rural holdings in Victoria at 31st March each year. Schedules are distributed to farmers by about 330 local police officers who act as collectors of statistics. 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 visited, and full particulars are obtained of the area occupied, the rural population, the number of persons employed, the area and yield of each kind of crop cultivated, artificial fertilizer usage, numbers of certain items of farm machinery, the number and description of livestock and the quantity of wool clipped.

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

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

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

Figure 12. Counties and Statistical Districts of Victoria.



### Land Occupied in Different Districts, 1960-61

For the season 1960-61, the number of occupiers of rural holdings was 69,623, the area devoted to agriculture 6,722,521 acres, and the total area occupied 37,934,319 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 the opposite page.

### VICTORIA—LAND IN OCCUPATION IN EACH DISTRICT, SEASON 1960-61

(Areas of 1 acre and upwards)

Statistical District	Total Area of Districts (Acres)	Number of Holdings	Acres Occupied				Total
			For Agricultural Purposes*	For Pasture		Unproductive	
				Sown Grasses, Clover, or Lucerne†	Natural Grasses		
	'000	No.		'000			
Central ..	4,065	14,424	279	1,118	940	333	2,670
North-Central ..	2,930	4,428	90	413	1,375	214	2,092
Western ..	8,775	12,790	282	3,297	2,342	649	6,570
Wimmera ..	7,395	6,094	1,826	1,423	2,178	663	6,090
Mallee ..	10,784	6,284	2,923	523	3,289	847	7,582
Northern ..	6,337	11,558	1,120	1,373	2,711	341	5,545
North-Eastern ..	7,221	5,018	112	709	1,883	941	3,645
Gippsland ..	8,739	9,027	91	1,190	1,185	1,274	3,740
<b>Total ..</b>	<b>56,246</b>	<b>69,623</b>	<b>6,723</b>	<b>10,046</b>	<b>15,903</b>	<b>5,262</b>	<b>37,934</b>
PERCENTAGE OF ABOVE TO AREA OCCUPIED							
Central ..	..	..	10.45	41.87	35.21	12.47	100.00
North-Central ..	..	..	4.30	19.74	65.73	10.23	100.00
Western ..	..	..	4.29	50.18	35.65	9.88	100.00
Wimmera ..	..	..	29.98	23.37	35.76	10.89	100.00
Mallee ..	..	..	38.55	6.90	43.38	11.17	100.00
Northern ..	..	..	20.20	24.76	48.89	6.15	100.00
North-Eastern ..	..	..	3.07	19.45	51.66	25.82	100.00
Gippsland ..	..	..	2.43	31.82	31.68	34.07	100.00
<b>Total ..</b>	<b>..</b>	<b>..</b>	<b>17.73</b>	<b>26.48</b>	<b>41.92</b>	<b>13.87</b>	<b>100.00</b>
PERCENTAGE IN EACH DISTRICT OF TOTAL IN STATE							
Central ..	7.23	20.72	4.15	11.13	5.91	6.33	7.04
North-Central ..	5.21	6.36	1.34	4.11	8.65	4.07	5.51
Western ..	15.60	18.37	4.19	32.82	14.73	12.33	17.32
Wimmera ..	13.14	8.75	27.16	14.16	13.70	12.60	16.05
Mallee ..	19.17	9.03	43.48	5.21	20.68	16.10	19.99
Northern ..	11.27	16.60	16.66	13.67	17.05	6.48	14.62
North-Eastern ..	12.84	7.21	1.67	7.06	11.84	17.88	9.61
Gippsland ..	15.54	12.96	1.35	11.84	7.44	24.21	9.86
<b>Total ..</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

\* Excludes area of clover and grasses cut for hay and seed.

† Includes oats and barley sown for grazing and lucerne fed off.

### Size of Holdings Showing Areas Cultivated and Grazed

A detailed cross classification of holdings by size and area of main crops or number of livestock is prepared approximately every five years. The following table shows some of the information, in summary

form, from the last classification of this type taken at 31st March, 1960 :—

VICTORIA—SIZE OF HOLDINGS SHOWING AREAS UNDER WHEAT AND STOCK DEPASTURED, 31st MARCH, 1960

Size of Holdings (Including Crown Lands Held)	Number of Holdings	Area Occupied	Holdings with—				
			Wheat	Sheep	Dairy Cattle	Beef Cattle	Pigs
acres		acres			No.		
1- 99 ..	21,803	841,772	4,352	2,864	11,070	2,271	2,510
100- 199 ..	12,374	1,750,203	3,064	3,927	9,842	2,361	2,670
200- 299 ..	6,499	1,569,717	1,899	3,489	4,782	2,005	1,323
300- 399 ..	5,263	1,780,143	1,005	3,707	3,537	2,050	987
400- 499 ..	3,423	1,523,243	545	2,746	2,267	1,533	523
500- 999 ..	11,287	7,931,505	692	10,134	7,434	5,381	1,413
1,000-1,399 ..	3,737	4,409,447	} 68 {	3,520	2,464	1,830	439
1,400-1,999 ..	2,477	4,081,603		2,382	1,573	1,243	254
2,000-2,999 ..	1,515	3,635,339	} 9 {	1,476	} 1,661 {	779	} 291 {
3,000-4,999 ..	888	3,292,668		858		457	
5,000 and over ..	512	6,920,890		470	321	343	60
Total ..	69,778	37,736,530	11,634	35,573	44,951	20,253	10,470

Artificial Fertilizers

In 1960-61 artificial fertilizers were used on 2,630,341 acres of wheat; 1,089,629 acres of other cereal crops; 74,821 acres of vegetables; 91,937 acres of orchards; 242,219 acres of other crops; and 9,407,813 acres of pastures. Superphosphate is the main fertilizer used on both crops and pastures and in 1960-61 amounted to 162,340 tons or 81 per cent. of the total artificial fertilizer used on all crops and 519,866 tons or 95 per cent. of that used on pastures.

A summary of the area fertilized, quantity used, and number of holdings on which artificial fertilizers were used is shown below for each of the years 1956-57 to 1960-61 :—

VICTORIA—ARTIFICIAL FERTILIZERS

Year	Crops			Pastures		
	No. of Holdings	Area Fertilized	Quantity Used	No. of Holdings	Area Fertilized	Quantity Used
		'000 acres	'000 tons		'000 acres	'000 tons
1956-57 ..	34,454	2,906	151	41,659	8,729	494
1957-58 ..	41,167	3,690	191	43,234	9,684	548
1958-59 ..	*	4,580	229	40,452	8,925	502
1959-60 ..	40,460	4,079	217	38,327	9,153	523
1960-61 ..	31,774	4,129	199	40,561	9,408	546

\* Not available

*Aerial Agriculture*

One of the earliest applications of an agricultural chemical by an aeroplane occurred in Louisiana, U.S.A., in 1917, when a cotton field was dusted with an insecticide. The first recorded application by aircraft in Australia was in 1929, when a pine forest near Ballarat, Victoria, was treated in an attempt to control the lesser case moth. This method of pest control was not continued, however, and it was not until 1948 that the aerial application of fertilizers and sprays began to be appreciated.

About this time farmers and graziers realized the benefit of using aircraft for pasture improvement and for the control of insects and weeds. Terrain which was too steep or rough for topdressing by ground machinery could now be treated by aircraft, giving the property a natural increase in carrying capacity. The spraying of crops could also be more effectively conducted and the aeroplane is, in fact, the best practicable distributor for the spraying of crops such as tobacco, which cannot be treated without damage by existing ground equipment.

The aerial agriculture industry in Victoria grew rapidly and aircraft are now extensively used for topdressing and 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 agriculture is the dropping of young fish into Victorian lakes and streams. A recent large scale air liberation of fish was conducted by the Department of Fisheries and Wildlife. On each stage flight, an aircraft dropped 33,000 fish and the operation represented a considerable saving over the cost of normal ground liberation.

Since 1956-57, statistical information has been collected by the Department of Civil Aviation and details are shown in the following table :—

## VICTORIA—AERIAL AGRICULTURE

Particulars	Unit	Year Ended 31st March—				
		1957	1958	1959	1960	1961
Total Area Treated (*) (†) ..	acre	230,781	339,019	505,805	616,531	806,592
Topdressed or Seeded ..	„	164,326	253,596	253,489	372,597	580,169
Sprayed or Dusted ..	„	66,455	85,423	155,256	134,561	196,297
Materials Used—						
Superphosphate ..	cwt.	234,900	341,300	317,900	459,520	749,020
Seed .. ..	lb.	4,940	7,240	8,320	24,000	1,624
Aircraft Utilization (Flying Time) ..	hour	(‡)	6,662	6,523	6,622	9,598

(\*) Areas treated with more than one type of material in one operation are counted once only.

(†) Includes 97,660 acres baited for rabbit destruction in 1959, 109,373 acres in 1960, and 29,981 acres in 1961; and 345 acres treated for mosquito eradication in 1961.

(‡) Not collected.

As the demand for aerial agriculture has grown, it has been necessary to provide aircraft capable of lifting greater loads with greater safety than the war surplus machines which were once adequate. Aircraft which are capable of carrying more than a ton of topdressing or spraying material are now used, together with other types with carrying capacities of 8 cwt. to 15 cwt. This latter may be used when the topography of the area under treatment is such that landing strips of suitable dimensions for the larger aircraft are not available, or when greater manoeuvrability is necessary. Modern and expensive aircraft, loading equipment, highly trained aircrews, and loader operators are now part of the aerial agriculture industry.

### Farm Machinery

The number of the principal items of farm machinery on rural holdings at the 31st of March during each of the past five years are given in the table below :—

#### VICTORIA—FARM MACHINERY ON RURAL HOLDINGS

Particulars	Number at 31st March—				
	1957	1958	1959	1960	1961
Milking Machines—Units ..	81,729	83,819	85,608	89,657	92,315
Shearing Machines—Stands ..	34,884	34,955	35,951	37,015	37,926
Tractors—Wheeled Type ..	52,275	55,263	57,818	59,438	62,730
—Crawler Type .. ..	1,621	1,652	1,684	1,730	1,807
Rotary Hoes .. ..	9,166	8,777	9,429	9,180	9,284
Fertilizer Distributors and Broad- casters .. ..	27,336	26,692	27,290	27,948	29,035
Grain Drills—Combine .. ..	19,363	18,360	19,428	18,517	18,749
—Other .. ..	8,206	8,531	8,525	9,531	9,501
Maize Planters .. ..	1,041	972	1,020	998	*
Headers, Strippers and Harvesters	13,722	13,641	13,507	14,216	13,888
Pick-up Balers .. ..	5,468	6,173	7,073	8,040	8,968
Stationary Hay Presses .. ..	3,077	2,658	2,518	2,465	2,584

\* Not collected.

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

### Further Reference

An article on the mechanization of farming will be found on pages 493 to 495 of the Victorian Year Book 1962.

### Rural Finance Corporation

The Corporation was established in April, 1950. Its objects, which are set out in section 5 of the *Rural Finance Corporation Act 1958*, include the making of advances by way of loan at low rates of interest

to existing or proposed country industries, both primary and secondary. The Corporation is the successor in law to the Farmers' Debts Adjustment Board and is empowered to advance moneys to, or for the benefit of, any farmer for the purpose of carrying into effect a composition or scheme of arrangement between him and his creditors.

Revenue, expenditure, &c., of the Corporation for each of the five years 1956-57 to 1960-61 is given in the following table :—

VICTORIA—RURAL FINANCE CORPORATION : REVENUE,  
EXPENDITURE, ETC.  
(£'000)

Particulars	1956-57	1957-58	1958-59	1959-60	1960-61
REVENUE					
Interest .. .. .	283	337	381	405	437
Other .. .. .	6	5	7	10	12
Total Revenue ..	289	342	388	415	449
EXPENDITURE					
Administration .. ..	41	47	49	54	58
Interest .. .. .	167	202	250	261	278
Sinking Fund .. .. .	18	23	19	20	20
Other .. .. .	7	8	21	9	16
Total Expenditure ..	233	280	339	344	372
Net Surplus .. .. .	56	62	49	71	77
Loans and Advances Outstanding at 30th June .. .. .	7,559	8,147	8,611	8,731	9,365
Loan Indebtedness to State Government at 30th June ..	6,557	7,223	7,734	7,836	8,323

### *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 1955 and the actual area for each of the following six seasons 1956 to 1961 :—

### VICTORIA—ACREAGE CULTIVATED ANNUALLY

Period or Year (Ended March)	Annual Average Area in Each Decennium, 1856-1955, and Actual Area Each Year 1956-1961, under—		
	Crop*	Fallow	Total Cultivation
	acres	acres	acres
1856-65 .. .. .	325,676	12,146	337,822
1866-75 .. .. .	624,377	57,274	681,651
1876-85 .. .. .	1,306,920	137,536	1,444,456
1886-95 .. .. .	2,109,326	364,282	2,473,608
1896-1905 .. .. .	3,022,914	524,197	3,547,111
1906-15 .. .. .	3,756,211	1,276,148	5,032,359
1916-25 .. .. .	4,594,244	1,852,145	6,446,389
1926-35 .. .. .	5,233,894	2,501,357	7,735,251
1936-45 .. .. .	4,435,645	2,142,953	6,578,598
1946-55 .. .. .	4,635,982	2,311,401	6,947,383
1956 .. .. .	4,542,096	1,982,742	6,524,838
1957 .. .. .	3,637,352	1,879,812	5,517,164
1958 .. .. .	4,051,249	1,644,764	5,696,013
1959 .. .. .	4,790,989	2,187,212	6,978,201
1960 .. .. .	4,482,757	2,180,266	6,663,023
1961 .. .. .	4,504,732	2,217,789	6,722,521

\* Until 1960 the area of crop included pasture cut for hay and seed. For 1961, area of pasture cut for hay and seed is included under pasture.

### 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 1960-61 :—

### VICTORIA—AREA, YIELD, AND GROSS VALUE OF CROPS, 1960-61

Crop	Area	Yield	Gross Value*
Cereals for Grain—	acres		£
Barley—			
2 row .. .. .	293,475	7,391,548 bushels .. ..	3,213,765
6 row .. .. .	15,818	326,836 bushels .. ..	102,519
Maize .. .. .	2,985	171,104 bushels .. ..	136,916
Oats .. .. .	834,920	20,665,818 bushels .. ..	6,478,734
Rye .. .. .	22,895	187,659 bushels .. ..	117,287
Wheat .. .. .	2,671,601	67,586,836 bushels .. ..	48,243,600
Hay—			
Barley and Rye .. .. .	10,595	16,943 tons .. ..	130,741
Lucerne .. .. .	84,061	165,868 tons .. ..	1,794,205
Meadow .. .. .	974,936†	1,767,271 tons .. ..	16,450,235
Oaten .. .. .	180,224	309,647 tons .. ..	2,937,914
Wheaten .. .. .	36,430	78,183 tons .. ..	705,101
Green Fodder .. .. .	101,203		1,035,392
Grey and Other Field Peas .. .. .	13,327	213,454 bushels .. ..	228,483
Grass and Clover Seed .. .. .	29,406†	39,334 cwt. .. ..	440,982

VICTORIA—AREA, YIELD, AND GROSS VALUE OF CROPS, 1960-61—  
*continued*

Crop	Area	Yield	Gross Value*
Industrial Crops—	acres		£
Broom Millet .. .. .	311	{ 1,338 cwt. fibre ..	14,049
Linseed .. .. .	6,179	606 cwt. seed ..	1,000
Hops .. .. .	456	40,508 bushels ..	70,877
Mustard .. .. .	456	6,937 cwt. ..	297,813
Tobacco .. .. .	9,932	560 cwt. ..	3,946
		86,854 cwt. ..	4,225,428
Vegetables—			
Onions .. .. .	3,532	16,286 tons ..	750,406
Potatoes .. .. .	38,672	180,819 tons ..	9,343,013
Other .. .. .	35,295	209,363 tons ..	10,084,347
Stock Fodder—			
Pumpkins .. .. .	399	.. .. .	16,958
Turnips, Beet, &c. ..	20,174	.. .. .	474,089
Vineyards—			
Grapes—			
Table .. .. .	2,361	7,120 tons ..	601,288
Wine .. .. .	4,983	14,093 tons ..	287,095
Drying .. .. .	35,344	299,638 tons producing—	
		45,725 tons of sultanas	6,320,500
		5,278 tons of raisins	671,453
		5,583 tons of currants	734,033
Vines, Unproductive ..	1,961	.. .. .	..
Orchards—			
Productive .. .. .	47,594	.. .. .	12,678,961
Unproductive .. .. .	23,821	.. .. .	..
All Other Crops .. .. .	5,728	.. .. .	4,327,023
Total Crops .. .. .	5,509,074	.. .. .	132,918,153

\* The gross value is based on the wholesale price realized 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 the principal markets.

† These areas which represent pasture cut for hay and seed have been excluded from the "Area under Crop" in the previous table as indicated.

The following table shows the numbers of growers of certain primary products, in each statistical district of the State, for the season 1960-61.

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.

VICTORIA—GROWERS OF CERTAIN CROPS, SEASON 1960-61

Crops Grown	Growers in Each Statistical District								Total
	Central	North-Central	West-ern	Wim-mera	Mallee	North-ern	North-East-ern	Gipps-land	
Grain Crops—									
Wheat ..	364	275	380	3,715	2,866	3,385	441	46	11,472
Oats ..	358	391	992	2,923	1,988	2,737	641	77	10,107
Barley ..	559	79	178	830	1,220	914	119	78	3,977
Maize ..	3	..	2	..	..	1	37	166	209
Green Fodder—									
Maize ..	529	61	277	13	9	30	78	787	1,784
All Other ..	1,059	429	1,433	65	58	375	401	874	4,694
Other—									
Potatoes ..	1,663	448	614	15	18	13	153	526	3,450
Onions ..	284	..	249	6	10	3	3	5	560
Other Vege- tables	1,328	18	201	51	314	602	25	95	2,634
Orchards ..	1,848	152	110	152	1,259	987	175	100	4,783
Vineyards ..	1	1	..	11	2,385	102	24	..	2,524
Grass and Clover Seed	32	58	195	57	8	85	91	15	541
Tobacco ..	..	1	..	..	2	67	329	..	*399

\* Excluding share-farmers.

A summary of the area under cultivation in each statistical district of the State for the season 1960-61 is given in the following table :—

VICTORIA—AREA UNDER CULTIVATION, SEASON 1960-61  
(Acres)

Crop	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-eastern	North-Eastern	Gippsland	
Grain Crops—									
Wheat ..	21,282	15,465	25,531	780,888	1,321,615	464,292	40,315	2,213	2,671,601
Oats ..	13,707	12,832	53,472	235,888	311,593	185,800	19,726	1,902	834,920
Barley ..	37,313	1,700	4,436	61,613	151,502	46,762	3,575	2,392	309,293
Maize ..	125	..	4	..	..	8	202	2,646	2,985
Field Peas ..	7,649	660	4,161	85	245	84	110	333	13,327
All Hay ..	175,113	66,883	340,434	144,717	55,316	252,635	94,196	156,952	1,286,246
Green Fodder ..	20,892	8,636	36,061	2,129	2,829	8,508	6,524	15,624	101,203
Grass and Clover for Seed ..	1,800	2,116	11,891	3,583	800	4,918	3,934	364	29,406
Tobacco ..	..	5	..	..	30	1,490	8,407	..	9,932
Potatoes ..	21,390	6,530	5,613	66	80	52	692	4,249	38,672
Onions ..	1,429	..	2,019	6	14	2	3	59	3,532
All Other Vegetables ..	18,300	49	6,651	167	3,506	5,248	157	1,217	35,295
Vines ..	1	35	..	711	41,768	656	1,478	..	44,649
Orchards ..	24,102	2,553	681	3,939	7,224	30,674	1,730	512	71,415
All Other Crops	8,223	862	12,855	443	22,345	2,380	1,915	7,575	56,598
Total Area under Crop ..	351,326	118,326	503,809	1,234,235	1,918,867	1,003,509	182,964	196,038	5,509,074*
Land in Fallow	71,214	18,752	78,024	690,369	1,023,332	300,666	6,967	28,465	2,217,789
Total Area under Cultivation ..	422,540	137,078	581,833	1,924,604	2,942,199	1,304,175	189,931	224,503	7,726,863

\* See footnote to first table on page 515.

The following table shows the yields, in statistical districts, of the principal crops for the season 1960-61 :—

VICTORIA—YIELDS OF PRINCIPAL CROPS, SEASON 1960-61

Crop	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-eastern	North-Eastern	Gippsland	
Grain Crops—									
Wheat bush.	571,351	371,040	642,429	22,024,420	30,172,558	12,583,881	1,156,138	65,019	67,586,836
Oats ..	385,552	349,451	1,310,550	5,965,581	6,562,425	5,458,568	591,985	41,706	20,665,818
Barley ..	1,230,388	45,643	83,040	1,538,303	3,347,574	1,314,789	79,034	79,613	7,718,384
Maize ..	3,950	..	75	..	..	80	8,185	158,814	171,104
Field Peas ..	127,013	9,055	60,605	2,279	3,860	2,644	1,690	6,308	213,454
All Hay tons	332,590	113,468	608,199	244,548	82,825	438,656	185,530	332,096	2,337,912
Grass and Clover for Seed cwt.	2,715	2,701	15,657	5,429	1,405	7,198	3,808	421	39,334
Tobacco ..	..	18	..	..	173	15,453	71,210	..	86,854
Potatoes tons	96,056	34,294	27,198	235	367	208	2,591	19,870	180,819
Onions ..	6,399	..	9,504	33	89	13	12	236	16,286
Wine Made gall.	*	*	..	*	*	*	*	..	3,020,960
Dried Vine Fruits—									
Raisins tons	..	..	..	..	5,251	27	..	..	5,278
Sultanas ..	..	..	..	..	45,725	..	..	..	45,725
Currants ..	..	..	..	..	5,572	11	..	..	5,583

\* Details for individual districts are confidential.

## 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 for all main crops grown in the State including those mentioned above.

### Wheat

Wheat is the main crop grown in Victoria, occupying approximately 2½ million acres or about half the total acreage under crop. The average annual production is about 44 million bushels, of which 60 per cent. is exported. Only 2 per cent. of the area sown is cut for hay. Grain yield averages 20 bushels per acre, but can be as high as 60 bushels per acre on individual farms in good seasons. The highest yield officially recorded is 78·8 bushels per acre for 50 acres grown at Murtoa in 1960.

The main wheat belt lies in the Mallee, Wimmera, and Northern Districts, where 95 per cent. of the crop is grown. The average annual rainfall varies from 11 inches in the northern Mallee to about 20-22 inches at the southern and eastern boundaries.

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

Sheep are run on most wheat farms for wool and/or fat lamb production. Wheat crops are generally grown on bare fallow land, seeding taking place from April to June. Superphosphate is applied at seeding to virtually all crops. The crop is harvested in December-January. Diseases are not a major problem, but occasionally some heavy losses can occur due to stem rust and root rots. Weeds are controlled by fallow cultivation and crop spraying.

The wheat varieties grown in Victoria are of the soft white class. The environment does not generally favour the production of wheat of very high baking quality, but recent developments, including the adoption of clover and medic ley rotation systems and the production of high yield, high quality varieties are leading to considerable quality improvement.

Victorian wheat is marketed by the Australian Wheat Board in one grade known as fair average quality (f.a.q.).

### *Agricultural Development in the Mallee during the Last Decade*

During the last ten years, there have been significant changes in the agricultural practices followed by Mallee farmers and in their way of life. A period of prosperity has provided better housing, modern domestic appliances, modern cars, and comparatively good roads.

An appraisal of the Mallee farmers' situation in the post-war period disclosed mounting damage from wind erosion and a degree of property neglect due to the general shortage and cost of rural labour. During the past decade energetic efforts have been made to remedy these ills. Mallee farms are highly mechanized today, and this reduces the demand for seasonal labour. The farmer himself is also acutely conscious of the advantages of practising both soil conservation and fodder conservation.

The results of scientific research are being freely applied to farming practices and these have caused a greater use of sown pastures and a favourable modification of crop rotational practice.

The area sown to medic pastures increased from 77,000 acres in 1951 to 359,000 acres in 1959. Improved soil fertility following the use of medic pastures has produced heavier crops with better quality grain. At the same time, better pastures and longer rotations have enabled the farmer to build up reserves of fodder and support greater stock numbers throughout the year.

In 1951, 1,168,055 acres were sown with wheat. This acreage remained much the same during the first half of the decade, but declined to under 1 mill. acres between 1956 and 1959. In 1960, however, it increased to 1,233,161 acres.

During the decade, there has been a steady upward trend in the average yield of grain per acre. This is due to the farmer's ready acceptance of new cereal varieties—which have been bred specifically by the Department of Agriculture to suit Mallee conditions. This plant breeding work is carried out at the State Research Farm at Werribee, and the Mallee Research Station at Walpeup.

Fodder conservation is mainly in the form of oaten grain stored in vermin proof silos, and oaten or pasture hay baled and stacked by modern machinery.

Higher incomes have enabled the farmer to finance the purchase of more and better machinery. Tractors with greater power and speed, and machinery mounted on rubber wheels make it possible to carry out cultural operations quickly and thus take maximum advantage of favourable soil or weather conditions, while bulk handling equipment for the collection of grain has increased the speed and efficiency of harvesting.

Research and experiments into methods of preventing wind erosion of soils have shown that soil can be kept in place by some modification of traditional farm practices and by the use of special cultivating equipment. These methods are being followed by Mallee farmers.

A less favourable feature of the past decade has been the increasing spread of skeleton weed which so far has not been effectively contained or controlled. Saffron thistle also is strongly established in Mallee areas, but can be controlled by skilled cultural practices and chemical sprays. Nevertheless, its presence adds to the cost of grain production.

Despite these problems, Mallee agriculture has developed tremendously during the past decade and this development has been paralleled by better living amenities, hospitals, and educational facilities.

#### *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. On submissions made by the Board to, and approved by, the Government, 197 country receiving elevators and a shipping terminal have been constructed, the necessary finance being obtained from loans totalling £3,806,015. Repayment of the principal and interest are guaranteed by the Victorian Government.

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

Prior to the introduction of bulk handling by the Grain Elevators Board, many wheat growers had opposed that method of handling their wheat. One season of operation of the Board's bulk handling system in any wheat producing area was sufficient to allay the fears of those growers and prove to them that the bulk handling system not only saved labour on the farms, but materially reduced the over-all handling costs for wheat.

The Board's Geelong Terminal is the most modern and the largest single wheat shipping terminal in the world. Its operation is by push-button remote control with operational indicator lights appearing on a diagram panel of the whole terminal. Wheat can be received from rail trucks at the rate of 1,200 tons per hour and can be shipped from the terminal at the 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 claims that wheat is taken off the farms by the Board in a shorter period and handled at a lower cost per bushel than is achieved by any other wheat bulk handling system in Australia or anywhere throughout the world.

The use of the tractor as well as the introduction of more modern harvesting machinery now permits growers to harvest wheat with moisture considerably in excess of that which was possible when they had to rely on horses to haul their harvesting machines. High moisture content, particularly when associated with high temperatures, can lead to considerable deterioration in wheat in a variety of ways. This deterioration means loss to the industry and necessitates precautions against acceptance at the country receival elevators of wheat with an unduly high moisture content.

Such deterioration is due to various biological causes and may take place at moisture levels much lower than those necessary for germination of the grain. The fact that Victorian wheat is normally harvested and put into storage at a time of the year when temperatures are high, and will remain high for several months, is an added complication

seldom found in other wheat-growing countries. Research is proceeding on the matter. Fortunately, a simple moisture meter, giving an indication of the moisture in a load of grain is available for use at all country receival elevators.

In addition to erecting its own country receival facilities, the Board has leased from country flour millers specified quantities of the storage constructed by millers.

The Grain Elevators Board has under its control storage for 72 mill. bushels of wheat. The largest quantity of wheat delivered to railway stations by Victorian growers in any one season prior to the 1960-61 season was 59,175,593 bushels in 1915-16. A new record was established during the 1960-61 season when 63,009,684 bushels were delivered. Despite very low rainfall during the 1961 wheat-growing period, the deliveries reached 54,680,000 bushels for the 1961-62 season.

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 31st October—				
	1957	1958	1959	1960	1961†
<b>REVENUE</b>					
Australian Wheat Board—Operating and Maintenance Expenses ..	492	480	478	513	704
Australian Wheat Board—Capital Facilities Allowance .. ..	262	312	342	350	368
Interest on Investments .. ..	59	53	63	90	103
Other .. .. .	..	1	1	1	1
<b>Total Revenue .. ..</b>	<b>813</b>	<b>846</b>	<b>884</b>	<b>954</b>	<b>1,176</b>
<b>EXPENDITURE</b>					
Operating and Maintenance Expenses .. ..	310	268	281	291	462
Administration Expenses .. ..	99	119	101	107	128
Depreciation and Renewals .. ..	83	93	96	114	114
Interest on Loans .. ..	167	177	178	188	207
Sinking Fund Charges .. ..	31	31	32	34	42
Appropriations to Reserves .. ..	110	113	131	252*	164
Other .. .. .	4	7	7	7	6
<b>Total Expenditure .. ..</b>	<b>804</b>	<b>808</b>	<b>826</b>	<b>993</b>	<b>1,123</b>
Net Surplus .. .. .	9	38	58	—39	53
Fixed Assets (At 31st October) ..	3,860	4,064	4,229	4,429	4,606
Loan Indebtedness (At 31st October)—					
State Government .. ..	965	955	946	935	924
Public .. .. .	2,808	2,774	2,838	3,195	3,894

\* Including £100,000 appropriated from profits accumulated in previous years.

† Subject to revision.

### *Australian Wheat Board*

The Australian Wheat Board, which is the sole marketing authority for Australian wheat, consists of a Chairman and four other Commonwealth Government appointees, whilst the remaining ten members are representatives of wheat growers in the five main wheat-growing States, each such State being represented by two members.

The current Stabilization Plan, ending with the 1962-63 season, provides for a guaranteed price to growers on up to 100 mill. bushels of exports from each season's wheat. The guaranteed price for wheat of a particular season is an amount equal to the cost of production of wheat of that season as determined in accordance with the Commonwealth Stabilization Act. For season 1960-61, it was fixed at 15s. 2d. per bushel and for season 1961-62, at 15s. 9d. per bushel.

Total deliveries by wheat growers to the Victorian Branch of the Australian Wheat Board during season 1960-61 were 66,886,566 bushels, including 2,728,586 bushels delivered to Victorian controlled receival points in Southern New South Wales. Season 1960-61 opened well, with good April-May rains, ranging from 3 inches in the Mallee to 5 inches in the Wimmera, thus enabling wheat to be sown under ideal conditions. Favourable weather was experienced to October when there was a dry period associated with high temperatures and hot northerly winds. However, with above average rainfall in November, the season finished well, with record deliveries to the Board and a record average yield of approximately 25 bushels per acre.

### *Wheat Standard*

The fair average quality (f.a.q) standard is fixed 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.

The f.a.q. standard method is peculiar to Australia, other countries selling according to sample or fixed grades.

The following table shows the standard determined in Victoria for each of the ten seasons, 1951-52 to 1960-61 :—

#### VICTORIA—WHEAT STANDARD

Season			Weight of Bushel of Wheat, f.a.q.	Season			Weight of Bushel of Wheat, f.a.q.
			lb.				lb.
1951-52	..	..	64	1956-57	..	..	65½
1952-53	..	..	64¾	1957-58	..	..	65½
1953-54	..	..	64½	1958-59	..	..	64
1954-55	..	..	62½	1959-60	..	..	62½
1955-56	..	..	63¾	1960-61	..	..	64½

*Area Sown, Production, and Gross Value*

In the following table the area, production, average yield, and gross value of production of wheat for each of the seasons, 1956-57 to 1960-61 are shown :—

## VICTORIA—WHEAT STATISTICS

Season			Area	Production	Average Yield per Acre	Gross Value
			'000 acres	'000 bushels	bushels	£'000
1956-57	..	..	1,565	35,282	22·54	24,041
1957-58	..	..	1,835	32,134	17·51	22,065
1958-59	..	..	1,810	42,697	23·59	28,274
1959-60	..	..	2,261	38,793	17·16	26,743
1960-61*	..	..	2,672	67,587	25·30	45,855

\* The production and average yield for 1960-61 were records.

*Farmers Growing Wheat for Grain*

The following statement shows the number of farmers engaged in growing wheat for grain :—

## VICTORIA—NUMBER OF HOLDINGS WITH TWENTY OR MORE ACRES OF WHEAT FOR GRAIN

1956-57	1957-58	1958-59	1959-60	1960-61
7,674	8,856	9,074	10,561	10,625

*Wheat Breeding*

The breeding of improved varieties of wheat for cultivation by the Victorian wheat grower is a function of the Victorian Department of Agriculture. The overall objective of the breeding work is to provide the grower with new varieties which will increase yields, reduce losses due to disease and drought and improve the milling and baking quality of the grain which he produces. The increased yields resulting from the introduction of these varieties assist in offsetting increased production costs and assure the grower of a higher monetary return from his crop, while the improved quality of the grain produced ensures a better demand for Victorian wheat both in local and oversea markets.

The Victorian wheat improvement programme is an extremely comprehensive one, involving the co-operation of the wheat breeders with the cereal agronomists, chemists, and plant pathologists of the Department of Agriculture.

New wheat varieties bred by the Department of Agriculture occupy a very large percentage of the Victorian wheat area and have significantly increased local production. This represents an increased monetary return to the wheat grower. In addition, the introduction of these varieties has resulted in a substantial improvement in the quality of the grain produced with a corresponding improvement in the baking quality of the local flour.

Seven new varieties have been released for sowing since 1946 :—

1946—Insignia	1953—Sherpa
1946—Pinnacle	1956—Olympic
1947—Diadem	1957—Beacon
1960—Stockade	

The following table shows the areas under the principal varieties of wheat, including wheat for hay, for the seasons 1958–59, 1959–60, and 1960–61. Varieties are tabulated in order of popularity for the last mentioned season.

#### VICTORIA—PRINCIPAL VARIETIES OF WHEAT SOWN

Variety (In Order of Popularity) Season 1960-61	1958-59		1959-60		1960-61	
	Acres Sown	Percentage of Total Area Sown	Acres Sown	Percentage of Total Area Sown	Acres Sown	Percentage of Total Area Sown
Insignia ..	872,373	47.34	981,765	42.64	1,325,742	48.96
Pinnacle ..	418,237	22.70	574,979	24.97	582,312	21.50
Olympic ..	132,427	7.19	316,148	13.73	384,599	14.20
Sherpa ..	163,889	8.89	163,818	7.11	135,351	5.00
Quadrat ..	121,250	6.58	119,428	5.19	94,646	3.50
Insignia 49 ..	51,097	2.77	64,463	2.80	91,036	3.36
Baldmin ..	17,601	0.96	21,613	0.94	16,342	0.60
Gabo ..	18,519	1.01	7,383	0.32	14,638	0.54
Beacon ..	920	0.05	8,452	0.37	14,638	0.54
Sabre ..	9,698	0.53	8,691	0.38	11,831	0.44
Magnet ..	10,009	0.54	10,472	0.45	7,921	0.29
All Other Varieties ..	26,590	1.44	25,226	1.10	28,975	1.07
<b>Total ..</b>	<b>1,842,610</b>	<b>100.00</b>	<b>2,302,438</b>	<b>100.00</b>	<b>2,708,031</b>	<b>100.00</b>

#### *Wheat Growing in Conjunction with Livestock Grazed*

A table showing the number of holdings in Victoria growing wheat for grain, together with sheep, dairy cattle, beef cattle, and pigs as at 31st March, 1960, appears on page 510.

*Oats*

The area sown to oats in Victoria is about 1·1 mill. acres, of which about 60 per cent. is harvested for grain, 20 per cent. cut for hay, and 20 per cent. grazed completely. Some of the area harvested for grain is also grazed during the winter. The average annual grain production is about 15 mill. bushels (40 lb. per bushel) and the average hay production 325,000 tons. Average grain yield is 20 bushels per acre and average hay yield is 1½ tons per acre.

About 87 per cent. of the area sown for grain is in the Mallee, Wimmera, and Northern Districts. Oat grain is used on farms for stock feeding and is often held in large quantities for this purpose as an insurance against drought losses. Grain is sold on an open market through merchants or through the voluntary oat pool, and prices fluctuate widely according to seasonal conditions and supplies available. Better quality oats may be bought at a premium for milling purposes.

Oaten hay is grown for farm use in all districts and for sale in areas where chaff mills operate (i.e., near Melbourne and Ballarat). About 40 per cent. of the area sown to hay is in the Mallee, Wimmera, and Northern Districts, and 25 per cent. in the Western District.

Most of the oat area grazed 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 completely grazed acreage is in the Mallee District. Most oat crops are grown on stubble land with very little preparation and with a smaller amount of superphosphate (if any) than is used on wheat crops. About 85 per cent. of the area sown to oats is sown to the varieties Algerian, Orient, and Algeribee.

The area harvested (season 1960–61) for hay was 180,224 acres, and for grain 834,920 acres, which produced 309,647 tons of hay, and 20,665,818 bushels of grain respectively. The area of oats sown for grazing purposes amounted to 149,751 acres. The following table shows the area, yield, and gross value of oats for grain for each of the five seasons 1956–57 to 1960–61 :—

## VICTORIA—OATS FOR GRAIN

Season	Area	Production	Average Yield per Acre	Gross Value
	'000 acres	'000 bushels	bushels	£'000
1956–57 .. ..	613	9,555	15·60	3,315
1957–58 .. ..	622	9,528	15·31	5,313
1958–59 .. ..	971	23,339*	24·04	6,820
1959–60 .. ..	673	12,701	18·87	4,797
1960–61 .. ..	835	20,666	24·75	6,479

\* Record production

*Barley*

Barley is sown on about 300,000 acres in Victoria each year, from which about 6 mill. bushels (50 lb. per bushel) of grain are harvested. The average yield is about twenty bushels per acre. Most of the barley sown is two-row or malting type barley, only a very small acreage being sown to the six-row, feed type.

Barley production is centred in two main districts which have favourable soil and climatic conditions for growing good quality grain suitable for malting. The most important area is the south-western Mallee and the adjoining northern Wimmera, where barley is grown on sandy soils usually in association with wheat. In this district, barley is either sown on wheat stubble land or on ley land cultivated in the autumn just before sowing. The variety Prior is almost exclusively sown, usually with superphosphate. The average district yield is about 15 bushels per acre.

The other important area is in southern Victoria between Geelong and Bacchus Marsh. In this district, barley is the main crop and is usually sown on fallowed land with superphosphate. The variety Research is grown here, and the average yield is about 30 bushels per acre. This area is close to the main shipping terminals and growers' freight costs are considerably lower than in the northern areas. Barley is grown less intensively in other districts and the quality is rarely up to malting standard.

Barley is marketed through the Australian Barley Board, which provides an orderly marketing system for the barley produced in Victoria and South Australia. The Board classifies growers' grain, on sample, into three grades—malting, milling, and feed—with a price differential between each grade.

Practically all of the malting grade barley is used in Australia, but most of the milling and feed grades are exported to Europe and Asia.

The following table shows the area, yield, and gross value of barley for each of the five seasons 1956-57 to 1960-61 :—

## VICTORIA—BARLEY PRODUCTION

Season	Area under Crop		Produce		Average per Acre			Gross Value
	Malting (2 row)	Other (6 row)	Malting (2 row)	Other (6 row)	Malting (2 row)	Other (6 row)	Total	
	'000 acres	'000 acres	'000 bushels	'000 bushels	bushels	bushels	bushels	£'000
1956-57 ..	325	20	7,164	385	22·04	18·97	21·86	3,838
1957-58 ..	334	18	5,201	246	15·57	13·91	15·49	3,280
1958-59 ..	343	19	8,174	407	23·80	20·97	23·65	4,165
1959-60 ..	264	14	5,318	274	20·17	19·79	20·15	2,643
1960-61 ..	293	16	7,392	327	25·19	20·66	24·95	3,316

*Maize*

Maize for grain is cultivated mainly in Gippsland. It is grown in Victoria both for grain and for green fodder. The area, yield, and gross value of maize for each of the five seasons, 1956-57 to 1960-61, are given in the following table :—

## VICTORIA—MAIZE PRODUCTION

Season	For Green Fodder	For Grain							
		Area			Production			Average Yield Per Acre	Gross Value
		Hybrid	Other	Total	Hybrid	Other	Total		
acres	acres	acres	acres	bushels	bushels	bushels	bushels	£	
1956-57 ..	6,429	2,214	513	2,727	68,373	12,425	80,798	29·63	66,930
1957-58 ..	8,122	3,459	819	4,278	208,444	33,320	241,764	56·51	158,708
1958-59 ..	7,619	3,135	746	3,881	180,796	22,570	203,366	52·40	136,876
1959-60 ..	9,084	2,981	402	3,383	167,489	12,965	180,454	53·34	131,367
1960-61 ..	11,681	2,742	243	2,985	162,682	8,422	171,104	57·32	136,916

*Rye*

Cereal rye is a minor crop in Victoria, with about 22,000 acres sown to it annually. This acreage, however, is many times greater than the pre-war area of just over 1,000 acres. The average production is about 150,000 bushels (60 lb. per bushel) per year, and the average yield is about 6½ bushels per acre.

Rye is not a cash crop and it is sown mainly for control of sand drift on sandhills in the Mallee District and, to a much lesser extent, for winter grazing in the colder winter districts. Not all of the area sown is harvested, so that the average yield per acre is probably higher than that recorded. The variety sown is almost exclusively South Australian rye. Superphosphate is used as a fertilizer, with a portion of the Mallee area sown with a mixture of superphosphate and ammonium sulphate.

In recent years, European migrants to Australia have created a small demand for rye for human consumption.

The following table shows the area, yield, and gross value of rye for each of the five seasons 1956-57 to 1960-61 :—

## VICTORIA—RYE PRODUCTION

Season	Area	Production	Average Yield per Acre	Gross Value
	acres	bushels	bushels	£
1956-57 ..	19,419	129,729	6·68	94,054
1957-58 ..	17,807	84,975	4·77	72,229
1958-59 ..	27,458	226,320	8·24	114,104
1959-60 ..	22,344	138,438	6·20	88,831
1960-61 ..	22,895	187,659	8·20	117,287

*Hay*

The pattern of hay production in Victoria has changed considerably in the post-war period. More complete mechanization and the virtual disappearance of the working horse have taken the 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 there has been a marked decline in the amount of cereal hay produced.

On the other hand, there have been spectacular increases in the production of other forms of fodder. The annual production of meadow hay has increased from about 400,000 tons to over 1 mill. tons during this period. There has also been a substantial increase in the amount of lucerne hay conserved. Silage has become an important supplement to hay for stock feeding, and silage produced mainly from pasture growth has increased from about 25,000 tons annually to over 300,000 tons in the post-war period.

This increase in fodder conservation has resulted in more efficient utilization of the extra herbage grown as the result of pasture improvement in all districts. Record 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.

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

## VICTORIA—HAY PRODUCTION, 1960-61

Kind	Area	Production	Average Yield per Acre
	acres	tons	tons
Wheaten .. .. .	36,430	78,183	2·15
Oaten .. . . .	180,224	309,647	1·72
Lucerne .. .. .	84,061	165,868	1·97
Barley, Rye, &c. . . . .	10,595	16,943	1·60
Grasses and Clovers .. . . .	974,936	1,767,271	1·81
Total .. .. .	1,286,246	2,337,912	1·82

The following table shows, in respect of each statistical district of the State, the quantity of ensilage made during the 1960-61 season, and the stocks of ensilage and hay held on rural holdings at the 31st March, 1961 :—

VICTORIA—ENSILAGE MADE AND FARM STOCKS OF  
ENSILAGE AND HAY

(Tons)

Statistical District	Ensilage Made, 1960-61	Stocks at 31st March, 1961	
		Ensilage	Hay
Central .. .. .	61,684	43,215	323,334
North-Central .. .. .	6,500	5,722	120,021
Western .. .. .	38,598	32,127	580,206
Wimmera .. .. .	7,731	13,528	315,566
Mallee .. .. .	4,485	15,191	111,968
Northern .. .. .	22,187	29,191	564,048
North-Eastern .. .. .	23,148	25,976	254,807
Gippsland .. .. .	138,865	66,365	370,299
Total .. .. .	303,198	231,315	2,640,249

*Potatoes*

Victoria is the largest producer of potatoes in Australia contributing a little more than 40 per cent. of the total annual requirement. The bulk of the Victorian crop is used within the State for human consumption and seed purposes, the surplus being exported to other States to augment local supplies. Potatoes are generally used as a fresh vegetable, but there is increasing interest in processed forms.

With few exceptions, potatoes are grown in the better soils in higher rainfall areas on and south of the Central Dividing Range, the main districts being Koroit, Beech Forest, Bellarine Peninsula, Ballarat to Trentham, Kinglake, Gembrook, Koo-wee-rup and the Gippsland hill country.

Over the past 20 years there has been a very substantial increase in the volume of potato production in Victoria. This is due, not to greater area, but to improvement in the average yield, which has nearly doubled. Higher yielding varieties now being grown, improved

cultural methods, availability of virus-free seed through certification and approval schemes, and wider use of irrigation have contributed to this improvement. Potato growing has become increasingly mechanized and this has precipitated the trend for production of this crop to pass to specialist growers having larger individual areas.

The following table shows the area, yield, and value of potatoes for each of the five seasons 1956-57 to 1960-61 :—

#### VICTORIA—POTATO PRODUCTION

Season			Area	Production *	Average Yield per Acre	Gross Value
			acres	tons	tons	£'000
1956-57	..	..	39,706	227,307	5.72	5,862
1957-58	..	..	49,846	251,159	5.04	3,326
1958-59	..	..	46,122	259,346	5.62	5,040
1959-60	..	..	48,506	242,548	5.00	5,808
1960-61	..	..	38,672	180,819	4.68	9,343

\* Includes amounts held on farms for seed, stock feed, &c., as follows :—49,755 tons in 1956-57 ; 53,842 tons in 1957-58 ; 42,345 tons in 1958-59 ; 31,951 tons in 1959-60 ; and 23,910 tons in 1960-61.

#### Onions

The principal onion growing areas are in the Central and Western districts. In the season 1960-61 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 1956-57 to 1960-61 :—

#### VICTORIA—ONION PRODUCTION

Season			Area	Production	Average Yield per Acre	Gross Value
			acres	tons	tons	£'000
1956-57	..	..	4,503	26,811	5.95	861
1957-58	..	..	5,368	40,678	7.58	638
1958-59	..	..	3,971	28,456	7.17	1,062
1959-60	..	..	3,994	27,808	6.96	1,012
1960-61	..	..	3,532	16,286	4.61	750

*Linseed*

Linseed oil is one of the chief components of paints, varnishes, and linoleum, and has many other industrial uses. The presscake or meal, which remains after the oil has been extracted from the ground and partly cooked seed, is a valuable stock food.

The following table shows the area, yield, and value of linseed for each of the five seasons 1956-57 to 1960-61 :—

## VICTORIA—LINSEED PRODUCTION

Season			Area	Production	Average Yield per Acre	Gross Value
			acres	bushels	bushels	£
1956-57	..	..	1,143	12,236	10·71	20,236
1957-58	..	..	4,091	45,946	11·23	78,558
1958-59	..	..	8,817	110,779	12·56	193,863
1959-60	..	..	24,850	295,644	11·90	535,089
1960-61	..	..	6,179	39,356	6·37	70,877

*Flax*

Flax is used for linen fibre, flax, tow, linseed (oil and cake), chaff, and winnow refuse for stock feed.

Linen fibre is the long fibre suitable for spinning into threads where strength is required. Fine flax thread is needed for weaving into linen, coarser types for canvas or for fine strong string and cords.

Tow is normally used for padding. The percentage of linen fibre and tow obtained varies with the skill exercised in handling as well as with the variety. Linen fibre usually averages about 10 per cent. and tow 10 per cent. of the straw as delivered from the farm.

The following table shows the area, yield, and value of flax (straw) for each of the five seasons 1956-57 to 1960-61 :—

## VICTORIA—FLAX PRODUCTION

Season			Area	Production (Straw)	Average Yield per Acre	Gross Value
			acres	tons	tons	£
1956-57	..	..	2,196	4,013	1·83	68,553
1957-58	..	..	5,550	9,923	1·79	159,540
1958-59*	..	..	..	..	..	..
1959-60*	..	..	..	..	..	..
1960-61	..	..	430	592	1·38	8,159

\* No production recorded.

*Tobacco*

Tobacco has been grown in Victoria for about 100 years. The history of the industry is punctuated by periods of prosperity alternating with long intervals of recession, and in the period between 1932 and 1948, the tobacco acreage established in Victoria declined from over 12,000 acres to less than 1,000. This contraction indicates the uncertainty then inherent in the industry, and it is only in recent years that it has exhibited any degree of stability.

During the last 40 years, farmers have attempted to produce tobacco in many Victorian districts, but it is only in the north-eastern river valleys and on selected sites in the Murray Valley area that it has proved a profitable commercial venture.

Victorian tobacco-growing activities are directed solely toward the production of flue-cured leaf, which for many years has been demanded almost exclusively by the Australian smoker, and is the type required by the domestic manufacturing industry. The production of this type of tobacco calls for close control over plant growth and nutrition, and is not likely to be successful unless the environment provides conditions falling within precisely defined limits.

The average temperature during the three summer months should approximate 70° to 72° F. without extreme diurnal variation, and a minimum frost-free period of 140 days is essential. In those Victorian areas warm enough to promote normal growth and maturity in tobacco plants, the summer rainfall is neither heavy enough nor sufficiently reliable to ensure satisfactory production. Therefore it is necessary to locate plantations within reach of a reliable water supply which must be of high quality.

Suitable soils are of a sandy or sandy-loam texture to a considerable depth, and must be both friable and well-drained. High fertility is not desirable.

A good deal of manual labour is necessary to handle a tobacco crop, and it is estimated that 500 to 600 man-hours are absorbed by each acre of crop during the course of a season. One man can handle about 7 acres of tobacco in the field, but would require extra assistance at peak periods such as transplanting and harvesting. In Victoria, the bulk of this labour is provided by sharefarmers and only in rare instances is hired labour the sole productive force.

In addition to high labour requirements, much special equipment is needed to produce a crop of tobacco. This includes curing barn accommodation, bulk storage for cured leaf, and spray irrigation equipment. Because of the high capital cost of such installations, and

the high degree of technical skill necessary to produce tobacco of saleable quality, it cannot be regarded as a catch crop, but rather as a permanent system of agriculture towards which the greater part of the farm activities must be directed the whole year around.

For many years the main factor responsible for fluctuating production in the industry has been the fungous disease, blue mould. It has proved to be extremely difficult to achieve positive control of this disease, but recent research work has yielded fungicidal spray programmes which have been largely successful, and a drive towards better farm hygiene is thought to have shown worth-while results during the past several years.

Other tobacco plant diseases cause individual losses from time to time but, by comparison and in the over-all picture, are not of primary importance. On the other hand, recent expansion of production has prompted some re-examination of the question of general leaf quality, which has assumed more importance since production and usage attained their present high level.

The advent of new and inexperienced growers to the industry and the bringing into production of new, and sometimes marginal, lands are factors which militate immediately against leaf quality. These should automatically correct themselves in the time it takes the grower to acquire the necessary technical skills and the land to mellow with use. This assumes that rapid expansion ceases and that further consolidation and stabilization of the industry is achieved around its present level.

Other more enduring problems are posed by the necessity to modify certain leaf characteristics, previously regarded as acceptable, in order to bring them into closer conformity with the types currently demanded, and such considerations set a common objective for various research projects which are being carried out in major producing districts.

Research and extension services have been expanded and largely supported by industry funds since the inception of the Tobacco Industry Trust Account in 1955. Under the auspices of the Department of Agriculture, a Tobacco Research Station has been in operation at Myrtleford for some years, and a Research Sub-station is projected for Gunbower in the Murray Valley in the near future. Such establishments can only be of continuing and increasing benefit to the industry.

The whole of the Victorian tobacco crop, together with that produced adjacent to, but on the New South Wales side of the River Murray, is sold by public auction in Melbourne. The selling season normally extends from early June to the end of September.

The following table shows the area, yield, and gross value of tobacco in each of the five seasons 1956-57 to 1960-61 :—

#### VICTORIA—TOBACCO PRODUCTION

Season			Area	Production	Yield per Acre	Gross Value
			acres	cwt. (dry)	cwt. (dry)	£'000
1956-57	..	..	2,935	24,470	8·34	1,376
1957-58	..	..	3,252	32,884	10·11	1,862
1958-59	..	..	4,248	43,617	10·27	2,764
1959-60	..	..	6,424	66,080	10·29	4,146
1960-61	..	..	9,932	86,854	8·74	4,225

#### *Fruit*

Victoria produces one-third of Australia's tree-fruit production, three-quarters of the canned fruit production, and two-thirds of the Commonwealth's dried fruits. Approximately 100,000 acres are devoted to orchards and vineyards.

Fruit producing areas north of the Great Dividing Range have a rainfall which varies from 10 inches per annum in the Mallee to 20 inches to 40 inches per annum. Many orchards in southern areas in this part of the State rely on irrigation. Distribution is mostly by gravity except for small areas of citrus under spray irrigation.

In the south of the State, where apples, pears, plums, cherries, dessert peaches, lemons, and berries are produced, rainfall varies from 20 inches to 40 inches per annum. Many orchards in southern Victoria are irrigated from dams, rivers, or town supplies.

The largest area under a single horticultural crop is the vineyard area at Mildura, Swan Hill, and the War Service Land Settlement area at Robinvale.

Most of the dried fruits production is exported, mainly to the United Kingdom. The pome fruits are next in importance, most of the apples being sold locally or interstate, while most of the pear production is exported to the United Kingdom.

Peaches, pears, and apricots for canning are produced in the Goulburn Valley, where large co-operative canneries are also located.

The total output of 3,439,000 cartons\* of canned fruits for the 1961 season comprised apricots, 96,000 cartons; peaches (including 127,000 cartons of mixed fruits), 985,000 cartons; and pears, 2,358,000 cartons. The gross value of all fruit grown in the season 1960-61 was £12,675,824.

## VICTORIA—FRUIT GROWING

Particulars	1956-57	1957-58	1958-59	1959-60	1960-61
Number of Growers .. .. .	4,936	5,044	5,065	5,076	4,783
Area .. .. . acres	63,319	66,221	66,746	68,657	71,415
Kind of Fruit—					
Apples .. .. . bushels	2,621,487	3,125,088	2,969,521	3,005,669	3,134,917
Pears .. .. . "	3,432,090	3,730,427	3,279,535	3,582,549	3,704,278
Quinces .. .. . "	39,073	39,941	31,431	19,595	20,563
Apricots .. .. . "	274,780	692,139	291,547	468,055	206,521
Cherries .. .. . "	86,706	74,387	97,872	101,189	90,297
Nectarines .. .. . "	15,289	19,875	18,770	18,896	14,981
Peaches .. .. . "	878,560	1,287,011	1,033,712	1,210,021	955,224
Plums .. .. . "	104,280	157,332	139,579	156,940	106,833
Prunes .. .. . "	25,574	28,878	20,540	26,594	34,642
Lemons .. .. . "	159,153	159,085	162,616	156,217	199,629
Oranges .. .. . "	711,453	796,625	830,115	1,028,711	689,413
Mandarins .. .. . "	14,275	15,773	24,180	20,081	27,095
Grapefruit .. .. . "	53,917	55,900	66,894	67,214	69,844
Figs .. .. . "	6,053	4,414	4,660	3,218	2,273
Passion-fruit .. .. . "	5,026	5,609	4,800	2,197	2,680
Olives .. .. . "	8,181	12,510	12,281	11,741	23,425
Gooseberries .. .. . cwt.	1,382	1,250	953	1,172	703
Loganberries .. .. . "	1,667	2,262	2,458	2,462	2,144
Raspberries .. .. . "	1,733	2,150	2,486	2,862	2,616
Strawberries .. .. . "	6,694	8,211	7,739	6,692	6,531
Youngberries .. .. . "	1,342	1,823	3,383	3,833	4,172
Almonds .. .. . lb.	85,919	121,937	92,838	115,444	74,900
Filberts .. .. . "	7,283	7,827	6,615	6,590	7,244
Walnuts .. .. . "	159,743	137,544	139,660	149,136	148,357

\* Basic export carton containing 24 cases of No. 2½ can size.

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 536-537.

VICTORIA—DRIED TREE-FRUITS  
(lb.)

Year Ended 31st March—	Apricots	Peaches	Pears	Prunes	Others	Total
1957 .. .. .	12,499	272	4,481	330,762	2,945	350,959
1958 .. .. .	24,841	2,105	744	401,108	3,686	432,484
1959 .. .. .	72,807	5,122	6,824	355,072	1,183	441,008
1960 .. .. .	38,067	5,417	3,505	460,806	2,429	510,224
1961 .. .. .	33,820	4,510	2,290	368,731	626	409,977

Orchards

Information on the number of trees of each variety is collected triennially, the latest figures relating to 1958-59.

The extent of cultivation of each important class of fruit and nuts on holdings of 1 acre and upwards during the seasons 1955-56 and 1958-59 is shown in the following table :—

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

Fruit and Nuts	Number of Trees, Plants, &c.					
	1955-56			1958-59		
	Bearing	Not Bearing	Total	Bearing	Not Bearing	Total
Apples .. .. .	1,529,208	420,365	1,949,573	1,498,638	511,163	2,009,801
Pears .. .. .	1,100,880	236,531	1,337,411	1,124,220	376,722	1,500,942
Quinces .. .. .	25,655	3,709	29,364	21,402	922	22,324
Plums .. .. .	171,634	31,463	203,097	146,136	38,127	184,263
Prunes .. .. .	29,046	9,302	38,348	25,332	6,385	31,717
Cherries .. .. .	121,477	56,480	177,957	117,292	48,813	166,105
Peaches .. .. .	835,511	189,500	1,025,011	540,124	607,039	1,147,163
Apricots .. .. .	376,994	73,458	450,452	312,979	89,970	402,949
Nectarines .. .. .	20,097	3,874	23,971	18,103	5,296	23,399
Oranges .. .. .	370,595	77,325	447,920	372,550	86,824	459,374
Mandarins .. .. .	6,140	5,604	11,744	9,252	9,676	18,928
Grapefruit .. .. .	22,386	2,979	25,365	22,917	1,541	24,458
Lemons .. .. .	106,644	25,608	132,252	89,869	14,704	104,573
Figs .. .. .	5,506	716	6,222	5,840	983	6,823
Raspberries .. .. .	209,451	46,010	255,461	247,970	60,001	307,971
Loganberries .. .. .	108,403	10,675	119,078	138,129	19,001	157,130
Strawberries .. .. .	4,507,904	603,608	5,111,512	6,972,270	405,759	7,378,029
Gooseberries .. .. .	45,302	6,646	51,948	51,762	8,480	60,242
Youngberries .. .. .	*	*	*	127,304	21,600	148,904
Olives .. .. .	17,191	100,952	118,143	60,351	56,568	116,919
Passion-fruit .. .. .	22,803	6,718	29,521	15,950	8,085	24,035
Almonds .. .. .	34,781	9,211	43,992	26,496	4,576	31,072
Walnuts .. .. .	7,702	2,799	10,501	6,549	2,094	8,643
Filberts .. .. .	3,511	1,388	4,899	3,725	458	4,183

\* Not collected.

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 1958-59 :—

VICTORIA—NUMBER OF FRUIT TREES, PLANTS, ETC.,  
SEASON 1958-59

Particulars	Statistical District								
	Central	North-Central	Western	Wimmera	Mallee	Northern	North-Eastern	Gippsland	Total
Growers Area .. No. acres	2,031 24,116	172 2,483	125 683	150 4,153	1,238 6,272	1,057 27,131	201 1,538	91 370	5,065 66,746
Apples .. trees	1,445,277	185,390	57,446	18,637	12,546	187,477	73,030	29,998	2,009,801
Pears .. "	277,673	60,727	1,533	9,407	3,284	1,145,284	1,064	1,970	1,500,942
Peaches .. "	221,768	2,382	402	19,334	21,886	877,965	2,165	1,261	1,147,163
Apricots .. "	73,072	760	1,354	19,967	51,286	254,741	983	786	402,949
Plums .. "	93,477	6,203	1,184	3,649	12,346	63,024	3,456	924	184,263
Prunes .. "	507	8	936	11,459	7,513	11,207	51	36	31,717
Cherries .. "	138,786	3,581	57	4,614	259	10,442	7,799	567	166,105
Quinces .. "	11,260	639	181	1,490	752	7,786	140	76	22,324
Nectarines .. "	16,125	23	85	444	3,286	2,742	449	245	23,399
Figs .. "	1,539	16	37	65	648	3,816	637	65	6,823
Olives .. "	294	..	1	95,000	19,997	1,524	92	11	116,919
Oranges .. "	443	5	75	161	321,492	133,343	3,704	151	459,374
Mandarins .. "	13	..	..	6	16,398	2,441	64	6	18,928
Grapefruit .. "	325	..	5	22	16,961	6,974	161	10	24,458
Lemons .. "	76,413	81	14	250	8,796	17,959	959	101	104,573
Passion-fruit .. vines	5,220	4	111	6	1,148	5,645	11,331	570	24,035
Strawberries .. plants	7,327,292	100	..	..	25,630	21,252	3,755	..	7,378,029
Raspberries .. bushes	306,201	1,020	..	..	..	750	..	..	307,971
Loganberries .. "	157,127	3	..	..	..	..	..	..	157,130
Gooseberries .. "	58,431	1,507	4	..	..	..	..	300	60,242
Youngberries .. "	148,901	1	..	..	2	..	..	..	148,904
Almonds .. trees	562	62	34	715	16,827	7,598	5,208	66	31,072
Walnuts .. "	561	46	21	180	593	197	6,480	565	8,643
Filberts .. "	307	..	1	..	499	1	3,362	13	4,183

### 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 Murray river 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. The Swan Hill district with slightly lower temperatures and higher rainfall is less suitable than Robinvale and Mildura.

Dried fruits production in these districts for the season 1960-61 amounted to 45,725 tons of sultanas, 5,583 tons of currants, and 5,278 tons of raisins. After dipping and sun drying by the grower, the dried fruit is processed and packed in packing houses. Approximately 74 per cent. of Victorian produce for the season 1960-61 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 specialized industry. The main varieties are Waltham Cross, Purple Cornichon, Ohanez, Sultanas,

and Muscats. Melbourne and Sydney are the main market outlets, but Indonesia, Colombo, and Singapore may grow in importance as export markets.

Grapes for wine production are grown at Rutherglen, Great Western, and Nagambie, mainly without supplementary irrigation. The acreage in these districts is tending to decrease. Increasing quantities of grapes for wine making are now being obtained from the irrigated districts of Mildura and Swan Hill.

A considerable portion of Victorian wine is marketed in Great Britain, New Zealand and Canada.

Particulars of vine production for the five seasons 1956-57 to 1960-61 are given in the following table :—

#### VICTORIA—VINE-FRUIT PRODUCTION

Season	Number of Growers	Area		Produce				
		Bearing	Not Bearing	Grapes Gathered	Wine Made	Dried Fruits		
						Raisins	Sultanas	Currants
		acres	acres	'000 cwt.	'000 gall.	cwt.	cwt.	cwt.
1956-57 ..	2,428	41,741	3,153	4,702	2,369	81,875	919,825	79,070
1957-58 ..	2,467	42,089	2,678	5,188	2,582	122,628	1,012,220	83,063
1958-59 ..	2,494	42,482	2,319	5,041	2,354	116,252	937,878	95,517
1959-60 ..	2,505	42,244	1,885	4,229	2,147	122,258	773,035	66,615
1960-61 ..	2,524	42,688	1,961	5,017	3,021	105,552	914,492	111,660

#### 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 £10 mill. each year to Victoria are harvested from about 35,000 acres.

Most of the vegetables are grown in southern Victoria close to Melbourne. These areas are fairly frost free and also have a well distributed rainfall of from 20 to 35 inches. Soils on which vegetables are grown in southern Victoria vary widely and include sands, sandy loams, clay loams, peat, alluvial peats, and volcanic types. In general, most of these soils require 5 to 12 cwt. of fertilizer per acre for each crop.

The northern portion of the State is warm in summer, but more subject to frost in winter. It contains many areas which are ideal for growing early spring crops and is the home of tomato production, particularly for processing. In this warmer climate, on soils which are mainly reddish sandy loams, vegetables can be planted earlier and mature earlier than in most of the southern districts.

Prior to the season 1942-43, statistics dealing with vegetable growing were collected only from those market gardeners who cropped an area of 1 acre or more. Only the surface area employed for vegetable growing was tabulated and, as a consequence, due to double cropping, the actual area utilized was understated. Furthermore, vegetables grown between trees and vines in orchards and vineyards were not recorded.

From the season 1942-43, however, particulars were obtained of all vegetables grown on areas of 1 acre and upwards, including those grown in orchards and vineyards, and allowance was made for double cropping. These changes, therefore, invalidate any comparison with previous years.

Details of the area, production, and gross value of vegetables are given in the table below for all the more important types, except potatoes and onions which are shown under separate headings on pages 528-529.

VICTORIA—VEGETABLES FOR HUMAN CONSUMPTION,  
1960-61

Type	Area Sown	Production	Gross Value
	acres	tons	£'000
Carrots .. .. .	1,715	19,959	1,813
Parsnips .. .. .	744	7,381	710
Beetroot .. .. .	585	5,983	530
Tomatoes .. .. .	5,453	67,862	1,518
French Beans .. .. .	2,312	3,683	351
Green Peas—Sold in Pod .. .. .	6,590	7,176	542
"    " —Canning .. .. .	5,125	2,762	95
Cabbages .. .. .	1,874	24,424	789
Cauliflowers .. .. .	2,709	32,299	1,209
Brussels Sprouts .. .. .	675	2,266	288
Lettuce .. .. .	2,392	8,641	875
Pumpkins .. .. .	1,883	11,170	429
Other Vegetables .. .. .	3,238	15,757	935
Total .. .. .	35,295	209,363	10,084

*Minor Crops*

There are other crops cultivated in Victoria in addition to those enumerated on pages 515-516. The most important of these are nursery products, cut flowers, mustard, sunflowers, agricultural seeds, and hops.

## Pastoral and Dairying

### *Changing Patterns in Animal Husbandry*

#### *General*

Any change that develops in the breeding, feeding, and management of farm animals has its origin in four basic considerations. These are a better appreciation of the adaptability of certain strains of livestock to particular environments ; an improvement in both the overall quantity and seasonal availability of fodder supplies ; the application in practice of the increasing knowledge of the basic nutritional and reproductive physiology of farm animals ; and a change in public demand for quality in the product and the development of new products.

#### *Environmental Factors*

There is a growing recognition of the importance of environmental adaptability in wool production particularly in a State of many small clips. From the point of view of the national wool clip, one of the awkward consequences of closer settlement is that the decisions as to type of sheep to be run in any area or district are delegated to a relatively large number of independent proprietors. The resultant effect on uniformity and classing of the clip can be most serious, particularly at a time when wool as a fibre is competing with synthetics which can be obtained in large and uniform quantities and at a relatively stable price.

However, during recent years much information has become available about those features of Victoria's environment which determine the breed or strain of sheep which should be run and also significantly affect the volume and types of wool production. There can be no compulsion on the individual in such a matter, but the information now available clearly defines the limits within which he can practise breed selection and the limits within which he can practise sheep husbandry as far as wool production is concerned.

The environmental factors which determine selection are regularity of feed supplies throughout the year, the risks of dust and burr contamination, and the reactions of fleece characteristics to continuous wetting under warm and cool temperatures. With the possible exception of burr, these factors have been features of the Victorian environment since the earliest days of pastoral settlement ; their recognition is no new thing. The useful information now available concerns the reaction of the various strains of Merino and its derivatives to these factors, and the possibility of improving the efficiency of wool production by selection on performance (including fleece weighing within the adapted strain).

#### *Dairy Cattle Husbandry*

The major changes in this field are associated with the development of artificial insemination, the exploitation of improved fodder reserves, and application of results of quite fundamental research in animal physiology to the handling of cattle in the milking shed.

Artificial insemination provides a convenient service in dairy cattle breeding based on better sires than are readily available to individual farmers. Provided the farmers co-operate, it can also serve as a method of progeny testing for selection of more productive strains of the various breeds. However, the heifer progeny of the donor sires must be raised and tested to give this information. Rarely has the industry had a better opportunity to help itself.

Many dairy farmers are specialists with income from pigs and calves and cull cows as their only sideline. In times of beef shortage, the breeding potential of those females surplus to the production of herd replacements becomes of considerable interest to the community, particularly when crossed with a bull of one of the best breeds. This diversification of enterprise is now possible on quite small farms as the cross can be achieved with beef breed semen supplied by the artificial insemination centres. A premium is available for the progeny as a bobby calf, but it is an even better proposition as a good weaner.

Profitability of dairying is largely correlated with the way in which lactation is sustained and this can be markedly affected by herd management. It has been shown that cows which calve well before seasonal growth commences perform better in this regard. Their milk production is flushed twice, once following parturition and later by the spring grass. However, this arrangement of seasonal calving can only be undertaken when fodder reserves are sufficient to provide an adequate ration for the herd in the later stages of pregnancy. One of the effects of the mechanization of fodder conservation has been to provide the reserves to permit a considerable extension of the practice of early calving.

#### *Changes in Production: Beef and Lamb*

The beef-producing industry now appreciates the general demand in Australia and abroad for lean, tender meat. This is really no new development since few people can afford a continuous diet of the self-braising meats, roasts and steaks, on which a significant fat covering is desirable. With most of the other cuts to be used in made-up dishes, fat has been normally removed in course of preparation. The popularity of these dishes appears to be increasing and with it the demand for lightly finished young animals of 1,000–1,250 lb. live weight. This demand is being met by quickly finished animals of local breeding rather than by store cattle of interstate origin finished on Victorian pastures. Producers are being assisted in selecting those strains of cattle and methods of feeding them to meet this demand and by carcass competition at shows, which are judged by measurement of carcass qualities rather than by visual inspection.

The rate of growth of the young beef animal is largely a reflection of the milk supply of the dam, and time of calving in relation to seasonal pasture growth is even more important in beef production than it is in dairying. Few calves can utilize the milk available if their dams calve during the spring flush of growth.

In fat lamb production the value of cross breeding, both in the production of the breeding ewe and the sales lamb, has long been recognized. Although satisfactory sales cattle can be produced from any of the pure beef breeds, cross breeding between them has its place in improved efficiency of production and is gradually developing in the industry. It would, however, be wrong to suggest that standard crossbreds, as far as parent breeds are concerned, are yet being produced.

### *Poultry Production*

In no other animal industry have such dramatic changes occurred in recent years, and the list of these changes is quite impressive. They include :—

- (1) The widespread use of the crossbred between the Australorp and White Leghorn breeds as the hen for commercial egg production ;
- (2) the development of the random sample system of laying test for stud breeders' stock ;
- (3) the concentration of the production of commercial stock by fewer large breeders and hatcheries ;
- (4) the development of the broiler industry ; and
- (5) the use of the random sample test for broiler production.

There is sound experimental evidence to support the change to crossbred hens both for better rearability and increased production of eggs. The random sample test is based on the egg-laying performance of pullets hatched and reared at the test centre from eggs collected at random by the testing authority from breeders' farms. This may well be the shape of things to come in testing the productivity of other farm animals. The application of present knowledge in poultry genetics is easier for the larger breeder whose enterprise may be of a size to justify the employment of his own geneticist, and who can exploit the day-old chick business throughout Australia. The broiler industry has developed on the American pattern. The special broiler strains are produced by large breeding farms and supplied to the operator as day-old chicks to be raised to the broiler stage on prepared mashes and pellets, frequently under contract. In Australia, this industry may experience the problem of shortage of protein concentrates for the special diets.

### *Pig Production*

Mention should be made here of the introduction of the Landrace breed from the Scandinavian countries, via Northern Ireland, and the development of husbandry methods for the control of infectious pneumonia.

Pig testing is receiving wider support and the figures recorded for rate of growth and conversion ratios compare quite favourably with those reported by oversea centres.

*Progress of Stock Breeding in Victoria*

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 at the feet of 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 discovery.

According to early statistical records, there were 26,000 sheep, 100 cattle, and 57 horses in the colony on the 25th May, 1836. On the 1st 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 1st 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 since 1861 to 1951 and the number of livestock on rural holdings for each of the six years 1956 to 1961. Estimates of the small number of livestock not on rural holdings have been excluded from the table for 1957 and successive years. For 1956 these estimates were : horses 22,966 ; dairy cattle 16,155 ; beef cattle 8,301 ; sheep 54,511 ; pigs 4,413.

**VICTORIA—LIVESTOCK**  
( '000 )

Year	Horses (Including Foals)	Cattle*		Sheep	Pigs
		Dairy	Beef		
1861 at 1st March ..	77	722		5,781	61
1871 " " ..	167	721		10,762	131
1881 " " ..	276	1,286		10,360	242
1891 " " ..	436	1,783		12,693	282
1901 " " ..	392	1,602		10,842	350
1911 " " ..	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 31st March ..	186	1,489	727	20,012	237
1956 " " ..	119	1,663	954	23,343	227
1957 " " ..	88	1,704	1,036	25,776	254
1958 " " ..	80	1,708	1,017	27,036	274
1959 " " ..	73	1,637	989	26,871	249
1960 " " ..	68	1,652	937	26,542	280
1961 " " ..	64	1,717	1,147	26,620	319

\* Separate figures for beef and dairy cattle are not available for years prior to 1942-43.

A table showing the sizes of holdings and the numbers of holdings depasturing stock at March, 1960, appears on page 510.

The following table contains particulars of livestock in each statistical district of the State at 31st March, 1961 :—

VICTORIA—DISTRIBUTION OF LIVESTOCK, MARCH, 1961  
(’000)

Particulars	Statistical District								Total
	Central	North-Central	West-ern	Wim-mera	Mallee	North-ern	North-East-ern	Gipps-land	
Horses .. ..	15	4	14	4	3	9	7	8	64
Dairy Cattle—									
Cows in Milk or Dry	182	22	248	17	17	198	92	305	1,081
Springing Heifers ..	15	3	29	3	2	21	17	26	116
Other Heifers for Dairying ..	35	5	47	4	3	43	13	50	200
Calves, under 1 Year—									
Heifer .. ..	36	6	51	5	5	55	21	67	246
Other .. ..	5	2	6	3	2	6	3	5	32
Bulls, 1 Year and over	7	1	10	2	1	8	3	10	42
Total Dairy Cattle	280	39	391	34	30	331	149	463	1,717
Beef Cattle—									
Cows .. ..	80	30	151	16	9	54	97	92	529
Calves, under 1 Year	46	19	87	11	7	44	64	64	342
Bulls, 1 Year and over	4	1	7	1	1	3	4	4	25
Other .. ..	34	16	53	7	4	34	50	53	251
Total Beef Cattle	164	66	298	35	21	135	215	213	1,147
Total All Cattle ..	444	105	689	69	51	466	364	676	2,864
Pigs .. ..	58	9	32	15	18	92	34	60	318
Sheep .. ..	2,289	2,000	8,963	4,221	1,792	4,042	1,785	1,528	26,620

### Fodder Conservation

The practice of fodder conservation is an essential part of livestock production because pastures do not provide a full ration for grazing animals the year round. Each year, in the dry summer and autumn typical of our Mediterranean-type climate, pastures dry off and die, and in the winter they may be extremely slow growing. These regular periods of pasture shortage for the grazing animal must be provided for by mechanically harvesting surplus pasture growth in the usual flush spring season, processing and storing it, and later feeding it back to the animals during the periods of shortage.

In actual fact, of course, much of a farmer's skill is directed towards equating the feed requirements of his livestock to the availability of plant growth. This he does by planning farm activities such as calving or lambing for times when the needs of the mothering of young stock will be met by plenty of good-quality pasture, or he may grow special pastures or crops to provide additional grazing. All these practices, including fodder conservation as the major one, play their part in meeting these more or less regularly recurring periods of pasture shortage.

Unfortunately, it is a feature of Australian agriculture that frequently rains may fail to arrive at the expected time, and the regular seasonal shortage of feed may be easily prolonged into a much more serious

drought. The ever-present risk of drought can only be met effectively by adequate fodder conservation. It is indeed an improvident or careless farmer—even in the most favoured district—who does not plan his fodder reserves to give him some safety margin above the normal seasonal requirements of his stock. Gambling on scraping through each year with a minimum of fodder reserves or relying too heavily on the next harvest always being a good one is the surest way of courting ultimate disaster.

As the growing season in Victorian agricultural areas varies from about five months in the north-west of the State to about nine in the south, fodder conservation is probably the most important single farm practice in maintaining maximum livestock production each year. This is apart altogether from providing against shortages due to drought, fire, flood or pests and diseases.

Fodder conservation in Victoria today refers mainly to the conservation of hay, particularly pasture or meadow hay (see pages 527–528). Cereal grain, particularly oats, is also of great importance. The pattern of fodder reserves has changed considerably since the war years and the drought of 1944–45. At that time, cereal hay predominated, but since then meadow hay production has increased remarkably from about 300,000 tons annually to over 1½ mill. tons in 1960. Cereal hay production has meanwhile declined, while lucerne hay has increased. Silage, although a relatively minor fodder in terms of the nutrients it contributes to Victoria's fodder reserves, has increased spectacularly.

Meadow hay production has expanded with the further development of improved pastures in Victoria, the increase in livestock populations and, probably most importantly, with the development of mechanization. The decline in cereal hay has been associated in part at least with the decline of the horse population. The upsurge of interest in silage has stemmed mainly from developments in mechanization.

Most of the hay made in Victoria is made with the mower, side-delivery rake, and pick-up baler. After mowing, the hay crop dries for a varying time in the swath and is then raked, and completes drying in the windrow before baling. Often the rake is not used until just before the crop is ready for baling, so that the rake may play a very minor part in the drying of the crop. Mechanical aids to drying, such as the hay conditioner (crusher or crimper) or the tedder, are practically absent as yet. Some farmers have developed systems of loose hay handling based on simple, low-cost equipment.

Most silage is made using the mower and buckrake, which provides a very cheap and simple system, although wastage is often high because of open stacking. The flail-type forage harvester is becoming popular because of its simple cutting action and relative cheapness. It consists of swinging knives (rotation on a horizontal shaft) which cut the crop by impact and throw or blow it into an accompanying trailer or truck.

The contribution of mechanization to increased fodder conservation has been a noteworthy one, but there is still much potential. For instance, less than 10 per cent. of our improved pastures are cut for hay, although frequently far more is cut on individual farms.

There is no doubt about the contribution that fodder conservation has made to the productivity of Victorian farms and their stability in dry years, but the challenge in the years ahead is a tremendous one. As the success of fodder conservation on the farm is largely dependent on effective mechanization, the challenge is one for machine and farmer alike.

### *Dairying Industry*

Though faced with the long-term prospect of expanding local markets, both for liquid milk and for dairy products, as the population of this country increases, the Australian dairying industry at present experiences varying fortunes according to the demand in overseas markets and the supply from other countries. In Victoria, however, the demand for good dairying land remains keen.

There is some tendency to sustain competitive land prices by increasing the output of milk or butterfat up to the point at which the farm business gives a satisfactory return. Until the middle of the 1930's, 30-cow hand-milked herds were common, and three milkers were usually needed to milk a herd of this size. In the next decade the introduction of milking machines made it possible for two people to milk 30 to 40 cows. In the late 1940's, dairy farmers in large numbers gave up hand-stripping after machines, and one man could then comfortably milk 40 to 45 cows. Doubling up of machine units also made the task easier. In the past four years the introduction of the herringbone-type milking shed has made it possible for one man to milk up to 60 cows and for two men to milk 80 or more.

Pasture improvement has been the basis of the increased carrying capacity of many farms. In some places potash fertilizers and trace elements have played their part; in others, the use of more superphosphate and better management and grazing of the pastures have sufficed.

With this increase of production has come a greater need to produce and conserve feed to be used at times when pasture production is slack. This is especially true on farms which supply market milk, as they must fulfil a contract every day of the year. Silage making on dairy farms has increased eightfold in recent years, and is still being taken up by more farmers. More crops are grown to fill the summer and winter feed gaps, and some have resorted to water harvesting and spray irrigation to provide green pasture in summer. Light tractors with hydraulic three-point linkage have brought with them the tendency to rely on machinery in preference to employing labour.

Advisory services given by the Department of Agriculture through dairy supervisors, the bi-monthly "Dairyfarming Digest", and other media, have made dairy farmers more conscious of their need to give thought to every side of farm management. More cows are under test than ever before in Victoria. Many artificial breeding groups have been formed, and a co-operative society now conducts the bull farm on which the semen is produced. There has been increased interest in milking methods, milking machine efficiency, and in the use of new and improved dairy detergents.

Refrigeration of milk on the farm and its collection from bulk vats by road tanker have been proved practicable in some districts, and these practices are now being adopted in other areas.

Local markets are changing. More and more country towns are being provided with supplies of pasteurized bottled milk, and the Milk Board has brought several country areas under its jurisdiction. In manufacturing, the trend is towards large versatile factories equipped to change from one type of product to another, according to market prospects. There is a growing local market for various types of cheeses hitherto little known in this country, and cheddar cheese is now exported in blocks wrapped in plastic film. These have several advantages over the traditional cylindrical bandaged cheeses.

The research projects now being financed by the industry levy for research and promotion should benefit the dairying industry greatly in the coming years.

Victoria is the principal milk producing State, and in 1960-61 the Victorian output (599 mill. gall.) represented 45 per cent. of the Australian production.

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 31st March—	Number of Cow-keepers	Number of Dairy Cows*	Estimated Total Production of Milk for All Purposes (Year Ended 30th June)	Gross Value of Dairy Produce†
		'000	'000 gall.	£'000
1957 .. .. .	49,153	1,220	587,199	66,330
1958 .. .. .	48,451	1,235	565,439	65,431
1959 .. .. .	‡	1,204	582,948	65,264
1960 .. .. .	44,124	1,098	594,823	70,471
1961 .. .. .	43,690	1,081	599,482	72,004

\* Includes cows (in milk and dry) and springing heifers.

† Includes subsidy.

‡ Not available.

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 30th June—	Butter*	Cheese*	Condensed Milk	Powdered Full-Cream Milk	Casein
1957 .. ..	200,080	46,068	100,178	24,476	16,345
1958 .. ..	194,596	33,294	96,810	24,854	22,421
1959 .. ..	198,652	39,140	87,288	24,585	23,528
1960 .. ..	201,394	43,152	99,063	23,822	20,086
1961 .. ..	201,447	44,799	87,321	22,396	23,743

\* Including that made on farms.

The following table shows the number of dairy herds in Victoria, grouped, according to size, for each of the five years, 1956 to 1958, 1960 and 1961. Details for 1959 are not available.

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

At 31st 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	
1956.. ..	6,077	2,817	1,928	3,466	6,892	7,528	1,213	29,921
1957.. ..	6,183	2,916	1,953	3,448	6,893	8,042	1,310	30,745
1958 .. ..	5,889	2,801	1,860	3,215	6,402	8,406	1,464	30,037
1960.. ..	4,304	2,262	1,682	2,971	6,155	8,488	1,397	27,259
1961.. ..	4,213	2,149	1,545	2,738	5,915	8,723	1,549	26,832

The numbers of farmers with less than five cows were:—19,772 in 1956, 18,408 in 1957, 18,414 in 1958, and 16,865 in 1960. These numbers were excluded from the above table as the groups were considered too small to be classed as dairy herds.

#### *Eradication of Tuberculosis*

An article on this subject appears on pages 525–526 of the Victorian Year Book 1962.

#### *Pig Industry*

Between 20,000 and 25,000 tons of pig carcasses are produced in Victoria in a year. Most of them are consumed here. Only a few are exported to other countries. About half the pig meat is used

as fresh pork or for sausages and other meat products. The other half is made into bacon and ham, some of which is canned. Victoria is usually a net importer of pig meat from other States of Australia.

Farmers sell pigs to meat works either directly or through public auction sales. There are adequate facilities for selling pigs in most districts. Pigs are sold for meat as porkers about 4 to 5 months old and yielding dressed carcasses of 60 lb. to 100 lb. ; as baconers, 5 to 7 months old and with dressed carcasses of 120 lb. to 160 lb. ; or as backfatters, yielding carcasses of 200 lb. to 500 lb. after having been discarded from the breeding herd.

Most of the pigs in Victoria are in small herds on dairy farms and mixed farms. The sizes of the herds are related to the quantities of separated milk and other food by-products of the farms. A food supply which is adequate in quality, quantity and cost is the basis of economic pig production. There are few specialized pig farms in Victoria. Their main food supplies are buttermilk and whey from dairy produce factories, and food refuse from eating places and food factories.

Pig prices vary and farmers have practically no control over them. Prices are usually higher in spring when there are fewer pigs in the market, than in autumn when there are more pigs. Seasonal fluctuation in the quantities of milk available for pig feeding is the usual cause of fluctuating supplies of pigs to markets.

Another cause of fluctuation in production and prices of pigs, not so regular but sometimes big enough to cancel the seasonal one, is due to big increases or decreases in pig breeding. As three-quarters of the pig breeders in Victoria have an average of less than three breeding sows each, an addition of one more sow when prices are favourable results in a substantial overall increase.

The number of pigs in Victoria at 31st March, 1961, was 318,523. About 76 per cent. of these are held in the Central, Western, Northern, and Gippsland districts which are so largely devoted to dairying. The following table shows classifications (in statistical districts) of pigs, together with the numbers of pig-keepers :—

VICTORIA—PIGS AND PIG-KEEPERS, 31ST MARCH, 1961

Statistical District	Boars	Breeding Sows	All Other	Total Pigs	Pig Keepers
Central .. ..	1,098	8,713	48,647	58,458	1,446
North-Central .. ..	283	1,564	7,695	9,542	481
Western .. ..	940	5,336	25,872	32,148	1,417
Wimmera .. ..	457	2,294	11,849	14,600	1,008
Mallee .. ..	475	2,799	14,526	17,800	1,003
Northern .. ..	2,019	14,214	76,314	92,547	2,250
North-Eastern .. ..	902	5,314	27,583	33,799	1,250
Gippsland .. ..	1,566	9,370	48,693	59,629	1,931
Total .. ..	7,740	49,604	261,179	318,523	10,786*

\* Of this number 2,608 had herds of under 5 pigs, 1,368 herds of 5 and under 10, 2,019 herds of 10 and under 20, and 4,791 herds of 20 pigs and over.

The following table shows 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 MARCH, 1956

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 ..	529	76	54	34	26	40	30	26	815	14,111	14,926
5-9 ..	573	100	77	23	43	27	20	18	881	6,576	7,457
10-14 ..	349	112	49	27	40	20	9	13	619	2,934	3,553
15-19 ..	222	86	58	15	30	17	11	2	441	1,735	2,176
20-29 ..	363	198	110	62	57	29	16	7	842	2,523	3,365
30-49 ..	473	416	314	196	232	109	39	3	1,782	3,792	5,574
50-99 ..	357	529	580	430	723	617	208	36	3,480	6,541	10,021
100 and over ..	53	85	110	108	225	367	249	58	1,255	2,176	3,431
Total ..	2,919	1,602	1,352	895	1,376	1,226	582	163	10,115	40,388	50,503

### Pastoral Industry

#### Introduction

Sheep-raising provided the motivation and the means of Victoria's permanent settlement. Its progress in a century and a quarter has been affected, more or less profoundly, by the wide vicissitudes of price and season to which it has been subjected. Those short-term changes in the industry's fortunes tend to mask, however, three major periods in its development. The first, lasting until the mid-1870's, was characterized by expansion based on the geographical extension of an exploitative use of natural grasslands; in the second, covering the 50 years before the mid-1920's, the structure of the industry was radically changed; and in the latest, renewed expansion has been achieved by the application of scientific knowledge to farming and sheep-raising techniques.

#### Beginnings

Within eight years of the first small flocks being landed from Van Diemen's Land in 1834 and 1835, there were 1 mill. sheep south of the Murray. Settlement was rapidly extended through the rich grazing areas north and west of Melbourne and, as squatters trekked south from New South Wales, it fanned out from the track blazed by Major Mitchell. Despite the temporary check imposed by drought and depression in the 1840's, by 1851, when Victoria was separated from New South Wales, its sheep industry was nearly as large as that of the parent colony. Six million sheep produced wool and tallow worth nearly £1 mill.; nearly 1,000 sheep and cattle stations had been established on land leased from the Crown; only the drier

parts of the north-west and the rugged mountain and forest country remained unoccupied, and by 1860, even the Mallee was occupied, however sketchily and tentatively, by the squatters' flocks.

Although effective pastoral occupation of the country was restricted to areas with permanent natural water supplies, sheep-raising was an essentially nomadic form of land utilization until the 1850's. Shepherds grazed their flocks within small circles centred on "permanent" shepherd's huts or outstations, regularly moving the hurdles within which the sheep were folded each night. The first substantial building erected on a run was the wool-shed, but shearing was unreliable, sheep-washing primitive, and the sheep vulnerable to disease.

#### *After the Gold-Rushes*

The gold-rushes of the 1850's halted this first phase of expansion, but at the end of the decade the industry entered another period of rapid growth which, by the middle of the 1870's, lifted the sheep population from 6 mill. to nearly 12 mill. This was made possible by the use of a new technology which increased the carrying capacity of the land, extended effective occupation, increased production per sheep and, in the long run, considerably reduced the industry's labour requirements per sheep. The use of fences to enclose runs and form large subdivisions within them, the basis of the new technology, was commenced in the 1850's. Squatters committed themselves to this form of investment for a variety of reasons—protection of their boundaries prominent among them—and it was not until the process was substantially completed, in the 1860's, that the full implications for the utilization of back country and the more intensive exploitation of well-watered properties were recognized. The new technology had important side-effects, too: it encouraged pastoralists to protect their investment by securing freehold titles to their land, and a significant minority, especially in the important Western District, began to cull and select their flocks more carefully.

#### *Development from 1870 to 1920*

In the 50 years after the mid-1870's, the growth of the sheep population was slow and fitful: in 25 of them there were less sheep than there were in 1875. Unlike New South Wales and Queensland, where expansion continued through to the 1890's, Victoria had little land not already used nearly to the limits imposed by current pastoral technology. In addition, the growth of agriculture created complications and problems not encountered in New South Wales until the twentieth century. In these 50 years of relative stagnation in sheep numbers, the structure and nature of the industry were transformed. It ceased to be the preserve of the large squatter; in the place of the relatively few large flocks there gradually emerged a large number of small flocks raised for a variety of purposes and products.

The size of the average Victorian flock depended, broadly, on the average size of sheep-raising properties, and from the 1860's the basis of Victoria's land policy was to substitute the small agricultural holding for the large sheep run. Until the 1880's, however, there was little real decline in the importance of the large flock-owner. In the 1850's and, through dummied selections, in the early 1860's, pastoralists

created many large freehold estates in the Western District and the Wimmera, where two-thirds of the Colony's sheep were then depastured. That the overwhelming proportion of large flocks recorded at the end of the nineteenth century were in those districts is testimony of the protection gained through purchase. Moreover, despite legislative intention, many large holdings were still leased from the Crown in 1879: the average size of the Colony's 701 runs was over 24,000 acres and that of the 438 runs in the well-watered, fertile grazing regions was over 16,000. Subsequent legislation, however, severely limited the size of new runs, reclassified unalienated lands and changed the types of tenure appropriate to each classification, and thereby steadily reduced the area available to the average pastoral lessee.

### *Small Selections*

By contrast, the rate at which small selectors were established was rapid even from the mid-1860's. Many of those selectors ran sheep, and it was that multiplication of small flocks, rather than the elimination of large ones, that changed the industry. By 1906 over 70 per cent. of the flocks in the State were of less than 500 sheep; another 15 per cent. of them were of from 500 to 1,000 sheep; together they accounted for 30 per cent. of the sheep population.

The policy of encouraging small selectors was based on, and associated with, the growth of agriculture. The relations between cultivation and grazing during this period, however, are peculiarly difficult to define. The decline in the size of the average flock, for example, was not directly dependent on agricultural expansion: it was experienced in all districts despite their widely different agricultural histories. Nor were geographical shifts in the location of agriculture and grazing closely connected. In the 1860's and 1870's, the incidence of wheat growing moved from the coastal and central districts to the north and thence, in the 1890's and during the First World War, to the west. Yet during this long period the only significant geographical re-distributions of the sheep population were a slow but steady decline in the relative importance of the Western District and the Wimmera (the main centres of the industry) and a more substantial gain in the relatively lightly populated Gippsland and North-Eastern Districts. Nevertheless, by the beginning of the twentieth century, nearly half the flocks in the State were run on holdings that were used primarily for agricultural purposes.

### *Mixed Husbandry*

Throughout most of the nineteenth century the association of crop-growing and sheep-raising was essentially casual. Small land-holders could not easily rely on a single product; Victoria's soils and climate were generally suited to mixed husbandry. Sheep, raised indifferently for wool and meat, therefore provided a profitable sideline for the wheat grower, as did wheat for the small grazier. Seldom, however, were the reciprocal advances more than dimly perceived; very rarely were the two activities integrated. Yet, as long as wool prices remained at profitable levels, the problem of making small flocks worth while was solved reasonably well by mixed husbandry, and for those not growing crops, by the production of wool and mutton

and perhaps beef for the local market. When wool prices began to fall in the 1880's, the position of the small flock-owners became uncertain; when the fall continued to the depression trough of the 1890's they, and the industry as a whole, were forced to act. There is evidence of a more intelligent approach to mixed farming in some of the better pastoral districts, but the main solution lay in exploiting the opportunities provided by refrigerated ocean transport. During the 1890's, butter production increased three-fold, and in choice localities the association of sheep and dairy cattle became an important type of pastoral enterprise. More significantly, exports of frozen meat, first recorded in the statistics of 1892, grew rapidly in the following twenty years. From the mid-1890's, the value of exporting lamb rather than mutton was appreciated, and the establishment of a profitable fat lamb industry secured the future of the small grazier.

The trend towards a smaller average flock continued through to the first quarter of the twentieth century. Largely dependent, previously, on the multiplication of small flocks, it now also encompassed the accelerated reduction in the number of large flocks. While wheat farmers established their paddocks and their flocks on erstwhile pastoral areas of the Mallee, pastoralists in the richer grazing districts were induced to subdivide large freehold estates, either for sale or for leasing, to meet the expansion of dairying and fat lamb production. As a consequence, in 1910, the average flock contained only 531 sheep—nearly 40 per cent. less than in 1906—and in several years during the following decade the number fell below 500.

#### *Changes in Breeding*

The sizes of flocks and the purposes for which they were run produced a striking change in the breed composition of Victoria's sheep population during these 50 years. The original stock was Merino, but even in the 1860's some graziers were experimenting with long-woolled sheep and by the 1870's and 1880's a number of large flocks consisted of well-bred crossbred sheep of the types now known as Comebacks and Polwarths. The small flock-owner, even more than the large, needed the heavier wool clip and heavier carcass produced by crossbred stock, and his choice was reflected in the increasing proportion of crossbred wool at the Melbourne auctions. By 1908 only about 35 per cent. of Victorian sheep were Merino, 23 per cent. were Comeback, 15 per cent. were fine-woolled and 12 per cent. coarse-woolled crossbreds. (It was not until after the First World War that that distribution was altered.)

#### *Developments from 1920 onwards*

The flexibility derived from the industry's new structure was one of the factors permitting and encouraging a new expansion after the long period of relative stagnation. The new level of sheep numbers established in the late 1920's, attributable to flock increases in the high-rainfall areas, was maintained—even increased slightly—by a shift from wheat growing to sheep-raising in the Mallee and Wimmera in the 1930's. The other factor was the gradual introduction of techniques permitting more intensive grazing. The application of science to pastoral problems assumed an increasing importance in the

inter-war period, especially in the Western District, but its indispensable role in modern grazing was most spectacularly displayed by the great expansion of the industry since 1947. The State's apparent sheep-carrying capacity, lifted from about 12 mill. to 17 mill. in the first phase of twentieth century growth, was raised by a further 10 mill. in the past decade.

### *Pasture Improvement*

Pasture improvement, in the form of sown grasses, has a long but, for many years, undistinguished history in Victoria (see pages 469 to 472 of the Victorian Year Book 1962). The area sown increased steadily but slowly throughout the nineteenth century, mainly in the choice dairying and fattening regions of the Western, Central, and South Gippsland Districts. Until the end of the century, when the potentialities of high-quality pasture in fat lamb production were recognized, few graziers followed the lead of the small band of experimenters who, from the 1860's, had sown clover and lucerne as sheep pastures. The basis of the modern, sophisticated form of pasture improvement is the combination of superphosphate fertilizer with leguminous pasture species, mainly clovers. It is this combination that has revolutionized twentieth century grazing, for soil fertility is enhanced and an increased quantity of higher-quality pasture is produced. The carrying capacity of a property can be doubled—and more. In the late 1920's and in the 1930's, the area under improved pastures increased significantly, though modestly, in the Western and Central Districts, and accounted for a good deal of the increase in sheep numbers in the Western District in that period. Improvement programmes were interrupted by the scarcity of labour, fertilizers, and farm machinery in the war and immediate post-war periods, but since 1947, progress has been extremely rapid. In recent years, moreover, improvement has not been restricted to the high-rain-fall regions, for the value of fertilizing natural pastures and introducing other grass species in parts of the wheat/sheep belt has been clearly demonstrated.

Pasture improvement corrects the low phosphate and nitrogen content of the soil; the identification and correction—even though partial as yet—of other soil deficiencies, including the minor elements, has also helped lift the State's carrying capacity in the last ten years. In the wheat belt the use of sown grasses and longer systems of rotation has not only directly increased the area available as pasture, but is also increasing soil fertility to the ultimate benefit of both wheat and sheep production. Finally, the partial control of the rabbit, first by means of the myxomatosis virus and more recently by the use of "1080" poison, has had a remarkable effect on the quantity of feed available for stock.

The increase in pasture production has extended the industry's interest in fodder conservation, a practice that has always been more prominent in Victoria than in other States. Although it has traditionally been associated with the creation of drought reserves, it is now being used increasingly to provide supplementary feed in the seasonal periods of slow pasture growth. This purpose, and indeed fodder conservation itself, acquired added importance from the geographical extension of

the fat lamb industry—an industry which places a premium on the maintenance of adequate nutritional levels throughout the whole year. Victoria, of course, is still vulnerable to drought, even though less so than other mainland States. Increased fodder conservation and the creation of additional water storage facilities in the last 40 years, however, assure greater protection in the future. Moreover, the construction of the complex water supply system in the Mallee and Wimmera not only opened some of the more arid areas of the State to effective occupation, but also served to protect them against all but the most severe and prolonged droughts. On the other hand, irrigation—the other major way in which the environment is being altered to serve man more bountifully—has been used less to reduce the impact of the seasons on the industry as a whole than to support specialized fat lamb producers.

### *Economic Factors*

Although pasture improvement is broadly concentrated in the high-rainfall areas, developments in the last three decades have not substantially changed the distribution of sheep within the State. The large increase in the number of sheep in high-rainfall regions and the heavier stocking rates now possible have intensified problems associated with animal health. Footrot and worm infestations are much greater dangers now than at any time during the last century, while sheep grazed on improved pastures are more vulnerable to certain metabolic diseases. Again, science and skilled management can provide the answers, but the need for the combination underlines the changed nature of the industry.

By the 1920's and 1930's, it was evident that long-term legislative objectives and short-term economic pressures had pushed property subdivision beyond its economic justification; too many holdings on which sheep were run were too small. At the same time, the scale of investment in farm machinery, fences, and water facilities required to implement pasture improvement programmes created strong pressures favouring larger farm units. Consequently, in the last three or four decades, there has been a trend rise in the size of the average flock; in 1956 it was the same as it had been exactly half a century before. The change had been produced primarily by an increase in the number of flocks containing between 500 and 2,000 sheep, but the newly acquired flexibility of sheep-raising is reflected in the sporadic increases in the number of smaller flocks in response to short-term economic inducements.

The increased number of sheep in the wetter regions of the State, the increased importance of the fat lamb industry and its geographical extension into the wheat-sheep belt, particularly in the 1930's, provide the main explanation of the continuation of the shift to Crossbred sheep through to the 1940's. In their long search for the most appropriate dual-purpose sheep, Victorian farmers have not, however, been prepared unreservedly to sacrifice wool fineness for carcass size and quality. In the 1920's, Comebacks became more important, both absolutely and, primarily at the expense of long-woolled sheep,

relatively ; since the end of the 1930's they have been progressively displaced by other breeds, notably Polwarths and Corriedales, that are more adequately dual-purpose. The relative importance of the Merino remained broadly unchanged from the beginning of the century until the immediate post-war period. Since 1947, relatively higher prices for Merino wool have produced a significant, though undoubtedly short-term, shift in their favour.

It is clear that the industry's adjustment to, and exploitation of, the new techniques made available to it is far from complete ; it is equally clear that the range of innovations that science can supply is far from exhausted. Pasture improvement, fodder conservation and supplementary feeding, the correction of minor element deficiencies in the soil, clover-ley farming, greater (and perhaps a different) use of irrigated pastures, improved management methods on breeding properties and an increasingly sophisticated genetic approach to breeding—to mention merely the more obvious—have vast potentialities yet untapped. Whether, and to what extent, they are developed depends not only on the grazing community and on the economic implications of increased production, but also, and increasingly, on the wide and complex array of economic inter-relationships with other forms of land use.

### *Sheep Industry*

The world renowned Merino is the most common sheep breed in Victoria. In 1959, the sheep population of this State comprised Merinos 42·4 per cent., Corriedales 13·5 per cent., Polwarths 4·4 per cent., Comebacks 12·7 per cent., Crossbreds 22·2 per cent., and British breeds 4·8 per cent., consisting mainly of Border Leicesters, Dorset Horns, Romneys, and Southdowns.

The Merino is the main wool producing breed and it also plays an important role in the breeding of Comeback and Crossbred sheep. These are produced mainly by crossing the Merinos with Corriedales, Polwarths, and Border Leicesters.

The pure British breeds are mostly run in small stud flocks which produce rams for cross breeding in fat lamb production.

The two main sheep enterprises are wool production and fat lamb production.

Wool is produced mainly in the Western, Wimmera, and Northern districts where both rainfall and topography are ideal for the development of improved pastures. The majority of these flocks breed their own replacements and consist of about one-third breeding ewes and two-thirds wethers which are the best wool producing sheep. Most of the ewes in wool producing flocks lamb in April, May, and June, but in the high rainfall districts there is an increasing trend to lamb down in August, September, and October.

Nearly half of Victoria's total wool production comes from the Western and Southern Wimmera districts and the wools are much sought after by oversea buyers because of their high yield, good colour, soft handling, and freedom from dust and seed.

On the other hand, most of the fat lambs are produced in the Wimmera, Mallee, and Northern districts where fat lamb production has become complementary to cereal production. These lambs are produced mainly from strong crossbred ewes which graze on clover and medic pastures—an important part of the clover ley system of crop rotation. The lambs are usually dropped in the autumn and fattened on the late winter and early spring crop feed. The majority are cashed from August to November. Wool from these areas is poor in quality and contains more seed and vegetable fault than that produced in the higher rainfall districts.

Fat lamb production is also carried on in the South Western, Central and Gippsland districts, where rainfall and country favour the development of highly improved pastures which carry well into the summer.

These lambs are usually dropped later than in the cereal growing districts and, after fattening on spring and summer pastures, the majority are cashed in local markets from November to April.

The wools produced in these areas are mainly fine and strong crossbred types, which have good style and no dust or vegetable fault.

A description of the types and qualities of wool in the wool growing districts of the State appears on pages 534 to 536 of the Victorian Year Book 1962.

The numbers of sheep in Victoria in various years since 1861 are shown in the table on page 542. The distribution of all livestock is shown in the table on page 543.

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 mortality due to 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 dropped to ewes mated, and thus the natural increase from season to season may vary considerably. The following table shows the numbers of ewes mated or intended to be mated, the number actually mated, and lambs marked, in each of the five seasons 1958 to 1962 :—

#### VICTORIA—LAMBING

Season	Ewes Intended for Mating	Ewes Actually Mated	Lambs Marked	Proportion of Lambs Marked to Ewes Mated*
	'000	'000	'000	%
1958 .. .. .	10,794	10,173	8,455	83
1959 .. .. .	11,403	11,232	9,357	83
1960 .. .. .	10,837	10,614	8,630	81
1961 .. .. .	11,516	11,440	9,773	85
1962 .. .. .	11,410	†	†	†

\* Prior to 1958 this proportion was based on farmers' intentions at the beginning of the season.

† Not available at the time of printing.

*Sheep and Lambs in Statistical Districts*

The following tables set out the numbers of rams, ewes, wethers and lambs depastured in each Statistical District of the State at 31st March, 1961, 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 31st MARCH, 1961**  
(’000)

Particulars	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Rams ..	27	21	100	43	22	58	24	17	312
Breeding Ewes*	1,049	819	3,709	1,764	1,077	2,311	950	690	12,369
Other Ewes ..	85	65	555	185	19	76	49	53	1,087
Wethers ..	724	764	2,750	1,428	265	789	461	453	7,634
Lambs ..	404	331	1,849	801	409	808	301	315	5,218
Total Sheep and Lambs	2,289	2,000	8,963	4,221	1,792	4,042	1,785	1,528	26,620

\* Includes breeding ewes not mated (853,279 at 31st March, 1961).

**VICTORIA—LAMBING, 1960 SEASON**

Particulars	Statistical District								Total
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Ewes Mated ’000	939	726	3,089	1,352	893	2,131	870	614	10,614
Lambs Marked ’000	807	591	2,440	1,042	725	1,782	706	537	8,630
Percentage ..	86	81	79	77	81	84	81	87	81

**VICTORIA—LAMBING FORECAST, 1961 SEASON**  
(As Advised by Farmers at 31st March, 1961)  
(’000)

Breed of Rams Used	Ewes Mated or Intended to be Mated (For Lambing during 1961 Season)								Total
	Statistical District								
	Central	North-Central	Western	Wimmera	Mallee	North-ern	North-Eastern	Gipps-land	
Merino ..	141	249	1,458	915	158	317	176	171	3,585
Corriedale or Polwarth ..	201	112	972	206	85	195	113	66	1,950
Shortwool Breeds ..	520	285	511	264	426	1,152	444	281	3,883
Longwool Breeds ..	113	122	390	222	379	573	176	123	2,098
Total	975	768	3,331	1,607	1,048	2,237	909	641	11,516

*Breeds of Sheep*

The method of collecting particulars of breeds was changed considerably in 1950 and, apart from Merinos, all comparison with breeds of previous years is nullified. Merino Comebacks were previously collected as a whole, irrespective of whether they were fine or coarse. The 1950 collection made provision for segregating those “finer than half-bred”, while those not up to that standard were included with other Crossbreeds.

Similarly, it cannot be determined if any increase in the numbers of other Pure Breeds (British and Australasian) has occurred as another very important change in method was the substitution of the category "Other Recognized Breeds" in place of the former category "Other Pure Breeds". "Other Pure Breeds" in 1947 numbered 1,407,349, whereas in 1953, "Other Recognized Breeds" numbered 5,220,326. Crossbreds, which numbered 6,923,603 in 1947, dropped to 5,625,483 in 1953, notwithstanding the inclusion of half-bred and coarser Merino Comebacks.

Australasian breeds are the Polwarth and the Corriedale. The Polwarth is a Merino-Lincoln cross (approximately three-quarters Merino and one-quarter Lincoln). It was evolved to meet the conditions of light wool-growing localities found to be too wet and cold for the pure Merino. The Corriedale was evolved by heavily culling the progeny of Lincoln rams and Merino ewes and by judicious mating over several years. The Corriedale is a dual purpose sheep, being favoured by many breeders both for lamb raising and for wool production.

Information on the number of sheep of each breed is collected triennially.

The following table shows the breeds of sheep in Victoria (by districts) at the 31st March, 1959 :—

VICTORIA—BREEDS OF SHEEP, 31ST MARCH, 1959  
(’000)

Statistical District	Merino	Other Recognized Breeds	Merino Comeback (Finer than Half-bred)	Crossbred (Including Half-bred and Coarser Comebacks)	Total
Central .. ..	527	787	306	877	2,497
North-Central .. ..	920	390	258	436	2,004
Western .. ..	4,130	2,747	1,158	813	8,848
Wimmera .. ..	3,052	505	211	416	4,184
Mallee .. ..	636	238	293	536	1,703
Northern .. ..	1,124	792	575	1,678	4,169
North-Eastern .. ..	524	392	311	698	1,925
Gippsland .. ..	496	268	311	520	1,595
Total .. ..	11,409	6,119	3,423	5,974	26,925

Information on the number of rams of each breed is collected annually. The following table shows the breeds of rams in Victoria (by districts) at the 31st March, 1961 :—

VICTORIA—BREEDS OF RAMS, 31ST MARCH, 1961

Statistical District	Merino	Corriedale	Polwarth	Border Leicester	Dorset Horn	South-down	Other	Total
Central .. ..	3,794	3,798	1,823	1,569	8,343	4,718	3,668	27,713
North-Central .. ..	7,117	2,837	393	2,191	4,211	2,458	1,848	21,055
Western .. ..	48,640	18,824	9,290	1,646	7,094	3,728	10,755	99,977
Wimmera .. ..	25,139	5,232	392	3,791	5,663	302	2,195	42,714
Mallee .. ..	3,749	1,827	103	7,495	8,005	151	910	22,240
Northern .. ..	9,435	4,811	611	13,311	22,284	4,665	3,373	58,490
North-Eastern .. ..	4,115	2,117	813	3,605	7,080	2,454	3,471	23,655
Gippsland .. ..	4,173	1,288	340	1,123	3,829	2,558	3,210	16,521
Total .. ..	106,162	40,734	13,765	34,731	66,509	21,034	29,430	312,365

## Production of Wool

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

## VICTORIA—SHEEP AND LAMBS SHORN, SEASON 1960-61

Statistical District	Shorn		Wool Clipped (Including Crutchings)		Average	
	Sheep	Lambs	Sheep's	Lambs'	Per Sheep	Per Lamb
	'000		'000 lb.		lb.	
Central ..	2,121	459	20,905	1,380	9·86	3·01
North-Central ..	2,009	393	19,582	1,123	9·75	2·86
Western ..	8,580	2,048	89,288	5,959	10·41	2·91
Wimmera ..	3,966	844	44,003	2,653	11·10	3·14
Mallee ..	1,384	386	15,413	1,164	11·13	3·02
Northern ..	3,722	910	37,062	2,820	9·96	3·10
North-Eastern ..	1,799	380	16,056	1,013	8·93	2·66
Gippsland ..	1,418	402	13,606	1,110	9·60	2·76
Total ..	24,999	5,822	255,915	17,222	10·24	2·96

## VICTORIA—SHEEP SHORN AND WOOL CLIPPED

Season	Shorn		Wool Clipped (Including Crutchings)		Average	
	Sheep	Lambs	Sheep's	Lambs'	Per Sheep	Per Lamb
	'000		'000 lb.		lb.	
1956-57 ..	22,674	6,556	249,945	20,421	11·02	3·12
1957-58 ..	24,832	7,182	240,510	19,487	9·69	2·71
1958-59 ..	25,553	5,821	241,872	15,703	9·47	2·70
1959-60 ..	25,393	6,823	255,341	18,621	10·06	2·73
1960-61 ..	24,999	5,822	255,915	17,222	10·24	2·96

## VICTORIA—WOOL PRODUCTION AND VALUE

Season	Clip	Stripped from and Exported on Skins, &c. (Greasy)	Total Quantity (Greasy)	Gross Value	Average Price Per lb.
	'000 lb.			£'000	d.
1956-57 ..	270,366	29,206	299,572	97,659	78·24
1957-58 ..	259,997	36,493	296,490	76,255	61·73
1958-59 ..	257,575	41,269	298,844	59,471	47·76
1959-60 ..	273,961	49,265	323,226	75,814	56·29
1960-61 ..	273,137	48,874	322,011	69,265	51·62

*Wool Marketing System*

Samples of Australian wool, taken to England by McArthur and by Marsden early in the nineteenth century, aroused considerable interest and in 1808 the first commercial consignment of one bale was sold in London. The years following saw regular sales there, the wool being consigned by the grower himself or by speculative or general merchants. However, the round journey of the wool out and the cash home resulted in a long period of uncertainty.

The present system of wool marketing has been built up over more than a century by the efforts of many able and energetic leaders, notably Thomas Sutcliffe Mort who prompted the first Australian auctions held at Sydney in 1843, and Richard Goldsbrough who started the sale of Victorian wool and produce in Melbourne in 1848. Geelong, the third Australian centre, was established in 1857.

On these foundations has been built a marketing system probably unique in world commerce, where a product is sold, in the presence of its grower, to the highest bidder amongst manufacturers and their agents from all over the world. Practically the whole of the Australian clip is sold under this system of local realization, which requires the provision of facilities for receiving, storing and showing the wool, and a closely integrated programme of orderly offering. Each year estimates are made of the quantity of wool available for auction, and the Australian total is divided between Northern, Southern, and Western centres, which each have their resident buyers.

The Commonwealth annual production of almost 5 mill. bales is marketed under the auction system. It is disposed of in the various selling centres of all State capitals and a number of provincial cities. The sales programme in all centres is arranged by the National Council of Wool Selling Brokers of Australia, after consultation with buyers. Later, State allocation committees attend to details such as individual sale dates and the quantities to be offered in each centre at the various sales.

Victorian buyers cover, as well as Melbourne, Geelong, and Ballarat, auctions at Albury, Adelaide, Hobart, and Launceston, and allowing for this, a sales programme for the complete season is prepared. This recognizes the buyer's problems of transport and accommodation and ensures that supplies are evenly spread, not only in quantity, but in type and quality, so that there is a representative selection to meet the varied demand. Thus, by controlling the amount of wool offered, an orderly marketing system is maintained.

*Auction System*

Under the auction system wools are displayed on the show floors of woolbrokers' stores, equipped with sawtooth roofs, giving clear, even lighting. This presentation of the wool under conditions which

promote the interest of the grower, and at the same time retain the confidence of the buyer is the responsibility of the selling broker, and involves strict and thorough attention to detail.

On arrival at the store, each bale is weighed by a sworn weigher, and the weight, brand, and description is marked on the head. The wool is stacked to await its turn of offering, which occurs in rotation according to date of arrival. When the wool is due for sale, a representative portion is taken to the show floor, and there the brokers' wool experts inspect it and arrange it into lots. It is also inspected and valued by buyers, who represent oversea and local wool users. Should any lot need additional attention, it is sent to the required department for treatment. The operation of reclassing, by which skilled classers grade a grower's consignment according to quality, length, colour, &c., and the bulk classing department, where large lots are made from various owners' wools, are important services which the broker provides.

The whole of the offering in each catalogue is valued by the brokers' experts, who keep in the closest touch with the market and its movements. When the auction begins, the auctioneer is accompanied by the wool expert who is able to protect the growers' interests. In this way, the grower exercises control up to the last moment, and may withdraw any lot if the bids do not conform to his ideas of value.

The Wool Exchanges are the hub on which the big business of wool revolves. Bidding is vocal, buyers advancing their prices by  $\frac{1}{4}$ d.,  $\frac{1}{2}$ d., or even more until limits are reached and the lot falls to the bid of the last caller. The sale is conducted with great rapidity, and in approximately two hours 850 lots will possibly have been sold, as on a normal market it takes on an average only eight seconds to dispose of an individual lot or line of wool. Although about 5 mill. bales are disposed of in the various centres of the Commonwealth during the course of a season, with proceeds representing millions of pounds, disputes are few. This is a remarkable and gratifying feature of the auctions, which it will be seen are based on the confidence, goodwill, and mutual trust of all parties.

At the fall of the auctioneer's hammer, the ownership of the lot passes from the woolgrower to the woolbuyer, but the woolbroker still performs some service by storing it in his warehouse until it is required by the buyer. If the wool is to go overseas it is dumped, or compressed tightly and held by metal bands. The broker then has it delivered to the ship, or the local mill, and at that point marketing ends, and wool enters the process of manufacture.

### *Wool-growing Districts*

A description of the main wool-growing districts in Victoria will be found on pages 534 to 536 of the Victorian Year Book 1962.



productivity is the annual harvest of honey taken from many species of eucalyptus in all parts of the State. Today, Victoria ranks second among the States in its apicultural activities.

With an average registration of some 1,250 apiarists and some 300–400 large commercial operators, Victoria's honey production averages about 7 mill. lb. per annum. Colony yields are relatively good and range between 180 and 240 lb. per colony per annum.

Eucalyptus species provide the bulk of the honey crop—up to 95 per cent. of the total—with the balance made up of clover and one or two minor species of ground flora.

The industry is, of necessity, migratory, whole apiaries with the necessary plant being moved by road transport from one part of the State to another following the flowering of the eucalyptus species in the forests. 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 thousands of colonies are hired out to fruit and seed growers to ensure profitable sets of fruit and seed.

Marketing is the great problem of the industry. Violent fluctuations in the annual honey crop are, in the absence of any organized marketing arrangements, attended by similar fluctuations in the prices of produce and, in some cases, considerable carry-over from one season to the next.

Governmental interest in the industry is authorized by the *Bees Act 1958* and extends to disease control, advisory services and research into problems of apiculture.

Prior to the season 1936, the statistics of honey and beeswax were based on returns received from apiarists who were permanent occupiers of holdings of 1 acre and upwards. As a consequence, production was understated because of the exclusion of (a) hives on areas of less than 1 acre, and (b) travelling beekeepers who were not occupiers of rural holdings. Commencing with the season 1935–36, all beekeepers were required to furnish returns. The collection was further revised in 1958 to exclude apiarists with less than five hives. Particulars relating to apiculture for the five years 1957–1961 are given in the following table :—

#### VICTORIA—BEE-HIVES, HONEY, AND BEESWAX

Season Ended 31st May—	Beekeepers*	Hives	Production		Gross Value	
			Honey	Beeswax	Honey	Beeswax
	No.	No.	lb.	lb.	£	£
1957 ..	1,341	101,736	8,215,350	89,749	590,478	28,888
1958 ..	1,086	104,265	5,884,381	67,431	429,069	20,721
1959 ..	1,145	100,953	7,624,037	85,743	532,094	24,383
1960 ..	1,217	104,767	9,660,937	113,526	599,480	29,091
1961 ..	1,184	105,685	8,389,817	104,690	524,364	26,173

\* Apiarists with 20 hives and over numbered 814 in 1957, 779 in 1958, 771 in 1959, 818 in 1960, and 822 in 1961.

## Primary Industries Other than Farming

## Forestry

## Forest Estate

The extent of Victoria's forest estate is shown in the section "Alienation of Land" on page 488 of this volume and further information will be found on page 513 of the Victorian Year Book 1961.

## Forests Output

The following table summarizes the total output of all species for the years under review :—

VICTORIA—FORESTS OUTPUT  
(’000 Cubic Feet)

Year Ended 30th June—	Sawn Timber*	Fuel Timber†	Pulpwood†	Miscellaneous†
1957 .. .. .	23,905	15,223	7,024	4,823
1958 .. .. .	22,670	12,300	7,061	6,160
1959 .. .. .	23,843	10,790	7,410	4,430
1960 .. .. .	23,703	9,481	7,529	5,359
1961 .. .. .	22,274	10,942	8,398	4,806

\* These figures are estimates of sawn timber obtained from the recorded volumes of logs cut.

† Volumes estimated from recorded quantities in various units (e.g., tons, cunits, lineal feet, &c.).

The miscellaneous group in the preceding table includes such diverse items as telephone and electric supply poles, bridge piles and beams, fencing timbers, railway sleepers and mining timbers. So many factors, including temporary influences such as the recent introduction of full-length preservation of non-durable species of poles, fluctuations in market conditions for agricultural and pastoral produce, railway construction projects, &c., influence the demand for these items that output trends are obscured in the collective totals, but by and large, the demand for wood products is being well sustained.

Traditionally, Victoria is not, and does not appear likely to be, an exporting State as far as wood products are concerned. It is more likely that the problem in the future will be meeting the ever-increasing home demand for all types of wood products except wood fuel.

Although there has been a slight improvement in the output of firewood, it should not be interpreted as indicating any return to favour of this fuel. Having regard to the alternative sources of heating and power which are becoming available, decline in its use must be expected to continue.

Part of the low grade wood released by this decline will be available to meet the increasing demand from the cellulose and fibre industries. This has been emphasized by the opening, during the year, of a new hardboard factory at Bacchus Marsh.

*Softwood Plantations*

Experimental plantings of softwoods began in Victoria in 1880, and the first commercial plantations were established in 1910. In 1925, there were 4,555 acres of State plantations and the planting programme then began to accelerate rapidly until by 1935 the area had increased to 38,360 acres. The main areas were at Bright, Ovens and Stanley in the north-east, the Otways, and at Ballarat and Creswick. More recent extensions of State plantations have been in the south-west, and in the south Gippsland hills on abandoned settlement areas. The total area of State plantations at 30th June, 1961, was 50,724 acres.

*Pinus radiata* has proved itself adaptable to all sites available, makes rapid growth, is hardy and relatively immune from insect and fungous attack, and produces a good quality utility timber. The area planted to *Pinus radiata* comprises 35,900 acres. Many of the areas originally planted with other conifers are now being converted to this species.

Present stands are principally 17 to 29 years old. Relatively small areas have been clear felled and either replanted or naturally regenerated, the bulk of the timber utilized to date being from thinnings in the form of logs for peeling and sawing, and pulpwood for paper manufacture.

The output from State plantations is summarized below :—

**VICTORIA—OUTPUT OF SOFTWOOD LOGS AND  
PULPWOOD**  
(’000 Super. ft.)

Year Ended 30th June—	Saw Logs and Peeling Logs (H.L.V.).*	Pulpwood Equivalent (H.L.V.).*
1957 .. .. .	17,916	8,765
1958 .. .. .	17,736	6,627
1959 .. .. .	19,505	9,195
1960 .. .. .	22,319	10,763
1961 .. .. .	23,017	13,114

\* Hoppus Log Volume, which expresses the content of timber in a log. It is approximately 78·5 per cent. of true volume.

Privately owned softwood plantations were estimated to comprise 58,100 acres at 30th June, 1960, 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.

In the foreseeable future the requirements for softwood timber for the rapidly expanding economy of Victoria will greatly exceed the yield of existing plantations. There will be a strong demand for softwood for general utility purposes and for use as raw material for the large mills and factories of the wood-fibre industry. In particular the modern pulp and paper mills require large areas of well-managed plantations to ensure a steady supply of raw material.

In order to meet the rising demand for softwood, a long-term planting programme has been initiated which will greatly increase the extent of State plantations. An extensive examination of State forest has been made to locate and classify areas suitable for planting. Detailed soil and vegetation surveys are in progress on the more promising sites. There are many parts of the State where climate and soil are well adapted to the growth of timber, and areas suitable for large plantations have already been selected in the north-east and south-west regions of the State, and in South Gippsland. It is planned to establish a 40,000-acre plantation of *P. radiata* on the Koetong Plateau in the north-east, commencing with 1,000 acres to be planted in 1962.

In addition to the four main nurseries maintained by the Forests Commission for distributing trees to State Schools and farmers throughout the State, and a number of small nurseries attached to existing plantations, three new nurseries have been established for propagation of the large quantities of planting stock which will be required in the Lower Glenelg, Myrtleford, and Tallangatta districts.

### *Fire Protection*

Because of its climate, vegetation, and topography, Victoria is recognized as one of the most fire prone areas in the world. Many disastrous fires have occurred since the first were recorded in 1851; 71 lives were lost in fires in 1939 (see pages 494-495 of the Victorian Year Book 1938-39), and 51 in 1944.

The Forests Commission is responsible for the prevention and suppression of fires in all State Forests, National Parks, and all alienated lands within 1 mile of the boundaries of State Forests and National Parks (except in the Mallee, lands under control of the Melbourne and Metropolitan Board of Works, and some urban fire districts). This sphere of responsibility is designated the Fire Protected Area.

The territorial units for fire protection are the 55 forest districts in the State. During the summer, fires are detected by an interlocking system of fire towers and lookouts augmented by aerial patrols. Communication is by radio and telephone. Each forest district holds a supply of fire equipment and reserves are held in Melbourne and selected country centres. In the event of major fires, men and equipment are transferred between districts as required.

The Commission maintains communications and fire research sections, and operates a radio laboratory and an equipment workshop for the development of maintenance and repair of radios and fire equipment.

The main features of forest fire legislation are the prohibition of the lighting of fires in State Forests and National Parks except with the permission of the Authorities or in accordance with strict rules ; power for the Minister of Forests to prohibit the use of fire or to suspend forest operations in areas threatened with acute fire danger ; and provision for the construction of dugouts, shelters and safety zones for the protection of human life within the fire protected area.

### Telecommunications

The radio system consists of 34 fixed stations situated in major forest centres, 302 mobile and portable equipments in field use and a central station at Melbourne. Four automatic repeating stations and a mobile emergency station are provided to strengthen fire protection links during summer.

### Forest Fires

The causes of fires attended by Forests Commission personnel in the period 1957-58 to 1960-61 were as follows :—

#### VICTORIA—CAUSES OF FOREST FIRES

Cause	Number of Fires—			
	1957-58	1958-59	1959-60	1960-61
Grazing Interests .. ..	15	6	8	2
Landowners, Householders, &c. ..	139	103	141	101
Deliberate Lighting .. ..	76	62	91	44
Sportsmen, Campers, Tourists ..	76	33	58	59
Licensees and Forests Workers ..	25	18	19	18
Smokers .. .. .	53	43	65	59
Lightning .. .. .	29	59	100	187
Tractors, Cars, Trucks, Locomotives, Stationary Engines .. ..	42	39	33	47
Children .. .. .	26	19	27	30
Sawmills .. .. .	12	13	20	10
Miscellaneous Known Causes ..	80	39	107	80
Unknown Origin .. .. .	54	31	59	25
Total .. .. .	627	465	728	662

The areas of State forest burnt in the years 1957-58 to 1960-61 were—

1957-58	..	..	218,072*	acres
1958-59	..	..	250,515*	„
1959-60	..	..	1,201,433*	„
1960-61	..	..	144,939*	„

\* 1957-58 includes 156,644 acres of non-commercial forest area ; 1958-59 includes 106,624 acres of non-commercial forest area ; 1959-60 includes 1,065,850 acres of non-commercial forest area ; 27,850 acres of National Parks were burnt in 1960 ; 1961 includes 118,996 acres of non-commercial forest area.

### Laboratory Research

Studies involving the number of viable seeds per capsule and per unit weight of seed and chaff of Victorian eucalypts have been continued. Further progress has been made in longevity studies of stored Victorian eucalypt seeds, and similar work has been started with seeds of *Pinus radiata*. Research has been carried out to determine the influence of temperature and seed moisture content on germination of dodder laurel (*Cassytha melantha*). Other trials have been initiated to determine the longevity of dodder seeds when stored under and on the surface of the field seed-bed.

### Field Research

Studies of flowering habits and of seed and litter which fall under stands of red ironbark (*Eucalyptus sideroxylon*) have been continued. A comprehensive study of flowering, natural seedfall, germination, and establishment of seedlings has been commenced in riverain forests of river redgum (*E. camaldulensis*). This programme also includes investigation of the effects of inundation and of grazing by animals on establishment and form of seedlings.

Further trial plantings and natural regeneration experiments have been carried out with various eucalypt species and hybrids. Measurements and other relevant data from experimental plots throughout the State have been recorded regularly.

Intensive research is in progress to determine the optimal rates of thinning for re-growth stands of mountain ash (*Eucalyptus regnans*) and alpine ash (*E. delegatensis*) of various ages, site qualities and stand densities.

Certain fungicides and insecticides have been used in trials to isolate an effective animal repellent for application to seedlings to reduce losses to vermin in the first year after planting out.

Tree breeding work with the plantation species *Pinus radiata* has been commenced in recent years. Improvement of the type of tree to be grown in the future is sought in all the aspects which influence the

yield and quality of the final product, i.e., vigour, trunk straightness, branch development, presence or absence of cone holes, wood quality, and freedom from disease.

A survey of Victorian plantations has been undertaken following which the most outstanding trees have been vegetatively propagated in large numbers by grafting. Progeny and clonal trials designed to assess the quality of these selected trees have been commenced. Controlled cross pollination will be undertaken between selected trees with a view to combining particular tree characters in "pedigreed" progeny.

Large scale production of seed from selected parent trees will be achieved in a "seed orchard"—an area isolated from the pollen of other specimens of the pine, in which many grafted plants of the superior trees have been established. Each grafted plant is genetically identical to the original tree from which the scion was collected. Cross pollination between the superior parent trees in the seed orchard gives rise to seed which should be genetically superior to seed obtained by normal collection methods.

Grafting of the required number of plants from the sixteen best Victorian trees has been undertaken for use as parental stock in the seed orchard. Planting of the first 15 acres will be completed in 1962. The first yield of seed for plantation use may be expected by 1965-66.

Various pathological and entomological investigations have also been carried out.

### **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 is located at Snobs Creek, near Eildon. A wildlife research centre is in the process of being established 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.

#### *Introduced Fish in Victorian Waters*

Long before the Government played an active part in the control and development of Victorian freshwater fisheries, at least ten exotic species of fish had been introduced into various waters of the State by private fish enthusiasts.

Today, game fishermen of Victoria would undoubtedly claim unqualified success for two of these introductions: the European Brown Trout, which was first released in 1866, and the Californian Rainbow Trout which followed some 30 years later.

Two other salmonoid introductions, the Atlantic Salmon in 1865, and the Quinnat Salmon in 1877, failed to adapt to local conditions although the Quinnat Salmon does very well in one lake where a fishery is maintained by stocking. All other introduced species (English Perch, Tench, Roach, Mosquito Fish and two species of Carp) have thrived, and one or more are now represented in almost every fresh water of the State. With the exception of English Perch, which meets a very real need in a number of areas, none of these exotics is popular with the average angler. All successfully introduced species have made some impact on the native fisheries but this has been more marked in those waters in which the environment has been altered by water conservation, flood control and other activities.

Apart from legislation in 1879 proclaiming a close season for trout fishing, Government interest and participation in trout acclimatization dates from about 1906. In that year, trout were hatched by departmental officers at the Zoological Gardens, and in subsequent years, at a number of small country hatcheries, usually with the cooperation of local angling interests. The largest hatchery of that era was constructed by the Department at Studley Park in Melbourne, and the annual output from this establishment, and from the small country hatcheries, together with trout purchased from the Ballarat and Geelong Societies, rapidly accelerated the spread of trout to suitable waters in Victoria.

By 1940, the Department was issuing more than 10,000 trout angling licences annually to fishermen who claimed, with some justification, that Victorian trout fishing was equal to and, in some localities, better than any in the world. There was considerable pressure for greatly increased trout stocking which could not be met from existing hatcheries, and plans were soon laid for a very large hatchery and research station at Snobs Creek near Eildon Reservoir. Native fish as well as trout were to receive attention at this station which was to augment and ultimately replace the Studley Park establishment.

The Snobs Creek Freshwater Fisheries Research Station and Hatchery was officially opened in 1960, and with trout production from this establishment now at a level of 2 mill. yearling fish annually, research staff are carrying out a careful appraisal of existing and potential trout fisheries to determine which waters must be stocked to maintain good fishing. Approximately 200 streams and lakes in the State are now stocked with trout and 97,000 inland angling licences were sold during the 1961-62 fishing season to fishermen, the majority of whom went after the wily trout.

*Marine Fisheries*

One role of the Department is the management of the marine fisheries and research into the biology and ecology of important species of marine fish. Fisheries and Wildlife Officers are stationed permanently at key points along the coast and patrol vessels are maintained at a number of centres.

Fish production in Victoria is low compared with world production, but management and the development of new methods are directed to raising the catch. Specialized techniques, including the use of aerial spotting, echo sounders and radar for locating fish, and two-way radio have been introduced by the industry. A cannery has been established to utilize certain fish species for which the fresh fish market demand is limited.

The Department provides scientific advice on fisheries management, and technological information on the development of new gear and fishing methods.

The Commonwealth Fisheries Office in the Department of Primary Industry is associated with the Department in the management of the commercial fisheries through complementary legislation. The Commonwealth controls fishing in the extra-territorial waters, and certain State officers are empowered to police the Federal Act. There is close co-operation with the C.S.I.R.O. Division of Fisheries and Oceanography and there is an annual Interstate Federal Fisheries Conference.

*Fisheries Statistics*

The statistics of production shown below are in terms of recorded weight. 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 certain particulars about the fishing industry in Victoria for the years 1956-57 to 1960-61 :—

**VICTORIA—FISHERIES : MEN AND BOATS EMPLOYED :  
QUANTITY AND GROSS VALUE OF TAKE**

Year Ended 30th June—	Number of Men	Boats Employed		Value of Nets and Other Plant	Recorded Production*			
		Number	Value		Fish		Crayfish	
					Quantity	Value	Quantity	Value
			£'000		£'000	'000 lb.	£'000	'000 doz.
1957.. ..	930	703	685	166	12,244	1,203	1,164	176
1958.. ..	937	699	732	171	11,233	1,099	1,230	186
1959.. ..	929	690	1,002	215	9,864	1,185	1,294	231
1960.. ..	897	657	1,165	198	12,748	1,726	1,500	300
1961.. ..	1,002	714	1,207	220	12,140	1,559	2,069	483

\* Includes catch by Victorian fishermen in Tasmanian waters.

**Further References**

An article describing wildlife in relation to other natural resources will be found on pages 544 to 546 of the Victorian Year Book 1962.

Department of Fisheries and Wildlife—*Fisheries Contribution*; *Fisheries Circular*; *Fauna Contribution*; *Wildlife Circular*; *Miscellaneous Paper*; *General Circular*; and *Newsletter (Monthly)*.

**Mining***Mining Development in Victoria*

Mining has played a most important role in the history and development of Victoria. The discovery of gold in payable quantities was the event which had the greatest effect upon the history of the State. The search for gold first attracted migrants in large numbers and led to their permanent settlement. In September, 1851, a great alluvial goldfield was found at Ballarat and this discovery was followed by very rich gold strikes at Bendigo, Castlemaine, Stawell, Maryborough and other places. The revolutionary effect of this first gold rush was such that, from the start of the rush until 1858, the population rose from 70,000 to nearly 500,000. In the peak year of 1856, Victoria produced 3 mill. ounces and in the first gold decade it exported over 23 mill. ounces.

The gold mining industry was in large measure responsible for determining the pattern of the inland cities, towns, and roads.

The emphasis today is, however, not on gold but on the fuel mineral—brown coal—from which is derived most of the energy indispensable to industrial expansion.

*Coal*

The most important mining events in the past few years have been the increase in the brown coal production to 16,279,168 tons in 1961, and the proposal of the State Electricity Commission to extend its already huge developments. Yallourn and Morwell are now among the world's major coal developments for electricity generation and the manufacture of briquette fuel. The area deposits are undoubtedly amongst the largest in the world.

The most extensive of Victoria's deposits of tertiary brown coal exist in the Latrobe Valley, 90 miles east of Melbourne. Tests have proved that here exist reserves of over 17,000 mill. tons of brown coal suitable for open-cut exploitation. The deposits have shaped the destiny of the Victorian economy since the end of the First World War.

Private producers are making some contribution to the amount of coal won. Roughly, this production was 2 per cent. of the total produced (371,928 tons in 1961), but the proportion is likely to increase through the development of newly discovered brown coal fields on the western side of Port Phillip Bay. These deposits will complement the eastern side deposits and are of comparatively easy access to the main points of consumption. They will particularly benefit the fast growing city of Geelong and will supply power for the aluminium refining plant to be erected there.

Bituminous coal was mined during 1961 at Jumbunna, Kilcunda, Korumburra, Mirboo North, and Wonthaggi, and brown coal at Bacchus Marsh, Morwell, Thorpdale, Yan Yan Gurt (near Winchelsea), Yallourn, and Yallourn North.

### Mineral Production

The mineral production of the State, as recorded by the Mines Department, from lands occupied under the Mines Act (excluding stone raised in quarries, and salt) for the year 1961, and the aggregate mineral production up to 31st December, 1961, are shown in the following table :—

### VICTORIA—MINERAL PRODUCTION

Minerals	During 1961		Total to 31st December, 1961	
	Quantity	Value	Quantity	Value
Precious Metals—	fine oz.	£	fine oz.	£
Gold .. .. .	26,229	469,450(†)	73,704,196	337,078,452
Silver .. .. .	573	226	1,719,207	272,587
Other Minerals—	ton	£	ton	£
Antimony Ore .. .. .	2	400	36	5,440
Bauxite .. .. .	3,539	14,008	73,843	171,349
Coal, Black .. .. .	66,363	359,457	22,088,913	25,088,162
Coal, Brown .. .. .	16,279,168	7,721,671	218,779,249	57,688,121
Copper Concentrate .. .. .	2	66	*	*
Copper Ore .. .. .	50	1,650	*	*
Diatomaceous Earth .. .. .	507	6,367	15,889	172,835
Fire Clay .. .. .	25,584	23,432	*	*
Fluorspar .. .. .	$\frac{1}{2}$	7	4,155 $\frac{1}{2}$	18,248
Gypsum .. .. .	80,223	79,655	1,199,262	959,703
Kaolin and Other White Clays	516,454	515,164	*	*
Limestone .. .. .	1,243,154	594,614	16,138,944	*
Limonite .. .. .	690	4,449	*	*
Tin Concentrates .. .. .	..	..	18,915	1,468,089

† Includes gold subsidy (£63,036) paid during 1961.

\* Not available.

The following table shows the average annual production and value of black and brown coal for each of the five year periods from 1921 to 1955 and the production and value for each of the years 1956 to 1961 :—

## VICTORIA—COAL PRODUCTION AND VALUE\*

Period	Black Coal		Brown Coal	
	Production	Value	Production	Value
	tons	£'000	tons	£'000
1921-1925 .. .. .	520,705	592	258,094	62
1926-1930 .. .. .	668,177	893	1,515,592	193
1931-1935 .. .. .	472,030	444	2,445,215	256
1936-1940 .. .. .	324,903	284	3,608,751	356
1941-1945 .. .. .	286,277	409	5,010,555	526
1946-1950 .. .. .	156,290	361	6,648,430	1,202
1951-1955 .. .. .	143,535	795	8,728,116	3,593
1956 .. .. .	118,827	668	10,559,801	4,644
1957 .. .. .	111,569	556	10,740,989	5,227
1958 .. .. .	108,359	528	11,643,629	5,418
1959 .. .. .	87,715	455	13,040,717	6,123
1960 .. .. .	77,995	418	14,982,990	6,845
1961 .. .. .	66,363	359	16,279,168	7,722

\* Value of output at the mine.

## 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. The value of quarry products may vary from that shown on page 577 which is on an industry basis. It is realized that there is considerable quarry production unrecorded due mainly to contractors who, requiring material from a source adjacent to the work for which they are suppliers, open up quarries for that purpose or exploit stone outcrops, mine tailings, &c. This work is usually only of a temporary nature.

## VICTORIA—CONSTRUCTION MATERIALS\*

Year Ended 31st December—	Number of Returns	Main Kinds of Stone Extracted—				Approximate Value of All Quarry Products†
		Bluestone	Sandstone	Granite	Limestone	
		cub. yds	cub. yds.	tons	tons	£
1955 ..	141	2,644,392	117,082	179,964	27,464	3,931,657
1956 ..	142	3,240,699	113,241	215,609	39,826	4,738,013
1957 ..	133	3,416,132	191,232	204,590	61,495	4,952,773
1958 ..	132	3,852,012	146,016	173,096	63,230	5,202,993
1959 ..	121	4,556,604	162,091	215,227	35,129	5,841,988
1960 ..	126	5,423,000	175,287	266,181	69,060	6,581,290

\* Since 1952-53, limestone quarried for the manufacture of cement, lime, &c., has not been included in this table. It will be found in "Mineral Production" on page 573.

† Wholesale selling value of all quarry products (including sand and river gravel), exclusive of delivery charges.

## Value of Production

## General

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 1 acre.

A detailed account of the period covered for individual rural industries is given on page 507. Except in the case of mining and quarrying, statistics for the non-rural industries refer to the year ended 30th June. Statistics for mining and quarrying relate to the year ended 31st December of the first year shown.

## Gross Value

Gross value is defined as the value placed on recorded production at the wholesale price realized 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, &c., is included in manufacturing production.

VICTORIA—GROSS VALUE OF PRIMARY PRODUCTION  
(£'000)

Industry	1956-57	1957-58	1958-59	1959-60	1960-61
Agriculture .. ..	86,141	88,198	101,058	92,411	132,918
Pastoral .. ..	149,880	137,854	134,015	160,138	139,414
Dairying* .. ..	66,330	65,431	65,264	70,471	72,004
Poultry and Bees ..	21,464	23,266	22,263	24,691	27,290
Trapping .. ..	3,588	3,621	3,862	3,749	3,156
Forestry .. ..	13,134	14,109	15,441	16,969	16,314
Fisheries .. ..	1,381	1,294	1,433	2,045	2,064
Mining .. ..	11,891	12,728	13,694	14,935	16,267
Total Primary Industries	353,809	346,501	357,030	385,409	409,427

\* Includes Subsidy—1956-57, £6,286,000; 1957-58, £6,696,000; 1958-59 £6,223,000; 1959-60, £6,204,000; 1960-61, £6,710,000.

*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	1956-57	1957-58	1958-59	1959-60	1960-61
<b>Agriculture—</b>					
Barley .. ..	2,829	2,710	3,375	2,042	2,364
Maize .. ..	60	130	114	113	106
Oats .. ..	2,307	4,072	4,716	3,573	4,910
Wheat .. ..	19,778	18,460	23,567	22,421	40,721
Onions .. ..	685	425	894	842	628
Potatoes .. ..	4,797	2,222	3,874	4,966	8,313
Other Vegetables ..	9,954	9,219	8,217	8,703	9,410
Hay and Straw ..	14,358	16,331	17,789	13,836	20,854
<b>Fruit—</b>					
Orchards .. ..	8,364	9,422	7,884	7,914	10,084
Vineyards .. ..	6,498	8,106	8,342	6,188	7,236
Other Crops .. ..	3,317	3,836	6,679	8,532	9,850
<b>Total ..</b>	<b>72,947</b>	<b>74,933</b>	<b>85,451</b>	<b>79,130</b>	<b>114,476</b>
<b>Pastoral—</b>					
Wool .. ..	89,652	68,520	51,786	67,758	61,095
Sheep, Slaughtered ..	17,341	20,865	22,375	27,766	23,655
Cattle, Slaughtered ..	30,969	36,004	45,623	49,891	40,963
<b>Total ..</b>	<b>137,962</b>	<b>125,389</b>	<b>119,784</b>	<b>145,415</b>	<b>125,713</b>
<b>Dairying—</b>					
<b>Whole Milk Used for—</b>					
Butter .. ..	29,481	29,027	28,522	30,829	30,796
Cheese .. ..	3,921	2,973	3,650	4,329	4,742
Condensing, Con- centrating, &c. ..	6,085	6,520	5,979	6,667	6,070
Human Consump- tion and Other Purposes .. ..	12,050	12,243	12,744	13,122	13,552
Subsidy Paid on Whole Milk for Butter and Cheese .. ..	6,286	6,696	6,223	6,204	6,710
Pigs, Slaughtered ..	5,936	5,459	5,540	6,460	7,177
<b>Total ..</b>	<b>63,759</b>	<b>62,918</b>	<b>62,658</b>	<b>67,611</b>	<b>69,047</b>
<b>Poultry and Bees—</b>					
Eggs .. ..	14,349	15,516	13,545	15,493	17,839
Poultry .. ..	4,932	5,589	6,533	6,765	6,895
Honey and Beeswax ..	506	268	408	428	319
<b>Total ..</b>	<b>19,787</b>	<b>21,373</b>	<b>20,486</b>	<b>22,686</b>	<b>25,053</b>

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

Produce	1956-57	1957-58	1958-59	1959-60	1960-61
Trapping, &c.					
Rabbits and Hares ..	2,387	2,501	2,717	2,560	2,310
Rabbit and Hare Skins, &c. ..	946	786	845	932	635
Total ..	3,333	3,287	3,562	3,492	2,945
Forestry—					
Sawmills .. ..	7,828	7,617	7,468	8,015	7,307
Hewn Timber .. ..	1,007	1,300	998	1,426	1,358
Firewood .. ..	3,280	4,030	5,454	5,913	6,036
Bark for Tanning ..	163	120	128	86	58
Other .. ..	19	21	15	36	36
Total ..	12,297	13,088	14,063	15,476	14,795
Fisheries—					
Fish .. ..	1,026	937	1,062	1,495	1,347
Crayfish .. ..	150	158	199	260	420
Oysters .. ..	2	6	1	1	2
Other .. ..	..	3	3	15	18
Total ..	1,178	1,104	1,265	1,771	1,787
Mining—					
Gold .. ..	653	736	694	585	471
Coal—					
Black .. ..	668	556	528	455	418
Brown .. ..	4,644	5,227	5,418	6,123	6,845
Other Metals and Minerals .. ..	1,188	1,256	1,851	1,930	2,007
Quarrying .. ..	4,738	4,953	5,203	5,842	6,526
Total ..	11,891	12,728	13,694	14,935	16,267
Total Primary Industries	323,154	314,820	320,963	350,516	370,083

*Net Value of Production*

The ultimate aim of the valuation of production is to arrive at the sum available for distribution among those concerned in each class of industry. These include :—

- (1) Workers in all grades of industry ;
- (2) proprietors (including landlords) of any of the instruments of production concerned ; and
- (3) providers of capital including debenture holders and mortgagees.

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, kerosine, other oils, dips, sprays, and other costs. Details for primary industries and manufacturing are shown in the table below :—

VICTORIA—NET VALUE OF PRODUCTION  
(£'000)

Division of Industry	1956-57	1957-58	1958-59	1959-60	1960-61
<b>Rural—</b>					
Agriculture .. .. .	63,802	64,971	73,661	68,912	104,031
Pastoral .. .. .	129,883	115,970	110,392	135,630	116,181
Dairying .. .. .	47,933	46,153	44,382	47,469	50,947
Poultry .. .. .	12,506	14,042	12,572	14,636	17,011
Bee-farming .. .. .	506	268	408	428	319
<b>Total Rural .. .. .</b>	<b>254,630</b>	<b>241,404</b>	<b>241,415</b>	<b>267,075</b>	<b>288,489</b>
<b>Non-rural .. .. .</b>	<b>26,265</b>	<b>27,423</b>	<b>29,877</b>	<b>32,840</b>	<b>32,685</b>
<b>Total Primary .. .. .</b>	<b>280,895</b>	<b>268,827</b>	<b>271,292</b>	<b>299,915</b>	<b>321,174</b>
<b>Manufacturing .. .. .</b>	<b>528,031</b>	<b>566,476</b>	<b>608,947</b>	<b>686,501</b>	<b>700,511</b>
<b>Total All Industries .. .. .</b>	<b>808,926</b>	<b>835,303</b>	<b>880,239</b>	<b>986,416</b>	<b>1,021,685</b>