QUEENSLAND

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE AND STOCK

FOR

THE YEAR 1949 - 50

1950.

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PRESENTED TO PARLIAMENT BY COMMAND.

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ORGANISATION OF THE DEPARTMENT AS AT 30TH JUNE, 1950.

SECRETARY FOR AGRICULTURE AND STOCK .. .. Hon. H. H. Collins, M.L.A.

CENTRAL ADMINISTRATION—

Under Secretary	A. F. Bell, M.Sc., D.I.C., A.R.A.C.I.
Assistant Under Secretary (Technical)	R. Veitch, B.Sc.Agr., B.Sc.For.
Assistant Under Secretary (Administrative)	W. T. Gettons, A.I.C.A.
Special Administration Officer	H. Barnes.
Officer in Charge, Information Services	C. W. Winders, B.Sc.Agr., A.C.I.S.
Accountant	E. C. Sadler, A.A.U.Q.

DIVISION OF PLANT INDUSTRY—

Director of the Division	W. A. T. Summerville, D.Sc.
Senior Soil Conservationist	J. E. Ladewig, Q.D.A., B.Sc.Agr.

Agriculture Branch—

Director of Agriculture	C. J. McKeon, Q.D.A. (seconded to The Queensland-British Food Corporation).
Acting Director of Agriculture	D. O. Atherton, Q.D.A., M.Sc.Agr.

Regional Experiment Stations—

Director of Regional Experiment Stations	W. G. Wells.

Horticulture Branch—

Director of Horticulture	S. A. Trout, M.Sc., Ph.D.

Bureau of Sugar Experiment Stations—

Director of Sugar Experiment Stations	N. J. King, Dip.Ind.Chem.

Science Branch—

Officer in Charge	J. H. Simmonds, M.B.E., M.Sc.

Chemical Laboratory—

Agricultural Chemist and Biochemist	M. White, M.Sc., Ph.D., A.R.A.C.I.

DIVISION OF ANIMAL INDUSTRY—

Director of the Division	W. Webster, B.V.Sc.
Assistant Director	A. L. Clay, B.V.Sc.

Veterinary Services Branch—

Director of Veterinary Services	J. C. I. Maunder, B.V.Sc.

Animal Health Stations—

Director of Research	J. Legg, B.Sc., D.V.Sc., M.R.C.V.S.

Sheep and Wool Branch—

Director of Sheep Husbandry	G. R. Moule, B.V.Sc.

Pig Branch—

Officer in Charge	F. Bostock.

Poultry Branch—

Officer in Charge	P. Rumball, R.D.A.

Cattle Husbandry Branch—

Officer in Charge	R. D. Chester, B.V.Sc.

DIVISION OF DAIRYING—

Director of Dairying	E. B. Rice, Dip.Ind.Chem.
Assistant Director of Dairying and Senior Dairy Technologist	L. E. Nichols, B.Sc.Agr., A.R.A.C.I.

DIVISION OF MARKETING—

Director of Marketing	H. S. Hunter.
Assistant Director of Marketing	C. H. P. Defries, H.D.A., B.Com., A.F.I.A.

Standards Branch—

Standards Officer	F. B. Coleman.

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REPORT OF THE DEPARTMENT OF AGRICULTURE AND STOCK FOR THE YEAR 1949-50.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

DEAR SIR,—I have the honour to submit a report on the main activities of the Department during the past year, together with more detailed reports prepared by Divisional and Branch heads.

The value of agricultural and pastoral production in Queensland has continued to increase. Including dairy and sugar processing, the value of this production for the year 1949-50 is estimated to be over £120,000,000. The several industries responsible for this great earning capacity are dependent upon the Department of Agriculture and Stock for almost the whole of their scientific advisory services. Concurrently the work of the Department has continued to expand, with particular emphasis on the provision of field services. The policy of granting scholarships and cadetships to selected students is now providing an increased flow of trained officers. The position in respect of professional staff is developing reasonably satisfactorily, but, unfortunately, the reverse is true of the clerical-administrative staff for which an adequate flow of recruits is now a serious and urgent need.

Two changes in organisation were effected during the year: A special pineapple section was created within the Horticulture Branch, to deal with the needs of this increasingly important crop and to ensure closer liaison with pineapple producers. The Division of Dairying, which has greatly expanded over the past three years, has been divided into two component branches covering research and field services; the positions of Directors of these two new branches have been advertised.

Representations of the wheat growing, flour milling, and baking industries have initiated discussions with a view to exploring ways and means for the establishment of a special wheat research section. During the past five years wheat has advanced from the status of a relatively minor to that of a major crop, while the continued practice of monoculture is introducing special problems.

It is also becoming evident that consideration will soon have to be given to the establishment of a food storage, preservation, and transport branch within the Department. The loss of quality and quantity of foodstuffs through spoilage is high in the Queensland climate and represents a serious economic drain; the development of more effective storage methods could eliminate a great deal of this loss. The problem of potato supplies might be cited as an example: Each year that portion of the spring potato crop surplus to immediate needs is exported to the South because of high loss in storage. By the middle of January Queensland is dependent upon supplies from the South and remains so until the lifting of the autumn crop in June. If suitable methods of storage and preservation could be evolved then it would pave the way for Queensland to become continuously self-sufficient as to potato supplies, thus saving transport and eliminating the periodic shortages.

The great size of Queensland, the relative importance of primary production in the State, and the diversity of that production, all combine to increase the demands made upon the Department of Agriculture and Stock for service and guidance. The gradual tendency of the primary industries to enter the field of processing serves but to add to these demands. Permanent officers of the Department are now stationed in 97 centres in 90 towns beyond the metropolitan area, while 55 temporary officers are engaged in herd recording and dairy farm demonstration in various parts of the State, and over 100 in cane testing duties at the 32 sugar mills. During the year motor cars used in the Departmental investigation and extension services were driven an aggregate of more than 1,500,000 miles.

The building up of the animal industry services is proceeding satisfactorily and it can be said with confidence that these now compare favourably with those of any other State in the Commonwealth. During the year the Director of Animal Industry, Mr. W. Webster, visited New Zealand to study methods of animal production in that Dominion, and he later represented the Commonwealth at a world conference on livestock breeding in the tropics and sub-tropics, convened by the Food and Agriculture Organisation of the United Nations, and held at Lucknow, India.

The complexity of the work of the Department may be gauged from the fact that more than twenty professions are represented on the staff, which includes 128 University graduates. Twenty-nine Departmental scholarship holders are in full-time attendance at Universities while a further 24 officers are proceeding to degrees through the medium of part-time courses.

The Wool Industry.

Wool has now far outdistanced all other Queensland primary products in monetary yield, £45 million being secured during the 1949-50 selling season. The high prices being obtained for wool have been accompanied by a decline in the number of sheep slaughtered for mutton and in the area devoted to fat lamb production.

The whole of the sheep country received thorough soakings during the year, the beneficial effect of which will be felt for a long time; the body of grass is perhaps the greatest in memory. Some of the value of the rains has been offset by losses due to floods, inability to move, shear, and handle sheep, and increased worm and blowfly troubles. Losses of ewes and lambs were heavy in some areas and this will retard the building up of flocks which were depleted by drought conditions in recent years.

The increased activity of blowflies found many graziers unprepared. The utility of the Mules operation as a protection against breech strike has been amply demonstrated, and Departmental officers have been advocating and assisting its adoption for some years. Nevertheless, a large proportion of flocks remains untreated, and breech strike in flocks not "mulesed" was very damaging in recent months. Body strike has been a real problem during the year; but medicaments were used with considerable success in some instances.

Worm infestations were responsible for heavy losses of sheep and many low wool cuts, and heavy demands from several States for worm drenches could only be partly met by manufacturers, which meant that even among sheep which could be mustered there were many not treated. It is not yet fully realised that to keep the worm burden light it is necessary to drench according to a programme which takes into account the seasonal occurrence of the more important worm species, and to employ appropriate grazing practices.

Infertility in sheep, and high rates of mortality among young lambs, are factors seriously impeding the building up of flocks and increasing production. Further field and laboratory observations were made on factors considered to have some relation to these problems in central-western and north-western areas. The Director of Sheep Husbandry, Mr. G. R. Moule, visited New Zealand early in the year in order to study the methods in use in that country to combat similar problems.

Equipment for the Wool Biology Laboratory to be conducted by the Department was assembled during the year, and the laboratory will shortly be operating a service designed to assist studmasters in breeding improved stock.

Beef Production.

Good pastures and ample surface water were available during most of the year and cattle were generally in excellent condition following the best rains experienced for many years in the western parts of the State. Such seasonal conditions naturally increased the incidence of pests and diseases but both tick and buffalo fly were held in check on the borders of clean country by the efficiency of DDT dips and sprays. Pleuro-pneumonia outbreaks have been much more common than usual and additional inspectors have been stationed at strategic points to enable more effective control of infected herds and travelling mobs. The significance of this disease has been increased by the stricter application of quarantine measures against infected stock by the southern States.

Queensland depastures more than half the beef cattle of the Commonwealth and the potential for increased beef production lies mainly in this State. The 8,000,000 people of the Commonwealth already consume more than four-fifths of the total beef production and, since the population is expected to be more than 10,000,000 by 1960, it is obvious that beef production must be quickly and greatly increased if Australia is to continue as an exporting country. Against this is the fact that mean beef cattle and sheep numbers have remained virtually static over the past half century although, in the interim, there has been a great deal of improvement of properties and development of transport systems.

It would appear that the general structure of the beef cattle industry requires a good deal of modification if a permanent increase in cattle numbers is to be effected. The problem is undoubtedly complex and its solution will demand enthusiasm, faith, and energy on the part of all concerned. At the same time the dairying industry could make a substantial contribution to beef production by the raising of a few calves on each farm.

By the liberal granting of scholarships in Veterinary Science, improved training of Stock Inspectors, and the establishment of a Cattle Husbandry Branch within the Division of Animal Industry, this Department has taken important steps towards the provision of adequate technical services.

At the same time, attention is being given to nutritional problems. The cattle industry is dependent upon natural pastures which, due to the unfavourable distribution of rainfall, have a period of lush summer growth followed by a very dry winter and spring during which growth is at a standstill and palatability and nutritive values fall rapidly. In consequence many hundreds of thousands of cattle lose condition seriously during the normal dry season and, in time of drought, many of them die. The basic problem of the cattle industry is, therefore, the lifting of the nutritional plane so as to minimise these losses. There are, of course, many other associated problems but that of nutrition is basic.

Since the cattle industry is, for the most part, carried on in the better than 20-inch rainfall zone it is possible to cultivate summer crops on suitable soils. By arrangement with a number of land owners experiments on summer crop production have been initiated on properties in the predominantly summer rainfall zone. The next step in the investigation will be the method of utilisation of such crops. In general it can be said that there is an increasing interest in the possibilities of crop fattening and maintenance of cattle.

An officer has been stationed at Cullin-la-Ringo, a Queensland-British Food Corporation property, to study the use of sorghum stubble as a cattle food. At the newly-established exploratory farm at the base of Cape York Peninsula the growth of summer crops and the regeneration of Flinders grass are being studied.

The decision of the Commonwealth and State Governments to build roads from railheads to the south-west channel country has stimulated

interest in the operation of road trains. Several such trains operated during the year and one property marketed large numbers of fat cows which could not have been walked to the railhead.

Dairying.

The dairying industry benefitted considerably from the rains experienced during the year, and butter production was the highest since 1942-43, though cheese production was slightly lower than in 1948-49. Butter was valued at over £14 million, cheese at £1½ million, and whole milk at £3½ million.

The Department's main activities in connection with the Commonwealth-sponsored dairy efficiency drive were the supervision of 54 demonstration farms and the production recording of grade herds. Approximately 40,000 cows are included in the herds contained in groups now operating.

The elimination of bovine tuberculosis from dairy herds is proceeding along two lines. The testing of milk-producing herds and the destruction of reactors has been continued in the prescribed areas, and within herds which have had re-tests the position is very satisfactory. The Department is also operating a scheme whereby stud herds are given a certificate of freedom from tuberculosis following testing and elimination of reactors.

Increasing numbers of veterinarians have assisted in improving the health of dairy herds generally. Marked improvement in the control of mastitis and brucellosis has followed the extended use of penicillin and "Strain 19" vaccine respectively.

Many pasture trials are being conducted in the main dairying districts, and means of renovating run-down pastures are becoming clearer as information is accumulated. This work is regarded as basic to the stability of dairying in many districts, and additional officers were allocated to pasture investigations during the year.

The tremendous volume of milk produced in Queensland represents extremely large amounts of nutrients of various kinds and in the aggregate a considerable proportion of these nutrients is wasted because the milk is not always efficiently utilised. Whole milk, as such, is worth 2s. 1d. per gallon but if butterfat worth 1s. 2d. is separated from it the residue of skim milk has a market value far below 11d. This is one of the great weaknesses in the economic structure of the dairying industry in Queensland.

A committee representative of various interests was set up during the year to examine and report on the uses to which milk is being put and means by which the greatest possible percentage of nutrients may be recovered in milk products and by-products.

Sugar.

The year 1950 is significant in the annals of the Queensland sugar industry in that it is the golden jubilee of the enactment of *The Sugar Experiment Stations Act of* 1900 and the establishment of the Bureau of Sugar Stations. The excellent record of the Bureau is outlined in a special Jubilee publication "50 Years of Scientific Progress." Appropriately, Queensland has been chosen as the venue of the Seventh Congress of the International Society of Sugar Cane Technologists, commencing on 11th September.

Approximately 6½ million tons of cane were crushed in the 1949 season to yield 897,267 tons of 94 n.t. sugar. The value of the output was approximately £24 million, the overall price of £26 14s. 10d. per ton being the highest since 1923. The Australian market absorbed 57·4 per cent. of the raw sugar at £24 6s. per ton, and the overseas market took the remainder at £29 7s. 6d. per ton.

An arrangement of very considerable importance to the sugar industry was made between the British and Australian Governments during the year. Led by the Premier of Queensland (Hon. E. M. Hanlon), an Australian delegation received an assurance of an export quota, from 1953 to 1957, of 600,000 tons of sugar. Coupled with an anticipated local demand for at least 500,000 tons annually during that period, the export quota enables the Australian sugar industry to plan for an annual production of more than 1,100,000 tons.

The increased quota of the United Kingdom market, together with rising home consumption following the anticipated accelerated increase in Australia's population, make forward planning necessary. The Queensland Government accordingly appointed a Royal Commission to enquire into and report upon the measures necessary to develop sugar production over the next quarter of a century; the Commission is now sitting.

The amount of cane required to produce one ton of sugar in 1949 was 7·26 tons, which was somewhat higher than in the previous year. The yield of sugar per acre was one-quarter of a ton lower at 3·26 tons, though greater than in any other year since 1939.

Queensland varieties constituted 59·2 per cent. of the 1949 crop, as compared with 53·5 per cent. in the previous year. This change reflects the growing popularity of canes bred by the Bureau of Sugar Experiment Stations, such as Q.50 and Q.28, and of other Queensland-bred canes, such as Trojan and Eros, produced by the C.S.R. Company at Ingham. Despite the advances made in cane improvement in Queensland, there is still an urgent need for varieties for special purposes and, in particular, for early maturing varieties. A cane collecting expedition of Bureau officers will visit New Guinea next year to search for material of likely value to the cane breeder or to the commercial grower. A graduate scholarship-holder has been sent overseas for three years to study advanced genetics, with particular reference to cane improvement, and on his return will join the cane breeding staff.

A good deal of time has been devoted by the Bureau to testing various weedicides and methods of using them in canefields, particular attention being given to the possibility of destroying weed seedlings before they emerge from the soil. Both pre-emergence treatment and spraying of weeds in the crop are yielding promising results.

A substantial acreage of land in central and northern districts was treated with benzene hexachloride preparations for grub and wireworm control in 1949, the area aggregating 34,000 acres. The availability of this insecticide, and the development of suitable methods of application, have completely altered the status of these hitherto serious pests.

Tobacco.

Tobacco was grown on some 2,450 acres in 1949-50 and about 2,600,000 lb. of leaf was cured from this crop. The average yield of over 1,000 lb. per acre, which has not previously been achieved in Queensland, reflects not only satisfactory growing conditions but also improved cultural methods.

The bulk of the crop is now irrigated, and in the northern part of the State this enables it to be grown through spring and early summer, and thus avoid the pest infestations and other disabilities of the wetter months. Surveys of streams and adjacent lands in both northern and southern Queensland have shown that there are very considerable acreages of suitable tobacco-growing soils which can be irrigated; in particular surveys have disclosed the existence of more than 30,000 acres of first class tobacco soil in the Burdekin valley. Increased interest is being shown in tobacco production with and without irrigation between Maryborough and Gladstone.

At the tobacco experiment stations and substation situated at Mareeba, Ayr, and Ingham, experimental work has proceeded and useful information on irrigation methods, rotations, fertilizing, varieties, and pest control is being collected. Much of the work is naturally of a long-term type, and it will be necessary for the stations to be operated for some years before the solution to certain of the problems of the industry can be expected.

The station at Ayr has played a major part in the training and guidance of settlers on the adjacent Soldiers' Settlement. The excellent yields and quality of Settlement tobacco in its first season augur well for its permanent success.

Wheat.

As stated earlier in this Report, wheat has, during the past few years, advanced in status from a relatively minor to a major crop. A wartime average crop of about 5,000,000 bushels rose to some 14,000,000 bushels in 1948-49 and 12,000,000 bushels in 1949-50; over the same period values have also increased very materially.

Increased production has brought some difficulties in its train: Extension of areas up the slopes has increased soil erosion while difficulties of handling have been accentuated by transport and sack shortages; half of the 1949-50 crop is still in country storages. Departmental officers, in association with the State Wheat Board, are conducting investigations into the practicability of providing some measure of bulk handling. Recommendations have been made regarding bulk shipment of wheat railed to wharf in bags, and the provision of some bulk storage at selected country sites.

Millers and bakers are becoming greatly concerned at the reduction in flour quality due to the grinding of mottled wheat. Investigations carried out by the Department to date indicate that if mottling is a nutrient trouble it is unlikely to be due to a deficiency or excess of a single nutrient in the soil but is more likely to be due to nutrient imbalance. In this case, a good deal of tedious work may be necessary to determine corrective measures under various soil and weather conditions.

The grain characteristics upon which flour quality depends are subject to variation according to seasonal and soil conditions and variety. Thus the problem of supplying each miller with grain to meet his particular requirements is both complex and continuous. A good deal of equipment has been assembled for the purpose of conducting wheat quality investigations. At the request of industry members the Department has convened a meeting to discuss a co-operative approach to the problem.

In the wheat breeding programme of the Department particular emphasis is now being placed on quality tests, and wheats which do not comply with certain specifications are not permitted to go into commercial use.

Peanuts.

Both the acreage planted and the quantity of peanuts harvested per acre have fluctuated considerably in recent years. In 1946-47, 38,800 acres were harvested, to yield 23,000 tons of nuts valued at considerably more than a million pounds. The following season was very bad and the heavy plantings yielded less than 16,000 tons of nuts. The experience of that year was largely responsible for the reduced area of 24,000 acres being planted for the 1949 crop, and the crop losses from poor germination and plant disease were so high that only 11,000 tons were harvested. The area planted for the 1950 crop rose slightly, but the final yield is estimated to be only 10,000 tons.

Since the current demand for peanuts is estimated to be 25,000 tons annually there is obviously room for a great increase on recent production. In some considerable measure the reduced acreage in the main South Burnett area is due to the substitution of a crop rotational programme for monoculture of peanuts; to this extent the smaller plantings give cause for satisfaction and will assist in conserving the fertility of the soil. The better returns for alternative crops, such as maize and sorghum, have also influenced peanut plantings.

In order to assist production the Peanut Board is considering the establishment of special seed farms to be run with technical assistance from this Department. Departmental field experiments with peanuts over the past year have been concerned mainly with the fertilizer requirements of the crop and methods for reducing losses from crown rot disease; seed treatment practices have been shown to be reasonably successful.

An increasing amount of interest is being shown in peanut production in North Queensland and over 2,000 acres were harvested in central and northern districts this year. The Peanut Marketing Board has acquired permanent premises on the Atherton Tableland and

growers there are giving consideration to the local processing of peanuts. With the rehabilitation of the tobacco industry in North Queensland there should be increased production of peanuts as an alternate crop for tobacco.

Cotton.

The reluctance of farmers to undertake cotton growing in the absence of suitable price guarantees resulted in only 3,300 acres of land being planted to the crop in 1949. This yielded only about 700 bales of raw cotton, compared with the best post-war yield of 2,372 bales and an average for the immediate pre-war years of over 10,000 bales. Wet weather interfered with the year's harvest and reduced the yield to some extent.

As Australian spinners use 70,000 bales annually and a much greater equivalent is imported as piece goods, the possibilities of expansion of the industry in Queensland are very substantial. Apart from the obvious advantage of domestic production of a commodity essential to defence and one which at present absorbs many millions of dollars, cotton growing offers the mixed farmer a very useful rotation crop and for this reason alone its more widespread adoption is desirable.

The financial relief afforded the Cotton Marketing Board following the presentation of the Tariff Board's report to the Commonwealth Government was welcomed by growers, but the rejection of the claim for a guaranteed net return was very disappointing.*

The Cotton Marketing Board operated four mechanical harvesters in the 1950 crop harvest. Though even under the best of conditions some lint remained on the plants and the cotton picked was of a slightly lower grade than comparable hand-picked cotton, the saving in time and labour is very great. Steps are being taken to import more machines and their acquisition will assure the farmer that his crop will be harvested.

Departmental investigations of technical aspects of cotton production were continued during the year, particular attention being given to irrigation procedure and to plant breeding.

Tropical Crops.

Investigations covering tropical crops are carried out at the tropical agriculture station at South Johnstone and the irrigation station at Ayr, in addition to the several stations devoted to sugar cane and tobacco. Investigations at South Johnstone were concerned particularly with rice, tea, and fibre plants, while the Ayr station is mainly concerned with testing crops and pastures, and methods for their production, likely to be suitable in the projected Burdekin irrigation area.

The belief is still held (and indeed fostered) in some quarters that rice cannot be grown in Queensland because of a restrictive "gentlemen's" agreement between unspecified government agencies. It is true that the New South Wales Rice Marketing Board has refused to make seed available to persons other than its own suppliers; this refusal no doubt engendered this quite unfounded belief in a restrictive agreement. Commercial rice is of two types, "swamp" and "upland," the former requiring liberal irrigation for its cultivation. Pending the establishment of major irrigation works in Queensland the Department's interest in rice-growing has been mainly directed towards upland rice. Immediately after the war a considerable number of varieties was assembled from overseas and these have been subjected to rigorous test. Seed of the best varieties has been multiplied and is now available to interested farmers. The highest yield so far recorded in trial plantings is 2,650 lb. of paddy rice per acre; at current fixed prices returns from this yield would not be particularly attractive.

The tea plots at South Johnstone have been maintained and tea of good blending quality has been made in the laboratory from hand-picked leaves. At current wage rates the cost of picking amounts to four or five shillings per pound. Interest is now centred on the long-delayed arrival of an experimental mechanical picker ordered from England. It may be accepted that this will greatly reduce harvesting costs but basic factors to be investigated will be the effect of leaf wounding on quality and the effect of mechanical cutting on the tea bushes.

The changed situation in India and Pakistan has made the coarse fibre position very uncertain and shortages of hessian and sacks are an ever-present threat. Preliminary experiments indicate that jute may be grown satisfactorily in frost-free areas suitable for the cultivation of sugar cane; these planting trials will be extended this season. Local production of fibre is, however, dependent upon the prior development of mechanical methods of decortication and this aspect is now being investigated by the Bureau of Industry. The new kenaf is also being grown in experimental plots.

Field crop irrigation experiments at Ayr are following the pattern successfully developed there for tobacco, namely "out of season" growth. Under this system what are normally summer crops are being grown under irrigation during the dry spring and early summer, with harvesting being completed before the onset of the wet season. Disease and pest hazards are thereby greatly reduced, quality of the mature crop is not affected by excessive wet, and weed control is simplified.

Tropical and Sub-Tropical Fruits.

The pineapple remains the most valuable of the fruit crops grown in Queensland, and heavy disposals of canned products in Canada have earned many dollars for Australia. The growers' co-operative cannery has had a stabilising effect on the industry and new growers are entering upon pineapple production.

Provided sufficient supplies of tinplate are available, it should be possible to market the factory crop profitably for some time to come, though increasing competition for overseas markets may be expected from several countries. Quick freezing presents an alternative to canning, and this method of preservation is being developed with the assistance of Departmental technical officers.

* The Commonwealth Government has since undertaken to guarantee a price of 9½d. per lb. of seed cotton for a period of 5 years.

In view of the importance of the pineapple industry, a team of specialists has been formed within the Department to give particular attention to the production of the crop. The far north coast has much land suitable for pineapple growing, and special officers are assisting in the expansion of the crop there. In addition, an area is being developed at the Ayr Regional Station as an investigation centre for large-scale production.

An adequate supply of good planting material is essential to sound progress, and the Horticulture Branch has continued its programme of building up stocks of superior foundation pineapple plants from which commercial planting material can be supplied and increased. Advances have been made in pineapple cultural practices, following experiment station and farm investigations. In particular acetylene has now been largely replaced by alpha naphthalene acetic acid as the chemical used in the regulation of flowering; and sodium pentachlorphenate is expected to be widely used soon as a weed killer.

Though the spread of bunchy top disease has been arrested, the area under bananas has declined further to 12,682 acres. If this acreage is to be increased appreciably, more forest land will have to be brought under the crop; this will involve modification of some current cultural practices, and investigations along these lines are in train.

Studies on the artificial ripening of bananas have been continued, and attention has been given also to processing of the fruit, with particular reference to canning and quick freezing, the latter of which offers better prospects than canning.

The growing of papaws is extending, and it is pleasing to record that available seed of improved varieties developed by Departmental plant breeders met a heavy demand. Plant and fruit diseases continue to be troublesome in papaws, and little progress has been made in devising practical methods of control. The best line of approach in respect of plant disease appears to be the incorporation of disease resistance, and this line is being followed. Experiments on artificial ripening of papaws conducted during the year suggest that damage from transport rots may be obviated in this way.

The limitation of overseas and interstate markets because of fruit fly incidence continues to worry local citrus producers. Conferences of various interstate authorities were held during the year to discuss means of confining the pest to its present Australian limits and of treating fruit from infested areas to kill any fruit fly larvae which they might contain. A comprehensive programme of investigations is now being carried out by Commonwealth and State authorities.

Strict quarantine regulations imposed by Victoria and South Australia have made it necessary for Queensland citrus growers to consign only thoroughly inspected fruit to those States. There is no great hardship involved in sweating fruit for a few days to obviate packing fly-infested fruit, but some growers consigned fruit inter-State which was condemned on arrival. Heat treatments and vapour treatments of infested fruit to destroy fruit fly larvae are still being tested in an endeavour to devise a treatment which will ensure larval destruction without affecting fruit quality.

Queensland mandarins are highly regarded in the southern States and there is room for an expanded acreage of good varieties. The Horticulture Branch has begun breeding work aimed at the improvement of varieties.

Soil Conservation.

The weather conditions of the past year served to accentuate the soil erosion problem in most of the agricultural districts, but they also provided evidence of the soundness of Departmental recommendations for soil conservation, inasmuch as soil saving structures and practices on all demonstration farms prevented serious soil loss under severe conditions.

During the year, 250 applications for advice on farm planning to combat soil erosion were received. Twelve miles of waterways were constructed by or under the supervision of soil conservation officers and a thousand acres were contour banked. This may not appear to be a substantial achievement when the very large area affected or threatened by soil erosion is taken into consideration, but the basis of the Department's soil conservation work is to demonstrate and advise. It is expected that after it has been shown that soil conservation is effective on a "pilot" farm in a district, the practices adopted will spread throughout the district. At the same time, assistance which can only be provided by the personal attention of trained advisers is essential in every individual case. Consequently a substantial increase in the field officers of the Soil Conservation Section will be necessary if this serious threat to agricultural areas is to be arrested.

Staff.

If the obligations of the Department could remain at their present level for the next few years the staff position could be regarded as fairly satisfactory. Many appointments have been made since the war and during the next two or three years there will be an assured steady intake of trained men as scholarship holders and cadets complete their courses.

But the obligations are very far from being static: Queensland has entered upon an accelerated developmental phase and land settlement schemes and projected irrigation areas have served the Department with demands for new soil surveys which alone would require the additional appointment of a dozen soil surveyors and analysts. There is a continuous and insistent demand for the investigation of the potentialities of new crops—jute, pepper, tea, and rice, to name but a few. Farmers, confronted with the threat of soil erosion, are clamouring for technical assistance far beyond the present resources of the Department. Existing industries are calling for intensified technical services, as exemplified by the pineapple and wheat industries' call for the establishment of special sections for their crops.

All these demands are gratifying in that they have their origin in appreciation of the value of services now rendered by the Department, and confidence in the ability of technologists to assist primary industry. At the same time it must be realised that the staff is fully occupied and new activities can only be undertaken by increasing the staff and facilities. If this is to be done, then industry must be prepared to give a greater measure of direct financial assistance.

The scheme under which private veterinary practitioners contract to undertake tuberculin testing of dairy cattle has released several Departmental veterinary officers for full-time duty on control of other diseases and pests and has thus contributed to a substantial improvement in field veterinary services. Ten private practitioners are now operating under this two-years-old scheme.

The employment of a number of temporary officers to provide services financed from the Commonwealth Dairy Industry Efficiency Grant has enabled herd recording and farm demonstrations to be expanded to an extent which would not have been possible under ordinary conditions.

The status of the Sheep and Wool Branch was raised during the year by the appointment of a Director of Sheep Husbandry.

Co-operation.

The financial burden of developing various primary industries and projects of national importance, and the need to apply Commonwealth and State technical services to the best advantage, have led to increased co-operation between Government departments and agencies and producers' organisations.

The Department has worked in close association on a number of matters with C.S.I.R.O., the Commonwealth Department of Commerce and Agriculture, the University, various State Departments, and producers' organisations. A notable development has been the appointment of a Research Committee by the Queensland-British Food Corporation. This Committee is composed of representatives from the Corporation, C.S.I.R.O., the University, and this Department. It will plan investigations in the application of science to practice which the Corporation is so well equipped to carry out. Departmental officers have served on numerous joint committees concerned with development of areas for settlement, problems of the sheep, beef, cattle, dairying, tobacco and other industries, control of weeds, &c., and a great deal has been achieved as a result of co-operative effort.

Isolated instances of duplication of effort still occur, but for the most part the spheres of operation of various organisations are clearly defined and liaison between groups is quite effective.

In conclusion I would like to express my sincere appreciation of the co-operation obtained within the Department. The number of officers who do far more than a fair day's work is many times greater than that of those who are satisfied with the regulation output.

Yours faithfully,

Under Secretary.

DIVISION OF PLANT INDUSTRY

Report of the Director of the Division (Dr. W. A. T. Summerville).

The period under review has been characterised by increasing commitments undertaken by almost every branch of the Division of Plant Industry. The increase in commitments is due essentially to two factors. These are, firstly, the ever-increasing demand by farmers and graziers for services of the Department; and, secondly, the work arising out of advancement of primary industry with the development of irrigation projects and other land settlement proposals. Both of these are, of course, very desirable factors, but a third potent factor enters into most of the work of the Division. This is the biological factor, and biological material cannot be hurried in its development if the true answer to reactions to soil and climate is to be obtained.

Much of the work, then, entails obtaining knowledge which can be gained only after a considerable period. The period is longest when experience alone is the guide, shortest when experimentation can be used, and soundest when the two can be combined. It is in this last that the Division is most severely handicapped by the loss of staff which is apparently an inevitable part of war and its aftermath. The long-term ill effects of the losses sustained are now beginning to make themselves more apparent through the dearth of men of fifteen to twenty years' or more experience who could be expected to supply at least partial answers to the many questions arising from the developmental works envisaged. Now, more than for many years, investigation is thus called for, and this is reflected in the large percentage of the time of many officers which must be devoted to this type of work even though the call for advisory services is concurrently very heavy indeed. Officers of the Division have given a highly gratifying response to the demands thus made on their energy, both physical and mental.

In the investigational phase of activity the position may be summarised by reference to the fact that during the twelve months under review some 325 field experiments were continued or initiated, and 87 were finalised. The crops covered by these experiments number 38, including nine grain and oil yielding species, three fibre crops, six fodder crops, 14 fruits, and 10 species of vegetables. Additionally, some 280 pasture species are the subject of some form of experiment varying from investigations of farm management problems to observations on growth habits and requirements for propagation.

On the advisory side, field officers of the several branches have kept in constant touch with producers. Indicative of the desire to keep abreast of developments is the fact that at the request of farmers some 40 field days have been held and more than 80 lectures given. These forms of extension activity have the advantage that a large number of men can be contacted, as is shown by the fact that for soil conservation alone it is estimated that the aggregate attendance at such gatherings has exceeded 8,000. One disadvantage of field days lies in the very limited amount of individual contact, and personal visits by officers still appeal as the most effective method of farmer education.

STAFF.

During the past twelve months four officers have retired under age-limit regulations and the Director of Agriculture (Mr. C. J. McKean) has remained under secondment to the Queensland-British Food Corporation. During the same period five non-graduate technical officers have resigned, whilst four others are now absent in special circumstances, but in each of these four cases the absence is temporary only. More than offsetting the losses, the staff has been strengthened by the addition of sixteen graduates and nine other technical officers, together with ten additional cadets, of whom six are undergoing part-time training at the University. The resignations of nine members of the clerical staff and the transfer of two others is recorded with regret. Temporary embarrassment generally follows such moves, owing in part to the inevitable time lag before replacements can be secured and become familiar with new duties.

Both the Agriculture and Science Branches have made notable staff gains, and in the former branch agrostology has been strengthened to cope with the warranted increased attention to pasture improvement.

The most noteworthy step in relation to the staff of the Horticulture Branch pertains to pineapple work. After conference with the appropriate industry interests, a Consultative Committee was set up representative of the industry and this Department. The Committee freely discusses the problems with which the growers are faced and takes such steps as are necessary to have work initiated where deemed desirable. It is believed that the frequent contact for exchange of views must be of considerable value to all concerned, and the results to date certainly support that belief.

The Bureau of Sugar Experiment Stations lost the services of two field advisory officers, and effective replacement will be difficult to achieve for some time. An overseas scholarship tenable for three years has been awarded to enable the holder to prosecute studies in genetics with a view to carrying out fundamental work on sugar-cane breeding on his return to Queensland.

The staff of the Chemical Laboratory now totals twenty-nine, and though pressure on several sections is very great, the Laboratory is reasonably well placed for the most part.

SEASONAL CONDITIONS.

The seasonal conditions have been very variable. Following an abnormally cold winter, late spring rains gave promise of an exceptionally good summer. Excellent rains fell in October, and though grain harvesting was interfered with to a degree, the agricultural and main horticultural areas benefited very considerably. The greatest benefit, however, was felt in pastoral areas, and the State's pastures as a whole responded excellently. A hot dry period in midsummer offset the early rains to some extent, but late summer and autumn falls were again bounteous and the year closed with favourable conditions for the production of winter crops. The rains were not an unmixed blessing, however, for some producers, and delays in land preparation and harvesting owing to waterlogged conditions caused appreciable losses to vegetable growers in many areas, potato and tomato growers being the most severely affected. The seasonal conditions, even where not wholly favourable to the landholder, had some merit from the Departmental point of view in that they afforded opportunity to secure information not otherwise obtainable. Thus certain data in connection with Burdekin soils and pests and diseases of vegetables and other crops were obtained under conditions not frequently experienced.

SOIL CONSERVATION.

The fact that applications for assistance in combating erosion now exceed five hundred and embrace almost a quarter of a million acres is indicative of the awakening of the rural community to the menace of erosion. Satisfactory as this is, it does not give any grounds for complacency, and intensive work by this section of the Division will be required for many years to come. A disturbing feature of the present position is that to still too many people soil conservation conjures up pictures of massive soil-moving equipment and little else. Such an attitude is wholly deplorable. Whilst a limited amount of the necessary work in some cases is beyond the financial and physical resources of the individual, the farmer must appreciate that the scourge must be attacked at its source, and that source lies very largely in the incorrect practices which precondition the soil. The basis of economic and successful soil conservation is agronomic, not engineering. The tardiness with which this is accepted is understandable but nonetheless irksome and militates against rapid sound progress. Field officers of production branches have been given instruction in the subject so that they, whilst not specialising, can afford the farmer assistance against the menace, which in some of the most important agricultural areas of the State amounts to threat of catastrophe.

REGIONAL EXPERIMENT STATIONS.

As reported last year, virtually every field crop produced commercially, or considered likely to have commercial possibilities, is now being grown on one or more of the four regional experiment stations. These institutions have been developed considerably during the period under review and the broad purpose for which they were established is taking definite practical shape. This purpose, as has been stated in earlier years, is to determine the correct economic relationships of crops and animals, and as data are collected it becomes increasingly apparent that this is the road to permanence of agriculture in many parts.

The establishment of a dairy herd and what might be termed ancillary units of pigs and poultry at Kairi was accomplished during the year and the experiment programme is now being implemented. So far as Hermitage and Biloela are concerned the preliminary work has continued, but until the necessary buildings can be provided development of the main programme cannot proceed. It is hoped that at least one of these centres and perhaps both will be equipped during the coming year.

AGRICULTURE BRANCH.

The report of the Acting Director of Agriculture discloses the wide range of activities of officers of this branch. It will be seen that every avenue of approach to problems facing the producer of field crops has received attention, and progress can be claimed in each of the phases of plant breeding, agronomy, agrostology, and soil technology.

If the work of plant breeders is to be wholly successful, full use will have to be made by farmers of the certified seed produced within this State. The production of such seed is exacting, time consuming work, but provided the seed is used within the State is a very worthwhile job and should be expanded with the demand. The sound farmer knows that good seed is an essential basis for sure substantial returns.

In general agronomy the expanded acreages of wheat, linseed, and tobacco call for special mention. The results from the exploratory farm at Wrotham Park dealing with the production of supplementary fodders for beef cattle, together with the practical interest displayed by a number of pastoral companies, give substantial promise of important developments in districts hitherto regarded as mere natural pasturage areas subject to all the vagaries of the climate. Evidence is being accumulated that supplementary feeding, particularly by the use of grain sorghum, is practicable. The translation of that potential into actuality will not be easy but it is obvious that the attempt to do this is worth while.

The emphasis which has been placed on tobacco work is now showing results and the production of this crop is quickly assuming its rightful place in Queensland agriculture. That the Burdekin and Mareeba-Dimbulah areas will continue to develop and become really stable tobacco areas seems assured. The south-west (Texas-Yelarbon district) has, of course, been producing tobacco for many years, but the growers in this area should pay more attention to varieties than is the case at present.

Pasture is, and for a long time must remain, the State's most valuable and important crop. The attention given to this phase of Agriculture Branch activities therefore needs no further justification here.

HORTICULTURE BRANCH.

The pineapple retains its place as the leading fruit crop of the State and accordingly has been given a very great share of the time of the officers of the Horticulture Branch. By far the greatest emphasis at this stage is rightly

being placed on the dissemination and use of superior planting material. This is undoubtedly the only foundation on which the industry, relying as it does so largely on the export of processed products, can hope to keep its returns at a reasonable level. It is essential that that point of view be accepted by growers quickly, for the longer such acceptance is delayed the further and more difficult the retracing of steps.

Both papaw and avocado growing show signs of expansion, and provided factors which bear on marketing are given careful attention there are very great possibilities for quick and sound economic developments.

Tomato growers, perhaps to a greater degree than any other class of horticultural crop producers, recognise the essential need to commence with good seed, and therefore the keen demand for Departmentally certified seed by tomato producers is particularly gratifying. The whole problem of plant improvement, together with soil management investigations, constitutes the essential work of the three branch experiment stations situated at Redlands, Nambour and Kamerunga, respectively.

Whilst production of high quality produce is important, its value is greatly reduced where poor methods of handling for market or inferior marketing facilities prevail. The Preparation and Transport Section of the Horticulture Branch, therefore, is handling a comprehensive programme covering investigation of new methods, education of growers, and enforcement of legislation designed to improve the product ultimately available to the public.

BUREAU OF SUGAR EXPERIMENT STATIONS.

The forecast for the 1950 crop suggests that new peaks will be attained in the current season both in cane crushed and in sugar produced. The early estimate is for a crop of seven million tons calculated to yield 988,000 tons of 94 net titre sugar.

One of the outstanding features of the year is the continued and expanding success achieved by benzene hexachloride in grub control. In the 1949-50 period over 20,000 acres were treated for protection against this pest and a further 14,000 acres against wireworms. The year 1950 has been one of intensive grub damage on unprotected farms.

A pleasing degree of success was obtained with pre-emergence weed control in both light and heavy rainfall areas during last summer. Growers in the wet belt in particular are very enthusiastic regarding the control obtained and it is anticipated that commercial usage will rapidly develop.

During the year developmental work on the new sugar experiment station at Ayr proceeded favourably. The first plantings of sugar cane and seedlings will be made in the coming season.

CHEMICAL LABORATORY.

All branches of the Department offering technical service to rural industries at some stage in their work, with the exception only of the Bureau of Sugar Experiment Stations, enlist the help of the Chemical Laboratory. Thus the work of the laboratory to an extent reflects, and is reflected by, the work of the whole, but of course more particularly that of the Division of Plant Industry, with which it is most closely associated.

The necessity of chemical data being available is clearly brought out by the fodder work, since it is quite apparent that qualitative information or even figures on mere gross weight are an insufficient basis for recommendations. Here is a very good example of how precise scientific work can at least partially substitute for experience and thus shorten the time necessary for progress to be achieved.

The extent to which the Bureau of Investigation, the Forestry Sub-Department, the Land Administration Board, and the Irrigation and Water Supply Commission call on the help of this laboratory is at times embarrassing, but collaboration is certainly the only sound way in which the various plans of each in the sphere of land use can be furthered.

SCIENCE BRANCH.

The opening paragraph of the report of the Pathology Section dealing with the rust position in cereals gives a splendid example of the magnitude of the problems facing officers of the Division. There is little that is static in the work. On the contrary, as living material is being dealt with—and even the soil is a living system—the field is essentially dynamic and it is rarely that a problem, be it disease control or any other phase, can be said to be finally solved. In the particular instance to which attention has been drawn a new strain of fungus arising in 1949 could greatly alter the whole picture for a crop and crop prospects. Vigilance therefore becomes a keynote, and nowhere is this more essential than in the Science Branch with its problems of insect, disease and weed control.

The number of insecticides, fungicides and weedicides continues to increase, as also do the extravagant claims made by their manufacturers in some cases. There is no doubt that the entomologist and the plant pathologist are better equipped with such tools now than ever before, but there is still no panacea, and careful assessment of merits in each individual, or at least category of, pest must be undertaken.

Fruit fly constitutes a very serious menace to several of the more important fruit industries of the State, particularly since authorities in southern States have translated their apprehension into action, and accordingly particular stress is being laid on investigation of this pest.

The finding that impregnation of bags is probably as effective as dusting each potato in the containers is very important, and if confirmed on a commercial scale will be a most worthwhile contribution to both growers and consuming public.

Investigations on weed control and poison plants also constitute important phases of Science Branch activity, and worthwhile progress is recorded in each of these. The part played by the Botany Section in the investigation of Birdsville horse disease is particularly pleasing.

Report on Soil Conservation Services

Mr. J. E. Ladewig, Senior Soil Conservationist.

The period under review has been marked by a gradual expansion of activities in respect of an educational campaign, work on soil conservation demonstration areas, the provision of a technical advisory service, and the conduct of a soil conservation research programme.

The rapid increase in the volume of applications for technical advice and assistance in respect of soil conservation matters is indicative of a wider appreciation of the dangers of erosion; but it also indicates a general acceptance of the efficiency of soil conservation measures in countering this menace. The increase in applications for assistance is tabulated below:—

	No. of Applications.	Area. acres
Total to 30-6-48	95	28,000
Total to 30-6-49	250	86,000
Total to 30-6-50	502	241,000

To provide an adequate advisory service to the applicants now listed will require the full-time services of the present soil conservation staff for some years, even though field officers of the Agriculture and Horticulture Branches and the Bureau of Sugar Experiment Stations are assisting in the work, particularly from the agronomic aspects; numerical increase in staff is therefore urgent and is effected as personnel can be recruited and trained.

An increased interest in soil conservation matters has been shown by local authorities and farmers' organisations during the year, and as a result requests have been received for the planning and execution of group watershed control schemes in respect of 100,000 acres of land.

CONTOUR EROSION CONTROL.

Land reclamation work is the most urgent requirement in the many severely eroded areas of the State and in these parts is a necessary prerequisite to the application of correct land use practices. While every effort has been made to meet the urgent need for the reclamation and protection of the land, this has tended to obscure the vital necessity of modifying the farming methods which are the cause of present losses.

At least 4,000 acres of arable land have been saved by the application of soil conservation measures and a much larger area of lower country has been protected by the installation of these works; in the past year contour banks were constructed on an additonal 1,000 acres of land. Artificial waterways designed and constructed totalled 62, with an aggregate length of about 12 miles. Numerous diversions and pondage banks have been designed, surveyed and constructed to provide partial protection for lower arable lands.

These control works have been applied throughout the Darling Downs (see Plate 1, facing page 12), in the South Burnett and Monto districts, and on the Atherton Tableland (see Plate 2, facing page 12); special measures have also been designed and applied for the steep coastal horticultural lands, the canefields of the Childers and Mackay districts, and the tobacco lands at Ingham and Mareeba. These works performed satisfactorily throughout summer rains, which provided a severe test; on protected sites soil losses were insignificant, whereas adjoining untreated areas in most cases suffered serious erosion.

WATER DISPOSAL PROBLEMS.

One fundamental requirement for successful soil conservation work is that water disposal lines must be stable and able to transfer runoff to the permanent watercourses without further soil loss occurring. In many agricultural areas, chiefly the Darling Downs and South Burnett districts, the original drainage lines are now no longer suitable for water disposal because of excessive siltation or a severely eroded condition.

Numerous investigations concerning this problem have been conducted during the year in response to urgent requests from landowners and local authorities. The matter has recently been the subject of investigation and discussion by officers of the Irrigation and Water Supply Commission and this Department, and it is expected that a working plan will eventuate.

SOIL CONSERVATION DEMONSTRATION AREAS.

Twenty soil conservation demonstration areas have been established throughout the State for the purpose of illustrating in a practical way recommended methods of soil conservation. Some of these demonstrations were initiated in previous years, and in the past year these have been further developed simultaneously with the initiation of work on new ones. Delays due to wet weather considerably reduced the effective working time of Departmental earth-moving plant on the Darling Downs demonstration areas. Many of these areas were selected because of the severity of the erosion, and on some the arable lands were on the verge of abandonment as a result of advanced gully and sheet erosion. Consequently, major reclamation works were necessary and on one farm a total expenditure of approximately £7 per acre was required to stabilise the area. Of this amount £2 10s. per acre represented the direct cost of construction of contour banks, £4 per acre that of gully filling work, and 10s. per acre that of the construction of a dam. Since this position applies in respect of at least 100,000 acres of similarly eroded land on the eastern Downs, the cost of reclamation presents an economic problem.

Work on the soil conservation demonstrations on the Atherton Tableland and in the Monto district has proceeded satisfactorily during the year; farm equipment has been used almost exclusively on these areas and it has been shown that where eroded land can be treated in the early stages the cost is comparatively low and large earth-moving equipment not necessary.

The activities on all demonstration areas have been followed with keen interest by farmers and the general public; two public field days were held on these areas (total attendance 900) and, as well as inspections of completed works, various soil conservation methods were demonstrated in the field.

Work executed on all demonstrations during the year included the construction of 480 acres of contour banks, 230 chains of pondage and diversion banks, 9,000 feet of artificial waterways, and four dams totalling 5,000 cubic yards; the planting of 1,300 trees; the establishment of 14 acres of improved pasture; and the sowing of 60 acres of green manure and cover crops.

SOIL CONSERVATION INVESTIGATIONS.

Two experiments previously established at Kairi Regional Experiment Station have been continued; both experiments were subjected to a series of intense rains during the summer months. The observations have confirmed the belief that where the open structured soils of the Atherton Tableland can be worked on the contour and correct land use practised, the major part of even moderately severe rains can be absorbed by the soil and so reduce the erosion incidence.

At Hermitage Regional Experiment Station, further steps were taken to initiate the major experiment designed to determine the effect on soil and water loss of various land use methods and crop rotations. Contour banks have been constructed on the experimental area and preliminary land levelling work has been executed. The design of suitable measuring equipment for runoff and soil loss determination is proceeding and will be finalised by the time the experimental area is ready for the establishment of this equipment.

The soil conservation investigations at Maroochy Horticultural Experiment Station have proceeded satisfactorily. Four exploratory treatments were designed and established on 25 per cent. slopes, and rains received in the spring and summer months were sufficiently severe to indicate the merits and defects of the various control systems being investigated.

EDUCATIONAL ACTIVITIES.

The activities in this field have been directed along two main lines; firstly, to place before farmers and the public generally the facts concerning the erosion problem, and, secondly, to provide for primary producers the technical information required to apply soil conservation measures.

The farm planning service mentioned in last year's report has been expanded considerably, and a total of 64 plans for 21,000 acres of land was completed during the year.

Eight public field days were held. the aggregate attendance at these functions being 1,630, or an average of over 200 at each. Field days provide an excellent opportunity for the dissemination of technical information because of the facilities available for practical demonstrations. At least fifty of the applications for advice on farm planning received during the year are known to have originated from field days.

An aggregate audience of some 8,000 people attended the 75 lectures given during the year to primary producers' organisations and other groups. Sixty-six film showings organised by the educational section of a large oil distributing company were supported by lectures by soil conservation officers.

Soil conservation displays have been featured at a number of Queensland shows, including the Royal National Exhibition at Brisbane, and provincial and country shows at Toowoomba, Jandowae, Miles, and Gladstone.

The major part of a soil conservation publication, *Soil Conservation in Queensland,* has been prepared, and four chapters have been published in the *Queensland Agricultural Journal.*

MACHINERY MODIFICATION.

The large amount of reclamation work involved and the alteration to farming procedures necessary for soil conservation have focussed attention on the need for modification and additions to farm tractors and equipment to meet the requirements of permanent agriculture.

Activities in this field have been fostered, and in many cases the preliminary investigational and design work has been carried out by soil conservation officers.

During the year a standard grader ditcher was redesigned and modified to enable the execution of the major types of soil conservation works on slopes of up to 40 per cent.; this work has been completed and tests satisfactorily performed.

The "contour liner," an instrument attached to a tractor and intended to indicate when the tractor is following the contour, was tested during the year, and results indicate that this instrument may be satisfactory for pasture furrowing on gentle slopes and so eliminate the necessity for expensive surveying work.

The design and modification of existing machinery to enable its utilisation for stubble mulching procedures has received attention in the Darling Downs, South Burnett and Atherton districts. The preliminary design has been completed in all districts, and testing will be completed at the end of next summer.

The attachment of simple dozer units to farm tractors has been fostered throughout the State to reduce the cost and facilitate the execution of reclamation works. It is estimated that twenty of these dozers, many home-made, have been fitted to farm tractors in the South Burnett district this year, two at Atherton, and three on the Darling Downs. It is considered that the more general utilisation of this type of equipment on the Darling Downs will assist considerably in the drive to combat the very severe erosion in that area.

PLATE 1.

Contour Furrows to Conserve Moisture on a Darling Downs Pasture.

PLATE 2.

Contour Banks on an Atherton Tableland Farm.

In further trials of lucerne in cultivated rows, Hunter River, Hairy and Smooth Peruvian, and Buffalo varieties and a strain originating in Bolivia indicated that they can produce satisfactorily under this cultural system even under very dry conditions.

Soil Fertility.

The green manure-superphosphate experiment of the previous season was repeated on the same area—the third year in succession—to test for residual influence of the treatments. An average yield of 39·5 bushels of wheat per acre was realised over the experiment and again no significant differences were obtained through the use of any of the green manures—maize, Sudan grass, Poona pea and combinations of the last with each of the other crops. An overall response of wheat was obtained to 200 lb. superphosphate per acre applied prior to planting the green manure crops. The greatest gain per treatment was 4.25 bushels of grain.

The complex fertilizer trial mentioned in the last report was repeated on two soil types on the lower slopes. On a soil comparable to the site of the green manure-superphosphate trial, no significant differences were obtained, although there was a suggestion that 224 lb. superphosphate improved yields over the "no phosphate" plots. On a lighter soil, where green manure crops had been turned under and an average yield of 48·5 bushels was realized with the good season, no significant differences or even trends were obtained.

On a much less fertile soil on the slopes a significant response of four bushels of wheat per acre was obtained from an application of 112 lb. of sulphate of ammonia at planting time, but an application of 224 lb. superphosphate alone at this date did not increase yields. Ploughing under cowpeas in time for them to decompose well before the wheat was planted failed again to improve yields. In another experiment on similar soil, but without a green manure ploughed under, a highly significant response was obtained to an application of 112 lb. sulphate of ammonia and 224 lb. superphosphate, the gain amounting to seven bushels per acre, or 22.4 per cent. Superphosphate alone did not improve yields.

Soil Conservation.

Owing to the hillside native pastures having been badly overgrazed prior to the re-occupation of the property by the Department, stock were withheld to study the rate of natural regeneration as a part of the soil conservation investigations. Such an excellent cover resulted from these measures that insufficient runoff was obtained in 1948-49 to provide ample water in a dam constructed for the soil conservation investigations. Similar difficulties were encountered in the past year until a heavy rain was experienced when the surface soils were sodden. The season's experience showed that severe runoff may occur on clay slopes, even when they are well grassed, if the surface soil is saturated when heavy rain falls.

BILOELA.

The weather experienced at this centre illustrated the benefits to be obtained from practising rotations which provide good supplies of subsoil moisture at the planting period of either winter or summer grown crops.

Oats.

The programme of testing oat varieties for grazing was enlarged early in 1949 to embrace Belah, Fulghum, Mulga, Victoria x Richland, Fulghum x Victoria, and Klein. Planted in March on soil wet to a depth of 44 inches, all varieties grew slowly during the wet conditions which prevailed until after the early June rains. With the onset of the following dry weather, the most rapid growing types—Mulga and Victoria x Richland—quickly outyielded the rest until finally checked by the lack of supporting rains. These two varieties produced the most grazing and hay for the season, while Klein and Fulghum x Victoria produced the least. Periodic sampling through the season brought out some striking differences in the protein, calcium and phosphorus contents, both between varieties and at different periods of growth of a variety.

Wheat.

A varietal trial of seven of the leading standard wheats reported upon in the previous season, three Queensland hybrids, and the New South Wales Kendee, was conducted. Planted on 6th June in soil wet to a depth approximating 42-48 inches, all varieties grew well until the time of heading, although only ·64 inch of rain had been recorded since planting. A further ·52 inch on 10th September was sufficient to ensure a crop. Heavy rains commencing early in October caused some germination of the grain in the earlier maturing varieties. The mean yields of the seven varieties common to both seasons are given in Table 2. The colder winter of 1949 may possibly explain the improvement in performance of Gabo in comparison with Puno, Gabo being a New South Wales wheat bred in a colder climate than is normally experienced at Biloela. The value of having good depth of subsoil moisture at planting was again clearly demonstrated.

Linseed.

Yields in a varietal trial of the seven most promising varieties of linseed grown in this State, planted on 4th May, 1949, as a whole were 100 lb. of seed per acre better than the mean yields obtained in the 1948 varietal trial at this centre. This may reflect the merits of planting earlier than 29th June, the planting date of the 1948 experiment. Morocco, with a yield of 741 lb. of seed per acre, was again the leading variety. The mean yield of 626 lb. seed per acre produced by Morocco over the two seasons, when compared with the mean yields of Gabo and Puno wheats, respectively 2,310 lb. and 2,382 lb. per acre from similar soils, indicates the greater water requirements of linseed under Callide Valley conditions.

Grain Sorghum.

In a varietal trial of ten leading grain sorghums planted on 5th December in rows spaced 3½ feet apart, Plainsman and Caprock—two medium-early varieties introduced in recent years from the United States of America—performed well throughout the season, even under the very dry conditions of most of January, and produced 37 bushels per acre, outyielding the rest of the varieties in the trial. The depth of wet subsoil at planting time was 30 inches, which provided insufficient moisture to carry

the earliest maturing varieties past the flowering stage without suffering some stress conditions during the hot dry weather at the end of January. On the other hand, the slower maturing types suffered serious loss of late flowers through a heavy midge attack early in March. Weekly determinations of the prussic acid content of all varieties were made throughout the growing period until all were ready for harvesting. The results indicated that under the season's conditions the prussic acid content of the slower maturing varieties was either well above or approximated what is accepted as a dangerous level—i.e., 20 milligrams per 100 grams green material—throughout most of their growth until the grain had hardened, whereas the content of Martin—the quickest maturing variety—did not reach a dangerous level. The content of other quicker maturing varieties was also satisfactory after the first 45 days of growth, i.e., after the plants had reached about 30 inches in height.

Analyses of the feeding value of the leaves and stalks of several varieties of grain sorghum were made, commencing soon after harvesting of the grain in the 1947-48 varietal trial. The results indicated that for some months the standing stover would provide feed of high protein and phosphate content, although the protein content declined with length of exposure to the weather. Further investigations are in progress.

Cotton.

The results of the 1948-49 experiments, which were not completed in time to be included in the last report, may be summarised as follows:—

1. Planting rains did not occur until November and as a result yields of all dryland cotton, in keeping with the findings of previous seasons, were below those usually obtained from the more normal October plantings.

2. Cultural operations which had resulted in the conservation of a good depth of subsoil moisture by planting time contributed to the satisfactory yield, for such an irregular season, of 954 lb. of seed cotton per acre.

3. Applications of 9 to 12 inches of supplementary irrigation were beneficial, the average yields of irrigated plots ranging from 1,312 lb. to 1,752 lb. seed cotton per acre.

4. In a time-of-watering experiment, the three treatments receiving a 3-inch application six to eight weeks after planting plus three other waterings averaged 1,941 lb. seed cotton per acre, with the leading treatment yielding 2,063 lb., compared with an average of 1,564 lb. for the three treatments which did not receive this additional watering.

5. The results obtained in irrigated trials of hybrid strains bred at Biloela indicated that several of them may prove superior to the commercial varieties in lint percentage and yield per acre of both seed and lint cotton.

6. Thirty-two acres of cotton were mechanically harvested with satisfactory results, the machine averaging ·85 acre per hour in bulk areas. Machine-picked cotton contained less stained fibre than companionate hand-picked cotton, and was graded Middling in comparison with Middling Light Spot for the latter. The machine-harvested cotton also averaged slightly higher lint percentage through elimination of cotton from diseased or partly immature bolls. The efficiency of the machine varied with the type of plant harvested, 97 per cent. of the bolls being picked in the varieties with the most open habit of growth and down to 78 per cent. in very leafy varieties.

Pasture Investigations.

The yields obtained in comparison with Rhodes grass of different ages of establishment demonstrated once again the need for growing this grass in short-term leys on forest soil.

The testing of row-cultivated areas of *Paspalum scrobiculatum* (scrobic), blue panic, green panic and Rhodes grass was continued. The results obtained in tests of selective grazing by dairy cows indicated that preferences were largely correlated with the stage of growth of the grasses, no one species always being preferred. All four species were established in separate areas during the wet season to provide facilities for testing the relative merits of row cultivation and broadcast stands of each one next summer.

The nursery of grasses and legumes was further increased during the season, and some 106 species and strains are now being investigated. Several species have shown sufficient promise to justify multiplication to permit establishment in trial grazing areas.

The testing of Poona pea and C.P.I. 9432, a strain of Poona pea mentioned in the last report, was repeated. The results confirmed the previous findings that the newer introduction produces much more heavily than the standard variety and matures seed later, thus providing considerably better autumn grazing than the standard from March onwards, especially when following a good wet season.

AYR.

There was further development of this regional experiment station during the year. An adjacent area of 29 acres of light soils was leased to permit the initiation of a comprehensive programme of pineapple experimental work and cost-of-production studies. Two acres were set out with planting material secured from Maroochy Horticultural Experiment Station, and three acres were planted with a good commercial strain obtained from the Nambour district. Some 25 acres of irrigated pastures were established for the purpose of conducting grazing trials.

A comprehensive programme of crop experiments was completed. The findings in experiments relating to potato culture will be reported by the branch responsible for conducting them. The results obtained in the more important experiments conducted by the station staff are described in the following summaries:—

Sunflower.

A varietal trial planted in April, 1949, with an application of a 10.10.0 fertilizer at the rate of 160 lb. per acre and given a side dressing of 56 lb. sulphate of ammonia when the plants averaged 12 inches in height, made very satisfactory growth with the aid of four irrigations. The experiment was harvested early in August, the yields obtained being as given in Table 3. The results indicate that this important vegetable oil crop has definite possibilities as an irrigated crop in the district.

Linseed.

A varietal trial embracing the same varieties tested at Biloela was planted in May, 1949. Although an application of 160 lb. per acre of 10.10.0 fertilizer was given at planting time, and a side dressing of 112 lb. per acre of sulphate of ammonia when the plants were nine inches tall, plant growth in the later part of the crop season indicated clearly the need for additional nitrogen. Yields were low, the leading variety, Bolley Golden, producing at the rate of 654 lb. seed per acre, with Morocco, the leading variety at Biloela, yielding 554 lb.

More satisfactory yields were obtained in seed multiplication areas of Punjab 47 CI. 1115 (see Plate 3, facing page 20, and Imperial CI. 1114, two new strains obtained through the U.S. Department of Agriculture from the Imperial Valley irrigation district in California. Planted on more fertile soil than the varietal trial and given only a pre-planting application of 160 lb. per acre of the same fertilizer, vigorous growth was obtained which yielded respectively 1.432 and 1,334 lb. seed per acre. These strains will be further multiplied in the coming season and also will be included in a repetition of the varietal trial.

Maize.

A maize varietal trial of three Queensland bred double hybrids, Star Leaming and Improved Yellow Dent was grown during the winter season to test the possibility of obtaining good, yields of maize to supplement grazing pastures during the normal dry spring. The trial was planted on 28th April, 1949. Yields were not impressive. It is probable that the very cold temperatures experienced during July adversely affected yields. Accordingly, the experiment is being repeated in the coming season, planting in early August.

Sorghums.

Several strains of Coastland—an open headed type of grain sorghum bred by the Department's Senior Plant Breeder while stationed at Biloela—were grown as a winter crop in comparison with several standard varieties, and until destroyed by birds gave promise of producing heavily. The general growth and attractive open head of Coastland suggested definite possibilities for this variety as a winter crop on the Burdekin if grown in sufficient acreage to minimise the effect of bird damage.

The loss of seed through attacks by birds, and the high nutritive value of grain sorghum stover at Biloela, focussed attention on the possibility that summer grown sweet sorghums might contribute more total nutrients than grain sorghums for maintaining cattle in satisfactory condition during the usual dry spring in the Burdekin district. Accordingly, a varietal trial of eight of the most promising sweet varieties was planted in late January. The trial is not completed, as it is proposed to allow the crop to stand in the field until late spring to provide material for analysis of the nutrient content. By mid-June, however, a heavy tonnage of attractive material was available in all varieties.

KAIRI.

Facilities for implementing the programme of investigations planned for this centre were increased by the establishment of a Jersey dairy herd. The Division of Animal Industry was thus able to carry out investigations relating to the use of dairy cows and calves, pigs and poultry to consume the various crops produced on the station.

The weather experienced at Kairi was favourable throughout most of the year. As a consequence, good yields of pastures and crops were produced and all areas were in a satisfactory condition for the Field Day held on 14th April, which some 130 visitors attended.

Oats.

Excellent results were again obtained with Victoria x Richland, Fulghum x Victoria and Klein, and it apears that by planting areas of each of them, provision can be made either for grazing from June to November inclusive or for the production of heavy tonnages of good hay. Queensland hybrids supplied by the Agriculture Branch are under trial this winter to ascertain whether they contain even better grazing types.

Wheat.

The promising results obtained with June plantings of the Warput variety in 1948 and 1949 have led to more extensive trials of wheats during the current winter in an endeavour to obtain a thoroughly rust resistant type which would allow of earlier planting and thus receive the full benefit of the autumn rains.

Maize.

The main features connected with the season's investigations in this crop have been the reduction in weed growth in areas on which oats followed maize for silage, the general high yields obtained with the station's strain of Durum maize, and the low incidence of disease-affected ears in crops produced in the main rotations in which maize for grain is grown for two years following five years of either lucerne or lucerne plus Rhodes grass pasture.

Pasture Investigations.

An even colder winter in 1949 than in 1948 severely killed back once more the tropical legumes *Centrosema pubescens, Clitoria ternatea* and *Glycine javanica.* Lucerne, on the other hand, grew well during the winter both in the main pure bulk plantings and in combination with Rhodes grass. Cultivated row lucerne on a shallow soil again performed better than companionate lucerne in drills spaced seven inches apart. Row spaced scrobic germinated so thickly between the rows at the start of the wet season that the area was left uncultivated. Calf grazing trials on the resultant growth gave most promising results and it would appear that after the establishment period scrobic need not be cultivated in this district. Row cultivation of green and blue panic grasses may also be placed in the same category if a suitable legume cannot be discovered for interrow planting with these species.

Soil Conservation.

Further facilities for conducting soil conservation investigations were completed during the season, together with diversion banks to control runoff waters in critical positions revealed by the previous season's heavy rains. It is now felt that soil erosion is well under control at this centre.

Report of the Agriculture Branch.

Mr. D. O. Atherton, Acting Director of Agriculture.

A great deal of attention was devoted to advisory services to farmers, both from the Brisbane office and from country centres. Many field experiments were conducted to clarify problems associated with crop production and to investigate the growth of plants not already established in commercial production in Queensland.

An exploratory farm was established in one of the hitherto uncultivated black soil areas in the far northern inland portion of the State. Experimental work was continued on three tobacco experiment farms in the north of the State.

CROP PRODUCTION.

Wheat.

The weather conditions in 1949 were reasonably favourable for this crop, except for the exceptionally cold and dry winter, and a total planting of 670,000 acres was effected. The dry winter and unusually wet late spring were not altogether suitable for the crop and the adverse effects of lodging and bleaching of grain caused by spring storms is apparent in the lower yield of approximately 11,800,000 bushels.

Maize.

The early spring rains encouraged many growers to plant in October and November, but the hot, dry weather of midsummer was unfavourable for the complete development of these early sowings and many of them were used as stock fodder instead of being left for grain. However, suitable rains in late January and February made further sowings possible and these late planted crops are now yielding well. As a result it is expected that some 3,500,000 bushels will be harvested from the estimated area of 130,000 acres. Increased attention is being paid by commercial growers to hybrid maize, particularly to strains developed in the State.

Grain Sorghum.

The Queensland-British Food Corporation extended planting activities in the Clermont-Emerald-Springsure district. In the remainder of the State, chiefly in the Darling Downs and Burnett districts, approximately 75,000 acres were planted for an estimated yield of 2,250,000 bushels. The State's grain sorghum was affected to some extent by the dry spell in summer but not to the same extent as maize.

Sunflower Seed.

The area devoted to this crop was about 10,000 acres, with about half being sown by the Queensland-British Food Corporation in Central Queensland. Yields are not expected to be high, but the total crop may be 60,000 bushels.

Linseed.

The area sown to this crop, mainly on the Darling Downs and in the South Burnett, was approximately 11,000 acres, or nearly twice that of the previous season. Heavy frosts affected some sowings adversely, particularly on the Downs, and the appearance of pasmo disease also reduced the harvest. The yield from 11,000 acres was only about 60,000 bushels, although corn ear worm was effectively controlled in many areas by insecticides.

Canning Beans.

This crop remains firmly established as one of the minor cash crops of southern Queensland, particularly on parts of the Darling Downs and in the South Burnett. Conditions were much less favourable than those of last year and only 15,000 bushels are expected from the 1,500 acres harvested of the 5,000 acres planted.

Soybeans.

No large commercial plantings of this crop have yet been made, but the testing of promising varieties has been continued. Recently commercial firms have shown some interest in purchasing soybeans at remunerative prices and farmers may plant greater areas next summer.

Peanuts.

Seasonal conditions were reasonably favourable for the 26,000 acres planted, although the dry period in midsummer and the wet autumn had an adverse effect in some cases. The total crop is not expected to exceed 10,000 tons.

Pumpkins.

The weather conditions reduced expected yields to a considerable extent. Crops planted for late harvesting gave very poor yields owing to the effects of the wet weather in autumn, and the incidence of fungus diseases was higher than usual. Many areas were not harvested and the sales of about 19,000 tons were considerably lower than normal.

Potatoes.

Seasonal conditions were generally unfavourable for both spring and autumn plantings of this crop. Although some farmers had satisfactory results, in many cases yields were seriously affected by rotting of seed in the ground and also by abnormally high flooding. The yield is not expected to exceed 25,000 tons from about 10,000 acres.

Onions.

The crop harvested in 1949 gave reasonably good returns, although the heavy late spring rains affected quality to some extent. Crops in the Lockyer did not show the same tendency to throw a flower stalk as was experienced in the previous year. The total yield was approximately 13,500 tons from the 3,500 acres sown, mainly in the Lockyer Valley.

Tobacco.

Most of the area now devoted to this crop is irrigated and returns were quite satisfactory. Where the crop was grown without the aid of irrigation in the Dimbulah district, the rainfall in spring and summer was adequate and good crops were obtained. Further expansion of the

industry occurred in the Herbert and Lower Burdekin areas. Interest in this crop has also revived in the Bundaberg-Miriam Vale district.

Owing to the unusually wet conditions in spring, some blue mould occurred in the field, particularly in northern Queensland, but the leaves lost did not affect yields to any marked extent. About 2,450 acres were planted, and the total yield is expected to exceed 2,500,000 lb. If this expectation is realised it will be the first season in which the State average has been higher than 1,000 lb. of cured leaf per acre.

Cotton.

It is apparent that farmers are still reluctant to re-enter the cotton growing industry, although the mechanical harvesters now available are capable of harvesting approximately 1,500 acres. Efforts to establish the crop in the Burdekin Delta have been unsuccessful. The season's cotton is still being harvested but it is not expected that the yield will exceed some 700 bales of lint from less than 4,000 acres planted.

Lucerne.

Seasonal conditions were quite favourable for the development of this crop early in the spring, and good quantities of prime quality hay were produced before midsummer. The period of protracted rains and, in some areas, floods, in late summer and autumn adversely affected many fields and reduced the yields of hay very considerably. Owing to the effects of floods, replanting became necessary on many farms.

Pastures.

The season over most of the State, with some exceptions, as in the Goondiwindi-Inglewood district, favoured prolific pasture growth, and yields in terms of weights of green matter reached record proportions. Following the previous good year the heavy rains in the far south-west, and particularly in the sheep country, have been an embarrassment because they have caused rank grass and herbage growth.

In much of the sub-coastal and coastal cattle and dairying lands, prolonged rains have induced coarse unpalatable growth, which will also constitute a serious fire hazard.

AGROSTOLOGY.

The main pasture activities were confined to the dairying industry and, as in previous years, the work was largely financed by the Australian Dairy Produce Board. Investigations are also in progress at the Bureau of Tropical Agriculture and the Wrotham Park Exploratory Farm. Close contact in an advisory and consultative capacity was maintained with the pasture work being conducted on regional experiment stations and Gatton Irrigation Research Station.

Experiments on dairy farms number 64, and two small trials were located on cattle raising properties. Many of the trials are complex in nature, combining fertilizer and cultural treatments with numerous sown pasture species and also taking cognisance of soil conservation requirements.

District Pasture Surveys.

The Daintree River dairying lands were examined and a farm-to-farm survey completed, special attention being paid to encroachment by blady grass. A report was prepared on lantana infestation of dairy farms in the Mackay district. An examination of the south-eastern coastal dairying lands revealed a strikingly prolific growth of *Lespedeza striata.*

Pasture Introduction.

Seed was harvested from the more promising introduced species being grown at the regional experiment stations and in the plant introduction gardens at Mackay and Rockhampton.

Exploratory Plots.

Nineteen small plots, comprising summer and winter grass and legume species, are being maintained in twelve agricultural districts from the far north to the southern border.

Grazing and Persistence Studies.

The major grazing trial is located at the Bureau of Tropical Agriculture and is discussed under that heading in this report.

On the Atherton Tableland pasture plots established on old maize land, stock preferred scrobic, green panic and molasses grass to Rhodes grass, and green panic and molasses grass successfully competed with weed growth.

At Peachester, buffel grass, green panic, paspalum and Rhodes grass were allowed to seed before grazing. A continuing preference for buffel was so marked that this species was nearly eaten out while Rhodes grass was almost untouched. Similar palatability observations were made at Upper Caboolture and Dayboro. The taller growing grasses, such as green panic and Rhodes grass, appear to have an inhibiting effect on the spread of mat grass. At Dayboro, Kenya Rhodes grass proved more palatable than the common Rhodes strain and it also showed promise in the Mackay district.

Fertilizer Trials.

Marked responses to lime and superphosphate at Conondale and to lime, superphosphate and potash at Peachester were maintained. The treated areas are under observation for residual effect. Areas at Peachester topdressed in the autumn of 1948 were still grazed in preference to untreated areas. At Maleny the heavy application of lime and of dolomite increased the growth of white clover, but the cost of treatment would probably render the practice uneconomic. The response to superphosphate of pilot plots on parts of the Eungella highlands and in the Kingaroy district was marked.

Renovation Trials.

Renovation trials in areas infested by blady grass and mat (or carpet) grass indicated that, where practicable, ploughing, short term cropping, and resowing to grass and legume is the best means of restoring productivity. At Cooroy, disc renovation together with topdressing increased pasture productivity and decreased the mat grass population, but the change was slow. At Worongary, in the poorly drained mat grass infested pastures, shading either by trees or by cut grass depressed the growth of mat grass. Analyses showed that

soil in the shelter of the swamp oaks was higher in phosphate and potash than soil from open land. Heavy discing in this area resulted in thick clover growth and increased palatability.

Contour Furrows.

In the Gympie and Beaudesert districts, contour furrows increased the growth of pastures. Kikuyu grass was established in the furrows, by using cowyard manure carrying seed of the grass ingested during grazing.

Pasture Irrigation.

On land being prepared at Homebush for the flood irrigation of pastures, one annual crop was grazed and a second one planted. The permanent pastures will be established next year.

Pasture Weed Control.

An experiment on the control of bracken fern at Ravensbourne was completed. The hormone weedicides used were ineffective, but sodium chlorate reduced the stand by 50-70 per cent., as did also regular mowing. The effect of management on a molasses grass pasture being invaded by blady grass was studied at the Bureau of Tropical Agriculture.

FIELD CROP INVESTIGATIONS.

Wheat.

A full-scale wheat breeding programme was continued at Hermitage Regional Experiment Station, with the aid of subsidiary rust nursery plots at Dalby, Lawes and Moggill. Natural rust infestation was heavy at Hermitage, enabling selection to operate efficiently upon hybrid progenies. New fixed crossbred strains were introduced into the preliminary replicated yield test, and ten of these exceeded Gabo, the highest yielding standard variety, in yield. Pelshenke testing for gluten quality was considerably enlarged in its scope, and four new selections which are now available for regional testing were subjected to actual milling tests. Such tests placed one of these strains (K_2P_4—4620) in premium quality class, and a second (TSKPF—4601) as producing a straight bread flour of excellent balance and high quality. Florence x College—3813, a late maturing strain with high resistance to both leaf-rust and stem-rust, was submitted for naming as a new variety, and is recommended mainly as a dual-purpose variety for early sowing.

Varietal trials were carried out, mainly on the Darling Downs, but also in the Callide and Dawson Valleys. Results were variable, reflecting the influence of erratic seasonal conditions, but in most trials Gabo, Charter, Kendee, Fedweb 5 and Puseas were among the best.

Gabo was outstanding in yield and freedom from lodging, particularly in the Allora-Warwick section of the Darling Downs, but Kendee gave a slightly better general performance in the trials. Charter yielded well at Killarney and also at Mt. Tyson and Pirrinuan; Puseas also did well at the last two sites.

Within the slow maturing group, the Florence x College strains and Celebration yielded well, while Warput and Ford gave the best dual-purpose performances (early grazing followed by grain production) under dry conditions at Dalby.

New strains of stem-rust were reported to have been responsible for a breakdown in the resistance of such varieties as Gabo, Kendee, Charter and Yalta in southern Queensland and northern New South Wales. The field trials confirmed reports in regard to Yalta and Kendee but not in respect of Gabo, Charter or Fedweb 5. The Florence x College strains maintained their high resistance to both stem-rust and leaf-rust.

Wheat mottling investigations on the Darling Downs covered a wide field, including fertilizers, minor elements, crop rotations and grain analyses. Some years' work may be necessary before any definite conclusions can be drawn, but present indications are that mottled wheat does not always make poor flour, and that mottling cannot be explained simply as a result of low soil nitrogen.

A fertilizer trial at Tannymorel (mean yield, 25.21 bushels per acre) showed increased yields for nitrogen and for phosphate, but these increases were small. An analysis of the mottling percentages showed a significant decrease in mottling with the addition of nitrogen and a non-significant increase with the addition of phosphate. This suggests that the repression of mottling depends on a delicate balance between nitrogen and phosphate (Table 1). Another trial at Allora (mean yield, 33.7 bushels per acre) did not show responses to nitrogen or phosphate.

TABLE 1.
WHEAT FERTILIZER TRIAL.
MOTTLED GRAIN (MEAN PERCENTAGES).

—	No Super.	80lb. Super. per acre.	160lb. Super. per acre.	Means.
No Sulphate of Ammonia ..	62·0	67·7	74·3	68·0
56lb. Sulphate of Ammonia per acre	46·0	47·7	61·0	51·6
Means ..	54·0	57·7	67·7	59·8

Oats.

Selection for rust resistance in hybrid material from the cross (Bond x Victoria) x Hajira, has been advanced a stage during a season of heavy rust infection. While none of the progenies tested showed any resistance to stem-rust, a number were highly resistant to crown-rust. The best of the resistant strains will be increased and made available for further grazing trials.

On the Atherton Tableland, in Central Queensland, in the Central Burnett, in the Beaudesert area and on the Darling Downs, the varieties Victoria x Richland and Fulghum x Victoria have proved to be resistant to crown-rust but susceptible to stem-rust, while the variety Klein has shown partial resistance to both rust species. Victoria x Richland is an early variety which has made a very favourable impression on farmers, particularly in wet coastal areas. Klein shows much promise as a variety to provide late feed.

Maize.

Selection has been continued within the varieties Improved Yellow Dent, Star Leaming, Golden Beauty, and Funk's Ninety Day for

maintenance of varietal standards and provision of seed stocks to farmers. The replicated ear-to-row test within Star Leaming in 1948-49 showed significant differences in yield between progenies from individual ears. Remnant seed from the best six ears was therefore bulked and used to sow a small increase plot in the Mary Valley district.

In the 1948-49 Durum versus Dent trials on the Atherton Tableland, the average yields of the two varieties did not vary greatly (Durum 31.9 bushels per acre and Dent 31.4 bushels per acre). Disease, however, was slightly heavier in the Dent variety with 14.6 per cent. of cobs being diseased against 10.6 per cent. in the Durum variety.

Most of the plant nutrition investigations have been concentrated on the Atherton Tableland. A peanut-maize rotation trial on "forest" soil has been continued for four years. For each of the two years for which data are available there has been a substantial increase in yield from maize following peanuts over maize following maize—40 per cent. in 1948 and 32 per cent. in 1949 (Table 2).

TABLE 2.

PEANUT-MAIZE ROTATION TRIAL, ATHERTON TABLELAND.

Season.	Barren Plants and Yield.	Maize–Maize.	Peanuts–Maize.
1947–48 ..	% Barren Plants ..	10·7	4·4
	Grain (bus. per acre)	26·1	36·7
1948–49 ..	% Barren Plants ..	30·82	23·26
	Grain (bus. per acre)	23·82	31·46

Two green manure-maize rotation trials on "forest" and "scrub" soil respectively have been continued for three years. Data for the second year showed that on "forest" soil there was a 60 per cent. increase in yield where maize followed cowpea compared with maize following maize. On the "scrub" soil the increase of maize following cowpea was insignificant. These results, which are consistent with the fertility status of the respective soil types, are summarized in Table 3.

TABLE 3.

GREEN MANURE—MAIZE ROTATION, ATHERTON TABLELAND.

Soil Type.	Barren Plants and Yield.	Maize–Maize.	Cowpea–Maize.
"Forest" ..	% Barren Plants ..	29·18	16·25
	Grain (bus. per acre)	22·15	35·62
"Scrub" ..	% Barren Plants ..	17·51	16·78
	Grain (bus. per acre)	65·67	69·56

Three fertilizer trials were conducted on the Atherton Tableland. One, on "forest" soil, showed a marked response to nitrogen applied as sulphate of ammonia at 2 cwt. per acre. The grain yield increased from 27·37 bushels to 37·07 bushels per acre. There was no response to phosphorus or potassium. In the previous season, which was drier, a more marked response to nitrogen and a response to phosphorus were obtained. Following these marked responses, the residual effects of the fertilizer were investigated in 1949-50. There was no indication of any carry-over effect of the fertilizer, although the seasonal conditions may have had an important bearing on this result. On fertile "scrub" soil, no response to fertilizer was obtained (mean yield, 58·66 bushels per acre).

In the South Burnett two fertilizer trials were conducted on the red volcanic soils. One on "forest" soil responded to nitrogen and to phosphorus, and showed an interaction between these two nutrients, the response to either one being most marked when the other was present. The other trial was on the more fertile "scrub" soil and no responses were obtained (Table 4).

TABLE 4.

MAIZE FERTILIZER TRIALS, SOUTH BURNETT.

MEAN YIELDS—BUSHELS PER ACRE.

Treatment.	"Forest" Soil.	"Scrub" Soil.
No sulphate of ammonia ..	50·05	61·0
1 cwt. sulphate of ammonia per acre	55·17	66·1
2 cwt. sulphate of ammonia per acre	57·67	64·2
No superphosphate	47·81	63·9
2 cwt. superphosphate per acre..	55·74	64·2
4 cwt. superphosphate per acre..	59·34	63·2
No sulphate of potash	54·17	65·7
1 cwt. sulphate of potash per acre	53·44	62·2
2 cwt. sulphate of potash per acre	55·27	63·4

Sorghums.

Plant breeding was continued at Kingaroy, progress being made in pedigree selection within hybrid families and some newer varieties. The most promising families at present comprise strains of Day Milo x Dwarf Kalo, Kafir x Milo and Wheatland x (Wheatland x Betty). Some fifty progenies from these crosses have reached a high degree of uniformity, and are being multiplied for replicated strain testing. Progenies from the Wheatland x Shallu cross still show considerable variability.

Results of the 1948-49 varietal trial at Kingaroy and the two trials harvested to date this season on the Darling Downs are summarised in Table 5. Because of early frosts the 1948-49 Gayndah trial gave no grain yields, but in a feeding-off test the stock showed a marked preference for Capricorn. The 1949-50 season favoured early maturing varieties on the Darling Downs. The Queensland selection from Early Kalo (E.K.1) has done well, and the recent American introductions, Martin, Plainsman and Caprock, have also proved reliable.

TABLE 5.

RESULTS OF GRAIN SORGHUM VARIETAL TRIALS IN BUSHELS PER ACRE.

Variety.	Kingaroy 1948–49.	Bongeen 1949–50.	Brookstead 1949–50.
Wheatland	47·5	39·0	21·4
Alpha (Wheatland 11S) ..	42·8	95·5	41·5
Caprock	40·1	74·9	25·8
Capricorn (Ex Early Kalo E.K.7)	38·6	71·2	24·3
Martin	21·2	92·1	43·5
Kalo	19·3	89·6	44·5
Hegari	16·6	..	..
Martin A	15·9	..	..
E.K.1	..	89·1	52·6
Plainsman	..	87·9	29·0

PLATE 3.

A Linseed Varietal Trial at Ayr Regional Experiment Station.

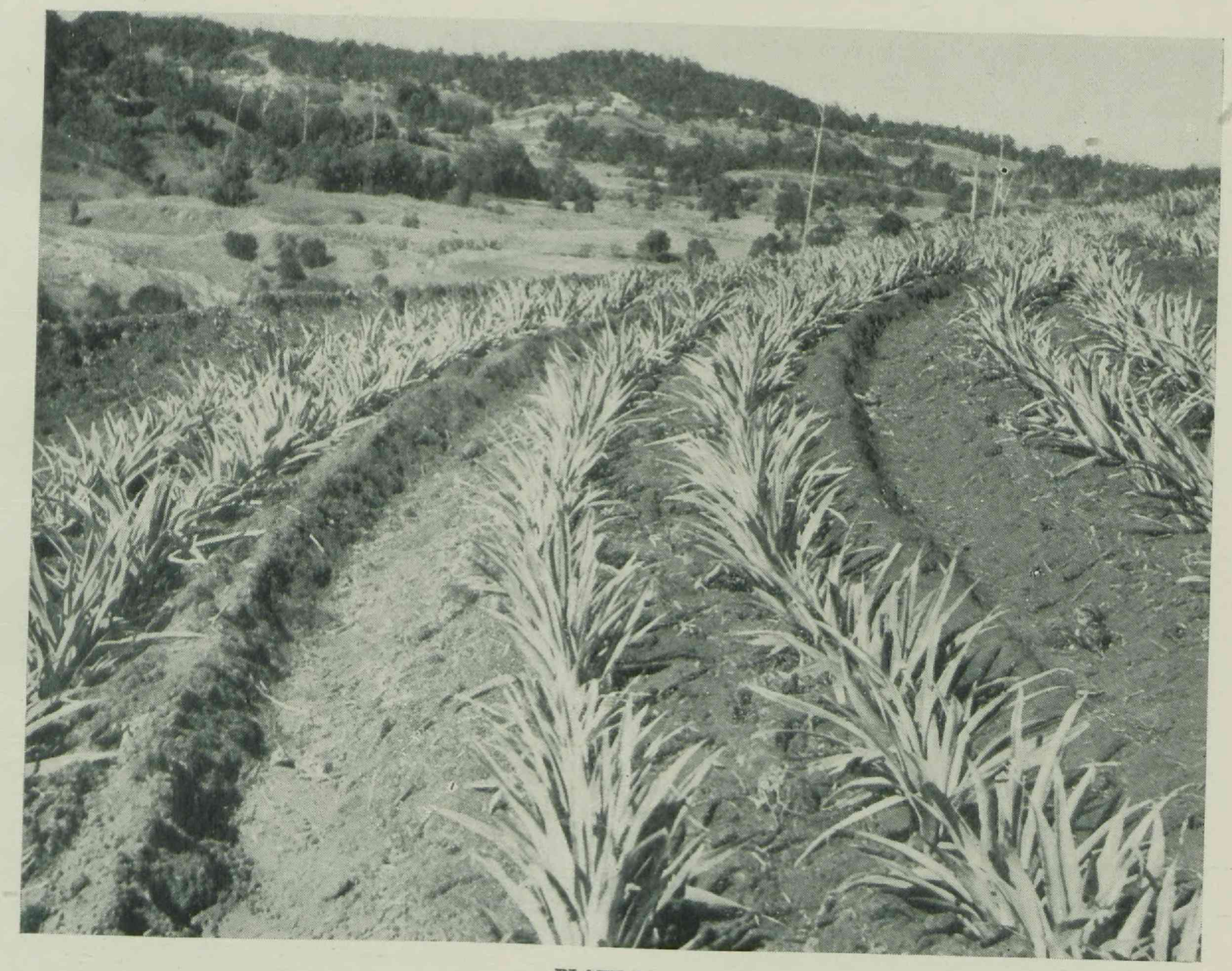


PLATE 4.

Pineapples Planted on the Contour at Maroochy Experiment Station.

The new Queensland grain sorghum variety, Alpha, is now in limited use on farms, and will later be distributed throughout the State. A comparison in yield between Alpha and Wheatland in a series of varietal trials covering a four-year period is provided in Table 6.

TABLE 6.

ALPHA AND WHEATLAND GRAIN SORGHUM YIELDS.

Locality.	Year.	Yield (bus. per acre.)	
		Alpha.	Wheatland.
Biloela	1947	23·4	17·1
Hermitage	1948	36·7	15·0
Biloela	1949	34·3	29·7
Hermitage	1949	94·3	50·5
Kingaroy	1949	42·8	47·5
Brookstead	1949	79·2	75·4
Pittsworth	1949	35·6	44·3
Bongeen	1950	95·9	43·5
Brookstead	1950	41·5	18·9
Mean 1947–50		53·7	38·0

Within the sweet sorghum group, maintenance of pure strains of superior varieties to provide mother seed for seed certification areas is proceeding. In variety trials at Gympie, as in last season's trials at Mackay, the variety Honey was outstanding and it is best for the coastal area (Table 7).

TABLE 7.

RESULTS OF FODDER SORGHUM VARIETAL TRIALS IN TONS OF GREEN MATERIAL PER ACRE.

Variety.	Gympie Trial A.	Gympie Trial B.
Honey	15·0	19·2
Jones	14·0	16·1
Sugardrip	10·5	12·7
White African	10·3	13·7
Atlas	9·4	10·5
Italian	8·2	9·3
Saccaline	8·1	13·9

Prussic acid tests applied to pedigree selections from Roma Sudan grass indicate that one strain is markedly superior to all of the others with respect to low toxicity. There is a possibility of developing a strain of this variety which will be safe for grazing at all stages of growth. Similar tests being applied to pedigree selections of Sweet Sudan grass will be used as a major basis of selection in the purification of this new variety.

Sunflower Seed.

Further study has been made of the hybrid sunflower, Advance. Large seed increases of both male and female parent strains have been harvested, and a crossing plot established at Gatton Irrigation Research Station has assisted in the development of crossing technique. By planting both parent strains simultaneously in alternate pairs of rows, and fertilizing the female rows with superphosphate, the parents have been brought to flower at the same time, thus ensuring optimum conditions for crossing.

In a varietal trial at Toowoomba (Table 8), seasonal conditions greatly favoured the quick maturing dwarf varieties (of which both strains of Advance were impressive) in comparison with the slow maturing Giant Russian. Reviewing the last three seasons' work, it is clear that the varieties offering the best chance of good seed and oil yields on the Darling Downs are Giant Russian and Advance.

TABLE 8.

RESULTS OF SUNFLOWER VARIETAL TRIAL AT TOOWOOMBA.

Variety.	Lb. Seed per acre.	% Oil (solvent extract).	Lb. Oil per acre.
Advance (local seed) ..	1,008	25·4	260·2
Advance (ex Canada) ..	970	22·8	231·9
Mennonite	884	22·6	213·2
Sunrise	791	24·8	201·9
Giant Russian	717	24·6	175·4

Linseed.

A linseed fertilizer trial at Evanslea was hampered by unfavourable seasonal conditions and the yields were low. There was a suggestion that the increased yield of from 4·87 bushels to 5·58 bushels per acre as a result of applying 122 lb. superphosphate per acre may have been significant. The corresponding yields of oil were 95·42 and 112·58 lb. per acre.

In a rate of seeding trial at Pittsworth, using rates between 18 lb. and 32 lb. per acre, there was little difference in yields.

Experience in Queensland with linseed strongly suggests that time of planting is an important factor in yields. In a time-of-planting trial at Westbrook, the best yields came from the mid-June and mid-July plantings. There was much green growth at harvest time, due to the late rains, and pre-harvest seed losses were higher in the early than in the later sowings. Of all treatments, mid-July planting provided the best crop for mechanical harvesting.

Navy Beans.

No response to treatment was obtained in the phosphate fertilizer trial conducted on the eastern Darling Downs in the 1949 season. The mean yield was 30.6 bushels per acre.

Soybeans.

Further progress has been made at Kingaroy in the sorting out of soybean strains suited for seed production and others showing promise for green manure and green feed. Yield trials have been established, including the eight varieties selected as most suitable for mechanical harvesting.

Cowpeas.

Purification of Reeves cowpea is proceeding, and one progeny has been reserved for special increase. The best of a number of other hybrid selections are six strains from (Victor x Large White) x (Skewbald x Poona). These strains will be tested for wilt resistance in northern sugar-cane districts, with a view to liberating the best as a new variety.

Peanuts.

Two fertilizer trials designed to investigate the responses of peanuts to different forms of phosphate and to potash on a scrub and a forest soil were established in the Kingaroy district.

Potatoes.

Fertilizer trials conducted in the Lockyer, Fassifern, and Lower Burdekin Valleys have again shown that nitrogen is the plant nutrient most deficient in the potato soils of these districts. There were no indications of responses to either phosphorous or potassium (Table 9).

TABLE 9.

MEAN YIELDS OF FIRST GRADE POTATOES (TONS PER ACRE).

Treatment.	Ayr R.E.S.	Kalbar.	Woodbine, *via* Gatton.
No sulphate of ammonia ..	3·84	5·10	5·53
2 cwt. sulphate of ammonia per acre	4·52	6·85	5·94
4 cwt. sulphate of ammonia per acre	4·88	6·12	6·15

At Ayr the increased yields resulting from applications of 2 cwt. and of 4 cwt. sulphate of ammonia per acre were similar to the results recorded in the previous year.

The trial at Woodbine in the Lockyer, on an area which had previously been cropped to lucerne for some years, showed that good average yields were obtained and that fertilizers were of no benefit. This adds weight to the opinion that leguminous green manures or rotational crops will supply all or most of the nitrogen required for a succeeding potato crop in the Lockyer Valley potato soils.

Although the trial at the Gatton Irrigation Research Station gave good average yields without any clear response to fertilizer, there was a suggestion of a response to 2 cwt. sulphate of ammonia per acre. The mean yield was 5.8 tons of first grade tubers per acre.

Some interesting data were obtained from a trial at Gatton Irrigation Research Station following a fallow and the turning under of some green manures (Table 10). The highest yields followed a bare fallow and a good crop of field pea, while non-legumes had a depressing effect on yields. The trial was in an area where responses to added nitrogen have not yet been obtained, and it seems that the availability of the nitrogen in the soil here is of much greater significance than the total amount in relation to the potato crop.

TABLE 10.

MEAN YIELDS OF POTATOES (TONS PER ACRE) FOLLOWING BARE FALLOW AND GREEN MANURE.

Green Manure Crop.	First Grade.	Total.
Fallow	4·84	6·11
Field Pea	4·84	6·10
Peas and Wheat	4·53	5·66
Lupins and Weeds	4·09	5·21
Barley	3·84	5·10
Wheat	2·61	3·76

Spray irrigation again proved better than furrow irrigation in a combined irrigation and variety trial at Gatton Irrigation Research Station, the difference in yield of first grade tubers being .61 tons per acre. Although Sebago and Saranac both yielded better than the standard variety Factor, only the difference in favour of Sebago was significant. The mean yields were 6.02, 4.67 and 4.17 tons per acre for Sebago, Saranac and Factor respectively.

Bismarck, Saranac and Sebago gave significantly better yields than the standard variety Factor in a trial at Boonah. In the same trial it was shown that a 12 inch sett spacing gave a significantly higher total yield than either the standard 15 inch or an 18 inch spacing and that both 12 inch and 15 inch spacings were significantly better than the 18 inch spacing for yield of first grade tubers.

Bismarck also significantly outyielded Factor by more than one ton per acre in a variety trial at Ayr.

Sweet Potatoes.

In a trial at Mackay the varieties Porto Rico (13.0 tons of tubers per acre), White Maltese (11.2 tons), and Abundance (11.2 tons) were the best yielders. Porto Rico and Abundance are both excellent for cooking purposes.

Onions.

Storage tests indicated that brown onions stored better than white types, that immediate pre-harvest conditions were important in storage capability, and that onions from heavy clay loam behaved similarly in storage to those from light sandy clay loam, the other soil type used. A varietal trial has been planted at Rockhampton and a varietal x time of planting trial at the Gatton Irrigation Research Station.

Tobacco.

New pure seed stocks have now replaced all previous stocks, and bulk seed of the new varieties Hicks, Yellow Special, 400, 401 and 402 have been made available to farmers to supplement older established varieties. Other work on tobacco is discussed under the heading of "Tobacco Experiment Farms."

Cotton.

Pedigree selection and strain building have been continued within jassid-resistant back-cross selections, and strains of the commercial varieties Miller, New Mexico Acala and Triumph. In a season in which jassid attack was more severe than for many years past, the resistance of the Miller back-crosses to this pest was most striking. The best strains within this group combined jassid resistance with uniformity, open fruiting habit, and suitability for mechanical harvesting.

Unusually severe frosts in June, 1949, caused unsatisfactory results again from the various trials in the Lower Burdekin.

The results of the 1948-49 trials did not provide a reasonable comparison between varieties except at Gatton Irrigation Research Station. Although the average yield here was 1,563 lb. seed cotton per acre, there were no pronounced differences between varieties.

Lucerne.

A fertilizer trial at Bunjurgen, near Boonah, showed a significant response to gypsum on green weights, but not to any other sulphate. Superphosphate, potash and some trace elements were also without effect. The average weight of green material per acre was 5.02 tons. A similar trial has been established at Beaudesert with the principal object of further investigating the effect of sulphur-bearing soil amendments.

TOBACCO EXPERIMENT FARMS.

Experimental work was continued at Mareeba, Ingham, and Ayr, but because of shortage of skilled labour a reduced programme was undertaken at Ingham and grading of leaf was omitted. Appraisal values for the leaf from Mareeba and Ayr for the 1949-50 trials have not been received, so final analyses of the data cannot be given here.

As in the previous year, facilities were provided at Clare Tobacco Experiment Farm for investigations by officers of C.S.I.R.O. into problems associated with plant breeding, water requirements of the crop, and leaf quality determinations.

Mareeba.

No significant differences between treatments appeared when the 1948-49 fertilizer trial results were examined on the basis of appraisal values.

In the muriate versus sulphate of potash trial, the chlorine content of the leaf was higher for muriate than for sulphate in the case of lugs and tips, but was lower for muriate in cutter leaf.

There was no difference in value per acre between tobacco grown with nitrate of soda as the inorganic nitrogenous fertilizer and that grown with sulphate of ammonia, indicating that in this trial the former had no special influence on leaf quality.

A fertilizer trial and a varietal trial were grown in 1949-50, and the crop rotational experiment already established was continued. A further rotational trial involving peanuts, cotton and velvet beans as well as tobacco was set out. Tobacco plants made good growth in each case following Gambia pea, Rhodes grass and maize. General progress in the varietal trial was satisfactory, the average yield being 1,403 lb. of leaf per acre.

Abergowrie College, Ingham.

Appraisal values for the leaf from the 1948-49 trials showed that the highest nitrogen application returned the highest value per acre in the fertilizer trial, while in the varietal trial, Yellow Special, Yellow Mammoth and 402 gave the best monetary returns.

In the fertilizer trial and the varietal trial for 1949-50, analyses of total plot yields showed no significant differences.

Clare, Ayr.

Yellow Special and Hicks were the best varieties when the 1948-49 leaf was analysed on appraisal values, but no significant differences between treatments were shown in the fertilizer trial.

Chemical analyses of leaf which had been sprayed with DDT weekly during its growth indicated that the chlorine content of the leaf was not increased by this treatment. Samples of sprayed leaf averaged 0.8 per cent. chlorine and of unsprayed 1.0 per cent.

Trials in 1949-50 included investigations of irrigation methods, examination of soil types other than the Burdekin fine sand with regard to suitability for tobacco growing, and the continuation of the crop rotation trial which had already been established.

There were no appreciable differences between furrow and spray irrigation methods based on yield figures alone. From observation pilot plots on Landers sandy loam, Clare loam and Clare sandy loam compared with Burdekin fine sand, yields of good saleable leaf were 1,466 lb., 1,487 lb., 1,771 lb. and 1,600 lb. per acre respectively, indicating that all these soil types are suitable for tobacco growing. The rotational trial made excellent progress and gave an average yield of 1,832 lb. per acre. It is considered that this phase of the investigations is most important in relation to the stabilisation of tobacco growing in the Lower Burdekin.

BUREAU OF TROPICAL AGRICULTURE.

Pasture investigations have been continued, completing the fourth year of trials with grazing animals and the second year over which the liveweight gains of animals have been recorded. Other activities have included rice, tea and fibre plant investigations.

Pastures.

The year was rather dry, especially between July and December, but approximately 102 inches of rain fell from January to May inclusive, resulting in lush growth of pastures and some harmful waterlogging of the cultivated fields.

Wide variations are now beginning to show up in the pasture treatments. The mixture of molasses grass and puero (*Pueraria phaseoloides*), which has given good results to date, is now deteriorating. The mixture of purple topped Guinea (*Panicum maximum* var. *coloratum*) and centro (*Centrosema pubescens*), however, gave better results than any other treatment this season and looks very well.

The established pasture mixtures have made excellent growth at Utchee Creek, but shortages of labour and material have continued to be a problem. It is hoped that the large scale grazing trial will be commenced next year.

Rice.

The highest yielding variety in the varietal trial (see Plate 6, facing page 28) was Q2309 (59 bushels of paddy per acre), while in a trial at Tully Q2461 with 45 bushels of paddy per acre performed well under upland conditions. Sufficient data have been accumulated over the last three seasons to enable some of the less desirable varieties to be discarded. Those which do not hold their grain well when mature and those which lodge badly are considered unsuitable.

The 1949-50 varietal trials, harvest results of which are not yet available, have been restricted to nine varieties and it is expected that this number will be further reduced for

next season. Areas to provide bulk seed for distribution to approved farmers were planted and harvested.

Tea.

A considerable amount of information has been accumulated from the tea harvesting trial (see Plate 5, facing page 28). The quality of the tea produced has exceeded expectations and the product, though made with improvised manufacturing equipment, has been well commended by trade tea tasters.

On the basis of harvesting results from the trial, one man can harvest 4½ lb. of freshly plucked leaf equivalent to .9 lb. of black tea per hour; that is, under the labour conditions at the Bureau it costs 3s. 11d. to harvest a pound of commercial tea. With more experienced labour and piecework rates, this cost could be reduced appreciably.

It seems clear that the cost of harvesting will be the limiting factor in any future development of the tea growing industry in North Queensland. Mechanical harvesting equipment has been ordered, and this will be used to examine closely the prospects of solving the labour problem in tea harvesting.

Fibre Plants.

Small plots of two varieties of jute (*Corchorus capsularis* and *C. olitorius*) were planted, but the crop did not thrive in the waterlogged soil. A plot of kenaf (*Hibiscus cannabinus*) was also planted; these plants survived the wet soil conditions which had been so harmful to the jute. An observation plot of pink burr (*Urena lobata*) is to be planted with the other fibre plants for comparison. The ramie plants were again injured by Rhyparida beetle, resulting in stunted growth.

GULF EXPLORATORY FARM.

Despite numerous supply difficulties, an exploratory farm was finally established on 100 acres of plain country leased on Wrotham Park, about 60 miles north-west of Chillagoe. During the first year's operations, 25 acres of land were broken up and sown with various fodder crops, mainly of the sorghum group. The main interest is centred on how long into the dry winter and spring the several plantings (especially that of early April) will provide succulent feed superior to the natural pasture.

The major indications from the first year's work are:—(1) successful cropping on virgin land requires good seed-bed preparation to overcome the prolific regrowth of Flinders grass and to promote thorough decomposition of dry pasture residues in order to avoid soil nitrate irregularities; (2) although the soil is deficient in phosphorus, superphosphate applications at the rate of 112 lb. per acre did not benefit sorghum, but Flinders grass, Poona pea and native pasture legumes gave very pronounced yield increases; and (3) cultivation resulted in a much greater body of feed being available per acre than was the case in adjoining pasture. More than ten tons of green matter per acre was provided by fodder sorghums planted in January, compared with less than three tons from unfertilized natural pasture. Some January planted grain sorghum plots yielded at a rate exceeding 40 bushels of grain per acre.

In addition to the work on the exploratory farm, the Department was interested in a number of trial plantings of fodder crops on cattle and sheep stations in the drier areas south of the Gulf of Carpentaria. The results were spectacular in many cases, but there were some failures; these were mainly due to the selection of sites unsuitable for cultivation or to faulty seed-bed preparation.

FODDER CONSERVATION.

A number of silos, both pit and tower types, were constructed through the medium of the services provided by the Department, and three tower silos for grain storage on the farm were included in the number. The demand for these services from farmers remained steady, but the wet summer in most dairying districts did not favour silo construction.

The need for fodder conservation measures, especially on dairy farms, was publicised at field days, at numerous country shows by the display of exhibits and in published articles. Shortages of labour and machinery, however, continue to retard the expansion of fodder conservation. Farmers have shown little activity in the formation of machinery pools.

Report of the Horticulture Branch.

Dr. S. A. Trout, Director of Horticulture.

CROP PRODUCTION.

Pineapples.

Pineapple plantings showed an upward trend and the 1950 harvest is expected to be nearly two million cases. During the summer, heavy rains upset plantation operations, but a good winter crop is expected.

The relatively high returns obtained from the crop have attracted many new growers into the industry, and a heavy demand is being made on advisory services. Yields are lower than they should be owing to the excessive use of inferior planting material, but the pineapple selection work has now reached a stage where limited amounts of high-quality planting material can be distributed.

Sodium pentachlorphenate proved to be an effective weedicide and should ease the weed problem during the summer months when wet weather interferes with cultivation.

Studies in the physiology of flower induction and pineapple nutrition were continued. It may be noted that the synthetic hormone alpha naphthalene acetic acid has now largely replaced acetylene in the commercial control of flowering.

At the Ayr Regional Experiment Station, an area of 29 acres has been assigned to pineapples. The crop will be grown under irrigation and managed on a rotational system with a five-acre planting each year. Three of these will form a part of commercial planting from which costing data can be obtained; the other two will be used for experimental work designed to show how the crop should be handled in North Queensland.

Bananas.

The banana industry shows no signs of returning to its output of a decade ago and current plantings are not sufficient to maintain the acreage under crop. In 1950, the area under bananas was 12,862 acres, compared with 13,517 acres in 1949.

The northward spread of bunchy top has apparently been checked. Plantings of tall varieties susceptible to Panama disease are now permitted only after the source of planting material has been inspected.

Current research work on the crop is mainly concerned with the control of bunching. The aim is to determine whether the depth of the offshoot or the time at which it is thrown in terms of season and the age of the parent plant has any bearing on growth and fruiting habits in ratoon crops.

Considerable interest is being shown in the possible value of hormone weedicides for the destruction of old plantations.

Papaws.

The 1949 spring harvest opened with a heavy crop of well-shaped fruit, but first quality papaws were not available until warm weather reduced the wastage from fruit rots and improved the colour of the rind and flesh.

Pure seed of the Departmental varieties Bettina and Improved Petersen was distributed to growers in spring by the Queensland Acclimatization Society. The demand far exceeded the available supplies and the position will not be satisfactory until the pure-seed area at Redlands comes into bearing. Both varieties are now being tested in all papaw producing districts.

In a trial at Maroochy Horticultural Experiment Station, heavy dressings of lime were associated with star cracks on the skin of the fruit. Similar blemishes have been recorded elsewhere in commercial plantations. It is now considered necessary to use lime only on very acid soils.

Deciduous Fruits.

The deciduous fruit season opened well with good spring rains in the Granite Belt and a very heavy blossoming in both pome and stone fruits. Subsequent conditions were unbalanced, dry weather in November and December being followed by excessive rains which lasted well into the autumn. Shedding was, therefore, heavy and the crop harvested was little better than normal.

At Stanthorpe, plantings in 1949-50 exceeded 1,000 acres, but the majority of these plantings were on replant land. Good orchard management and correct soil treatment will be needed if replant orchards are to pay their way. In coastal districts, plantings of the Muscat Hamburg variety of grapes for the early market are greater than usual.

Apple rootstocks released by C.S.I.R.O are now being made available to growers through the Deciduous Fruit Sectional Group of the C.O.D. Three new stocks of particular interest are Merton 778, Merton 793 and Merton 789, all of which should prove better than Northern Spy for the important varieties of apple grown at Stanthorpe. Merton 789, however, is not recommended for Jonathan.

Citrus.

Rind blemishes due to Maori mite and melanose were more severe than usual, but the local market has been well supplied with good fruit. Queensland-grown mandarins are exceptionally good and growers have a competitive standing in southern markets which they cannot acquire with oranges, except perhaps very early in the season. An expansion of the area under mandarins and an extension of the harvesting period are desirable. New and improved varieties would do much to bring this about and breeding work on these lines has therefore begun.

The citrus budwood scheme operated satisfactorily during the year, approximately 100,000 buds and 187 lb. of seed having been supplied at a relatively low cost to nurserymen. Current orders indicate a trend away from rough lemon as a rootstock for some types of citrus.

Observations were made on a frost protection project in a nursery at Mundubbera. Frost protection by oil burners is not economically sound, but good results were obtained by a light sprinkler irrigation when temperatures fell

below 28°F. The effect of such irrigation is probably due partly to the relatively high temperature of the river water used and partly to the prevention of ice formation on the leaves.

Many citrus soils are singularly short of organic matter and a number of summer green manures were, therefore, studied at Gayndah and at Howard. Good crops of L.W.S.M. and some other newly developed strains of cowpea were grown, but the more woody Crotalarias, with the possible exception of sunn hemp, proved unsatisfactory. The use of green manures in bearing orchards may interfere with cultural operations and the crop sometimes competes with the trees for the available soil moisture. Greater interest is, therefore, being shown in mulching techniques. Work done on this subject suggests that heavy mulching with a bulky crop grown outside the orchard and carted onto it at the end of the wet season has distinct possibilities.

Avocadoes.

The current season's avocado crop has been better than usual, the fruit being well filled and very attractive. Field observations show that irrigating the variety Fuerte when the crop sets in spring increases yields considerably.

The avocado industry is still relatively young and the main requirements for the development of the industry are a more certain method of propagation, careful selection of soils for the orchard, and a consumer awareness of the stage at which the fruit should be eaten. These matters are receiving attention.

Miscellaneous.

The current season's crop of Macadamia nut has been good in most districts, with little damage from insect pests and generally a high quality nut. Existing plantations are based on seedling trees, each of which differs from its neighbour in habit of growth, the type of nut borne and its cropping potential. Work on the crop, therefore, aims at selecting trees of superior strains and devising suitable propagation methods.

Commercial production of custard apples is confined to the metropolitan district and most growers have a long experience with the crop. There is an increased interest in the crop at Redlands, where tall varieties of bananas are becoming unprofitable owing to the high incidence of Panama disease.

Fig growers had an excellent season in the metropolitan district, where both White Adriatic and Brown Turkey came through the wet season with little injury from either pests or diseases.

Strawberries.

Yields from the strawberry crop in 1949 were heavy and the quality of the berries well up to average. Markets for fresh fruit opened up by air transport and a steady, unsatisfied factory demand ensured payable returns to the grower. Growers are increasingly conscious of the fact that a good crop can only be expected from runners taken from plants which are free from yellow edge or crinkle virus disease. There is accordingly a heavy demand for runners from crops approved by the Department as sources of planting material.

Strains of the main commercial variety, Phenomenal, differ in their times of maturity and their productivity. An area has therefore been planted at Redlands Horticultural Experiment Station for the purpose of selecting a uniform type of plant without which experimental work on fertilizer requirements and cultural practices cannot be satisfactorily carried out.

Tomatoes.

During the current season diseases caused heavy losses in both the seed-bed and the field. At times, the market was undersupplied and much inferior fruit was offered for sale.

The certified varieties, Q1, Q2, Q3 and Q4, released by the Department in 1949, performed well. The demand for seed of the early maturing type Q1 was very heavy. Although specially recommended for the Stanthorpe district, all four varieties have been grown extensively elsewhere. Many growers are using the certified seed as a source of planting material from which they can make selections adapted to their own soil type. About 1,750 oz. of certified seed of Q1, Q2 and Q3 produced during 1949-50 are available for the coming season. The crop grown for Q4 seed failed to comply with the prescribed standards.

Under some conditions, all the more important tomato varieties show defects. Factors associated with these disorders are being investigated.

Leaf Vegetables.

So far, 1950 has been a bad year for leaf vegetable crops, mainly owing to losses in the seed-beds during the wet late summer and autumn. The few early crops harvested were characterised by small heads of indifferent quality. Mid-season crops promise reasonably well.

During the past two years, several varieties of cabbage and cauliflower have been under test and recommendations for both crops have been made. The Snowball strains of cauliflower showed up well in the trials. The lettuce variety position is also reasonably good, at least for the cool weather crops.

Beans.

In 1950, early crops encountered very wet weather. Faulty land preparation was common and field losses were high. However, mid-season crops bore very well and excellent beans were marketed.

Bean production continues to expand in southern Queensland, mainly because air freight services have opened up more distant markets. Departmental work on the crop has standardised varietal usage and fertilizer practice. There is, however, considerable room for improvement in both yield and quality of the Brown Beauty bean. Strains of widely different vegetative and fruiting character have therefore been selected and the best of them will soon be built up as mother seed for certified crops, thus increasing the types being certified.

Pepper.

The recent upward price trend of pepper suggests that the State should produce its own requirements. Planting material is not available here and steps have been taken, therefore, to obtain both seeds and cuttings from Malaya.

HORTICULTURAL EXPERIMENT STATIONS.

Maroochy.

The mass selection project in pineapples covers about ten acres of land and severe culling has been necessary to maintain and improve plant type. This work has now been supplemented by clonal plantings, the study of which should supply information on the stability of inheritance within the type.

The citrus area assigned for the production of budwood and the study of stock-scion relationships has made good progress.

The papaw breeding block occupies about an acre of ground. The present pure types will be maintained; some others will be purified further; and the possibilities of using hybrid vigour in the crop will be investigated.

Approximately two acres of bananas were planted in 1949, and the first bunches should be thrown in spring. Experimental settings of the followers will begin shortly and should show the effect of management methods on both the cropping capacity and the commercial life of the plantation.

Plantation crops are now planted on the contour (see Plate 4, facing page 20), but this may not be a complete solution of the problem of hillside farming. A compromise between contour and sectional drains may be the outcome of soil conservation studies on the pineapple crop.

Mulching is becoming a standard practice and the system of station management is being modified accordingly. Land which is not suitable for horticultural crops has been set aside for the production of mulch crops.

Redlands.

Four acres are under crop and another four should be added during the coming year. Two acres are allocated to an experiment in which the effect of leaving crop residues on the top of the ground is compared with normal cultivation practice. The cropping sequence on this area gives ample scope for varietal trials with the more important vegetable crops.

A papaw strain trial was planted in autumn in conjunction with supplementary trials established elsewhere.

Kamerunga.

On this experiment station, problems associated with fruit and vegetable production in the tropics are being investigated. Much of the land is still being reconditioned, but valuable collections of mango and papaw strains are maintained for detailed study. Two tomato trials carried out during the year demonstrated that many southern varieties cannot tolerate northern tropical conditions. The need for disease resistance in all fruits and vegetables grown in the humid tropics is a paramount consideration in this type of work.

About one acre of land cleared on the southern boundary will be planted shortly with rough lemon trees to supply the seed requirements of nurserymen.

REFRIGERATED TRANSPORT.

Tests have been carried out in conjunction with C.S.I.R.O. to determine the insulating properties of a four-wheeled A.B.G.F. railway wagon with an approximate tare of five tons and an eight-wheeled C.M.I.F. wagon with an approximate tare of ten tons. The wagons have been proved to be suitable for carrying fruits and vegetables over long distances provided they are regularly re-iced. Although cooling occurs during transit, a marked improvement in condition over non-refrigerated consignments cannot be expected unless the load is adequately precooled before loading.

STORAGE TESTS.

Citrus.

Storage tests were carried out with Late Valencia oranges to determine whether the marketing period could be extended by cool storage. Low temperature injury developed after one month at 40 deg. or 45 deg. F.

Cool storage treatments have been found to be an effective means of killing fruit fly in infested apples, but it would appear from preliminary investigations with Emperor mandarins that the recommended treatment of 12 days at 34 deg. F. results in severe skin injury.

Onions.

Considerable quantities of onions are exported interstate and overseas, and storage tests were therefore carried out in conjunction with field trials of the Agriculture Branch. The conditions of storage were equivalent to those in unrefrigerated cargo spaces in which foodstuffs are carried to countries north of Australia.

Varietal differences in storage behaviour were noted, the brown being superior to the white type of onions. Weather conditions prior to harvesting, and treatment between harvesting and storage, had a considerable influence on storage behaviour.

WASTAGE.

Citrus.

Citrus fruits grown in Queensland appear to be particularly susceptible to mould development, and heavy losses occur during local marketing. Trials carried out in conjunction with the Science Branch indicate that wastage can be considerably reduced by dipping the fruit in a solution of borax or salicylanilide. The former treatment, however, caused severe skin injury. Further tests are in progress.

Bananas.

Abnormal ripening of bananas characterised by rubberiness occurs in winter ripened fruit in southern plantations and has recently been recorded in summer grown fruit and in northern districts. The available evidence indicates that the condition is confined mainly to the first cut from plants grown on virgin scrub or forest soil. Investigations are being

planned to determine whether soil conditions are a contributing factor or whether abnormal ripening is associated with any chemical or physical constituent or with enzyme activity.

Pineapples.

Conditions during the summer were extremely favourable for the development of water blister, and large losses occurred in interstate consignments and in factory fruit which could not be processed on the day of arrival. More growers are adopting the recommended control measures. A colour film illustrating the correct methods of harvesting, handling and packing for various markets and for the factory has recently been made. It is hoped that visual instruction will form an integral part of extension activities.

Further investigations have been made on factors associated with the development of black heart. This form of cold injury can be induced by severing portion of the stem of the fruit; the affected portion has a lower carbohydrate content than the healthy tissue. No difference in black heart incidence between fruit borne on healthy and unhealthy plant crops has been noted, but in the ratoon crop significantly less black heart affected fruit was borne on healthy plants. Cultural conditions are important, and the effect of trace elements is now being investigated. Black heart incidence was not affected by ripening conditions after harvesting. The rate of fall in temperature during growth appears to be of greater significance than the mean minimum temperature.

MATURITY INVESTIGATIONS.

Grapes.

Trials involving chemical and tasting tests on five varieties of grapes picked at different stages of maturity from a number of orchards in the Stanthorpe district and carried on for three seasons, have now been completed. The prescribed standard is based on the density of the expressed juice, and this has been related to sugar content and to palatability. The standard of 1.066 may have to be raised for the sweeter varieties.

Citrus.

Physical and chemical measurements and palatability tests have been made on citrus fruits picked from the more important districts over several seasons, and although acid values of the 1950 crop were low the samples were not acceptable on a palatability basis until after the main crop had been marketed. The slow development of flavour and the relatively low acid content this year were probably associated with abnormally heavy rains during growth.

Pineapples.

Further investigations have indicated that both the winter and the summer crops are normally harvested at a stage of maturity which complies with the prescribed colour and sugar standards. There was a significant correlation between total solids as determined by the Brix hydrometer or refractometer and the total sugar content estimated chemically. Readings, however, must be taken on the expressed juice of the whole fruit.

RIPENING.

Bananas.

Further observations have been made on methods of ripening bananas, with particular reference to the control of conditions during the early stages of ripening. Some of the methods employed commercially are costly and result in excessive weight losses.

Papaws.

The artificial ripening of papaws, employing higher temperatures than those used for bananas, is being used extensively for the winter crop. By this method, skin blemishes which develop when the fruit is allowed to ripen slowly on the tree can be largely avoided and the harvesting can be spread more evenly. Observations are being made in conjunction with commercial ripeners on the optimum stage of maturity and other factors influencing quality.

PROCESSING.

Canning of Bananas.

The value of various anti-oxidants in preventing the darkening of bananas during canning is being investigated and recent results are of distinct promise. The bananas maintained their fresh colour, texture and flavour after canning, but storage tests are necessary before commercial application can be recommended.

Pickling of Onions.

Due to abnormally wet conditions preceding harvesting, considerable losses in pickling onions occurred because of incorrect processing methods. Overseas methods are not applicable to Queensland, where conditions during summer result in rapid spoilage. Bacterial action can be completely arrested by holding in a 20 per cent. salt solution. However, in order to obtain an attractive and well flavoured article, curing in lower salt solutions is necessary to enable lactic acid fermentation to proceed. For this purpose a 10 per cent. salt solution has been recommended, but in tests only 0.2 per cent. lactic acid was obtained after six weeks treatment. Further investigations will be made with lower salt concentrations.

QUICK FREEZING OF TROPICAL FRUITS.

Preliminary experiments on methods of preserving pineapples and bananas by quick freezing methods have been completed. The selection of fruit at the optimum stage of maturity is more important for quick frozen than for canned foods. The latter process can develop latent flavours in immature fruit and destroy over-ripe flavours in very mature fruit. In quick freezing, abnormal and objectionable flavours frequently develop in both immature and overmature fruit. The results have indicated that prompt and rapid freezing at –20°F. is necessary to obtain a pack of good texture and colour, while the addition of sugar improves the flavour. The addition of ascorbic acid or other anti-oxidants is necessary to prevent darkening, especially in fruits such as bananas which discolour very rapidly on cutting. Overseas markets are at present available for all processed foods, and quick freezing offers distinct promise as a means of transporting tropical fruits. A considerable

PLATE 5.

Harvesting Tea at the Bureau of Tropical Agriculture, South Johnstone.

PLATE 6.

Upland Rice Varieties at the Bureau of Tropical Agriculture, South Johnstone.

saving in tinplate could be effected, as quick frozen products are packed in cellophane lined cartons. Quick freezing as a means of concentrating fruit juices warrants investigation.

PACKING.

Packing Instruction.

The presentation of commercial packs shows considerable improvement as a result of Departmental instruction in methods of handling and packing. The difficulty of transporting pineapples to western Queensland towns has now been largely overcome by selecting fruit for these markets from growers approved under the Special Pack Scheme. In conjunction with the Department of Public Instruction, a further series of school packing classes is being held in the Maroochy district.

Cardboard Packages.

Acute shortage of timber for casemaking has necessitated attention being given to cardboard packaging. A container made of heavy cardboard, weighing approximately 3 lb., and of the same size, measurement and capacity as a half-bushel dump case, has proved satisfactory for the carriage of tomatoes from Stanthorpe to Brisbane. The case requires no nails and has the additional merit of being collapsible and returnable. Tests are being made on railings to Sydney with the winter crop of tomatoes.

EXPORTS OF FRUITS AND VEGETABLES.

During 1949-50, major exports through the port of Brisbane were 44,355 cases of apples and 2,800 cases of citrus. The quantity of apples exported is approximately 10,000 cases more than last year, due mainly to a larger crop of Granny Smith apples and to very favourable overseas markets. Most of the consignments are being carried in refrigerated holds and the out-turn is very much better than in unrefrigerated spaces. Only a small quantity of pineapples has been sent to New Zealand this year, as most of the crop has been canned. Considerable quantities of frozen strawberries and pineapples were consigned overseas, the amounts being 336 4-gallon tins of frozen strawberries, and 3,122 4-gallon tins and 18,795 cartons of frozen pineapple.

Regulations have been drafted for pineapples, restricting export to approved packing establishments and prescribing methods of harvesting and packing.

MARKET INSPECTION.

Heavy rains prior to harvesting caused large losses from moulds, particularly brown rot, and considerably affected the quality of many fruits. Condemnations therefore were particularly heavy, especially for stone fruits and tomatoes. Grade standards for all fruits and vegetables of commercial importance in Queensland have now been drawn up and their introduction should improve the standard of produce marketed. Wall sheets illustrating the requirements of the Regulations under the *Fruit and Vegetables Act* are being prepared for circulation to growers and distributors.

C

QUARANTINE.

Additional quarantine officers have been appointed to cope with inspection of the large quantities of plant material being imported into Queensland. Quarantine regulations have been drawn up for cotton, timber and nursery stock.

INTERSTATE TRADE.

The following quantities of fruit and vegetables were exported to and imported from other States during the year:—

EXPORTS.

Commodity.	Quantity.
Apples	85,069 cases
Avocadoes	2,745 cases
Bananas	109,285 cases
Custard Apples	9,310 cases
Grapes	47,494 cases
Lemons	6,060 cases
Mandarins	5,050 cases
Mangoes	40,653 cases
Melons	13,776 cases
Oranges	11,388 cases
Papaws	42,710 cases
Passion Fruit	3,760 cases
Pears	2,193 cases
Pineapples	450,791 cases
Strawberries	618 trays
Fruit (Various)	23,246 cases
Grape Fruit	4,456 cases
Citrus (Various)	50,296 cases
Beans	141,595 cases
Beetroot	23,492 cases
Cabbages	15,892 bags
Carrots	4,915 bags
Chillies	660 cases
Chokos	1,858 cases
Cucumbers	75,762 cases
Ginger	3,156 bags
Marrows	30,319 cases
Onions	169,632 bags
Peas	5,580 cases
Plants	1,042 cases
Potatoes	74,851 bags
Pumpkins	226,314 bags
Seeds	1,785 bags
Sweet Potatoes	22,805 bags
Tomatoes	512,391 cases
Vegetables (Various)	12,454 bags
Peanuts	75,373 bags

IMPORTS.

Commodity.	Quantity.
Apples	235,496 cases
Apricots	57,643 cases
Cherries	24,934 cases
Grapes	14,644 cases
Lemons	14,339 cases
Nectarines	3,013 cases
Oranges	126,956 cases
Passion Fruit	1,353 cases
Peaches	33,912 cases
Pears	74,942 cases
Plums	19,699 cases
Fruits (Various)	64,825 cases
Bananas	6,684 cases
Bananas	6,282 bunches
Citrus (Various)	19,326 cases
Beans	18,235 bags
Beetroot	275 bags
Celery	3,940 cases
Carrots	23,496 bags
Nuts (Various)	252 bags
Onions	75,469 bags
Peas	44,771 bags
Plants	3,327 cases
Potatoes	325,029 bags
Seeds	35,180 bags
Swede Turnips	2,884 bags
Tomatoes	12,223 cases
Vegetables (Various)	5,677 bags

Report of the Bureau of Sugar Experiment Stations.

Mr. N. J. King, Director of Sugar Experiment Stations.

CROP YIELDS.

The 1949 crushing amounted to 6,518,042 tons of cane. This was 384,000 tons in excess of the 1948 crop and constituted a new record of production for the State. However, the acreage harvested was 17,000 higher than in the previous year and the production per acre dropped to an average of 23·7 tons. Sixteen of the thirty-two mills exceeded their 1949 peak quotas and six mills experienced prolonged crushings extending into January. The last cane was crushed on 13th January.

Once again the major proportion of the crop was produced by Queensland-bred cane varieties (Table 1). These aggregated 59·2 per cent. of the tonnage crushed and for the first time Badila was supplanted as the major variety, being second to Trojan. C.P. 29/116, Q.28 and Q.50 were the next three in order of importance. Trojan and Badila were both over the one million tons mark, while the other varieties mentioned all exceeded half a million tons. Although Trojan and Q.28 have probably reached their peak of production, further increases in the tonnages of Q.50, Pindar and Q.47 may be expected, and it is anticipated that the proportion of Queensland-bred canes will continue to increase.

TABLE 1.

Composition of 1948 Crop on basis of Countries of Origin.

Country of Origin.	Tonnage Harvested.	Percentage of Crop.
Queensland	3,855,844	59·2
New Guinea	1,103,609	16·9
U.S.A.	800,213	12·3
Java	503,047	7·7
India	128,447	2·0
Mauritius	86,903	1·3
West Indies	25,087	0·4
Fiji	14,892	0·2
	6,518,042	100·0

VARIETAL TRIALS.

At Mossman, Whiterock and Gordonvale, Q.50 performed very well to outyield Comus, Trojan, Eros, Cato, 41 M.Q. 779, and several "Q" canes. In the Innisfail area, Eros was superior to Trojan on seven farms in the first ratoon crop, but in the aggregate of the two harvests Trojan exceeded Eros by 6 per cent.; both were superior to Q.54.

In the Lower Burdekin area, Pindar outyielded Badila and B.212 in tons of sugar per acre on three farms, while Pindar, Trojan and H.Q. 426 were not separated significantly. In other series of trials, Trojan was superior to B. 331, E.K. 28, Q.44 and S.J. 16, while Q.45 outyielded Q.28, Q.50, Eros and E.K.28.

The Proserpine and Mackay trials resulted in an unmistakable success for Q.50, except in one experiment, where C.P. 29/116 was the best variety in both cane and sugar. In this trial, C.P. 29/116 was the only cane to resist a heavy red rot infection.

At Bundaberg, several trials showed Q.50 in a favourable light in terms of sugar per acre, although C.P. 29/116 produced the most cane. On Bingera Plantation, Q.47 produced 6·07 tons of sugar per acre in a 14 months' trial, this yield being superior to that of Atlas, Q.49, Trojan, Q.44 and P.O.J. 2878. At Nambour, C.P. 29/116 exceeded Q.28, Q.47 and P.O.J. 2878 in one series of trials, while Vesta was superior to Q.47, Q.49, Akbar and P.O.J. 2878 in another.

EXPERIMENT STATION ACTIVITIES.

Seedling Propagation.

The normal programme of cross pollination was carried out at Meringa and the three stations raised and planted out the usual complement of seedlings. In addition, the new station in the Lower Burdekin district began activities with seedlings supplied from Meringa.

The seedling sub-stations at Bartle Frere (Babinda), Lansdowne Road (Mackay) and Beerwah were continued. At the first two, selections and progressive trials were carried out, but some further time must elapse before final selections reach the stage of being propagated. At Beerwah, the first seedling introductions were made in 1949, and these will enter the Moreton area for farm planting during 1950.

Meringa Sugar Experiment Station.

Work on this station has proceeded on similar lines to the previous year in both cane breeding and entomology, but emphasis has been laid on more particular problems. The control of the greyback grub by benzene hexachloride is now an accomplished fact where recommended dosages and methods of applications are adhered to; current investigations include further work on placement, residual toxicity and the use of 20 per cent. instead of 10 per cent. dusts. The more pressing problem at the moment, however, is the control of frenchi and other two-year-cycle grubs. Early results indicate that frenchi first instar larvae are controllable with the normal benzene hexachloride application, but more work is necessary to develop a control of the third stage grubs.

In the cane breeding work, success has been achieved in the development of quarter-robustum seedlings with higher than average early sugar, and certain of these canes have performed sufficiently well to justify field scale propagation. This development is worthy of comment, since it is generally necessary to dilute wild blood to one-eighth before favourable sugar content is obtained. The retention of one-fourth wild blood improves the chances of maintaining high vigour and of retaining resistance to certain diseases.

Lower Burdekin Sugar Experiment Station.

Since the first requirement of the new station is to produce seedling canes suited for the district conditions, an initial planting of 3,000 seedlings was made. In the absence of glass-house facilities, these were germinated at Meringa and forwarded in flats to Ayr, where potting took place.

The only field trial planted on the station was one to investigate ratooning performance of several district varieties under irrigated con-

ditions. This trial is designed to provide information on the economics as well as the practicability of growing first and second ratoons as opposed to plant cane only—which latter is the principal district practice.

Mackay Sugar Experiment Station.

In a varietal trial harvested, Pindar was not significantly different in performance from Q.50, and this augurs well for the newer variety. In a further experiment the seedling cane E.129 outyielded Q.28 and produced, as the aggregate of two crops, 9·31 tons of sugar per acre; in a year when red rot was particularly bad, only an odd stick of this new seedling showed discoloration. It is desirable, with the presence of ratoon stunting disease in the area, to produce a range of resistant varieties, and this cane is now under trial for susceptibility.

Following the re-introduction of C.P.29/116, a varietal trial at Oakenden demonstrated a valuable feature of this cane. In a very severe "red rot" year C.P. 29/116 outyielded Q.50, Q.28, Co.290 and B.174 and had a c.c.s. of 13·94 when the other varieties ranged from 10·77 to 6·15 due to red-rot damage. As a late harvesting cane this resistant variety would appear to have a place in the local industry.

Bundaberg Sugar Experiment Station.

The progressive seedling trials on this property have not produced any cane of outstanding promise during the year. The district is well supplied with varieties suitable for mid-season and late-season harvesting, and from early trials it would appear that Q.50 and Pindar may provide better sugar content in the early part of the season. The former cane produced 11·48 tons of sugar per acre in one series of trials as an aggregate of plant and first ratoon crops; although inferior to C.P.29/116 in yield of cane, the higher sugar content made it a more profitable cane to harvest.

The long range trials on the station dealing with trash conservation and various rotations failed to disclose any significant benefits. The first ratoons of the filter mud plus fertilizer trial did not show any clear cut responses, nor did the plant residue and fertilizer experiment which has been conducted since 1938.

SOILS INVESTIGATION.

Laboratory Work.

During the year 746 soil samples were analysed. Of these, 335 were from farmers' properties for which fertilizer recommendations were required. The remainder consisted of samples tested in conjunction with lime and fertilizer trials and the series of investigations which are being carried out in order to determine the effect of such materials as molasses and sorghum residues on the physical condition of cane soils. Fifty-two other samples, including irrigation waters, cane juices, &c., were also analysed.

Since the figures obtained from the farm samples constitute a representative picture of the soil fertility trends in the various districts, they are summarised in Table 2. As mentioned in last year's report, there are again indications that potash deficiency is more pronounced than that of phosphate. This is an important point that must be taken into consideration when planning the industry's future fertilizer requirements. The above trend is also borne out by recent fertilizer trials, the results of which indicate that adequate potash fertilization is necessary to ensure maximum sugar recovery per acre.

TABLE 2.

Soil Fertility Trend in Various Cane Areas, Showing Percentage of Soil Samples at each Fertility Level.

District.	Phosphate.			Potash.			No. Samples.
	Low.	Fair.	Good.	Low.	Fair.	Good.	
	%	%	%	%	%	%	
Babinda-Mossman	33	11	56	33	22	45	54
Innisfail ..	29	22	49	52	26	22	100
Ayr	..	..	100	..	20	80	5
Mackay ..	52	22	26	56	22	22	23
Bundaberg ..	31	14	55	51	22	27	78
Southern ..	31	20	49	33	28	39	75
Total ..	31	18	51	45	24	31	335

Fertilizer Trials.

Fertilizer trials were harvested on farmers' properties at Mossman, Fishery Falls, Moresby, Proserpine, Bundaberg and Yandina. Most of these trials showed increased yields due to the application of sulphate of ammonia, while the responses obtained from phosphate and potash depended upon the nature of the soil type.

Lime Trials.

A considerable amount of analytical work was carried out on soil samples taken from the 42 lime trials harvested last year. It would appear that the magnitude of the response to the application of lime is more closely related to the actual lime and magnesia content of the soil than to the degree of acidity present, so a series of trials is being laid down to determine the response to relatively small drill applications of lime as compared with the usual heavy and more expensive broadcast dressings.

Soil Aggregation Studies.

Because of the necessity of keeping a close watch on the possible deterioration of cane soils under continuous cultivation, laboratory studies were commenced last year to develop suitable methods for the determination of changes in the physical condition of soils. It was found that the measurement of water stable aggregates provided satisfactory data in this respect. The work was then extended to measure the effect of the application of molasses, since this material is well known to have considerable soil improving properties. In a 5 x 5 Latin square field trial set out at Moggill, preliminary results are indicating that molasses dressings bring about an appreciable increase in the percentage of water stable aggregates within the soil, thus confirming the results already obtained under laboratory conditions. A study is also being made of the effect of incorporating with the soil residues from sweet sorghums, which contain a high amount of sugar. Both field and laboratory trials are revealing that this material will also improve the crumb structure of the soil.

WEEDICIDES.

During the spring of 1949 an extensive series of trials to investigate the efficiency of 2,4-dichlorophenoxyacetic acid (2,4-D as a pre-

emergence spray under the Queensland conditions, in conjunction with contact weedicides, was put down.

Results of Pre-emergence Tests.

At Meringa, Innisfail and Bundaberg very good results were obtained from pre-emergence spraying. The results obtained on the Meringa station indicated that one application of 2,4-D applied at the rate of 4 lb. per acre early in September gave sufficient control of weeds and grasses for all practical purposes until the end of January, at which date the cane was nearly out of hand and no other treatment was necessary. The control given by the use of only 2½ lb. of 2,4-D per acre was not quite satisfactory.

At Innisfail plots were treated with 2,4-D at the rate of 4 lb. per acre. This application gave a satisfactory control of weeds and grasses from late September until February, covering a period of 21 weeks without any other treatment being required.

Other plots in this area were given a second spraying in November, consisting of a further 4 lb. of 2,4-D per acre plus diesel oil and sodium pentachlorphenate. However, from the plots which received only the initial spray in September it would appear that the second spraying was not necessary. In these trials it was also shown that 2,4-D prevented the emergence of sensitive weed and rattlepod. However, it did not prevent the germination and growth of Mauritius bean. Some results of the Innisfail sprayings are shown in Plates 7 and 8, facing page 36).

As in North Queensland, good results were obtained with the use of 2,4-D as a pre-emergence spray on the Bundaberg station. On one particular block complete control of weeds and grass during spring and summer was obtained by an application of 2½ lb. of 2,4-D per acre on September 21, followed by a similar application in December. Two other blocks were sprayed with 2,4-D at 4 lb. per acre on November 23 and December 16. These required no further treatment, since complete control of weeds and grass was obtained until the cane was out of hand in February.

Contact Spray Trials.

In addition to the pre-emergence work, a considerable amount of investigation was carried out with contact sprays based on diesel oil, tar oil or creosote and containing also sodium pentachlorphenate and 2,4–D. Further information regarding the most efficient and economical rates of application of these contact sprays has yet to be obtained and to this end trials are being laid down.

ENTOMOLOGY.

The major pests damaging sugar cane in the year under review were various species of "white grubs," which caused severe losses wherever they were allowed to persist in substantial concentrations. Army worms of two species, *Cirphis unipuncta* Haw. and *Spodoptera exempta* Walk., were represented in outbreaks throughout northern areas from Ingham to Mossman. They were present in greater numbers than had been experienced for some years, but the loss of foliage of young cane was not expected to cause serious reduction of the crop. Other cane pests continued at a normal low level and proved of little economic importance in most areas.

"*White Grubs*".—Large emergences of the greyback beetle (*Dermolepida albohirtum* Waterh.) commenced in most northern areas in mid-November, 1949, the population trend having continued upwards since 1947. Damage to cane was apparent in April, 1950, and it became sharply accentuated in intensity after the first week of May. A considerable proportion of the losses that would otherwise have occurred was obviated by the prior application of benzene hexachloride to many thousands of acres of cane land which had a history of consistent grub damage; but as usually happens in years of sharp population increase, heavy damage also took place in areas of intermittent or rare infestation which had not been protected in this manner. The use of BHC on 2,900 acres of cane land in Queensland in 1947 had increased in 1949 to 20,000 acres, and the heavy infestation in marginal grub-affected areas this year will have the effect of still further increasing the area that will be treated in the spring of 1950.

A 20 per cent. BHC dust (2.6 per cent. gamma isomer) is now supplied at a saving of approximately one-third of the cost of the equivalent quantity of the previously used 10 per cent. dust, and the demand by canegrowers has swung almost entirely to the 20 per cent. product for the heavier single dressings applied for protecting the plant and subsequent ratoon crops. The 10 per cent. dust is favoured chiefly for the lighter retreatments of such ratoons as did not receive adequate quantities in the plant crop to ensure sufficient residual toxicity. This change in field practice is ahead of experiments designed to compare the efficacy of the two concentrations, but progressive inspections of test plots have not as yet disclosed any unsatisfactory results from the lower volume of the higher concentration.

Field trials have shown that, provided certain precautions are taken to avoid unnecessary damage to the cane roots, BHC mixed with fertilizer and applied in the drill at planting time will control greyback grubs. Since this technique may have special value for the control of two-year-cycle grubs, and since it may also effect further economy by permitting the use of a higher concentration of BHC, this aspect is being further investigated.

The frenchi grub (*Lepidiota frenchi* Blkb.) was responsible for some losses in the areas of Mossman and Hambledon, and this pest likewise increased in severity over an area embracing the northern end of the Babinda and the southern portion of the Mulgrave cane areas. Spectacular success was achieved with control of the first instar larvae in the Babinda mill area by means of an application to the plant cane of 150 lb. of 10 per cent. BHC dust per acre. In this case a normal first ratoon crop estimated at over 20 tons per acre was produced on the treated areas, as compared with a total loss in the untreated areas. Whether or not similar results can be obtained in the drier districts remains to be determined.

In the southern areas, third stage grubs of *Pseudoholophylla furfuracea* Burm. were not

prevented from damaging cane where applications of BHC were made at rates less than 150 lb. of 10 per cent. dust per acre, and it appears that applications in excess of 200 lb. (or the equivalent) per acre will be needed if control is to be effected in this stage. The results from trials against *L. frenchi* suggest that similar successes with 150 lb. per acre may be possible against *P. furfuracea* and *Lepidiota trichosterna* Lea, provided control is effected in the first instar and the dressing is applied early enough.

Wireworms (*Lacon variabilis* Cand.).—Satisfactory protection of germinating cane setts against wireworms was obtained by the application at planting time of fertilizer containing 20 per cent. BHC at the rate of 10 lb. of the latter per acre. In Mackay and Proserpine about 9,000 acres planted in 1949 were so treated, whilst a further 5,000 acres in other parts of the Queensland cane belt were similarly protected. Damage caused by other species was also recorded from the Mulgrave area.

RAT PESTS.

Damage to cane by rats was slightly greater in the 1949 crop than in the previous year, and indications are that a still further slight increase is to be expected in the 1950 crop. Populations were not of plague proportions and noticeable damage occurred in restricted areas of favourable environment. Poison baits containing either yellow phosphorus, thallium sulphate or zinc phosphide were used as required, though there are grounds for suspecting that the strength of the zinc phosphide baits is too low.

PATHOLOGY.

Ratoon stunting disease is still prevalent in Q.28 in the Mackay district; a survey during the year showed that the disease was present on approximately 10 per cent. of the farms in the area. Several suspected cases of the disease in Q.50 were reported, but they have not as yet been confirmed. Present indications are that Q.50 will be considerably more resistant to ratoon stunting than Q.28. There is little doubt that the disease also occurs in P.O.J.2878 and M.1900 Seedling, and possibly in some of the other older varieties of the district. Ratoon stunting disease was also found at Proserpine, Sarina, Bundaberg, Maryborough and Bauple, and as a result, the variety Q.28 has been removed from the list of varieties approved for planting in the three southern districts mentioned.

After establishing that the disease could be transmitted by sett inoculation with juice from diseased cane, an extensive programme of investigational work was set out at Mackay and Brisbane. This included:—(1) A varietal resistance trial using all the important commercial canes in Queensland as well as promising seedlings from the Mackay Experiment Station and some breeding canes. (2) Hot water treatment of diseased setts. (3) Attempts at various methods of transmitting the disease. (4) Studies on the effect of disinfectants on the causative agent and its longevity outside the host plant. (5) The testing of various methods of identifying diseased plants. The results of this work should be available early next year.

Downy mildew disease occurred in only one commercial planting during the year, seven diseased stools being rogued from a two-acre ratoon field of P.O.J.2878 at Bundaberg. With the prohibition of the planting of P.O.J.2878 in the downy mildew disease area in Bundaberg, this disease should be eliminated from commercial plantings of cane in South Queensland. In the north there was no recurrence of the disease in the Hambledon area, where an outbreak had been recorded in 1949.

Fiji disease in South Queensland continues to decrease with the decreasing plantings of P.O.J.2878, and both at Bundaberg and at Moreton there has been a considerable reduction in the number of diseased stools rogued. However, seven stools of Fiji disease were found in a 9½ acre field of second ratoon P.O.J. 2878 at Cordalba in the Isis district.

Gumming disease was confined to three farms in the Mossman quarantine area, and in each case the field concerned was ploughed out after harvest in 1949.

Red rot decreased in severity in South Queensland with the reduced planting of the very susceptible variety Co.290, and losses caused by this disease there were not important during the past year. In the Mackay district, however, red rot caused severe losses in late cut fields, chiefly owing to the dryness of the spring months following an extensive early arrowing, and the prolonged crushing season. In some parts large areas of Q.50—and to a lesser degree of Q.28—were unfit for harvesting at the end of the season, and of those blocks which were cut many ratooned very poorly. Red rot also caused some losses in the drier areas of the far north.

Investigational work on different strains of the fungus responsible for red rot continued during the year, and a large number of cultures were obtained from various districts throughout the State. Many of these cultures show morphological differences and it is proposed to test their relative pathogenicity in the near future. In addition, the perfect stage of the fungus (*Physalospora tucumanensis*) has been produced in the laboratory, this being the first record of it in Australia.

Germination failures in the Burdekin area have been largely overcome by the preplanting dipping of setts in organic mercurial solutions. This area suffers severely from poor germinations largely due to the invasion of the planted setts by the pineapple disease fungus (*Ceratostomella paradoxa*). Germinations are particularly bad when a prolonged wet season delays planting until late autumn or winter and setts have to be planted in cold soil. The 1949 wet season was one such as this, and farmers were planting in the middle of May, approximately six weeks later than normal. Fortunately, however, the beneficial effect of dipping the setts in a mercurial solution prior to planting had already been proved in the area, and a number of farmers dipped the plants for all their fields. Although a total of 140 tons of plants had been treated in 1948, the 1949 season marked the first large-scale commercial application of the treatment, and results were excellent. Approximately 500 acres were initially planted with dipped setts and a further 200 acres were planted with treated setts after the first planting with undipped setts had failed. In addition,

hundreds of tons of plants were dipped for supplying misses in untreated fields which had given poor germinations.

Pineapple disease was fairly widespread throughout North Queensland during 1949 and observations showed that Trojan and Q.50 were much more susceptible to the disease than Badila. In Mackay several plantings of Q.50 failed because of the disease.

A minor element trial, set out at Mackay in a field of Q.50 ratoons which appeared to be suffering from a deficiency disease similar to that described as "droopy top" in South Queensland, has shown an excellent response to copper applied at the rate of 55 lb. of copper sulphate per acre. The plots treated with copper grew quite normally and showed an estimated increase in yield over the untreated cane of about 20 tons per acre.

During the year the Bureau took over from the Agriculture Branch an area of five acres of cultivation on University land at Moggill. This plot will be used for experimental work and for disease resistance trials which have to be moved from cane growing districts when these diseases are eliminated from commercial crops.

CANE BREEDING.

The spring and early summer conditions at Meringa during 1949 were better than had been experienced for several years and these were followed by an extended wet season. Arrowing in 1950 was much earlier than usual, and by the end of the first week in June no fewer than 134 crosses were in progress. Heavy rain when the crossing was at its height caused some trouble with dilution of solutions and also interfered with arrows on the ripening racks.

Early maturing crosses again received particular attention and large numbers of trial marriages with early maturing parents were effected. In addition, most combinations which in the past had produced progeny with a high sugar content were repeated. Entirely noble crosses were made mainly for the Burdekin district, and a high percentage of all crosses contained varying amounts of wild blood. Particular efforts were made to further nobilise the early maturing G.323, which has the *S. robustum* 28NG251 as a grandparent. G.262, the other early maturing variety with similar *S. robustum* blood, failed to arrow.

It is now necessary to produce a much greater quantity of seed and a greater diversification of crosses than formerly. Whereas a few years ago the requirements of only three stations had to be filled, it is now necessary to consider the needs of four main stations at Cairns, Ayr, Mackay, and Bundaberg, and three substations at Bartle Frere (Babinda district), Lansdowne Road (Mackay district), and Beerwah (Moreton district).

Much of the seed produced in 1949 gave a poor germination. This appears to have been largely due to a somewhat abnormal flowering season. In addition, some of the seed which did not germinate reasonably well failed to grow in the flats, and this was considered to be possibly due to a deterioration in the storage conditions at the iceworks. The failure of much of the seed does not represent a serious loss, since any deficiency in the number of seedlings produced can be made up by raising a further batch of seedlings later in the year from freshly produced seed. Among new varieties to be used in the crossing were those introduced from U.S.A. a few years ago, viz., C.P. 29/320, C.P. 34/120, C.P. 36/13 and C.P. 36/105. N.Co.310 was also used for the first time, although its extremely early arrowing was a disadvantage since it allowed of only one cross being made. These varieties have all shown early maturing characteristics and were used in attempts to produce early maturing varieties.

Among crosses which have offered promise in recent years have been various combinations of Co. 270. Although this Indian variety is very thin, it seems to impart considerable vigour to many of its progeny and in some combinations at least it gives an appreciable percentage of high sugar seedlings. The incidence of red rot has rendered necessary the replacement of several combinations with Co. 290 as major crosses for Bundaberg and Mackay. In particular, progeny of P.O.J. 2725 x Co. 290 and P.O.J. 2878 x Co. 290 appear to be very susceptible to this disease, and the examination of numbers of new families in these districts is desirable in an attempt to find other families which produce the vigour and sugar content of these two without the red rot susceptibility.

For the first time at Meringa, experimental work was carried out on the production of earlier arrowing by regulating the hours of daylight to which the growing canes are exposed. Portable light-tight boxes were used; the method showed some success, but is considered too laborious for practical use on a large scale. Arrangements have been made for the instal'ation of a field lighting system at Meringa this year in order to use the method of breaking the period of darkness to delay arrowing in early flowering canes.

Some 21,000 seedlings were planted out in the field during 1949 at the three main stations, whilst in addition several thousand seedlings were transferred from the main stations to the substations at Bartle Frere, Lansdowne Road, and Beerwah, respectively.

A frost resistance trial was planted at Kairi Regional Experiment Station on the Atherton Tableland. Included in the trial were a number of seedlings selected as possible fodder canes. In making this selection, softness of stalk and foliage and lack of hairs were considered in addition to ratooning capabilities. There is a considerable demand in both the coastal areas and on the Tableland for better fodder canes, and it is hoped to select some desirable types for propagation in the near future.

MILL TECHNOLOGY.

Seasonal Activities.

Two phases of manufacture studied in 1948 were further investigated during the 1949 season. Tests on the operation of Webre vacuum pans were conducted at Farleigh and Plane Creek mills, and the performance of the Werkspoor crystallizer at the latter mill was also examined. These investigations formed the subjects of two papers contributed to the 1950 Conference of the Queensland Society of Sugar Cane Technologists.

Other seasonal activities of a general nature included the investigation of the influence of low purity magma on factory work and the use of soda ash as an aid in the clarification of sugar juice. Tests were carried out on the sugar dryer at Moreton mill and the boilers at Plane Creek mill, and a general survey of operations at Mulgrave mill was conducted.

The Mutual Control Scheme operated during the season, with the usual 24 mills participating. The new procedure, involving a new form of presentation and circulation on a weekly basis, proved popular.

Laboratory Work.

Testing.—During the year the following apparatus was tested:—253 brix spindles, 18 pipettes, 215 flasks, 52 polariscope tubes, 1 graduated cylinder, 1 thermometer, and 1 box of weights. Six new polariscopes were tested and certified, and six others were cleaned, overhauled and calibrated. Two new models of pH meters were examined and tested and one glass electrode was checked. Several samples of molasses were analysed for checking purposes.

Viscosimeters.—The new viscosimeter of Bureau design was checked against the standard instrument and then used in an investigation into the flow properties of molasses and massecuites. It was established that commercial glucose syrup displays the properties of a Newtonian fluid and is very suitable for use in the calibration of viscosimeters—provided that its surface is sealed with a light immiscible fluid such as kerosene.

The molasses samples tested displayed a slight degree of plasticity, whilst the massecuites exhibited this property to a marked degree. Further work on this subject is proceeding.

The opportunity arose to test a Technico viscosimeter of the torsion wire type. This instrument was found to be highly satisfactory as an industrial class of instrument for work on molasses and massecuites.

Analytical Work.—Several samples of scale from superheaters were analysed, with inconclusive results. The problem of scale formation has received considerable publicity and attention in recent years, and several methods and devices for the elimination or prevention of scale are under observation.

A sample of Australian bentonite was examined with a view to its use as a clarifying agent, but the initial laboratory tests yielded unsatisfactory results and the project was abandoned. Recently a trial shipment of Wyoming bentonite was imported and is to be used in clarification tests at Fairymead mill. The laboratory examination of this material is proceeding.

Publications.—Two technical papers have already been referred to. The Plant Data Record, which has suffered a very long delay in printing, is expected to be published in the near future, together with the First Supplement (1948). The Second Supplement (1949) and the Mutual Control Synopsis for the 1949 season are ready for printing. The publication of the News Letter has been continued.

Work in Hand.—During the coming season the task of investigating the deterioration of raw sugars in storage and transport is to be undertaken. Clarification tests will be conducted at Fairymead mill and wax extraction trials at Isis mill. It is anticipated that the staff will attend and play an active part in the Congress of the International Society of Sugar Cane Technologists to be held in Brisbane in September.

Engineering Technology.

The trend in most mills towards further electrification continues, and in the last two years no fewer than ten turbo-alternator sets of various capacities up to 2,000 kW have been ordered from British manufacturers.

Several reports covering increase in generating plant were submitted by the Bureau and in three of these the apparently drastic recommendation to change from the existing system of direct current or non-standard alternating current to the standard Queensland system was adopted by the factories concerned.

The adoption of the standard electrical system facilitates the use of Regional Board power for the slack season and crushing season week-ends, and most factories are taking advantage of this use of the public supply as being a more economical proposition than private generation.

Main switchboard designs in keeping with the generating plants to be installed were drawn up for four factories and adopted by them without alteration.

Short visits were paid to the majority of factories and several visits made on request for the purposes of special discussion.

A number of factories sought information with a view to reducing the bagasse nuisance, which, probably because of the higher boiler outputs required, tended to be more pronounced than in past years. Suitable apparatus for flue gas sampling is now being assembled and it is proposed to carry out tests during the coming crushing season. With the information obtained the Bureau should be able to make recommendations as to the most economical way of dealing with the nuisance.

Report of the Chemical Laboratory.

Dr. M. White, Agricultural Chemist and Biochemist.

The application of chemistry to rural industry is to-day so universal that it is not surprising that each year brings its quota of fresh problems for the chemist to solve. This means that to function efficiently each section of the laboratory must keep abreast of improvements in methods and technical equipment.

The work set out under the different sectional headings indicates clearly the extensive field of chemical problems investigated by the laboratory during the past year.

TOXICOLOGY.

Three hundred and two specimens taken for examination in connection with fatalities in stock were submitted. The range of poisons found was wide and provides a useful index of the routine operations of the section.

Arsenic.

Fifty-nine specimens, or approximately 20 per cent. of the total, contained arsenic. This is a marked reduction on the figures of other years but it is still too high. Before the advent of the newer tickicides, careless disposal of arsenical dip residues and inadequate protection of the dipping vats themselves were fruitful sources of arsenical poisoning. But there were always cases following the too early use of paddocks after weed poisoning or timber destruction by arsenical compounds, and history continues to repeat itself. No such paddock is safe until either a successful burn has been obtained or sufficient rain has fallen to ensure a good growth of pasture.

Lead.

The legislation limiting the use of lead in paints made deaths of animals from this cause rare until recently, but, apparently as the result of defence disposal sales, lead-containing paints have been in use, and a sharp increase in deaths from this cause has occurred. Farm animals are strongly attracted by the linseed oil used in mixing the paint, and since lead is a cumulative poison, the lethal intake may not be obtained at one time. Of the specimens examined, eighteen were positive.

Strychnine.

As usual, nearly all the deaths from strychnine poisoning were among domestic pets.

Nitrate.

In previous reports the earlier unsuspected prevalence of nitrate in waters was recorded. The routine examination of stock waters for potability has now been extended to cover tests for both nitrates and fluorides, the first to gain some idea of prevalence and distribution, and the second as part of an extensive programme laid down some years ago. Two waters, one containing the extraordinary level of 4013 parts per million of sodium nitrate were incriminated in maladies affecting young stock.

Poison Plants.

Thirty species of plants were examined. Most followed the pattern of constituents known to be peculiar to the species, but because of its special interest one has been the subject of detailed work and is reported under Special Investigations.

Field studies by officers of other branches of the Department suggested that the plant *Eremophila latrobei* was responsible for the fatal malady of sheep and cattle known as Georgina River disease. A principle extracted from this plant during the war years was shown to be very toxic to sheep, and so a re-examination of extracts has been made. A highly active oil has again been obtained and in addition two crystalline preparations have been isolated. As soon as sufficient material from the relatively inaccessible area of common occurrence of the plant is obtained, more detailed work on the toxicity of, and counteractants to, the poisonous principle will begin.

A second investigation under way involves the search for plants which selectively remove poisons from the soil and accumulate them in special structures. Plants are being sought which can sufficiently concentrate selenium and tellurium from the soil to act as indicators.

Containers.

Pontoon drums and various containers previously used by the army are now being utilised by farmers for storage of water, molasses and grain. Some of these are chromate treated and others are lined with lead-containing material. Little is yet known of the risk from chromate poisoning, but checks have been made on the lead content of molasses stored in suspect drums. The work is not complete but the level is sufficiently high to suggest that the acids of molasses are abstracting lead from the container.

BIOCHEMISTRY.

Though a great number of routine examinations of biological material—blood, organs, bones, teeth, urine and faeces—are made for officers of other branches (some 500 samples being analysed during the year), the section maintains an active interest in the three main lines of research previously reported. Results are set out under individual headings.

Fluorosis.

The experiment initiated four years ago to evaluate the damage caused by continuous intake of fluoride through the water has been completed. It has been shown quite clearly that a level as low as five parts per million seriously affects the teeth and bones of sheep. It has further been demonstrated that none of the counteractants which have been thought to confer a marked degree of protection on caged laboratory animals fed fluorides in the diet offers any hope of prophylactic treatment for Merino sheep obtaining all their drinking water from contaminated sources. Though the levels were selected to correspond with "bad" and "very bad" waters, no evidence was found to justify the belief that the unborn lamb is affected. It is known, however, that at much higher levels a real risk exists. In case there was an abnormal accumulation of fluoride in the flesh, a number

PLATE 7.

Good Control of Weeds was obtained in this Sugar cane field at Innisfail by 2, 4-D spraying. The weedy row on the left was not sprayed.

PLATE 8.

2, 4-D Spraying before Seedlings emerged kept this crop clean for several months.

PLATE 9.

Dairy Cattle at Springbrook, showing condition after depraved appetite was remedied by Pasture Improvements.

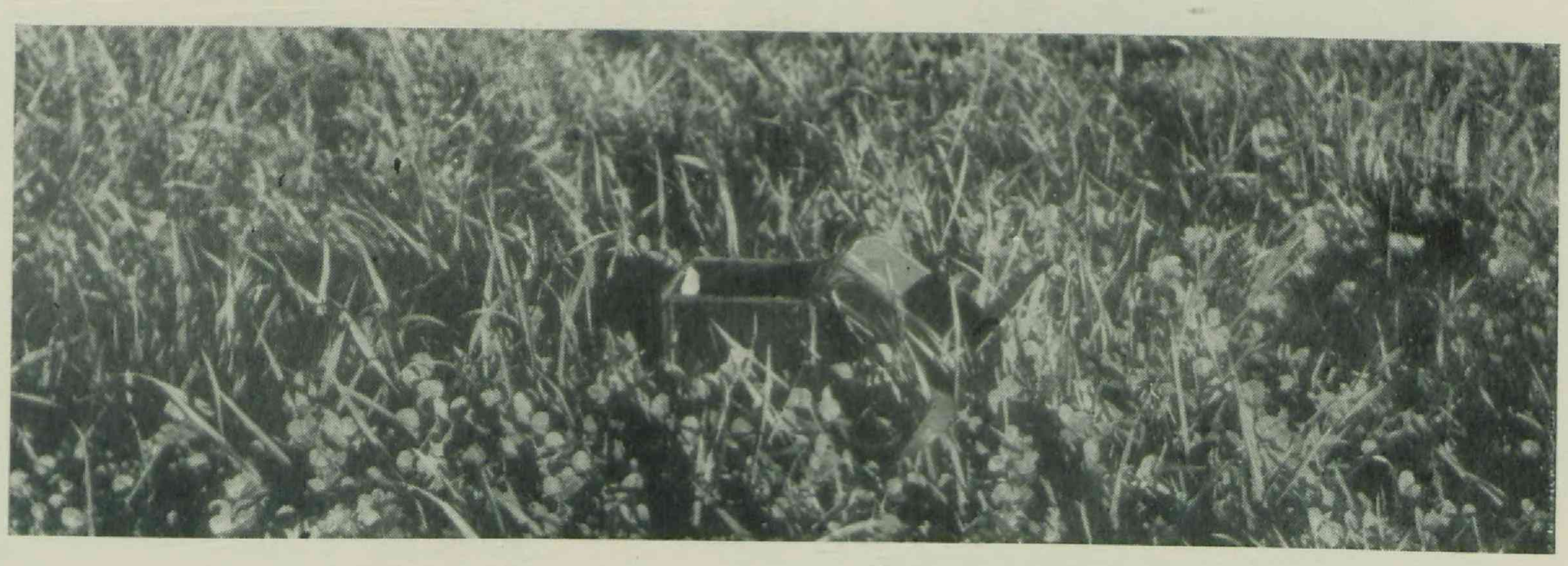


PLATE 10.

An Improved Pasture at Springbrook, produced by the use of Dolomite and Fertilizers.

of selected muscle samples from "poisoned" sheep were examined; the fluoride level was shown to be within the range suitable for human consumption.

The anomalies associated with the absence of fluorosis where it might have been expected, and the converse, have been investigated and satisfactorily explained. From the combined data of field and laboratory studies it now appears that the only feasible approach to the problem is through a type of management which allows alternate exposure to, and protection from, affected waters. This is a long and tedious form of enquiry, but a suitable experiment has been devised in which groups of young sheep are being subjected to various levels of fluoride intake, through the water, for different periods and with intermittent access (also for different periods) to "free" water.

A point of interest noted during the course of the first study was that fluorosis *per se* was not reflected in the wool. Only when the dental disability is sufficient to impair the gathering of food and its proper mastication does wool growth suffer. This, of course, is a much more common occurrence under field than under pen conditions.

Calculi.

Work on this serious problem, common alike to "stud" and "paddock" sheep, was foreshadowed in the last report. The magnitude of the task was not underestimated nor were the difficulties of studying a metabolic abnormality out of its climatic habitat overlooked, so that the negative evidence gleaned cannot be regarded as a failure. On the positive side it has been shown that diet is a strong predisposing factor, and that conditions favourable to the sudden production of an unusually alkaline urine in which deposits can occur are contributory.

The metabolic paths of the main inorganic constituents of the calculi analysed are now being studied. At the same time the owners of properties with a known history of fatalities due to "bladder blockage" have co-operated by sending, at bimonthly intervals, pasture specimens from suspect or incriminated paddocks. These are being examined for constituents now known to produce very alkaline urine.

Osteophagia Survey.

The programme of plotting winter and summer levels of phosphate in the soils, the pasture and the blood of cattle reared in affected zones has been continued. The areas are large and the distances too great for body fluids to be sent to a central laboratory for analysis without inviting the risk of decomposition—and consequently of false recordings. It is therefore necessary to assemble the requisite testing units and do the work on the samples freshly drawn.

GENERAL ANALYTICAL.

Use of DDT and BHC.

During the year under review there has been a further increase in the number of organic cattle dipping fluids submitted, and this has been at the expense of arsenical preparations. At present the proportion of BHC and DDT preparations to arsenical is two to one.

Vegetable Oils.

Seventy samples of oil seeds such as linseed and sunflower were examined for oil content. These analyses are part of the routine services to other branches and usually call for no special comment, but the unusual composition of some hybrid maize releases is interesting. The usual proximate analyses showed that the oil content in some cases was double that of the varieties standard for the district. This invited scrutiny for two reasons. First, the increased yields from hybrids might encourage expansion in production and hence increased use in pig feeding with all the attendant troubles of oily carcases. Second, if a very high oil level were consistently achieved, such crops might be useful for germ oil production.

Samples from the same releases were therefore obtained from different localities; again high oil content was recorded, so that a promising avenue for exploration next season has been opened.

Fodders.

The returns from cattle grazing on the residues left after the harvesting of grain sorghums have often been observed to exceed what might have been anticipated from recorded compositions of flag and stem. In view of the progress made in breeding new varieties, it was decided to evaluate a number at different periods after harvesting and to simulate in sampling, as far as possible, the grazing by stock. The main conclusions reached are:—

(1) The total digestible nutrients per unit weight equal or exceed those of good pasture;

(2) The protein level of all parts would allow a daily production level of 3 gallons of milk;

(3) So long as ample edible material is available, store cattle might be expected to reach a daily liveweight gain of 2 lb.

Miscellaneous.

Apart from the routine work associated with quality control of registered commodities, many tests have been made for contaminants, alleged deleterious constituents in tobacco, insecticide impregnation of bags, oil in fruit wrapping paper, and standards of reagents.

PLANT NUTRITION SECTION.

Field Work.

The amount of field work completed by soil chemists during the past year has greatly exceeded that of any previous year, yet demands are constantly being made for additional work—work which cannot be handled expeditiously by the present staff. Soil surveys required in connection with land settlement schemes account for much of this demand, and, where irrigation is involved, the field work is necessarily of a more detailed nature than that required for dryland farming. In connection with closer settlement schemes, assistance has been given to land survey units by attaching to them an experienced soil man to advise on the broad grouping of major soil types or soil associations. This has proved mutually beneficial, as soils information is passed to the land

surveyors and an insight into land survey methods is obtained by the soil chemists. Reconnaissance surveys or advisory field work has been undertaken in the Wandoan-Taroom, Calliope, Balcomba, Cecil Plains-Millmerran, and Theodore areas, while the field work of a detailed soil survey at Moura has been completed.

Apart from land settlement schemes, Departmental investigations have made calls on the Section. Field work has been undertaken in co-operation with members of the Agriculture and Horticulture Branches and with the Biochemical Section of the Chemical Laboratory. These are recorded below.

Wheat.

A field trial designed to test the effects of minor elements on the incidence of mottling in wheat was laid out at Wyreema. Results have not yet been collated, but it is evident from the analytical figures that so far as major plant foods are concerned there are no appreciable differences in the composition of the whole plant.

Bean Trials.

One of these was designed to test the effect of molybdenum on bean yield and quality in an area where foliar diagnosis had suggested that this element might be lacking; the other, the effect of increased potash and molybdenum applications on a soil type which from laboratory tests appeared to be potash deficient and from a study of its origin was thought might respond to molybdenum. The yields from the plots are not yet to hand, but two observations have been made:—(1) Molybdenum treatment of the seeds accelerated germination; and (2) the beans from the molybdenum treated plots had a more attractive colour and remained turgid for a longer period than those from the untreated ones. This might well prove important when considering bean transport to distant centres.

Animal Nutrition.

Three investigations involving animal health have been carried out in collaboration with the Biochemical Section. One of these was commenced several years ago, the others during the year under review, and results in all cases have demonstrated clearly the need for a very close liaison between these two sections.

In the 1947-48 annual report mention was made of an investigation being carried out on a property at Springbrook where cows of a dairy herd suffered from depraved appetites. Initial blood tests on dairy cows showed low values for both calcium and phosphate; the soil, a reddish brown clay loam derived from rhyolite, was strongly acid, very deficient in available phosphate, and probably deficient in lime and magnesia. Total nitrogen was high and potash fair.

Results of the field experiment showed that responses to phosphates were obtained, but only in the presence of lime or dolomite (which contains magnesium as well as lime). The probability of magnesium deficiency was confirmed by pot tests with clover. The information obtained from the soil analysis and the field trial has since been applied to cultivated areas by the farmer and this has resulted in the growing of successful field crops which have been followed by a sowing of mixed clovers and Italian rye grass. Plates 9 and 10, facing page 36, show the excellent type of pasture now available and the healthy condition of the herd. Full details of this experiment are being prepared for publication.

The other joint investigations involving cattle concern osteophagia and "Wamps" disease. In the case of osteophagia the soil chemists are endeavouring to correlate those soil types on which bone chewing is known to occur with certain soil and plant deficiencies such as those of calcium and phosphorus. Some measure of success has been obtained, but many anomalies have yet to be accounted for. The second investigation has just begun and to date it has only been possible to carry out a very broad reconnaissance survey of portion of the area on which this disease occurs.

Forestry Problems.

Fertilizer experiments at Beerwah with seedlings of *Pinus caribaea* have demonstrated:

(1) The need for heavy applications of phosphatic fertilizer; and

(2) That their nitrogen balance is a very delicate one, as slight depressions in growth were caused by dressings of sulphate of ammonia and nitrate of soda.

Trouble was experienced at some of the forest nurseries with leaf scald in seedlings of flooded gum (*Eucalyptus saligna*) and experiments were designed to test the salt tolerance of seedlings of this plant and hoop pine. The latter was found to be moderately tolerant but the eucalypt was affected by water containing approximately 30 grains of sodium chloride per gallon.

Miscellaneous.

Two further investigational projects were the study of the effect of large quantities of irrigation water of indifferent quality on the chemical and physical properties of heavy clay soils, and a conjoint investigation with the Science Branch on papaw dieback disease. In the latter investigation 119 soil samples were examined for moisture content and 8 for moisture equivalent.

In all, 3,340 soil samples were received during the year in comparison with 2,325 for the previous twelve months. The increase was chiefly in samples submitted either by farmers or field officers for fertility measurements.

Report of the Science Branch.

Mr. J. H. Simmonds, Officer in Charge.

The Science Branch comprises the four relatively distinct sections of Plant Pathology, Entomology, Botany and Weeds. Individual reports of these sections follow. In each case the respective head of the section has been largely responsible for the subject matter of the report.

PLANT PATHOLOGY.

Cereals.

Both leaf-rust and stem-rust were more severe in the wheat crop in 1949 than in the previous season. Not only did the recognised susceptible varieties suffer, but owing to the appearance of a new strain of rust the previously resistant Yalta variety was severely affected with stem-rust.

Associated with moist conditions in October and November, an unusual outbreak of wheat scab (*Gibberella zeae*) was reported from two districts. Both were previously maize growing areas and it is noteworthy that this fungus is a common cause of cob rot in Queensland.

The prolonged wet season in the early months of 1950 resulted in an increased incidence of sorghum leaf diseases. These included rust (*Puccinia purpurea*), leaf blight (*Helminthosporium turcicum*), anthracnose (*A. colletotrichum graminicolum*) and at least three distinct bacterial diseases, one of which has been identified as bacterial streak (*Phytomonas holcicola* Bergey).

Miscellaneous Field Crops.

Potato crops in the Lockyer in the autumn of 1949 were again seriously affected with purple top wilt, which has since been identified elsewhere as a virus disease. The identification of the disease still leaves unanswered many questions regarding its epidemic development, and investigations are in hand at Gatton Irrigation Research Station and elsewhere with the object of obtaining answers to these.

Arrangements have been made to carry on and extend the potato variety resistance trials initiated by the Commonwealth Council for Scientific and Industrial Research.

The occurrence of pasmo disease in linseed for the first time in Queensland caused considerable concern. Surveys showed the disease to be widespread, but the losses occasioned were low, as it appeared late in the development of the crop. The fungus may persist from season to season on volunteer plants and in summer can attack linseed in the pre-flowering stage. Trials are in hand to study the seasonal incidence of pasmo and to determine the effect of time of planting on its occurrence.

Results from field experiments on crown rot of peanuts confirm previous work and indicate that there is no need to vary the established method of seed treatment. The effect of soil conditions on the disease was emphasised. Much better stands have been obtained both with and without seed treatments where good rotational practices have been maintained. Apparent differences due to seed treatment are much greater on old deteriorated soil than on new soil or soil which has been for a period under grass.

A survey of peanut crops on the Atherton Tableland showed that those in the wetter areas were vigorous and generally healthy. It is not anticipated that crown rot will be serious with the present rotational practice. In the drier areas crown rot was widespread, but nowhere present to an extent greater than one per cent.

In the tobacco areas of the south-west, field blue mould caused appreciable reduction in yield and leaf quality on some farms. Mosaic and "bunchy top" caused by the tomato big bud virus were general.

Deciduous Fruits.

Spray trials for the control of brown rot of stone fruits have been continued. Beneficial results were obtained when the disease was moderately prevalent. However, extremely wet weather such as occurred in February favoured the fungus to such an extent that there were no differences between sprayed and unsprayed plots in the trial carried out at that time.

The collar rot of apple trees due to *Sclerotium rolfsii,* recorded in the previous season, continued to give considerable concern. There is some evidence that cutting away the affected parts and painting with Bordeaux mixture promotes recovery if performed sufficiently early.

Citrus.

In a trial of chemical dips for the control of blue mould of citrus fruit, salicylanilide, tetramethyl-thiuramdisulphide and borax treatments significantly reduced the disease. Salicylanilide at 1 per cent. strength was the best treatment; it reduced mould from the 25 per cent. encountered in untreated fruit to 2.4 per cent. The borax dip resulted in some scalding, while 2 per cent. T.M.T.D. left an undesirable residue.

The experiment commenced in 1948 in conjunction with the Horticulture Branch, and involving spray, pruning and soil treatments for the control of brown spot of the Emperor mandarin, was repeated last season with slight modifications. Some of the treatments showed significant differences but no worthwhile control was obtained in what was a particularly bad outbreak.

Tropical Fruits.

In experiments for the control of base rot of pineapple planting material conducted at Maroochy Horticultural Experiment Station, a strong Bordeaux mixture dip gave almost complete control of the disease. Treatments with a mercury or an organic fungicide dip and

spraying with a copper spray after planting had no effect. Planting on hills appeared to reduce the disease to some extent. Unfortunately there was a distinct stunting of plants following the copper dip, measurements indicating a reduction of 14 per cent. in length of leaf. Further trials involving modification of the treatment to overcome this adverse effect are in hand.

Losses from yellow crinkle of papaw have been lighter than usual. Similarly, in the case of dieback there was no epidemic development except one occurring in early spring. Powdery mildew was responsible for considerable scarring in late maturing fruit, and the need for more attention to dusting for this disease was indicated.

The papaw fruit rot observations carried out last season at Maroochy Horticultural Experiment Station showed evidence of considerable variation in rot resistance among the varieties evolved at the station. Some of the more promising of these are being planted at Redlands Horticultural Experiment Station, where their potentialities will be further explored. Fruit spotting may be caused by any one of at least four distinct fungi—*Gloeosporium spp, Ascochyta caricae, Phomopsis* sp. and *Rhizopus nigricans*. Investigations into the seasonal occurrence, source of infection, &c., of these organisms are proceeding.

Investigations of the custard apple fruit rots known as black canker or purple fruit blotch have demonstrated the association of three organisms—*Diplodia natalensis, Phytophthora* sp. and *Phoma* sp. The relative importance of these fungi and their seasonal distribution are matters of current enquiry.

Vegetables.

Prolonged wet periods during the year resulted in severe disease outbreaks in vegetables. The bacterial spots of tomato have been serious and some crops grown for seed certification had to be rejected. Phoma fruit spot of tomatoes was also prevalent. On beans, angular leaf spot (*Isariopis griseola*) was again much more severe than was expected from its behaviour prior to the last few seasons. A high incidence of virus diseases such as spotted wilt and big bud has also been noted on numerous hosts.

During the year special attention has been paid to diseases appearing in the markets. It was found that much of the loss was associated with packing damaged produce on which there subsequently developed *Rhizopus* and other rots.

Beans arriving in the Brisbane market from Stanthorpe during February and March were affected with cottony leak (*Pythium aphanidermatum*). This disease spreads rapidly through packed beans during warm weather.

General.

Assistance has been given by way of pathological inspections in connection with the various seed certification schemes, more especially in the case of tomatoes and beans. A strawberry approved runner scheme was carried through in co-operation with the Horticulture Branch. Assistance was also given in selecting Lady Finger banana plantations free from Panama disease to form a suitable source of suckers of this variety.

The number of cultures supplied for legume inoculation during the year was substantially higher than in previous years.

An examination of material held has shown that the identification of an onion infection, recorded in the 1938-39 annual report as onion smut (*Urocystis cepulae*) was incorrect. Onion smut is still unknown in Queensland.

ENTOMOLOGY SECTION.

Fruit Flies.

Attacks on commercial fruits by these pests, chiefly *Strumeta tryoni* Frogg., were reported from widely scattered districts throughout the State. These included the first records from some localities for many years. Extended summer rains interfered with protective spraying, and early ripening of fruit was an added factor responsible for abnormal losses.

In August, a conference of Commonwealth and State representatives was held in Melbourne to discuss the incidence of fruit flies in Australia and its effect on the export trade in fresh fruit. Subsequently cold storage investigations at Stanthorpe were discontinued, but preparations have been made for intensified field and laboratory studies of these pests. An insectary has been built at Toowoomba, and routine trapping and host surveys have been extended.

Pests of Deciduous Fruits.

Spray trials carried out in the Stanthorpe district involved calyx spray applications and cover spray schedules against moths and mites. Results confirm the previous observation that a calyx spray is unnecessary when suitable DDT cover spray schedules are used. E.605 can be disregarded as an alternative to DDT against codling moth (*Cydia pomonella* L.). However, this new insecticide is of very definite value in the control of woolly aphis (*Eriosoma lanigerum* Hausm.) and the mites *Tetranychus urticae* Koch and *Bryobia praetiosa* Koch.

Citrus Pests.

In some of the coastal districts red scale (*Aonidiella aurantii* Mask.) has been more prevalent than usual, and circular black scale (*Chrysomphalus ficus* Ashm.) appears to be increasing. In all districts where strict attention has been paid to spraying schedules, commercial control of scale pests has been attained, but increasing spraying costs are causing much concern. The poor results in screening tests with E.605 against red scale, pink wax (*Ceroplastes rubens* Mask.) and white wax (*Ceroplastes destructor* Hewst.) did not warrant larger field trials.

The citrus gall wasp (*Eurytoma fellis* Gir.) continues to be a problem, particularly with grapefruit and lemons. Galling was as wide-

spread and as severe as in the previous season, and pruning to remove galls is far from satisfactory as a control measure. Experimental work has been continued covering basic sampling methods, protective foliage sprays, flight habits of the pest, and the possible value of E.605 as a systemic poison against the larvae.

Potato Pests.

The tuber moth (*Gnorimoschema operculella* Zell.) was again responsible for losses in the field when cultural and spraying programmes were not carried out. Almost universal tuber dusting with DDT continues to keep post-harvesting and storage losses at a reasonably low level. In a few instances, where dusts containing BHC as well as DDT were used for tuber protection, tainting resulted.

Large scale storage experiments were established during the summer at the Queensland Agricultural High School and College. The results strongly indicate that, at the strength used, DDT impregnated bags give protection against the moth at least equal to dusts applied directly to the tubers, and at the same time overcome residue troubles. Follow-up work on this project is directed towards the formulation of commercial procedures.

Tobacco Pests.

In the Burdekin district crops were attacked by several pests during the main growing period, and frequent sprayings were necessary to keep damage at a low level. The looper (*Plusia argentifera* Gn.) is still difficult to control with present schedules. The root knot nematode (*Heterodera marioni* (Cornu) Goodey) is present in much of the new land coming under tobacco, and, to date, pest populations have not been reduced by including resistant crops and a four-months dry bare fallow in the rotation.

In the Inglewood, Yelarbon and Texas districts DDT has been used extensively to control lepidopterous and jassid pests. A potentially serious Eriophyid mite has appeared in these districts and some growers suffered severe losses with mid-season and late crops.

Grain Pests.

Weevil damage to maize and sorghum, particularly the former, has been given considerable attention during the past six months. It has been again demonstrated that either DDT or BHC dusts will protect initially clean maize seed, at least for several months, without affecting germination. Infestation prior to dusting is a complicating factor in this problem, and the economic treatment of grain for food constitutes a formidable task under Queensland farm conditions.

Tropical Fruit Pests.

Natural causes and cultivation have kept populations of the pineapple scale (*Diaspis bromeliae* Kern.) at a low level in the quarantine area, and results from insecticidal trials are neither conclusive nor commercially promising. D.D. experiments against nematodes in pineapple fields on the Blackall Range have not as yet given outstanding results.

Exploratory experiments with insecticides against the banana weevil borer (*Cosmopolites sordidus* Chev.), as reported last year, were continued using only chlordane and E.605. With beetle counts at baits as a criterion, 1 per cent. chlordane spray applied with the trash undisturbed appears worthy of further investigation, although under present conditions the treatment may be uneconomic.

The harvest results of large scale trials with sprays against red scale (*Aonidium aurantii*) on figs in the Sunnybank area have clearly demonstrated that an economically sound schedule is available. Further work in the coming season will be directed towards clearing up some minor points to complete the project satisfactorily.

Vegetable Pests.

Numerous screening tests of the newer insecticides were carried out during the year. As might be expected, some of the earlier claims made for these materials could not be substantiated. E.605 is proving a satisfactory alternative to nicotine sulphate, but DDT is still the best material for many purposes. BHC burns several crops and may cause off-flavours.

In general, mites, thrips and aphids have caused some concern to growers. Replicated trials using a wide range of materials and strengths were set out against *Thrips tabaci* Lind., *Tetranychus urticae* Koch., *Aphis gossypii* and *Macrosiphon solanifolia* Patch. on cucumbers. Thorough spraying with E.605 at recommended label strengths gave good, quick kills, but insecticidal persistence was not outstanding.

Miscellaneous Field Crops.

Corn ear worm and *Earias huegeli* Roz. were present in some fields of cotton without showing any high peaks of activity. Experiments against cotton insects were somewhat marred by these low pest populations, but it is evident that DDT is not entirely satisfactory in this crop. The looper (*Anomis flava* Fabr.) extensively defoliated experimental cotton in the Warwick district.

Many sorghum crops were infested with *Aphis maidis* Linn. but no economic damage was apparent. The sorghum midge (*Contarinia sorghicola* Coq.) was present in some Darling Downs crops during February and March, and it caused severe losses in the South Burnett. The yellow peach moth (*Dichocrocis punctiferalis* Gn.) attacked heads in some of the northern areas. Insect pests were of no importance in Central Queensland fields.

Considerable efforts were made by firms interested in the crop to spray large areas of linseed, although Heliothis populations were insignificant in most early plantings. Crops planted in June and July were infested by appreciable pest numbers by late September.

In the Lockyer Valley severe damage to lucerne by the jassid *Empoasca alfalfae* Evans was not so evident in the summer and autumn as in the previous year, when eventually 0.1 per cent. DDT sprays were applied extensively after each cutting.

Apiaries.

In south-eastern Queensland, 969 beekeepers are now registered, an increase of 130 since the last report. The number of growers is expanding steadily and some essential hive equipment is now manufactured locally. However, production in Queensland is still not sufficient to meet the State demand.

There has been an increasing demand for information and advice on all phases of beekeeping. The provision in *The Apiaries Act of* 1947 for special protection of queen-rearing apiaries has been well received and is now working satisfactorily. This is believed to be a pioneering attempt to protect the purity of breeding strains by preventing encroachment by other apiaries.

The two apiaries previously reported to be infected with American foulbrood (*Bacillus larvae* White) are now disease free. European foulbrood (*Bacillus alvei* Cheyne) was found in one hive in the Warwick district. This is the first record for Queensland. Paralysis and dysentery have also been observed in several apiaries, and wax moths (*Galleriia mellonella* L. and *Achroia grisella* Fabr.) caused heavy damage in some stored beecombs. Methods of preventing damage by these insects are available, but action is often delayed until serious infestations are observed.

Fauna Protection.

Experience in administering fauna legislation had suggested further possible improvements and consideration has been given to these during the year. Sanctuaries, well distributed throughout the State and covering 124,894 acres, have been gazetted. A district register of 1,300 honorary protectors, including 55 appointed during 1949-50, has been completed and is proving of value for administrative and extension purposes.

Flora Protection.

Protection has been extended to various native plants, comprising boronia (*Boronia* spp.), Christmas bells (*Blandfordia* spp.) and vanilla Lily (*Sowerbaea juncea* Sm.) Five new honorary rangers have been appointed.

Enquiries into several reports of contravention of *The Native Plants Protection Act of* 1930 have had the desired salutary effect, as evidenced by the cessation of several questionable practices.

BOTANY SECTION.

Noxious Weeds.

The Noxious Plants Consultant Sub-Committee of the Stock Routes and Rural Lands Co-ordinating Board recently decided that there was a necessity for revising the list of plants declared as noxious weeds throughout the State under various Acts, especially the *Local Government Acts,* which contain by far the greatest number. In many cases lists have been drawn up by individual local authorities without reference to the actual distribution of the weeds listed and regardless of whether the plants were likely to occur within the shire boundaries or not. Following this decision lists of declared noxious plants supplied by the Director of Local Government and others have been thoroughly checked, and after consultation with officers of the Lands Department the revision will be submitted through the Sub-committee to the various Departments concerned.

Of weeds that have made their appearance for the first time or have spread considerably during the past year, the following should be recorded:—Burr ragweed (*Franseria* sp.); Crofton weed (*Eupatorium adenophorum*); hemlock (*Conium maculatum*); and ragweeds (*Ambrosia* spp.). Other plants the spread of which should be closely watched are *Synedrella viailis* (no recognised common name) and golden rod (*Solidago canadensis*).

Mulga Research.

In continuation of research on mulga (*Acacia aneura*), 150 lb. (air-dried weight) of leaves and small twigs of umbrella mulga and a similar quantity of whipstick mulga were collected and submitted to the Agricultural Chemist for digestibility trials with sheep.

From information gathered during the year, it appears that mulga regeneration is dependent on the non-stocking of paddocks by sheep until seedlings are well established. Cattle and horses do not do the same damage to the seedlings. A paper embodying the results of investigations on mulga to date was published during the year.

Vegetation of "Scalded" Areas.

In connection with studies on the vegetation of "scalded" areas in the Dirranbandi district, 15 quadrats were laid down in November, 1949. These were examined in February and again in May. It was found that the two months of dry, very hot weather which followed the first observation resulted in a decrease in numbers of the two *Chloris* grasses (*C. divaricata* and *C. truncata*) and a regression of the islands towards the scalded condition where *Tripogon* is almost the only perennial grass species. The weather during the following eleven weeks was particularly favourable to plant growth. There was a remarkable recovery in the *Chloris* grasses, and seedlings of annual herbage plants became plentiful. An encouraging feature was the presence in greatly increased numbers of *Medicago minima.* This is the only leguminous species yet recorded from the scalded areas and its presence indicates that it might succeed on these areas if seeds were sown in furrows made in the course of reclamation work.

Western Legumes.

In connection with trials of native legumes from western Queensland, seeds of 16 species were collected for further work on regional experiment stations. Most of the samples were small and sufficient for only one sowing. However, a quantity of seed was collected of the Cooper clover (*Trigonella suavissima*), a plant that has considerable possibilities as an annual fodder crop under irrigation and as a green manure.

Botany of the Burdekin Valley.

At the request of C.S.I.R.O., a botanist accompanied a soil survey unit to the western side of the lower Burdekin valley to identify plants in the field and to assist in mapping plant associations in relation to soils. The plant communities or groups of communities of the area can be divided into nine major types. A fairly detailed account of each community was compiled and this and a complete list of plants observed were supplied to the survey party.

Poisonous Plants.

The most spectacular piece of work on poisonous plants during the year was on the cause of Birdsville horse disease. Following two visits to the Windorah-Betoota area in June and August, 1949, it was evident that if a plant was the cause of the trouble, the strongest circumstantial evidence was against *Indigofera enneaphylla*. Later, in January, at the request of the Division of Animal Industry of the Northern Territory Administration, a visit was made by one of the botanical staff to the Alice Springs district for the purpose of examining areas where cases of Birdsville horse disease had occurred and to compare the vegetation with that of areas in south-western Queensland where the disease was also known. *Indigofera enneaphylla* was found to be abundant in all areas where the disease occurred in Central Australia. Feeding tests conducted by officers of the Northern Territory Animal Industry Division produced symptoms typical of the trouble. This disease has been prevalent in the areas concerned for many years, and the progress made in its elucidation is very gratifying.

Systematic Botany.

In the field of systematic botany a monograph has been prepared on the genus *Argyrodendron*, a genus of trees the timber of which is known in the trade as tulip oak; two genera, *Pterocarpus* and *Mastixiodendron*, have been completed for the joint publication with the C.S.I.R.O. and the New Guinea Forest Service, dealing with New Guinea timber trees; a preliminary revision of the genus *Diploglottis*, which contains the "native tamarinds," has been made; and descriptions of several new rain-forest trees from North Queensland have been drawn up.

Many specimens of grasses and sedges were named for southern herbaria and correspondents, as well as a large number from Queensland. A study of Northern Territory eucalypts has been continued in connection with the work of the North Australia Regional Survey. This work throws a good deal of light on the nomenclature of some North Queensland species. A start has been made on a study of the plants collected in the Cape York Peninsula in 1948 by the Archbold Expedition and provisional revision of several groups undertaken.

WEEDS SECTION.

Surveys.

Preliminary surveys of the distribution of foxtail grass (*Pennisetum villosum*) on the Darling Downs, hemlock (*Conium maculatum*) at Peachester and *Franseria* sp in the Cloyna district have been made. A detailed survey of the distribution of Crofton weed (*Eupatorium adenophorum*) in Queensland has been made and a comprehensive report prepared.

Experimental.

Several experiments on the chemical control of regrowth of Crofton weed were carried out at Numinbah. The combination of 2,4-D and 2,4,5-T esters gave a 75 per cent. kill when heavily applied in a 0.4 per cent emulsion. Sodium chlorate gave a complete kill when heavily applied in a 5 per cent. solution. Ammonium sulphamate was ineffective when applied heavily in a 10 per cent. solution. The sodium salt and ethyl ester of 2,4-D and sodium salt of M.C.P.A. were ineffective even if heavily applied in a 0.4 per cent. solution or if applied twice in a 0.2 per cent. solution. The butyl ester of 2,4,5-T was ineffective when applied twice in a 0.2 per cent. emulsion but gave a complete kill when heavily applied in a 0.4 per cent. emulsion.

Experiments on the control of timber regrowth with hormones have been commenced. At Wolvi, near Gympie, tests were conducted on bloodwood, spotted gum, ironbark, blue gum, forest oak and various wattles. Results from these indicate that 2,4,5-T is markedly superior to 2,4-D and that solutions (either aqueous solutions of salts or kerosene solutions of esters) are more effective than emulsions. At Beechmont tests were conducted on wild tobacco; at Tiaro on mahogany; at Nerang on *Leptospermum flavescens;* and at Biloela on brigalow and *Acacia salicina*. Results from Beechmont indicate that the best method of controlling wild tobacco is to brush and swab the butts with the power kerosene alone. No results from the other trials can be considered conclusive.

At Moggill, 2,4-D and 2,4,5-T esters combined were tested on *Verbena rigida, Verbena tenera*, wild verbena (*Heliotropium amplexicaule*), *Solanum nigrum, Sida rhombifolia* and *Malvastrum coromandelinum*. The first two and *Salonum nigrum* were completely killed by a 0.2 per cent. emulsion. Young plants of *Sida* and *Malvastrum* were killed; older plants were defoliated but showed some regrowth. Wild verbena was not damaged by a 0.2 per cent. emulsion, but a 0.4 per cent. emulsion killed all plants which were completely covered with spray. Regrowth occurred on any plants the leaves and stems of which were only partially covered.

At Kerry the effect of 2,4-D on hybrid maize is being studied. The use of 2,4-D with DDT was investigated and it was found that a solution of 2,4-D could be used quite satisfactorily with a DDT emulsion. It was also found that *Ambrosia tenuifolia* could be killed at all stages by high volume spraying with 0.1 per cent. sodium 2,4-D, and that bellvine (*Ipomoea plebeia*) could be killed by applying 0.1 per cent. sodium 2,4-D at 20 gallons per acre.

DIVISION OF ANIMAL INDUSTRY.

Report of the Director of the Division (Mr. W. Webster).

The work of the Division has continued to cover a wide field of service, and increased production in the animal industries by more efficient methods has been the constant aim of all branches.

Whilst it is expected that the animal husbandry branches should provide a direct service to stockowners by demonstration and instruction in more efficient methods of production, it should also be remembered that disease prevention and control play an important part in keeping production at an economic level, and save waste. Good team work ensures the establishment of successful technical services, and the work of the Division has been directed along these lines.

The husbandry, disease control, and research staffs have worked effectively together, and collaboration with the other Divisions of the Department has been of benefit to the animal industries. Close association with the Commonwealth Scientific and Industrial Research Organization, the Commonwealth Department of Commerce and Agriculture, the Queensland Land Administration Board, the Queensland-British Food Corporation, and other such organisations, has made it possible to complete work with greater speed and efficiency than would have resulted from divided effort.

Discussions between the Directors of Animal Industry of New South Wales, the Northern Territory and Queensland have made it possible to restrict more effectively the spread of disease by moving stock without interfering unnecessarily with normal trade.

SEASONAL CONDITIONS.

Unusual seasonal conditions have prevailed in the whole of the pastoral country of Queensland. Heavy widespread rains fell during the spring of 1949, and two cyclones, followed by continuous heavy rains, occurred in the late summer. Further rain fell in southern Queensland during the winter, and heavy flooding was reported from all districts at some time during the year.

The good rains which were recorded in the autumn and early winter of 1949 prevented seasonal loss of production in the months when this is normally expected. Early spring rain ensured early production in the beef and dairy industries, and with satisfactory prices for animal products has placed the industries in a sound financial position.

Record flooding of the south-western channel country has focussed attention on this fattening area, which, in certain circumstances, is a region where production can be increased provided transport is available.

Production was not as high as might be expected, as the stock industries have not yet recovered from the serious losses sustained in 1946 and 1948.

STAFF.

There has been a general marked improvement in the number of staff, and recruitments have enabled the spread of field officers to be increased. As with other comparable organisations throughout Australia, resignations have occurred, but with some exceptions there has been a general increase. This is particularly noticeable in the case of graduate technical staff, but agricultural college diploma holders and clerical staff are not sufficient to fulfill the demands.

In the Sheep and Wool Branch the staff has been increased by the appointment of an Assistant Husbandry Officer, a Laboratory Assistant, and a Field Assistant. In addition, an Adviser in Sheep and Wool was appointed to Hughenden.

In the recently formed Cattle Husbandry Branch it has been possible to further develop an advisory service by appointing extension officers to country districts to assist the dairy and beef industries. These officers are men who have special qualifications and extensive experience and are therefore well equipped to advise dairy farmers and graziers who require information concerning breeding, feeding, and management of cattle. Five advisers have been appointed—three to Brisbane, Pittsworth and Atherton for dairy cattle work, and two to Clermont and Monto for beef cattle work. One cadet has been promoted to the position of Assistant Adviser and two new cadets have been appointed and are being trained as future advisory officers.

The staff of the Pig Branch has been further strengthened by the appointment of an agricultural science graduate as Assistant Husbandry Officer and of two Advisers for Bilcela and Warwick. The resignation of two cadets represents a loss to the Branch, but neither has been lost to the State as both are farming in country districts in Queensland.

Three candidates who were successful in the examination conducted for appointment as Inspectors in the Poultry Branch were recruited in December, 1949. A cadet was appointed in March and stationed at Kairi Regional Experiment Station. The poultry officer stationed at Boonah was transferred to Ipswich in April. This enables a wider use to be made of this officer's services. An Inspector was transferred to Bundaberg from Head Office, taking up his duties at the former centre in May.

Four veterinary officers have been appointed, three to the field staff and one to Yeerongpilly Animal Health Station.

FIELD VETERINARY SERVICES.

Buffalo fly infestation temporarily moved slightly further south during the year than in the previous few seasons, but it did not spread to the point reached in the worst fly year. There is some indication that the treatment of travelling stock in trains, through dips, and by mobile sprays is preventing the spread of the fly, which apparently is not entirely controlled by climatic conditions.

Cattle tick infestation has been heavy and there has been some extension into areas not normally infested. Such extension, however, has not been as great as might be expected, and it is very obvious that the use of DDT in cleansing dips has prevented this occurring. This is in marked contrast to the state of affairs which existed when arsenic only was used in

areas where arsenic-resistant ticks were present. Fogging for cattle tick destruction has been rather disappointing, but it may be that more has yet to be learned about this method of treatment. Dipping vats still appear to be the best method of treatment, but for the owner of small herds mobile sprays are quite satisfactory for tick control. As would be expected, tick fever has caused many mortalities in marginal areas.

Pleuro-pneumonia has been more prevalent than for some years, but the total number of cattle affected has been relatively small compared with the number of cattle on the holdings concerned. Enforcement of effective vaccination and control of movements are now possible under the provisions of the *Diseases in Stock Acts* and arrangements are being made to make vaccination compulsory in certain areas to protect those parts of the State where the disease does not exist.

The Department's tuberculin testing scheme has been extended to some parts of the Toowoomba and Warwick areas and a tuberculosis-free herd scheme for stud cattle has also been commenced.

ANIMAL HEALTH STATIONS.

The study of new synthetic insecticides of likely value in controlling the cattle tick has been continued in the laboratory and field spraying trials have been expanded. The efficiencies of different concentrations of DDT, benzene hexachloride, chlordane, toxaphene, E605 and dieldrin have been determined. All of these preparations are efficient tickicides, but except for DDT and benzene hexachloride they are not generally available in a form suitable for use in dipping vats.

Leptospirosis—a form of redwater—has now been found in all the major dairying districts except the Atherton Tableland, and it may, of course, occur there. Cows as well as calves have been affected, and the loss from deaths and reduced milk production has been serious in some herds. A study of experimentally and naturally infected calves has shown that the urine of recovered calves is a prolific source of infection.

Further experiments at Oonoonba have confirmed the previous year's work which showed that ingestion of the plant *Gomphrena celosioides* is the cause of coastal staggers of horses. In some seasons farmers at Bundaberg, Rockhampton, and Bowen have sustained heavy losses through this disease.

The cause of Birdsville disease of horses has been under investigation. Survey work in western Queensland suggested that ingestion of the common native legume *Indigofera enneaphylla* was the cause, and the disease has since been produced experimentally in feeding tests in the Northern Territory.

Field trials with *Eremophila latrobei,* the suspected cause of Georgina River disease in sheep and cattle, are in progress in the north-western area of the State where this disease normally occurs.

The relative importance of the common diseases of poultry is indicated by a tabulation—in the accompanying report of the Director of Research—of their frequencies in specimens submitted for diagnosis.

Over 1¼ million doses of scabby mouth vaccine have been sold to sheepowners since 1947. The vaccine is giving satisfactory protection against the disease.

The number of specimens submitted to both stations for post-mortem examinations and laboratory tests in connection with the diagnosis and control of livestock diseases continues to increase. Besides providing a service to stockowners, this work is a guide to the causes of ill health among stock and is often an important source of information bearing on research projects.

The number of bleeder steers and stud cattle passing through Yeerongpilly for tick fever immunisation increased from the record number of 422 head in 1948-49 to 623 head in 1949-50.

SHEEP AND WOOL BRANCH.

The State's sheep population of 17½ millions is below the long-period mean of 18¼ millions, although it shows a slight increase on the figures for 1948-49. Despite favourable lambings in the spring of 1949 the rate of increase has been reduced by the losses from fly strike experienced during the heavy rains of 1950.

The prices for wool and sheep have been buoyant and the £A45.2 million obtained from the sale of wool during the financial year is the highest amount ever earned by a single primary industry in the history of Queensland.

The high prices for Merino wool have retarded the production of mutton sheep, and fat lambs have been particularly scarce on the Cannon Hill market. The Ram Subsidy Scheme has been continued and a further trend towards the development of the sheep industry into the sub-coastal agricultural areas has been and is being encouraged. In addition, there has been an increase in the number of cross-bred sheep on the central highlands in the Emerald, Clermont, and Springsure districts.

Severe waves of blowfly activity occurred during the summer, and heavy infestations of parasitic worms have developed in some districts where such occurrences are uncommon. While valuable extension work has been accomplished, the difficulties in contacting a large number of producers in sparsely settled districts are apparent, and shortage of labour and the conservatism of many primary producers have militated against the more widespread application of modern methods.

A large amount of detailed extension work on flock and property management in relation to sheep breeding has been undertaken as part of the follow-up work to the field days on fertility and infertility of sheep which were conducted in the autumn of 1949.

During the fly wave in the autumn of 1950 detailed observations were made on the efficiency of DDT and BHC in the prevention and control of fly strike, and promising results were obtained.

Field investigations have been continued into factors influencing the lowered reproductive rates of flocks in semi-arid tropical Queensland.

Three large field trials were conducted to determine the level and causes of neo-natal

mortality of lambs. These indicated that lambing losses were extremely high in the north-west during the autumn lambing. One disturbing feature of these observations was the high proportion of premature births.

PIG BRANCH.

There was a small increase in the number of pigs slaughtered in 1949-50, no doubt due partly to the good season, and in some measure to an increased price for pig meats, but there has also been definite evidence of more efficient production brought about by extension work of field officers of the Brench.

More than 1,700 farms have been visited by its officers, who have given 24 public demonstrations and 23 lectures, and attended 16 field days as well as shows, pig sales, &c.

Carcase competitions, which have been used for visual extension work, have not only become more popular but the quality of the carcases judged is showing a definite improvement. The carcases have been judged both as fresh meat and cured bacon.

A purebred stud of Tamworth pigs has been established at Kairi Regional Experiment Station, where it is intended to use progeny testing methods so that proven sires or sons of proven sires will eventually be available for sale.

In collaboration with the Veterinary Services Branch a new scheme for brucellosis eradication has been introduced. Tested studs can be listed and pig farmers will be able to purchase stock from these studs with the knowledge that they have given negative tests.

CATTLE HUSBANDRY BRANCH.

The expanding staff of this recently formed Branch has carried out active extension work during the year, and approximately fifty field days were attended. Feeding demonstrations have been established to show the effect of the feeding of protein concentrates in association with normal grazing and cheap forms of roughage. Most of these demonstrations have been associated with the Commonwealth Dairy Industry Efficiency Grant and have been carried out in several important dairying districts of the State.

Calf feeding demonstrations using limited amounts of concentrates have been continued. The economics of steer raising from dairy type calves will be measured in the coming year.

Small scale feeding trials in connection with depressed butterfat content of milk in certain seasons of the year have been undertaken in association with the Division of Dairying.

Whilst it is not recommended that artificial insemination be generally adopted in Queensland, the insemination of a small number of cows in one district with semen imported from the U.S.A. was carried out in order to ascertain the practicability of such work.

Following on the establishment of a herd at Kairi Regional Experimental Station, a junior officer of this Branch was appointed to Kairi, and he has commenced to collect records of the performance of the herd as a preliminary to experimental work.

Scales for the weighing of beef cattle are at present being installed on one of the properties under the control of the Queensland-British Food Corporation. An officer of this Branch has been assigned to the work and beef fattening trials with the plant and grain of sorghum will be commenced in the very near future in association with the Corporation.

Observations have been made of the movement of 3,000 cattle by road train from the Northern Territory to Mt. Isa and thence by rail to Townsville. Whilst the movement by road train is more expensive than on the hoof or by rail, it was established that cattle can successfully be moved by road transport with a minimum of bruising but that rest periods are essential. It also became obvious that the use of road trains is at present restricted to the movement of stock that cannot be transported on the hoof when stock routes are bare or stony, or to special classes of stock such as fat aged cows which would tend to lose condition when being transported on the hoof.

POULTRY BRANCH.

There has been a decrease of 16 per cent. in the intake of eggs by the South Queensland Egg Marketing Board during the second half of the period under review, as compared with the corresponding period of the previous year. This has been due partly to abnormal weather and partly to reduction in the size of flocks. Higher feeding costs during the post-war years have also made farmers cull more heavily and forced the less efficient out of the industry.

Poultry slaughterings have been a little greater than in the previous year and there has been a definite increase in the production of duck meat. At least 60 per cent. of the killings at two of the larger establishments in the Brisbane area are exported.

The testing of flocks of stock suppliers for the presence of pullorum disease has indicated that work of this type is of major importance to the industry. According to the provisions of *The Poultry Industry Act*, stock suppliers will only be registered if their flocks contain less than 5 per cent. of reactors to the blood test for pullorum disease. Such reactors are of course removed.

There are now slightly more than 200 stock suppliers in Queensland who have been registered under these conditions, but constant testing has reduced the incidence of the disease to such an extent that at the last annual test 87 flocks contained less than 2 per cent., 34 less than 1 per cent. and 11 were clean. It is expected that during next year it will be possible to publish a list of pullorum free flocks and that such list will grow as each year of testing continues.

A feeding experiment with maize at Kairi Regional Experiment Station, using three laying rations with maize contents of 55, 62·5, and 70 per cent. respectively, did not disclose significant differences in egg production between groups on different rations. However, results were inconclusive as there were large variations within the groups. This experiment is now being repeated and results to hand indicate little difference between and within groups.

Officers of the branch have made over 3,000 visits to farms during the year for the purpose of extension work as well as giving many lectures and conducting field days.

Report on Field Veterinary Services and Acts Administration.

Mr. J. C. J. Maunder, Director of Veterinary Services.

PASTORAL CONDITIONS.

For the first time in many years, the entire State has enjoyed an excellent season. It is usual for the various parts of the State to experience different types of seasons; in any one year, the north may be bad the south good, and vice versa, while the same may be said of the inland and the coastal areas.

The fact that the whole of the pastoral areas of the State are in first class condition, combined with the stability of the stock market, should do much to lift the cattle population considerably, but a similar recovery in the sheep population has been slowed down by blowfly losses, mortalities in lambs, and the difficulty of purchasing sheep to replace the losses of previous bad years. Livestock statistics as at 31st March, 1950, are given in Table 1.

TABLE 1.

Live Stock Statistics (March, 1950).

Cattle	6,253,000
Sheep	17,419,000
Swine	389,000

Although the rainfalls recorded for many divisions of the State have been in the vicinity of records, and the far west Channel Country has been flooded repeatedly, there have been no great losses of stock due directly to floods.

There has been considerable delay in fat cattle reaching market, as the prolonged and heavy wet season delayed musterings on many holdings. It is not expected that this will affect the final kill, as there is excellent feed available to maintain the condition of cattle. The actual number of fats available should be comparable to that of last season. In southern Queensland the number will be increased but in the north fats will still be below normal due to the depletion of breeding herds in 1946 and 1948. There should, however, be a definite upward trend next season.

Store cattle are in great demand for three main reasons—the excellent pastoral conditions prevailing, high prices of fats, and the difficulty of obtaining sheep replacement leading to an extra demand for cattle. Brandings on most holdings have been excellent for the past two seasons and there should be an improvement in the store stock supply position next season.

The record wool prices have greatly affected the supply of mutton in most parts of Queensland, which is dependent largely on slaughterings from Merino flocks, as the State does not possess the mutton producing flocks of the southern States.

BUFFALO FLY.

The fact that there has been only a slight spread of buffalo fly beyond the limits reached in the previous season, notwithstanding that ideal conditions prevailed for its propagation, is accepted by many as further evidence of the existence of natural geographical limits. There is no doubt, however, that the control measures adopted have been primarily responsible for the prevention of spread by means of travelling stock, and have contributed materially to the prevention of spread by natural means. Stock moving south by rail are sprayed with DDT on trucks at Mungar Junction and those moving to clean country on the hoof are either dipped in the strategic dips charged with DDT or sprayed. In addition to treatment of travelling stock, infested or suspected cattle on the fringe of the infested area of the Burnett are treated by mobile sprays.

In those areas in which the fly is well established, the most effective control is obtained by those stockowners who use DDT or BHC dips for cattle tick control. Those using arsenical dips practise spraying with DDT in the draining pens and achieve satisfactory results.

In the Gulf country, where it is difficult to handle cattle more than two or three times in a year, buffalo fly caused considerable worry during the season, and is considered by many to be more troublesome than the cattle tick in some of the Gulf districts. It is hoped to obtain some useful data on the practicability of achieving a reasonable degree of control in these areas by dipping in DDT three times during the fly season.

CATTLE TICKS AND TICK FEVERS.

Throughout the tick infested areas of the State, the incidence of ticks has been extremely high due to the continued long period of conditions ideal for tick propagation. In these circumstances, as might be expected, there have been requests from many areas for the commencement of tick eradication. Some want a State-wide plan, while others would be satisfied with eradication in their own marginal areas. Despite the heavy tick season, and the excessive infestation in the marginal areas, there have been no serious extensions into the recognised clean country, although the steady increase in the areas bordering the clean country constitutes an added threat. It is significant that since all the important clearing dips have been charged with DDT there have been no outbreaks of ticks in clean country as a result of failure of the dips to kill ticks at the clearing dippings. This is in marked contrast to the history associated with arsenical dippings. Details of dippings in DDT are given in Table 2.

TABLE 2.

Stock Treated in DDT Dips, Year ending 30–6–50.

Number of dips charged ..	34
Cattle dipped	274,560
Horses dipped	2,903

It is significant that the best results have been achieved with those DDT dips which are under official supervision. Reports are received of unsatisfactory results with dips where supervision is impracticable, and this stresses the importance of paying close attention to the details of correct dip management.

Dips charged with a mixture of arsenic and BHC have given somewhat erratic results. The increased killing effect noted in laboratory trials is not always seen in the field, and there is the suggestion that arsenic has an adverse effect on the stability of BHC suspensions. However, it is too early as yet to be certain as to just what is involved.

In conjunction with the Director of Research many field trials are being conducted to test the efficacy of various new synthetic insecticides. Information on these is given in the report of the Animal Health Stations.

In the pursuit of a cheap and effective method of applying efficient tickicides, preliminary trials with a fogging machine were undertaken in both North Queensland and southern Queensland, but the results were disappointing. Cattle were "fogged" in an open yard, and notwithstanding that a reasonably good contact was made, the tick kill was very poor.

For tick eradication, or for clearing dips where a complete kill is required, dipping vats still appear to be the best method of application. Where field control only is sought, then power spray units are very effective, especially for the treatment of small numbers such as in dairy herds. Whether satisfactory results can be obtained by the use of atomised sprays, which are less costly, has still to be determined.

Tick fevers have been prevalent in all marginal areas and in the forest areas of the Gilbert River country; mortalities in some cases have been heavy where early treatment with specifics has been impracticable. Cases of anaplasmosis occur spasmodically. Only small numbers are involved, but the distribution is wide—from southern Queensland to Normanton. Some heavy mortalities have also occurred following protective inoculation, particularly where it was not possible to keep inoculated cattle under observation.

In a State that has so much permanently infested country and marginal country, cattle ticks and tick fevers must be rated as the prime disease factor restricting production in the beef cattle industry.

CONTAGIOUS PLEURO-PNEUMONIA.

There have been more than the average number of outbreaks during the year, and as usual they have all been associated with cattle movements. The somewhat increased activity of the disease may be due partly to the long wet season, but may also be incidental to the fact that stock movements have been fairly heavy. Although reports suggest that most of the outbreaks have been in mobs of cattle inoculated before going on the road, close investigation has usually shown that portions of the mobs had apparently been missed, and it was in these cattle that cases had occurred.

Control of the disease in Queensland must be based on effective inoculation and control of movements, and the greatest possible protection must and will be afforded to those districts which are dependent upon regular introductions of store cattle from enzootic pleuro-pneumonia areas.

The total number of recorded outbreaks for the period 1949-1950 was 37. Although the exact figures are not available, both the total number of cattle affected and the mortalities were relatively small compared with the numbers of cattle in the mobs or on the affected holdings.

TUBERCULOSIS.

The tuberculin testing programme has been maintained satisfactorily. Details are given in Table 3. Private practitioners continue to bear the bulk of the routine testing associated with the tuberculosis eradication campaign in the milk supply herds of Brisbane, South Coast and Darling Downs. The incidence of the disease is being satisfactorily reduced, and although individual problem herds are encountered, there do not appear to be any major difficulties which cannot be handled by the single intradermal test using synthetic medium tuberculin prepared by the Commonwealth Serum Laboratories.

Testing by Departmental officers has been mostly for disease control purposes, for the tuberculosis-free herd scheme, and for shows. An attempt is now being made to encourage stud owners to participate in the tuberculosis-free herd scheme, and although the response has been somewhat slow, it is anticipated that next year will show a considerable increase.

TABLE 3.

CATTLE TESTED FOR TUBERCULOSIS, 1–7–49 TO 30–6–50.

District.	Number of Herds.	Number of Cattle.	Number of Reactors.	Percentage of Reactors.
Southport ..	71	5,662	66	1·17
Cocmera	77	5,995	153	2·55
Beenleigh ..	127	7,105	75	1·05
South Brisbane and Brookfield ..	64	2,806	57	2
North Brisbane and Petrie	66	3,701	40	1·09
Samford	117	8,105	52	·64
Beaudesert ..	81	6,918	35	·5
Beaudesert to Border	32	4,102	126	3·07
Dayboro	57	5,326	344	6·4
Dayboro-Mt. Mee	71	5,614	131	2·34
Kilcoy	52	4,761	141	3
Caboolture ..	12	779	20	2·57
Ipswich	152	7,301	110	1·5
Total for Brisbane Area	979	68,175	1,350	1·98
Toowoomba ..	34	1,846	35	1·95
Darling Downs and Warwick ..	194	7,435	25	·33
Other Country Districts	366	24,983	639	2·55
Total.. ..	1,573	102,439	2,049	2

All tests except those conducted at Dayboro and Toowoomba and "other country districts" were carried out by private practitioners. In the Brisbane District tests, 8·5% of reactors showed no visible lesions.

BOVINE BRUCELLOSIS.

Strain 19 vaccination continues to form the basis of control of this disease and during the year a total of 23,524 calves was vaccinated. Results to date have been very satisfactory, although the usual number of reports are received from time to time suggesting that (*a*) vaccinated calves are hard to get in calf, and (*b*) abortions do occur amongst first calf cows that were vaccinated as calves. Investigations of these reports have always proved that there is no direct association between vaccination and sterility, and abortions have been shown to be due to infections and factors other than brucellosis.

As a result of these investigations, abortions due to *Vibro fetus* infection have been detected.

SWINE BRUCELLOSIS.

Stud breeders continue to seek control based on the conditions of the Department's brucellosis-free herd scheme, but it has long

been recognised that difficulties associated with interpretation of the agglutination test have inflicted some unnecessary testing on some herds. To overcome this, the brucellosis-free herd scheme has largely been replaced by a scheme which provides for regular testing with removal of positive reactors, with recognition for those herds in which no positive reactors are detected. This variation of the brucellosis-free herd scheme has only recently been implemented, but it is functioning well to date. A total of 33 herds is undergoing regular tests in accordance with the provisions of this modified scheme.

STERILITY.

A major cause of lowered production amongst dairy herds, this condition also affects beef herds. In both types of cattle the incidence is mainly seasonal, and is not so serious, generally, when the plane of nutrition is satisfactory.

In dairy cattle, many herds in which the breeding history is unsatisfactory have been found to be below the normal range of blood phosphorus, while a few have also shown low blood calcium. Improvement does follow with an improved mineral intake, but it is difficult to dissociate results from seasonal variatons.

Vaginitis, so-called, has been as prevalent as usual and the time has arrived when serious consideration must be given to the replacement of the empirical use of astringents by a physiological approach to the problem.

MASTITIS.

The most important development in connection with this disease has been the increased use of penicillin therapy, with a corresponding decrease in the application of the fundamentals of hygiene in dairies, for prevention and control of the disease. This aspect has received the attention of field officers, who endeavour to persuade stockowners that the use of penicillin alone cannot be expected to solve the mastitis problem.

While streptococcal mastitis continues to be the most prevalent, numerous outbreaks of staphylococcal mastitis do occur, and in North Queensland, some severe outbreaks, with mortalities, were considered to be due to infection with *Bacterium aerogenes*.

MISCELLANEOUS DISEASES.

Leptospirosis of Calves.

Subsequent to the clarification of the etiology of ictero-haemoglobinuria (one of the diseases known as "redwater") in calves, it has now been established that the disease has a wide distribution, having been diagnosed in most dairying districts.

However, although the disease has been serious on those holdings on which it has occurred, it has not been reported from a large number of farms in any one district. It is not confined to calves, but occurs in adult cattle also.

Foot Rot of Bovines.

As would be expected in an abnormally wet season, the incidence of foot rot has been high; however, the number of mobs of travelling cattle that have been affected, particularly in North Queensland, is most unusual. Response to treatment by the soluble sulpha drugs has been satisfactory only when applied in the early stages of the disease.

"Wallum" Disease of Cattle.

Little progress has been made in the elucidation of this disease, but a co-ordinated investigation, with the Director of Research and the Agricultural Chemist, is being continued in an effort to solve this problem, which affects a long, narrow strip of coastal country.

Arsenical Poisoning.

This continues to hold a prominent place in the list of deaths by poisoning, but a slight decrease is apparent. This is probably due to the fact that in those areas where tick control was difficult, stockowners are now using DDT or BHC instead of increasing the concentration of their arsenical mixtures. However, there are frequent reports of losses as a result of careless use of arsenicals for weed destructon, control of suckers, &c.

Tetanus.

The incidence of tetanus in horses has been of average proportions, occasional cases have occurred in cattle, and a number of cases have been reported in sheep. There has been fairly strong evidence that some of the outbreaks in sheep have been associated with heavy grass seed infestations with skin penetration. The use of toxoid for preventive purposes is adopted in these areas where tetanus is fairly common (North Queensland), and a combination of toxoid and anti-toxin treatment has been used successfully to deal with outbreaks.

Blackleg.

This disease has been very prevalent, losses being experienced in several districts for the first time in many years. As a result vaccination has been practised very widely. Results with vaccines which in previous years have given consistently good results have during this year sometimes been disappointing. Stockowners have reported that what appeared to them to be typical cases of blackleg occurred up to eight weeks after vaccination. Earlier investigations indicated that these losses were not true blackleg, but it was later shown definitely that some at least were.

Birdsville Disease of Horses.

Field investigations are now directed towards obtaining as much information as possible on the seasonal and geographical distribution of the disease, and the relationship of incidence to distributon and growth stages of *Indigofera enneaphylla*, which has produced typical cases in feeding trials conducted in the Alice Springs district by officers of the Northern Territory Administration. The losses in horses from this disease is serious in the south-west, and their prevention presents a serious problem.

Kimberley or Walkabout Disease of Horses.

Cases have been reported from areas in North Queensland, and particularly the Gilbert River area, in which whitewood (*Atalaya hemiglauca*)

is said to be either absent or rare. Owing to the remoteness of the areas, investigations are, as in the case with Birdsville disease, difficult, but every effort is being made to obtain as many data as possible on the disease. There is not much doubt that Kimberley disease, in Queensland, is not as important as Birdsville disease.

Oesophageal Disease of Horses.

Further investigations in North Queensland have failed to establish the cause of this peculiar disease, the outstanding characteristics of which are extensive ulceration of the oesophageal mucous membrane, emaciation and fatal termination in many cases. Suspicions are directed towards certain plants and feeding trials have been arranged; preliminary results are inconclusive.

Miscellaneous.

In addition to the above disease conditions, the exceptionally wet season, characterised by luxuriant pasture growth, appears to have produced mortalities in sheep and cattle which present peculiar similarities. Losses occur in sheep and cattle, mostly young stock, but adults are also affected, the chief manifestations being loss of condition and anaemia, though running on country in excellent condition. Worm infestation is not responsible and it is suspected that trace element deficiencies may be responsible.

Results of copper and cobalt feeding are not yet available and the losses are at present difficult to explain.

INTERNAL PARASITES.

Helminth infestations have been heavy in both cattle and sheep, but generally speaking control has been obtained with phenothiazine drenching. However, in some cases calves have failed to respond as well as one usually expects and it is considered that unusually heavy infestations with *Cooperia* and *Bunostomum* have been responsible.

An unusual happening was the finding of an infestation of the kidney worm of pigs (*Stephanurus dentatus*) in dairy calves, the liver being the organ mostly affected. Liver flukes were found in cattle in the Mt. Surprise area, which is situated between the parallels of 18 deg. and 19 deg. south latitude, probably the farthest north that this parasite has been found.

EXTENSION SERVICES.

The Inspectorial staff has not as much time to devote to extension services as is available to field officers who are not concerned with the administration of the various Acts and the control of stock movements. However, every effort is made to provide an advisory service on disease control, in addition to the very considerable advisory service that inevitably follows investigations of reports of disease outbreaks. Contacts are made with local branches of graziers' and dairymen's organisations and field days are held in various districts at which the problems of local importance are discussed and demonstrations arranged varying according to the particular problems of each district. Approximately 40 such field days were held in various districts of the State.

STOCK MOVEMENTS.

Movements have not been restricted by any bare stock routes and lack of feed, but some movements have been held up as the result of floodings. An unusual feature has been the entry of cattle into Queensland from the Alice Springs and surrounding districts of the Northern Territory, crossing into Queensland at Tobermory and dispersing from Urandangie, mostly to the fattening areas of south-west Queensland. These store cattle have travelled fairly well over the difficult route from Central Australia and have arrived in reasonably good condition.

Details of stock movements across the border are given in Table 4.

TABLE 4.

TRANS-BORDER STOCK MOVEMENTS.

—	Cattle.	Sheep.	Pigs.
Entered from Northern Territory	54,877	..	..
Entered from New South Wales	14,895	234,116	1,008
Removed to Northern Territory	1,592	..	..
Removed to New South Wales	338,773	440,225	34,571

MEAT INSPECTION SERVICE.

Particulars of stock slaughtered for local consumption are contained in Table 5.

TABLE 5.

TOTAL NUMBERS OF STOCK SLAUGHTERED FOR LOCAL CONSUMPTION.

—	Bullocks.	Cows.	Calves.	Sheep.	Swine.
Bacon Factories	26,632	13,318	12,735	3,765	377,736
City of Brisbane (Abattoirs)	48,466	62,381	111,582	445,521	28,282
Larger Population Centres	69,433	60,802	27,375	226,687	35,389
Country Centres	38,688	31,945	28,112	58,496	14,519
Totals	183,219	168,446	179,804	734,469	455,926

The meat inspection service, which controls all meat for consumption within the State, was carried out by a staff which comprises:—

(*a*) Inspectors stationed at bacon factories in various parts of the State, these officers being engaged full time on meat inspection.

(*b*) Inspectors in country districts whose main duties consist of meat inspection in country slaughter yards and supervision of yards, butcher shops and vehicles, but who also perform duties associated with disease control in livestock.

(*c*) Inspectors whose chief duties consist of disease control work, but who are also responsible for the maintenance of hygiene in slaughter yards, butcher shops and vehicles within their districts.

(*d*) Inspectors engaged full time on the inspection of butcher shops in the Brisbane Metropolitan area working under the Senior Slaughtering Inspector who also supervises all officers engaged on meat inspection at the various bacon factories within the area.

In those centres where slaughtering duties receive primary attention (that is, in the more important country towns), there is a multiplicity of yards to supervise and inspect. However, the service performed by the inspectors is adequate and the public is well protected as far as its meat supply is concerned. In the smaller towns and outlying districts, where stock duties receive prior consideration, the meat inspection service takes the form of regular visits to slaughter yards and shops to ensure the maintenance of a satisfactory standard of hygiene in yards, shops and vehicles.

NEW LEGISLATION.

There was some variation in the levy for tuberculin testing, provided for under Section 7A of *The Diseases in Stock Acts*. The Minister reduced the levy in the Brisbane and South Coast areas from ¼d. per gallon to $\frac{1}{6}$d. per gallon, and on the Darling Downs from ¼d. to ⅛d. per gallon of milk supplied. This was made possible by the continued reduction in the incidence of disease, with consequent reduction in payment for compensation in proportion to the numbers of cattle tested.

BREACHES OF ACTS.

Diseases in Stock Acts.

During the year there were seven prosecutions for breaches of the Acts, all of which were successful. The commonest breaches continue to be failure to obtain a permit to travel stock (Section 18) and failure to provide a waybill (Section 19). Some breaches are committed through ignorance of the requirements, some through carelessness, and some in a deliberate attempt to defy and/or evade the requirements of the Acts. Whatever the explanation, all breaches are viewed seriously, as Sections 18 and 19 are of vital importance in the control of spread of disease by stock movements. Many stockowners and their organisations believe that these sections of the Acts are for the purpose of prevention of stealing of stock, but this is not the case. The specific purpose of these two sections is prevention of spread of disease. Control of stock stealing is a function of the Police Department.

Slaughtering Act.

There were seven prosecutions during the year, the defendants being convicted and fined in each case. The breaches most frequently committed are:

(i.) failure to dispose of offal at a slaughter-yard to the satisfaction of the inspector (Regs. 26 and 27),

(ii.) failure to give an inspector notice of intention to slaughter stock (Reg. 23),

(iii.) failure by owner or occupier of a slaughter house to retain waybills as prescribed (Reg. 22),

(iv.) slaughter of stock at unlicensed premises (Reg. 13), and

(v.) failure to keep a slaughtering book as prescribed (Reg. 24).

Brands Acts.

It would appear that stockowners generally are observing the requirements of the Brands Acts, as few cases of irregular branding and earmarking have been reported to the Department. Two prosecutions for breaches of the Brands Acts, were launched during the year, the defendants being convicted and fined in each case. A number of warnings were issued to offenders in connection with minor breaches of the Acts, mainly in respect of careless branding and earmarking.

BRANDS.

There has been a slight decrease in the number of registrations of cancelled horse and cattle brands, symbol brands, sheep brands and sheep earmarks, with an increase in the number of transfers of horse and cattle brands and registrations of cattle earmarks. The figures compare favourably with those for the year 1948-49. Details are given in Table 6.

TABLE 6.

DETAILS OF REGISTRATIONS, TRANSFERS, &C., FOR YEAR 1949–50.

—	Number.	Number since Inception of Legislation.
Ordinary Three-piece Horse and Cattle Brands Registered	..	92,242
Cancelled Horse and Cattle Brands Registered	937	12,145
Horse and Cattle Symbol Brands Registered	96	2,419
Horse and Cattle Brands Transferred	2,100	74,985
Cattle Earmarks Registered	635	23,337
Sheep Brands and Earmarks Registered	170	13,537
Sheep Brands and Earmarks Transferred	235	8,575
Distinctive Brands Registered	6	1,317
Alteration of Address of Brands	133	..
Brands Cancelled	17	..
Earmarks Cancelled	176	..

QUARANTINE.

Certificates under Commonwealth quarantine regulations were issued and inspections made in respect of 1,029 animals.

Report of the Animal Health Stations.

Dr. J. Legg, Director of Research.

GENERAL.

The reports of the Yeerongpilly and Oonoonba Stations are submitted as a single report.

Laboratory Diagnosis.

Post-mortem examinations and laboratory tests in connection with the diagnosis and control of disease were done on an increased number of specimens submitted by Departmental officers, veterinarians, and stockowners. Particulars of the 2,181 separate batches of specimens received at Yeerongpilly and 445 batches examined at Oonoonba are shown in Table 1.

TABLE 1.

Summary of Specimens Examined.

—	Yeerongpilly.	Oonoonba.
Complement fixation tests for contagious bovine pleuro-pneumonia	108	..
Blood samples for brucellosis agglutination tests—		
Bovine	7,888	390
Porcine	1,823	86
Milk samples for bovine mastitis	530	51
Blood films for tick fevers of cattle	69	21
Autopsies—		
Fowls	963	85
Ducks	84	1
Pigs	43	9
Sheep	35	..
Cattle	23	1
Dogs and cats	12	5
Other animals	17	1
Other specimens (organs, tissues, plants, &c.)	705	323

The growing demand for laboratory aid in the diagnosis of animal diseases is due partly to the growth of the Department's field staff and partly to the fact that stockowners are paying more attention to disease control, because of the higher value of livestock. Furthermore, improvements in methods of treating and preventing diseases often require more accurate diagnosis, and, consequently, greater use of laboratory tests.

Vaccines.

Vaccines supplied to stockowners, veterinarians and Departmental officers showed an increase over previous years, the totals for 1949-50 being as shown in Table 2.

TABLE 2.

Vaccines Supplied by Animal Health Stations.

—	Yeerongpilly.	Oonoonba.
	Doses.	Doses.
Contagious bovine pleuro-pneumonia	239,925	211,350
Infectious labial dermatitis of sheep	667,500	..
Tick fever of cattle	23,780	5,128
Brucella abortus Strain 19 vaccine	23,524	..

Blood vaccine for tick fever is prepared at Yeerongpilly and Oonoonba. Pleuro-pneumonia vaccine is obtained from C.S.I.R.O. Melbourne, and infectious labial dermatitis ("scabby mouth") vaccine and *Brucella abortus* Strain 19 vaccine are obtained from the Commonwealth Serum Laboratories, Melbourne.

DISEASES AND PARASITES OF CATTLE.

Tick Fever.

Steers prepared as reservoirs (bleeders) for tick fever inoculation of cattle and distributed to stockowners numbered 156 from Yeerongpilly and 11 from Oonoonba.

The large increase in the numbers of bleeders sold and stud cattle immunized against tick fever at Yeerongpilly is shown in Table 3.

TABLE 3.

Tick Fever Immunization.

Year.	Bleeders Sold.	Stud Cattle Immunized.	Total.
1944–45	53	216	269
1945–46	73	190	263
1946–47	76	170	246
1947–48	134	187	321
1948–49	110	312	422
1949–50	156	467	623

Generally speaking, there has been little trouble with the immunization of either stud cattle under supervision during the reaction period or herds in the field, though on more than one occasion losses have occurred among the latter. Occasionally groups of susceptible cattle react severely, and no explanation can be found for this. Such reactions are difficult to control with drugs unless taken in hand early.

In the field, natural outbreaks of tick fever have been common. Nearly all of these were due to *Babesia argentina*. In one instance a mixed infection was seen, the two organisms *B. argentina* and *Piroplasma bigeminum* being present in large numbers.

Anaplasmosis was diagnosed at Yeerongpilly for the first time since 1946. The organism (*Anaplasma marginale*) was found in blood films from four outbreaks in widely separated district, viz., Ipswich, Injune, Biloela and Nebo. In each instance only odd cases of the disease occurred. A case of mixed tick fever (*Babesia argentina*) infection and anaplasmosis at Normanton was diagnosed at Oonoonba.

Synthetic Insecticides in Tick Control.

This work has been continued and some of the earlier experiments have been repeated. A small experimental herd has been maintained at Yeerongpilly for these observations. Any preparation used has always been freshly prepared and applied by means of a hand or power spray.

DDT in the form now available does not give a really good kill of ticks, particularly mature ticks, even with concentrations as high as 0.5 per cent. It seems to give slightly better results during the warmer months of the year. The efficiency of the drug in the field is probably due to its high residual effect.

Benzene hexachloride (BHC) is effective at concentrations between 0.03 and 0.04 per cent. gamma isomer. The addition of arsenic up to 0.1 per cent. (expressed as As_2O_3) increases the killing effects.

No further laboratory experiments have been done with chlordane, but field spraying trials

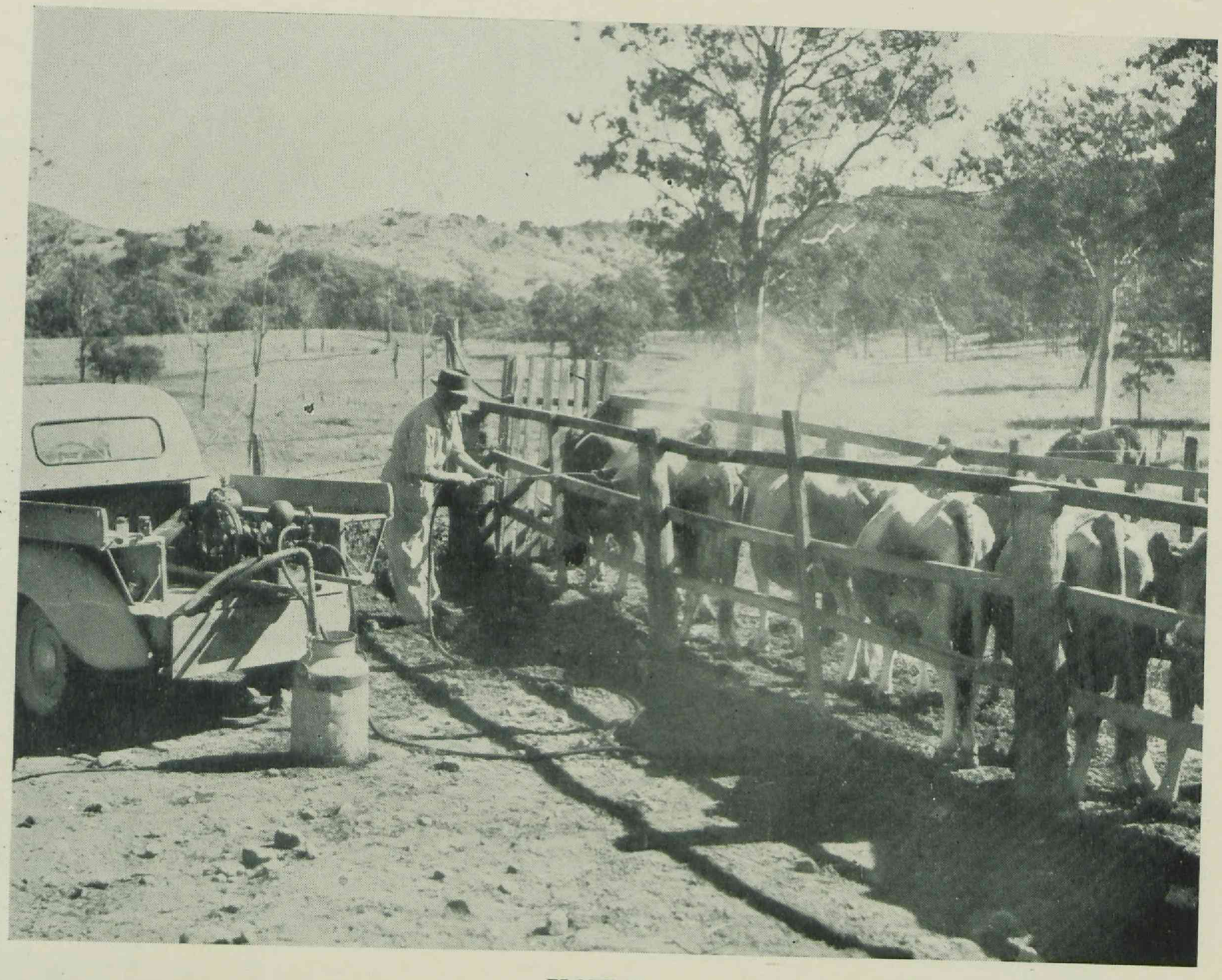
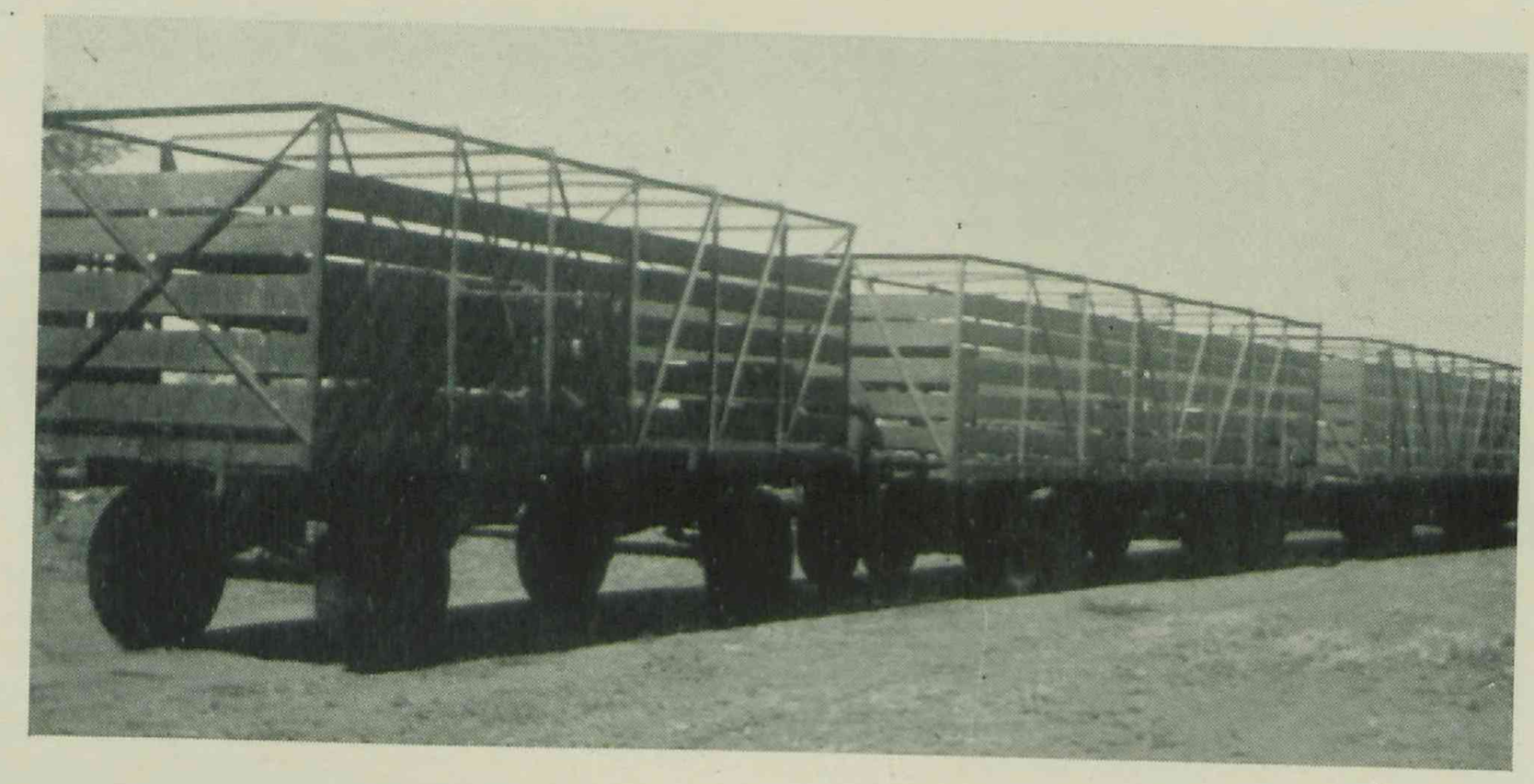


PLATE 11.
An Experimental Spraying of Cattle with one of the Newer Tickicides.



PLATES 12 and 13.
Road Transport of Cattle. The top view shows several units of a transporter, and the bottom view is of cattle being loaded.

have confirmed the earlier work with this preparation. Two dairy herds were sprayed with 0.25 per cent. chlordane during the 1940-50 summer. Good control was obtained by treating all stock once a month. This must be considered very satisfactory as conditions have been extremely favourable for tick life during the period under review.

Further spraying trials were carried out with toxaphene in tick control in dairy herds during the summer. At a strength of 0.4-0.5 per cent. good control was obtained when cattle were treated regularly at intervals of 3-4 weeks.

Work has also been continued with E605 (parathion). This preparation is very effective in tick control at very low concentrations. In earlier work it was noted that the lethal effect of the drug was apparently influenced by the different formulations. Field trials with spraying fluids did not confirm the earlier laboratory experimental tests. It was subsequently found that the concentrates were not stable. More work appears to be necessary in formulating this preparation for use on livestock.

Compound 497 (now known as dieldrin), a preparation allied to chlordane, has also been tested in laboratory trials. At concentrations between 0.05 and 0.1 per cent. it was very effective. This was confirmed by field spraying trials with lactating dairy cows running on badly infested country. No harmful effects were noted, and the parasites were rapidly brought under control.

Reviewing, from the point of view of tick control, the situation that has arisen since the introduction of so many new synthetic insecticides, it seems that some of them may present difficulty if attempts are made to put them up in a form suitable for use in dipping vats; but this will not preclude their extensive use by dairy farmers who can make up fresh spraying fluid each time the animals are treated. Indeed, many dairy farmers to-day are using these insecticides and applying them by means of a small power spray. For the average dairy herd, power sprays seem ideal.

Buffalo Fly Control With Chlordane.

Small scale experiments were done at Oonoonba to determine the effect of chlordane on buffalo flies. Heavily infested animals were freed of flies after several hours, but appreciable numbers were again present seven days later. In one test there appeared to be some repellant effect. Ten of a group of 20 animals were sprayed. Daily observations showed some flies on the untreated animals for the whole period, whilst the treated ones remained relatively free for one week, after which all the cattle were again infested.

The drug used at a strength of 0·25 per cent. emulsion killed the flies readily and gave satisfactory protection up to seven days. *Stomoxys calcitrans* appeared to be unaffected.

Helminth Parasites.

Studies on the seasonal incidence of the gastro-intestinal parasites of dairy and beef calves have been continued in association with the C.S.I.R.O. Veterinary Parasitology Laboratory, Yeerongpilly.

The general conclusions from the work are summarised as follows. Calves can become infested at an early age. *Strongyloides* and *Cooperia* are often present when the calves are four weeks old. *Haemonchus, Ostertagia* and *Trichostrongylus* appear a little later, while *Bunostomum* and *Bosicola* are not present until the animals are 3-4 months of age. The worm burden gradually builds up until the calves are 5-6 months old, and then decreases rapidly and remains at a low level. This loss of infestation is believed to be due to the development of immunity as the result of exposure to moderate intake of larvae.

This immunity appears to be specific for each species of parasite. Often an *Haemonchus* infestation is being built up while a *Cooperia* infestation is being thrown off. The immunity to *Haemonchus* is apparently not lasting, because weaners 12-18 months old that have thrown off a previous *Haemonchus* infestation may again acquire a pathogenic burden. Moderate infesta tion with *Bunostomum* seems to produce a permanent immunity.

Continuous exposure to large numbers of infective larvae appears to delay the development of immunity and the calves suffer from chronic parasitism. Anthelmintic treatment of these animals removes the adult worms, but the calves do not develop immunity, and they again become infested unless they are moved to clean pasture.

Conditions suitable for the development of natural outbreaks of parasitism in calves need to be much more favourable to the parasite than are the conditions which lead to outbreaks in sheep. Outbreaks of parasitism in dairy calves have generally been associated with overcrowding in damp pens or paddocks. This has been particularly noticeable in the case of *Bunostomum* infestations. High rainfalls, about five inches per month spread over several wet days, may lead to an outbreak of parasitism, particularly if overcrowding or local overgrazing is present. The effects of the parasitism may not be noticed until 6-8 weeks after exposure to these conditions.

From a parasitological point of view the time of calving seems to be important. Dairy calves born during the late spring and early summer appear to suffer most, because they are weaned and turned out to graze at a period (late summer and autumn) when the chances of picking up heavy infestations are greatest. Calves dropped during the winter and early spring generally suffer less from parasitism. Management to produce the bulk of the calves during this period is not practicable unless supplementary feeding is practised. In the case of beef calves the position is not so clear. These animals are generally dropped during the late spring to early summer, and parasitism is not important until the late summer and autumn after weaning, when the animals are 12-18 months old.

Numerous outbreaks of parasitism were reported during 1949-50. An abnormally wet period in October resulted in outbreaks during December, while further cases occurred in the late autumn and early winter following the heavy rains during the early part of 1950.

Phenothiazine, though recommended as a general anthelmintic for cattle, is apparently efficient against *Haemonchus* and *Bosicola* only. Heavy doses do not remove *Bunostomum* on all occasions, and *Cooperia* seems very resistant

to this drug. Other anthelmintics are used on the basis of their efficiency in sheep and this may not be applicable to calves.

Several cases have been observed where phenothiazine effected no improvement in calves exhibiting the symptoms generally associated with worm infestation. These animals had persistent diarrhoea with greyish-green foetid faeces and they became emaciated and anaemic. Fatal cases that had been drenched regularly with phenothiazine showed infestations of 40,000 to 98,000 adult *Cooperia* (*C. punctata* and *C. pectinata*) and negligible numbers of other Strongyles. There are, however, other factors, because a similar condition has been seen in calves carrying only small *Cooperia* infestations.

Kidney Worm Infestation of Calves.

Two calves from a farm near Ipswich showed extensive liver damage due to *Stephanurus dentatus*, the kidney worm of swine. Several adult worms were obtained from the liver lesions and from the bile ducts. The calves had been grazed on a small area that received drainage from a piggery after heavy rain.

Brucellosis and Vibrionic Abortion.

Brucella abortus Strain 19 vaccine prepared by the Commonwealth Serum Laboratories, Melbourne, was issued to field officers of the Department through the Yeerongpilly Station; 23,524 calves were vaccinated during the year.

The occurrence of abortion due to *Vibrio fetus* infection was reported for the first time in Queensland in last year's report. To gain information on the prevalence of this disease, field officers were asked to submit aborted foetuses whenever they were available and could reach the laboratory in a fit condition for bacteriological examination. Most of these specimens yielded *Brucella abortus*, but one case of *Vibrio fetus* infection was found. No cases of trichomoniasis were found.

Bovine Leptospirosis.

In the last report it was recorded that study of three outbreaks of the disease known for many years as icterohaemoglobinuria or "redwater of calves" had revealed that the disease is a leptospira infection. A total of 31 outbreaks has now been diagnosed at Yeerongpilly and several have been diagnosed at Oonoonba. Cases have come from all the major dairying districts of the State except the Atherton Tableland.

It has been found that the disease affects adult cattle as well as calves. The animals affected in 31 outbreaks were:—

	Outbreaks.
Calves only	20
Calves and cows ..	5
Cows only	6

Affected cows exhibited fever followed by anaemia and jaundice. The urine was often reddish or brownish for about 24 hours at the height of the disease. Milk secretion was usually reduced to a small quantity of blood-stained fluid. Some cows suffered more or less permanent udder damage, while others returned to normal milk production only very slowly. The mortality has not been high, but the financial loss through loss of milk production, either temporary or permanent, has been heavy in some herds. The symptoms of leptospirosis in adult cattle are similar to those of tick fever (babesiosis or "redwater"), and present knowledge does not permit of the two diseases being distinguished without laboratory examinations.

Among calves, losses from leptospirosis have often amounted to half the calves in a herd.

The disease is spread chiefly by the urine of recovered cattle. It is probable that the organism can survive under favourable conditions in water or mud for some weeks at least. It has been shown that infected calves continue to excrete large numbers of organisms in their urine for up to three months after infection.

Study of the disease is being continued.

Arsenic Poisoning.

Mortality among cattle due to arsenic poisoning was diagnosed on 20 occasions.

Lead Poisoning.

Five mortalities were diagnosed during the year, two in cows (Helidon and Mareeba districts) and three in calves (Toogoolawah, Brisbane and Clermont). It appears now that, among cattle, much mortality hitherto undiagnosed was due to lead poisoning. The symptoms and post-mortem findings are rather variable so that diagnosis often depends upon the delicate chemical analysis needed to detect the small amount of lead that can be fatal to bovines. Lead poisoning is usually due to the ingestion of paint or its ingredients or to the chewing of old flaking paint from painted surfaces. Experience in the past two years emphasizes that lead paint should not be used on any surfaces to which calves are likely to have access.

Plant Poisoning.

Poisoning due to the ingestion of seedlings of Noogoora burr (*Xanthium pungens*) was diagnosed as the cause of heavy mortality at Gympie and Nambour in September, and at Brisbane and Wandoan in October. Reports furnished with specimens from Gympie indicated that the losses in that district amounted to at least 112 cows in 19 herds valued conservatively at £1,300.

The woolly water lily (*Philydrum lanuginosum*) was suspected as the cause of mortality in the Gympie and Nambour districts. This plant has not previously come under suspicion in Queensland, but there is one record from New South Wales of its having caused a condition similar to that observed here.

Poison hemlock (*Conium maculatum*) was identified as the cause of death of a cow on a farm at Mt. Sylvia at the headwaters of Lockyer Creek.

Other plants suspected of having caused mortality were:—

Ranunculus rivularis var. *major* (river buttercup)—horses at Warra.

Solanum stelligerum (devil's needles)—cattle at Gympie.

Malva parviflora (marshmallow)—foals at Bundaberg.

Pratia concolor (poison pratia)—cattle at Boonah.

Nerium oleander (oleander)—calf at Mt. Isa.

Ricinus communis (castor oil plant)—cows at Home Hill.

Passiflora foetida (stinking passion flower)—cattle at Stuart.

Wedelia asperrima (sunflower daisy)—travelling sheep.

Cryptostegia grandiflora (rubber vine)—horses and cattle at Normanton.

Soley's Disease.

This disease was described in the last report. It has now been established that sickness and deaths on the property concerned are due to more than one condition. Bracken fern poisoning has been identified, and feeding experiments with other plants have been arranged to attempt to eliminate other probable entities.

DISEASES OF HORSES.

Coastal Staggers (Ataxia).

At Oonooonba feeding tests with *Gomphrena celosioides* were repeated, and a syndrome identical with that produced in previous experiments, and similar to the natural disease, was produced. There seems little doubt that this plant is concerned in the etiology of the disease.

Kimberley or Walkabout Disease.

Sporadic cases from both coastal and inland districts of North Queensland were reported to Oonoonba during the year.

The plant whitewood (*Atalaya hemiglauca*) was shown many years ago to be the cause of walkabout disease in the Kimberley district of Western Australia. This tree also occurs in western and northern Queensland, and material obtained from these areas was fed to a light draught horse at Yeerongpilly as follows:—

October, November, December 1948—674 lb. in 69 days; July, 1949—234 lb. in 19 days.

The horse became ill and died in March, 1950. Dullness and photosensitisation were present. The macroscopic and microscopic liver lesions were similar to those described by C.S.I.R. workers in their experimental horses fed on this plant from the Kimberleys.

Ulceration of the Oesophagus.

Study of this disease was continued at Oonoonba. It is more widespread than hitherto believed. Cases were examined at Ewan and on several properties near Georgetown, and they were said to have occurred in the Ravenswood district.

A feeding test is being done with a species of Crotalaria that has been frequently associated with the disease.

Birdsville Horse Disease.

The past year's work included attention to the cause of this disease. The first investigation in 1948 indicated that helminth parasites were probably not the cause. Plant poisoning was suspected, so, in collaboration with an officer of the Science Branch, the flora of affected and allegedly unaffected country was surveyed. This approach was abandoned when it was found impossible to be certain that any paddocks within the affected area were free from the disease. Attention was then concentrated upon an examination of the flora of paddocks where definite cases of the disease were seen. As a result of these investigations it was decided that *Indigofera enneaphylla* was the probable cause of the disease, and feeding tests with this plant were recommended.

This information was passed on to officers of the Animal Industry Division, Northern Territory, who now report that experimental feeding of *Indigofera enneaphylla* has produced typical symptoms of Birdsville disease.

DISEASES OF SHEEP.

Infectious Labial Dermatitis.

The amount of "Commonwealth" vaccine issued through the Station has increased from 525,000 doses in the previous year to 667,500 doses in the present year. No untoward sequelae or cases of "scabby mouth" among vaccinated sheep were reported during the year.

Georgina River Disease.

The plant suspected to be the cause of this condition, *Eremophila latrobei*, has been shown experimentally to be toxic to sheep. To confirm that this plant is the cause of the natural disease seen in the field, a paddock one square mile in area on an affected property was fenced and stocked at the end of 1949. Typical cases of the disease occurred. The paddock will now be cleared of the suspected plant and then restocked with sheep.

Salmonellosis.

For more than 20 years it has been known that drafts of rams imported from the southern States have occasionally suffered heavy mortality after their long journeys. Two types of mortality occur; in one type, sickness appears a few days after untrucking, and in the other the rams become sick during transit. Investigation many years ago showed that the type of mortality in which the rams became sick *after* untrucking was due to plant poisoning. Some of the plants responsible were *Wedelia asperrima* (sunflower daisy) and *Threlkeldia proceriflora* (soda bush).

The type of mortality in which the rams become sick *during* transit had not been investigated, because the Department had not been consulted until the trouble had subsided. This year, however, Departmental officers had the opportunity of observing five outbreaks. Bacteriological examination of specimens submitted to the laboratory revealed salmonella infection in each case. Symptoms of acute infectious enteritis were present. There were 625 rams in the five affected mobs; 29 were reported dead, 39 sick and 18 recovered, but the losses probably exceeded this because the information covered some of the outbreaks only up to the time at which specimens were sent to the laboratory.

Salmonellosis is a bacterial infection spread chiefly in the dung of affected or recovered (carrier) sheep. It is difficult at present to prescribe preventive measures. Close contact in trucks and spelling yards facilitates the spread of infection, and starvation and other stresses during these long journeys appear to play an important role by reducing the resistance of the rams.

Salmonellosis was identified also as the cause of death of a lamb seven days of age in the Charleville district.

Melioidosis.

This disease was referred to in the last report as a new infectious disease of sheep. No further outbreaks have been recorded. The identification of the causal organism as *Malleomyces pseudomallei* has been confirmed.

In experimentally infected sheep it has been found that the disease may take several different forms. There may be many abscesses in the lungs, liver and spleen, or the disease may affect principally the limb joints. In most cases severe inflammation and ulceration of the nasal cavity has been a feature.

Enterotoxaemia (Pulpy Kidney) of Lambs.

This disease was found to be the cause of losses among fat lambs on the Darling Downs. It had not previously been recorded in Queensland, and is probably not common.

Diseases of the Reproductive Organs of Rams.

One of the serious causes of infertility and wastage among rams is epididymitis. Pathological examination of organs from affected rams has shown a chronic inflammation which damages the epididymis and eventually the testes. Bacteriological examinations and transmission experiments have failed so far to reveal the infectious agent, but the work is continuing.

Urinary Calculi.

Investigation in collaboration with the Chemical Laboratory was continued. Four outbreaks of urinary calculi ("stone") in wethers have now been investigated. The calculi were either calcium carbonate or a mixture of calcium and magnesium carbonates. They occurred in sheep grazing on herbage with a high soluble oxalate content. It is known that ruminants convert soluble oxalate to carbonate in the rumen, and that the carbonate is, under certain conditions, then excreted in the urine. Field observations in south-western Queensland have confirmed that sheep with a high oxalate intake excrete a large amount of carbonate in the urine.

In an experiment at Yeerongpilly, sheep are being fed oxalate and different levels of calcium and magnesium to obtain information on factors involved in the production of carbonate calculi.

DISEASES OF SWINE.

Swine Erysipelas.

Three outbreaks were diagnosed during the year. In the two affected herds on the Darling Downs arthritis and some deaths had been occurring for many months. In the third herd (Pomona district) the septicaemic form of erysipelas occurred among suckers.

Respiratory Diseases.

Infectious pneumonia is the most important disease among pigs over eight weeks of age in Queensland. To determine the role of some of the bacteria associated with the disease, a study is being made at the Oonoonba station of the bacteria found in the lungs of normal pigs and pigs affected with pneumonia. Lungs of 77 animals, mostly obtained from abattoirs, have been examined. The bacteria identified in normal and pneumonic lungs are shown in Table 4.

TABLE 4.

BACTERIA IN LUNGS.

Bacteria.	Normal Lungs.	Pneumonic Lungs.
Pasteurella group	7	25
Haemophilic bacteria	1	6
Bacterium alkaligenes	1	6
Salmonella cholerae-suis	0	1
Negative	26	4
Total pigs examined	35	42

DISEASES OF POULTRY.

Table 5 shows the number of batches of specimens (not individual birds) in which the more common diseases were found.

TABLE 5.

FREQUENCY OF COMMON DISEASES IN FOWLS EXAMINED AT YEERONGPILLY.

Disease.	1948–49.		1949–50.	
Leucosis	74		92	
Coccidiosis—				
Caecal	23	50	26	39
Intestinal	27		13	
Respiratory Infections (the roup complex)—				
Fowl pox	15	37	14	42
Infectious Coryza	9		15	
Infectious Catarrh	8		2	
Fowl Cholera	5		11	
Nutritional Deficiency—				
Vitamin A Deficiency	11	19	21	32
Rickets	6		2	
Perosis	1		2	
Malnutrition	1		6	
Riboflavin Deficiency	0		1	
Worms—				
Ascaridiasis	23	31	29	34
Gizzard Worm and Tapeworm	8		5	
Crazy Chick Disease	12		26	
Egg Peritonitis	14		13	
Pullorum Disease (including adults)	14		9	
Salmonellosis	11		11	
Spirochaetosis	11		2	
Black Comb	8		4	

Leucosis is of outstanding importance not only because of its prevalence but because it affects birds when their value is greatest, namely from three months of age upwards.

Losses from coccidiosis have been reduced by the sulphamezathine and sulphamerazine treatments now being widely used, but even better control would be obtained if more attention were paid to prevention by means of sanitation and dryness in rearing pens.

The continued success of the Department's blood testing scheme for the control of pullorum disease is again reflected in a decrease in the number of cases of the disease diagnosed at Yeerongpilly.

Although 26 outbreaks of crazy chick disease were recorded, this is not a true index of the importance of this disease. It is a brain disorder, which first came to notice in 1947. Because of the rather spectacular nervous symptoms, farmers are apt to submit specimens when only a few cases occur. Chickens 3 to 10 weeks of age are affected. Losses have rarely exceeded 10 per cent. and are usually much less than this. The disease is evidently nutritional but the exact cause is rather obscure.

Report of the Sheep and Wool Branch.

Mr. G. R. Moule, Director of Sheep Husbandry.

SEASONAL CONDITIONS.

Extremely unusual seasonal conditions have prevailed in the sheep country during the year. The later part of the winter of 1949 was severe, and some deterioration in pastures occurred. The rank feed in semi-arid pastoral country dried off and only isolated light falls of rain were reported from the Darling Downs.

In the early summer, the heaviest and most widespread rains ever recorded at that time of the year in pastoral Queensland occurred. Falls varied between three and 11 inches and the Muttaburra district was the only one which was lightly served. Further rains were reported in November and December and falls of up to three inches were recorded, although they were not general.

In mid-January a cyclone passed from the Gulf of Carpentaria through the centre of the pastoral country. This movement travelled with the surprising speed of 24 knots and rainfalls varied between three and 11 inches.

Further cyclonic disturbances occurred in February and March and these brought particularly heavy rains to the central-west and north-west, where totals of up to 14 inches were reported in the two months. Further heavy widespread rains occurred in early April and in June. As all the movements responsible for these falls travelled slowly, dull, cloudy conditions were maintained for a considerable period.

Over 30 inches of rain were received in the first four months of 1950 in many districts which have a mean annual rainfall of under 20 inches, based on 65 years records. As heavy rain fell in the late summer of 1949, totals of over 55 inches have been recorded in some of the "semi-arid" pastoral country in 15 months.

As the result of the bounteous seasonal conditions, a large body of grass exists over the State. In many cases it became rank and grass seed set early. As the weather remained surprisingly warm during the early winter months of 1950, the grass seed has been late in falling. The greater part of central-western and north-western Queensland is lightly stocked, and pastures which were depleted as the result of the 1948 drought have been re-established.

THE SHEEP INDUSTRY.

Sheep numbers in Queensland are below the 60-year mean of 18¼ millions for the third consecutive year. Although successful lambings were reported from the central-west and south-west during the spring of 1949, heavy losses occurred in the summer and autumn of 1950. Many flocks were lambing in the north-west during the heavy rains in March and April and a close estimate of losses could not be made.

Neo-natal mortality amongst lambs was high and losses amongst lambing ewes heavy. Very little movement of sheep from the southern part of the State to the north has taken place and it will possibly be some years before sheep populations in tropical Queensland reach their usual level.

The wool market has been buoyant throughout the year. The 510,160 bales offered returned £A45.2 millions, which is the highest amount earned in a year by a single primary industry in the history of the State.

The lowest prices were obtained at the opening sale for the season in September, when wool averaged 46.69 pence per lb. greasy and £59 12s. 6d. a bale. In the May series, average prices were 88.42 pence per lb. greasy and £118 4s. 5d. per bale.

The ruling rates for lamb at Cannon Hill saleyards have been high, but quality has been poor. The high price for Merino wool has had a definite influence in retarding the production of mutton sheep. In addition, adverse seasonal conditions during the winter and spring of 1949 made it difficult to fatten lambs.

To stimulate cross-breeding of Merinos with British breeds, the ram subsidy scheme has been continued. This year the subsidy was paid on 231 rams, comprising Southdowns and Dorset Horns.

As a result of the prolonged wet weather some unusual circumstances have prevailed in the sheep industry, and extension work has been impeded. However, the experience gained during the year has been valuable from many points of view. Methods which have been recommended for the control of economic loss due to the infestation of sheep by internal and external parasites have been severely tested and an opportunity has occurred to gauge the ability of the grazing industry to combat some of the problems with which it is beset. In view of the serious losses sustained during the blowfly wave which occurred in the late summer of 1950, this might be an appropriate time to review the position with regard to blowfly control measures.

The development of the wave followed a well defined pattern. As the season in 1949 had been fairly bounteous over the greater part of the State, blowflies were quite active in both the autumn and spring, but heavy sheep losses were not reported from many districts. Although the October rain was followed by fine weather, a high incidence of fly strike was reported in the early summer, and the cyclonic disturbances of January and February, 1950, paved the way for a rapid build-up in fly populations as soon as even more favourable conditions developed with the cooler weather and continued rain of March. Shearing and crutching were delayed, insufficient station labour was available, transport was disorganised, and the ground was waterlogged. A large proportion of the State's woolgrowers decided on a "wait and see" policy, apparently without realising that further rain in April could result in heavy loss.

Since 1941, preventive measures which might be used against blowfly strike have been publicised on over 80 occasions, which included field demonstrations and the showing of instructional films. In addition some 865 demonstrations have been undertaken on properties, to show owners and managers the correct techniques to use in performing the Mules and tail strip operations and in docking lambs in order to reduce susceptibility to fly strike.

A high degree of protection against breech strike has been obtained by the application of these measures, even under the severest fly wave conditions, but the industry remains diffident about their use. The reasons for this are not apparent, but the results are obvious, and the inference disappointing.

EXTENSION WORK.

General.

The prolonged wet weather made travel impossible during a large portion of the summer and impeded field officers in extension work. Nevertheless, 2,520 visits were paid to properties in an advisory capacity. This represents an average of 14 visits per adviser per month. In all, 1,800 demonstrations were carried out on properties. A dissection of this work is presented in Table 1.

TABLE 1.

DISSECTION OF DEMONSTRATIONS GIVEN BY SHEEP AND WOOL ADVISORY OFFICERS.

Sheep classing and the selection of breeding flocks	124
Management of breeding flocks	221
Classing and marketing of wool	11
Sheep feeding, including provision of trace elements	71
Control of parasites—	
Internal	396
External—	
Blowflies	660
Lice and ked	38
Property improvement	83
Pasture management	39
Disease control	157

Three field days were held during the year and addresses were delivered to six branches of the United Graziers' Association. The field days were held in the central-west and dealt with fertility and infertility of sheep and neo-natal mortality of lambs. The circuit which was arranged for the Maranoa and Warrego districts had to be postponed on account of wet weather.

Two staff schools were conducted for new appointees to the branch, and the publication of extension articles in the *Queensland Agricultural Journal* has been continued.

Breeding Merinos.

A large amount of detailed extension work has been undertaken by field officers on special aspects of flock and property management in relation to sheep breeding. This work might be regarded as the corollary to the series of field days organised in the autumn of 1949. Rams were examined on 84 properties and a surprisingly high incidence of infertility detected. The care of rams prior to joining was stressed and the management of flocks at mating and lambing times discussed. In addition, methods of treating ewes affected with hypocalcaemia were demonstrated and the prevention of losses due to pregnancy toxaemia discussed.

An increased interest in this work is being shown by men controlling stud flocks, who have alse enquired about animal breeding plans.

British Breeds and Crosses.

Interest in British breeds and their crosses has been hard to maintain in some parts of the State, but has increased in others. This latter trend has been particularly noticeable on the sub-coastal agricultural country. Lambs produced at Beaudesert won the Australian Meat Board's Export Lamb Carcase Competition and a farmer on the Atherton Tableland reported results of a successful trial in that area. In addition, more Corriedales and sheep of the British breeds have been introduced to the Central Highlands. A large amount of this work has been the outcome of extension work undertaken by Departmental officers, who also report considerable interest in lamb raising amongst ex-servicemen newly settled on the Darling Downs.

Sheep Feeding.

Supplementary and Drought Feeding.—As a result of the bounteous seasonal conditions there has been very little need for extension work on drought feeding of sheep. Supplementary and drought feeding were supervised on only 24 properties, most of them in the Inglewood district.

Copper Supplementation.—As wool prices have risen, interest in methods of overcoming copper deficiency of sheep has decreased. However, methods of supplementation were designed for eleven properties, and beneficial results were reported.

Cobalt Supplementation.—Many reports were received during the autumn of 1950 of retarded growth rate of weaners and in some instances of mortality.

The clinical appearance of the sheep and the results of post-mortem and pathological examination were consistent with cobalt deficiency, and controlled field trials to determine the response to cobalt supplementation are in progress.

Agriculture in Conjunction with Grazing.

During the last decade there has been a gradual decrease in sheep numbers on the Central Highlands, which includes the Emerald, Clermont and Springsure districts. There are probably several reasons for this, including deterioration in natural pastures. The more nutritious indigenous grasses and ephemerals, which were dominant, are now less numerous in some pastures than mint weed (*Salvia reflexa*), spear grasses (species of *Aristida*), and other less palatable species.

These districts are now going through a transition stage. Agriculture is being practised more widely and property owners are seeking ways of incorporating agricultural practices into the management of pastoral properties.

Fifteen sheep raisers have planted summer crops, such as Sudan grass or grain sorghum, on prepared land and are on the point of harvesting crops. Others have broadcast grain sorghum and/or Sudan grass seed on unprepared land and have secured some excellent sheep grazing.

There has been a trend towards the production of crossbred sheep for the production of mutton and this development is being watched interest. The sheep raisers who have undertaken this work have been assisted under the British breeds ram subsidy scheme.

Property Improvement.

The objectives of the Sheep and Wool Branch include the dissemination of information which will assist the industry in developing a high state of efficiency and which will permit maximum productivity and at the same time husband the natural resources of the sheep pastoral country.

While such an outlook is fundamental to the successful and continued conduct of pastoral pursuits, its implementation on individual properties demands a high standard of improvement work. This has been difficult to achieve on account of shortages of material and labour.

With the subdivision of larger properties and the planning of further improvement work by established sheep raisers, field officers have been consulted a good deal about property improvement. Advice has been sought by 83 woolgrowers on such diversified subjects as fencing, the construction of yards and dips, the design and construction of shearing sheds, and water improvements.

Internal Parasites.

With the bounteous rains and humid conditions experienced during the past 18 months, worm burdens of sheep have increased rapidly. An interesting feature has been the way in which heavy infestations have developed in sheep running in what is often regarded as worm-free country. Despite publicity about the likelihood of increases in worm populations, a large number of graziers seemed unaware of the cause of losses amongst their sheep, and in many instances control measures had to be employed when ewes were on the point of lambing, or after lambing had commenced. An increased number of demonstrations have been given on methods of worm control, and further extension work, to familiarise woolgrowers with the epidemiology of the parasitic diseases of sheep, is in hand.

The rapid increase in worm burdens carried by sheep has demonstrated the value of field investigations undertaken conjointly by officers of C.S.I.R.O. and this Department, who were afforded the co-operation of woolgrowers in various districts in Queensland.

The results of these surveys provided information which permitted the forecasting of the present situation and the delineation of both preventive and control measures. Their implementation by the industry during the coming year will be required to curtail severe loss due to parasitic worms.

The Sheep Blowfly.

The severity of the fly waves in the spring and early summer of 1949 and the late summer and autumn of 1950 restricted the number of actual demonstrations of the Mules operation and of tailing which could be undertaken. However, it has provided an opportunity of evaluating the methods which have been recommended for the prevention and control of cutaneous myiasis.

Since 1941 the Department has recommended a long range plan for the protection of sheep fly strike. This included:—

(1) The application of the Mules operation and the employment of lamb marking methods which would reduce susceptibility to crutch and tail strike.

(2) A mid-season crutching.

(3) Jetting where necessary.

Despite concerted drives by extension workers, a survey conducted to determine the extent to which the Mules operation and improved tailing methods had been applied revealed that the industry has been slow to embrace more modern methods of fly control. The severe losses experienced during the autumn fly wave appear to have awakened fresh interest amongst woolgrowers in the Mules operation and in a basic plan for fly control. Information has been sought as to the protection which these procedures have afforded. Unfortunately, during the recent fly waves a good deal of confusion occurred between true body strike and breech strike that had spread over the rump.

During the October wave, true body strike—i.e., strike originating on some part of the body other than the breech, pizzle or head—occurred in the Warrego district. Some body strike also occurred in all districts during the March—April fly wave, but by far the greater proportion of the fly trouble during 1949 and 1950 resulted from breech strike. In all circumstances, the Mules operation gave good protection against crutch strike, and when combined with careful methods of tailing and the tail strip operation, excellent results were obtained.

For a number of years observations have been made in conjunction with officers of C.S.I.R.O. on the value of low concentrations of DDT and BHC applied as a light spray over the head, shoulders and back of sheep, as a protection against body strike. Unfortunately, seasonal conditions have not been ideal for observations of this type, but promising results were obtained in a trial in the Charleville district in November, 1949. A large amount of extension work was undertaken on the use of these newer insecticides during the fly wave in central-western and north-western Queensland in the autumn of 1950. Because of the severity of the wave and the heavy losses which were experienced, as well as the difficulty of handling sheep, it was not possible to make controlled observations, but some interesting comparisons could be drawn.

The results obtained from spraying in two flocks are recorded here:—

On March 21, 1950, a flock of 750 Mules treated ewes, with 8 months wool 2 years and over and 500 lambs 4-5 months were sprayed with 0.05 per cent. BHC from ears to tail, using

1 quart per sheep, which was applied through a garden hose nozzle fitted to a jetting plant, working at 130 lb. per sq. in. pressure. They were inspected on April 17, when 40 strikes were recorded away from untreated areas.

The flock was resprayed on April 17; when inspected on April 25, no strikes were recorded. Body strike occurred on 15 per cent. of the remainder of the sheep between March 31 and April 25, during which period eight inches of rain fell. No breech strike occurred in any of the Mules treated animals, although the lambs were affected.

The second property sprayed 5,000 sheep every two weeks with 1.0 per cent. DDT. The spray was applied over the back and shoulders and treatment commenced in early January. During the height of the fly wave, 2½ per cent. of the sheep were struck between treatments, but losses were negligible.

Management and Disease Control.

Though detailed work pertaining to the control of infectious disease is not a function of sheep and wool advisory officers, extension work on measures which can be taken to prevent outbreaks of disease, or investigations into the occurrence of disease, are undertaken in collaboration with officers of the Animal Health Stations and the Veterinary Services Branch. While most of this work is of a routine nature, particular interest attaches to the following aspects of the past year's activities.

(1) *Enterotoxaemia.*—Following investigations into mortality amongst fat lambs on the Darling Downs, a field diagnosis of enterotoxaemia was suggested. This was subsequently confirmed by the examination of specimens at Yeerongpilly Animal Health Station and represented the first recorded occurrence in Queensland. Controlled grazing was recommended as a preventive measure and no further losses occurred.

(2) *Salmonellosis of Transported Rams.*—It has been suspected since 1943 that mortality amongst rams which were sick before completion of their rail journey might be due to salmonellosis, and it would appear from Departmental records that losses from this cause were high in 1937, 1938, 1939, 1943 and 1946. A number of drafts of rams were affected in 1949 and *Salmonella typhimurium* was isolated from specimens submitted to Yeerongpilly Animal Health Station following investigations made in that year. This organism was also isolated from three drafts affected in 1950, and the symptoms and post-mortem findings were consistent with salmonellosis.

(3) *Brisket Abscesses.*—Following the heavy summer rains, spectacular abscesses occurred on the briskets of sheep in the central-west and north-west. Sheep in seventeen flocks are known to have been affected, and the condition was seen on as many as 20 per cent. of the animals in some flocks. No organism was isolated consistently, but in each case the affected flocks had been subjected to extremely wet conditions. Some animals had been standing up to their bellies in water, and all had been "camping" on extremely wet ground.

(4) *Infections Due to Penetration of Grass Seeds.*—Heavy mortality occurred in the Mitchell district during April when a flock of wethers carrying six months' wool were affected by tetanus. The sheep were carrying a large number of spear grass seeds, which penetrated the skin and apparently provided the portal for infection. Control was effected by the use of tetanus anti-serum and tetanus toxoid conjointly.

Another mortality in which penetration by grass seed apparently initiated infection occurred in the Warrego district. An anaerobe which was not consistent with *Clostridium oedematiens,* the cause of black disease, was isolated from material submitted to Yeerongpilly Animal Health Station. Control was effected by dipping the sheep in a phenolic dip, which appeared to loosen the seeds penetrating the skin.

RESEARCH WORK.

General.

Facilities for research work have been improved and extended by the provision of a building for the establishment of a Wool Biology Laboratory. The necessary equipment is available and provision has been made for the determination of clean, scoured yields, fibre diameter dispersion curves, and fibre populations.

Through the courtesy of a number of landholders, an increased number of field trials have been conducted with a view to determining the nature of some of the problems associated with lowered reproductive rates of flocks.

Lowered Reproductive Rates of Flocks.

Three aspects of factors influencing the breeding performance of Merino rams have been investigated.

Light Sexual Desire of Rams.—For many years stud masters in tropical Queensland who purchase leading sires at the Sydney ram sales, which are usually conducted in late May or early June, have experienced difficulty in getting imported rams to work during the spring or early summer. The transference of the rams from southern Australia to the tropics leads to a rapid increase in the light environment that the sheep experience and they are usually moved to northern latitudes at about the winter solstice. It was considered that the increase in the hours of daylight to which these sheep were subjected might decrease the activity of the pituitary gland, and that this effect might be overcome by subjecting the sheep to a rapid decrease in their light environment. In a controlled experiment conducted on a property situated in latitude 20½ deg. S., a group of rams which had been bred in New South Wales were subjected to a rapid decrease of hours in their light environment for a period of six weeks at a time when the light environment of the check group was increasing. At the completion of the trial the treated group was experiencing 8½ hours of daylight each day, while the check animals experienced 13 hours. The rams subjected to dark room treatment exhibited far greater libido, as judged by their

provocative time, the number of services completed in a given time, the mean number of times a ewe was mounted before service was completed, and the percentage of ewes served of those offered. During three weeks, three of the treated rams served 372 ewes—an average of almost six ewes per ram per day. On one day, no less than 40 ewes were served. Each ewe was served during one oestral period and no attempt was made to reserve ewes which exhibited oestrum within three weeks after service. It was subsequently found that 78 per cent. of all ewes served had conceived.

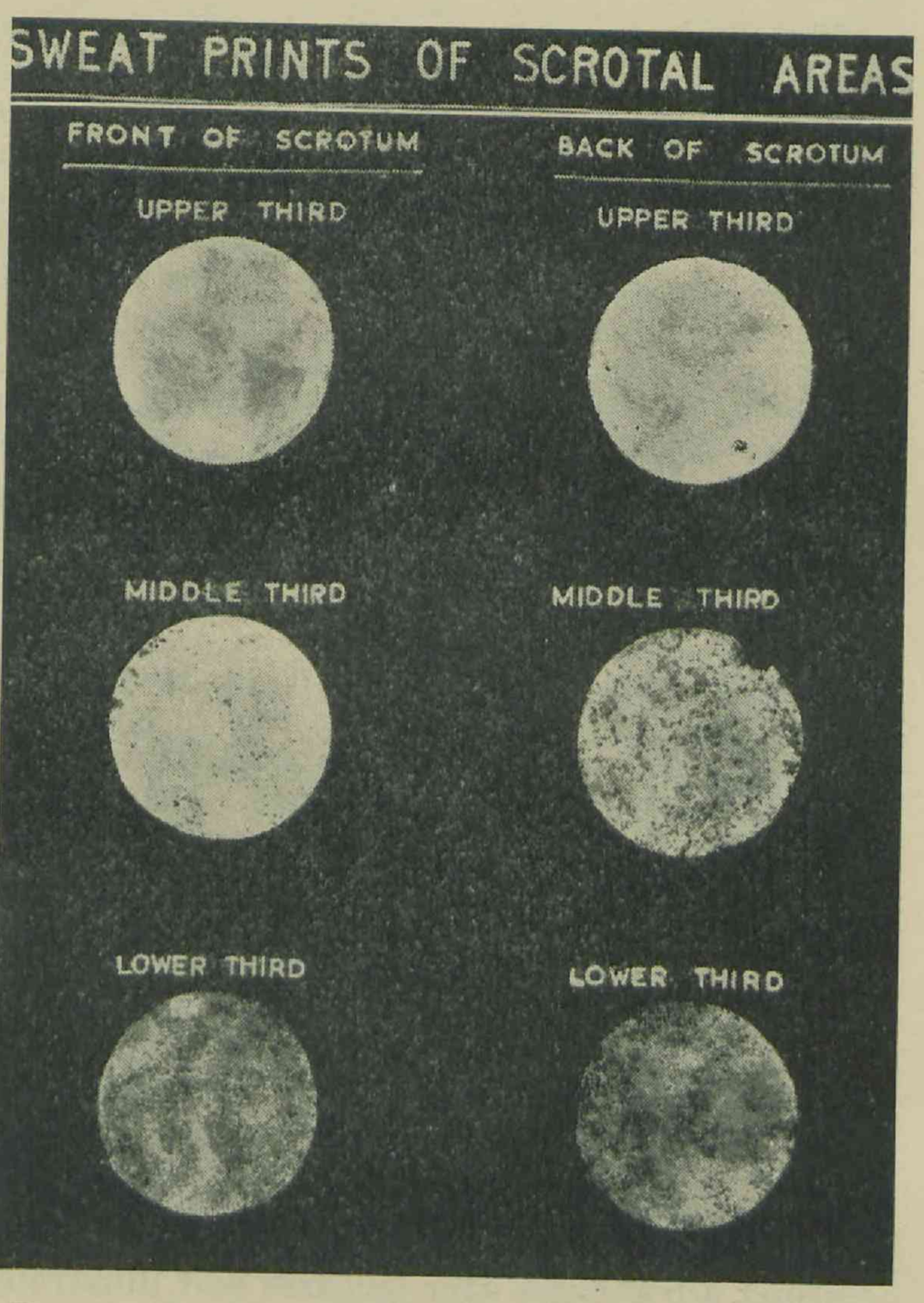


FIG. 1.—Studies of infertility of rams in tropical Queensland include observations on the sweating capacity of the scrotum. The sweat prints shown were among many taken to determine the distribution and functioning of the sweat glands.

Administration of Thyroid Extract and Vitamin A Supplement.—A group of 60 Merino rams located on a property situated in latitude 20½ deg. S. was divided into four subgroups, one of which was kept as a check. A vitamin A supplement was administered to one subgroup and thyroid extract to another. Both Vitamin A and thyroid extract were administered to the third subgroup. Treatment was continued for the three weeks ending on October 24, 1949, when the rams were mated with comparable groups of ewes. At this time daily maximum atmospheric temperatures of over 95 deg. F. and up to 100 deg. F. were recorded. Before the rams were joined semen samples were obtained and evaluated. There was a significant difference in favour of the two groups which received vitamin A when compared with those which did not.

Owing to the extremely heavy summer rains it was not possible to collect accurate data on conception rates. Heavy ewe losses resulted from pregnancy toxaemia, hypocalcaemia and blowfly strike. No figures are available in respect of the individual groups. However, it was determined that 79.3 per cent. of the ewes which survived, conceived.

The Heat-regulating Function of the Ram's Scrotum.—In association with the staff of the Physiology School within the University of Queensland, observations have been made on the sweating capacity of the scrotum of Merino rams. This latter may have an important bearing on the fertility of rams in the tropics.

The rams were subjected to various treatments, which included exposure to both normal and high atmospheric temperatures. The temperature of the air ambient to the scrotum was also varied and the effects obtained from the administration of various drugs and drenching with cold water, and with water at body temperature, were determined.

The results obtained from these investigations are being analysed, but some interesting effects are already apparent. These include variations in the sweating capacity of different animals, and ready response to increase in the temperature of ambient air. There was also marked decrease in sweat production when the temperature of the air ambient to the scrotum was lowered. No consistent general reactions were obtained from the administration of drugs. Definite local responses were obtained from intracutaneous injections.

Neo-Natal Mortality of Lambs.

Three trials have been conducted to determine the causes and levels of mortality in lambs at or near birth. In the first trial, which was conducted on a property at latitude 24½ deg. S., 200 four-year-old Merino ewes were lambed under close observation during the spring and early summer. The results are summarised as follows:—

Number of ewes mated	200
Number of ewes lambed	185
Number of lambs born	215
Number of ewes lost at lambing	0
Number of lambs died at birth	6
Number of lambs died within a few days of birth	6
Number of lambs missing at marking time, fate unknown (8 were probably due to predators)	19

The mean dry birth weight of all lambs was 8.13 lb. and the range was from 5 to 11.5 lb. For the second trial, which was conducted on a property at 20½ deg. S., 350 Merino ewes of mixed ages were lambed under close observation during the late summer.

The results are as follows:—

Number of ewes conceived	289
Number of ewes lambed prematurely	114
Number of ewes lambed full term	175
Number of lambs born alive	189
Number of lambs born dead	12
Number of lambs died within a few days	28
Number of lambs lost between neo-natal period and marking	21

The mean dry birth weight of the lambs born (excluding those aborted) was 5.3 lb. The mean birth weight of those which died at or within three days of birth was 3.8 lb.

The third trial was also conducted on a property at 20½ deg. S., and it was planned to include the lambing of 500 four-year-old Merino ewes under close observation during the late summer. The abnormal seasonal conditions resulted in heavy mortality amongst the ewes between mating and lambing, and the neo-natal mortality reached the extremely high figure of 52.6 per cent.

Report of the Pig Branch.

Mr. F. Bostock, Officer in Charge.

PRODUCTION.

Production figures for the year reveal a small increase in the number of pigs slaughtered, which is attributed mainly to the good seasons experienced but in some measure to the increase in prices paid for pigs. However, the high price of grain and the short supply of protein foods, fencing wire, piping and building materials have been factors preventing any substantial increase.

There has been a decided increase in the interest shown by farmers in pig raising and this is evidenced not only by the greater volume of enquiries received at Head Office and at all centres where advisers have been stationed, but also by the number of entries in carcase competitions conducted during the year by many show societies and judged by officers of the Branch.

The quality of pigs forwarded to market has been responsible for some concern to bacon factories and pork butchers because of the high percentage of over-fat pigs. There are indications that a grading system, together with preferential prices, would be supported by the trade. The matter has received the consideration of Departmental officers, and it is hoped that a scheme can be worked out that will operate to the benefit of both the industry and the consumer.

The seriousness of this problem of the over-fat pig is not realised by producers and in an endeavour to stress its importance a demonstration was given by an officer of the Branch at which 25 lb. of excess fat was removed from a typically over-fat carcase. This excess fat, instead of being worth 1s. 3d. per lb. to the industry, went to lard which, after cost of processing, was worth only 8d. per lb. It was pointed out that the food used to produce this fat could have been better utilised by feeding it to another pig, and that the solution to the problem of over-fat pigs lies in correct feeding and marketing in prime condition instead of holding pigs to utilise surplus food or until the whole of a pen is ready for market.

The marketing of a pig in prime condition is a matter of good management and sound judgment, but if a farmer has any doubt about the quality of the pig he is supplying, he can ask the factory to arrange for an appraisal by a Departmental officer co-operating with the factory.

As a result of the survey of the costs of production of pig meats carried out by the Bureau of Agricultural Economics at the direction of the Minister for Commerce and Agriculture, an increase in the price to 1s. 3d. per lb. to be paid for first quality baconer pigs was announced on 14th November, 1949, effiective from 3rd October, 1949. The Bureau emphasized in its report that the costs set out were not based on a direct examination of farm costs data. Before an accurate calculation of costs can be made, it is clear that it will be necessary for pig raisers to keep much better records of costs than is customary at present

STUD PIG RAISING.

There has been a keen demand for stud pigs in all parts of the State. The advantages to commercial breeders of using purebred stock are continually being pointed out and demonstrated by officers of the Branch. There is as a result competition for good blood lines in order to improve breeds.

The various show societies enable breeders to compare their pigs and provide opportunities for the purchase of fresh breeding stock. However, the selection of breeding stock on conformation or general appearance alone is no guarantee that they will produce suitable porkers or baconers, and the Department is planning to assist by the introduction of progeny testing. As a result of such testing, it will be possible for intending purchasers not only to select on appearance, but to secure information about the utility features of the pigs, such as litter size, weight for age at slaughter, economy of liveweight gain, and carcase quality.

Interest has been displayed in Queensland stud pigs by outside concerns and several consignments of pigs have been exported to islands in the Pacific and to New Guinea. Selection of these pigs, in the majority of cases, has been entrusted to officers of the Pig Branch.

CARCASE COMPETITIONS.

The type of baconer carcase competition introduced several years ago by the Branch, with the object of demonstrating to the producer the type of carcase required, has gained in popularity and entries have increased at country shows. The carcase competition has distinct advantages over lectures and illustrated addresses. That it is assisting producers to a better understanding of the requirements of the bacon trade is evidenced by the improved quality of the carcases exhibited in successive competitions.

The Australian Meat Board, in association with the Department and with the co-operation of all sections of the industry, again conducted a baconer pig carcase competition on a district basis.

Judging was carried out at field days arranged by officers of the Pig Branch at Mareeba, Rockhampton, Toowoomba and Brisbane. The championship was awarded for a pig of the Large White breed, bred in the Brisbane area, with a score of 86½ points. The carcase was of good type, scoring well in all points and had a particularly well developed eye muscle; it was nicely balanced, well proportioned and fleshed, and had an even covering of fat.

Field days were arranged to coincide with the judging. They proved popular with farmers, who gave excellent support by attending in good numbers at all centres except Brisbane. Every effort was made by the Department, together with the bacon factories and abattoirs in each district, to make these days as instructive and interesting as possible; farmers

attending were given the opportunity not only of seeing the type of carcase entered in the competition but also of inspecting the bacon factory or meatworks and to listen to addresses on subjects dealing directly with the industry.

Although only the same number of carcases (103) was judged as in 1949, it was quite apparent in all districts that these competitions are appreciated by pig producers. The number of entries would have been greater had not inclement weather prevented many prospective entrants from forwarding their pigs at the correct time. Notwithstanding the adverse conditions experienced, an improvement in the quality was noted, a pleasing feature being the smaller number of low scoring carcases. Farmers have no doubt benefited from past experience and utilised the information and knowledge gained at field days and from the display of score cards, which clearly set out the points awarded within the respective weight ranges.

To qualify for entry into the competitions, the pig in the first place must be sired by a purebred boar. The use of such a boar is considered essential to produce good quality pigs of uniform type. Secondly, the dressed carcase must weigh between 120 lb. and 180 lb. There were several overweight and underweight carcases entered in the competitions and these were rejected. While this was unfortunate, it focused attention on the weight requirements of the trade and proved a pointed reminder. The English or Hammond system of carcase appraisal was again used in judging.

The 103 entries which complied with the competition conditions of entry had an average score of 64.5 per cent., which in view of the high standard set by the judging system used can be considered satisfactory, although there is still room for much improvement.

The average of each section of judging is given in Table 1.

TABLE 1.

CARCASE COMPETITION SCORES.

—	Possible Points.	Total Points Scored.	Average Score.	Per Cent.
Hams	8	628	6·097	76·213
Shoulders ..	7	603	5·849	83·564
Streak	12	710	6·893	57·443
Eye Muscle ..	28	1,487	14·436	51·560
Backfat	20	1,501	14·572	72·864
Body Length ..	20	1,379	13·388	66·941
Leg Length ..	5	338	3·281	65·631
Total.. ..	100	6,646	64·516	64·524

GENERAL.

All advisers stationed in country districts have indicated that there appears to be increased interest in pig raising throughout the State.

The following figures give some indication of the work carried out by the Branch during the year:—

Visits to farms	1,714
Pig sales attended	41
Meetings attended	17
Field days attended	16
Visits to bacon factories and meatworks	47
Shows attended	21
Visits to regional experiment stations ..	61
Lectures given	23
Demonstrations given	24

At Kairi Regional Experiment Station the stud herd of Tamworth pigs established last year with three sows has been increased by selection from litters obtained to 10 sows and one boar. Stock from this piggery is to be used primarily for experimental purposes. At present a trial is in progress to study the availability of minerals to pigs at Kairi running on pasture and receiving locally grown grain. The trial will be continued until all pigs being fed the test rations have reached 200 lb. liveweight. They will then be slaughtered and the carcases appraised.

Early in the new year, when it is expected suitable boar pens will be ready, another boar will be purchased, and it is proposed then to commence progeny testing work at the station. This type of work has not yet been attempted in Queensland and it is hoped as a result to develop a strain of Tamworth pigs which can, with confidence, be regarded as measuring up to economic requirements of profitable pig raising.

At the request of the Queensland-British Food Corporation, an officer of the branch inspected a property at Moura, and selected a suitable site for building the first piggery unit for 200 sows, after which, in consultation with Corporation officers, plans for buildings and the lay-out of the piggery were prepared. The piggery has since been completed and fully stocked. The first batch of baconers was forwarded to Lakes Creek Meat Works in May.

A second unit has been commenced at Bajool and is partly stocked with Berkshire and Tamworth pigs. Because the first unit, with minor alterations, proved satisfactory from a constructional point of view and convenience in management, the second unit is being modelled along similar lines. It is understood that further units are to be established in the Clermont area along the lines originally outlined by this Department.

Few serious outbreaks of disease occurred during the year. Glassers disease was confirmed on one property, but was cleaned up in spectacular fashion by the use of sulphapyridine. The treatment was carried out in co-operation with a Divisional Veterinary Officer and officers of Yeerongpilly Animal Health Station. Salmonella infections were as usual responsible for light to moderate losses on many properties.

A new scheme for brucellosis testing has been introduced in collaboration with officers of the Veterinary Services Branch. This scheme provides for the testing of stud herds until such time as they have passed two consecutive tests without any positive reactors being found, when an appropriate certificate is furnished. A list of tested herds is to be published in the *Queensland Agricultural Journal* each month. It is anticipated that the scheme, which is a voluntary one, will increase in popularity. It is pleasing to note that the Royal National Association is indirectly assisting in that direction by requiring that all pigs exhibited in the stud classes at the Royal National Show be from tested herds. Similar action has been taken by a number of country show societies.

A necessary corollary to testing is a standard system of identification for record purposes. Checking subsequent to testing is also necessary

to protect clean animals exhibited at shows in good faith. Such a system of identification has been prepared and published by officers of the branch and this aspect of the scheme is receiving the attention of the officers concerned.

As a result of the work carried out by officers of the branch, many farmers now have a better understanding of food values and realise that better returns can be obtained from the practice of improved methods of feeding and management.

With all district officers now provided with a suitable projector apparatus, illustrated lectures have increased the efficiency of extension work.

Close co-operation has been maintained throughout the year with all organisations interested in pig production. In addition, an officer has been made available to lecture on pig raising to members of appropriate classes under the Commonwealth Reconstruction Training Scheme.

DISTRICT REPORTS.

North Queensland Area.

The past year has been a favourable period for the pig industry in North Queensland.

Because of increased efficiency due largely to greater attention to better feeding and sanitation practices, there has been a considerable decrease in the incidence of disease. This, together with the increased price paid for pig meats and a very favourable season for the dairying and maize industries, has been largely responsible for a greater interest in pig raising.

A gradual increase in mixed farming in the maize area is reflected in the greater number of pigs being forwarded from Atherton and Kairi; this improvement is apparently of a more permanent nature than the seasonal increase dependent on the maize harvest alone.

There has been a steady rise in the pig supply to the bacon factory at Mareeba, which is now treating sufficient pigs to place it on a sound financial basis. For several weeks during the year the majority of pigs slaughtered was exported to ease the local market, a happening not heard of previously.

The quality of the pigs submitted has improved considerably, and the percentage of over-fat pigs has decreased to such an extent that the problem which existed some few years ago has now been largely overcome. This is due to two factors:—(1) Payment for all pigs on a weight and grade basis. This district is the only area of the State where grading and preferential prices are in force. (2) The co-operation between the bacon factory, the Northern Pig Marketing Board and the local Pig Branch adviser. Farmers sending in over-fat and undesirable type pigs are visited on their farms and measures instituted to prevent further trouble. All northern officers of the Division of Animal Industry have co-operated in this work during the past twelve months.

Darling Downs Area.

On the Downs, weather conditions were favourable throughout the year and the sale of pigs has been constant, with a steady demand for all types of pigs.

Most stud breeders have received as many orders as they could fill, and the district adviser has had many requests for assistance in securing purebred boars and sows. Ten new studs have commenced operations and appear to be making satisfactory progress.

The baconer carcase competitions conducted throughout the area in conjunction with the bacon factory and show societies have done much to improve the bacon pig, but there are still far too many over-fat pigs marketed in this district. Personal contact and farm to farm visits have assisted in securing some improvement, but it would appear that grading and preferential prices are the only complete answer to the problem.

Burnett Area.

Excessive wet weather experienced during part of the year retarded field work in this area. However, a number of field days were attended, at which appropriate addresses were given on pig raising; in addition, lantern lectures were given at a number of centres throughout the district to members of the Queensland Dairymen's Organisation and to Junior Farmers Clubs.

Reports were received from bacon factories that some pigs marketed from the area were inclined to have soft fat and in a few cases showed a yellow colour. This was attributed to the incorrect feeding of peanuts. The matter was given wide publicity throughout the district and advice tendered with regard to the proper feeding of this type of food. The result was a marked improvement in the texture and colour of the fat of pigs forwarded for slaughter.

At Kingaroy and Murgon, cured bacon carcase competitions were conducted, 45 and 30 carcases respectively being exhibited. The interest shown therein augurs well for future competitions at shows in this area.

Moreton Area.

During the second half of the year excessive rainfall was experienced throughout the district and this affected field work to a considerable extent.

The Moreton area embraces the Greater Brisbane area, in which suburban pig farming is carried on extensively, the feeding of kitchen scraps, hotel refuse, etc. being the main source of food supply. This type of farming is controlled by the Brisbane City Council, which issues permits to operate; however, before such permits are granted, the Council requests a report from the branch with respect to the suitability of the proposed site selected. From time to time reports are also called for by the Council with respect to the management, hygiene, etc. of piggeries established in this area.

Because three of the major bacon factories are situated in the Greater Brisbane Area, more pigs are slaughtered there than in any other district, and close co-operation is maintained by the branch with these works. This has also led to more requests than received elsewhere for individual carcase appraisals to be made, as a guide to farmers in respect of the breeding and feeding of the stock forwarded for slaughter. The bacon factories have co-operated fully in this work and the help received has been of great value in furthering extension work.

Report of the Cattle Husbandry Branch.

Mr. R. D. Chester, Officer in Charge.

GENERAL.

The beef and dairy cattle industries have experienced one of the best years yet recorded. Cattle in almost all parts of the State have been maintained in excellent condition throughout the whole of the year; and in the dairying districts milk yields have remained buoyant. Early spring rains ensured good grass in October and November, with the result that beef cattle commenced to gain weight two months earlier than normally. For the same reason the seasonal decrease in milk production which is usually apparent before the advent of summer rains was not so marked in 1949.

Although both season and prices were very good, beef production was not as high as in some other years. The effect of the 1946 drought is now being shown in the reduced number of three and four-year old cattle available for market. Despite excellent prices for beef, property improvement has lagged and is far below what it could be if more materials and manpower were available to the industry.

The failure of the dairying industry to attain record production is due partly to the same factors which operated in the beef industry, but other factors are also operating. There are indications that some dairy farmers in certain areas have suspended dairying and engaged exclusively in grain growing. This has been an unfortunate development in the rural economy and is one that may have an adverse effect on soil fertility, since grazing animal plays an essential part in efficient farming programmes. In addition, the increased returns secured from beef have meant that some marginal dairy country has returned to beef production.

Both beef producers and dairymen in increasing numbers are seeking the services of the advisory staff of the Department. This has been particularly marked in the field of cattle husbandry. The Cattle Husbandry Branch is equipped with a fund of information insofar as the dairying industry is concerned and can give useful service to that industry. Because of the comparatively small amount of research which has been completed in Australia on beef cattle husbandry and management problems, it is more difficult to provide an adequate advisory service in these matters.

The Queensland beef industry is unique in that nowhere else in the world have large aggregations of British breeds of cattle been successfully established within the tropics. It is, therefore, probably unsound to base extension work on the results of overseas research into beef production problems. Although much advisory work is possible in certain fields, research into problems of cattle husbandry and land utilisation which are peculiar to Queensland is required to place the advisory work on a fully satisfactory basis.

There is an urgent need for increased beef production in Queensland and the Branch is giving earnest consideration to ways and means by which this objective can be attained by the industry. Production has remained static for a long period and it is not easy to be certain as to all of the factors involved, but the more or less regular occurrence of droughts is of very great consequence. Numbers of cattle in the State cannot be increased to any great extent until methods are found of countering the effects of drought.

Extension Work.

Increases in staff have made it possible for the branch to give a considerably better extension service than during the previous year and the graduate staff is now sufficient for the immediate requirements of the branch.

The drive to increase the efficiency of feeding methods in the dairy industry has been extended and intensified. Senior officers of the branch have attended approximately fifty field days and demonstrations throughout the State during the year. Talks have usually been directed towards improved nutrition.

Visits by senior officers were made at least once during the year to each of the important dairying districts of the State. Some districts in the south-eastern part of the State were visited as frequently as once a month.

During the year an advisory officer was appointed to work in the metropolitan milk supply area. This was the first direct move by the Branch to extend assistance to this section of the industry. The services of this officer have been keenly sought by milk producers.

The appointment of advisory officers to important districts has materially increased the efficiency of the extension service and will do much to render the work of herd recording of greater use to the industry.

Liaison with the Veterinary Services Branch and with the Herd Recording Section of the Division of Dairying has been closely maintained. It is felt that expansion of the work of the Cattle Husbandry Branch in the dairying industry depends upon the progress of herd recording activities, since all breeding work and almost all extension work in the field of nutrition and management must be based on herd recording figures. Consequently, the closest possible co-operation between the branch and the Herd Recording Section is effected.

UREA FEEDING.

In view of the serious protein shortage, it was decided to test the value of urea for feeding to dairy cows along the lines suggested by American work. It is felt that there is little likelihood of urea feeding being economically sound, but fundamental information concerning its effect on appetite and production under Queensland conditions might be of value at some future time.

Several small trials are proposed and one is already proceeding on a milk supply farm in the Beaudesert district.

DEPRESSION OF BUTTERFAT CONTENT IN MILK.

Seasonal low butterfat tests are of considerable importance to producers supplying the raw milk market.

Certain breeds of cattle and strains within breeds have inherently low fat tests. Unequal periods between milkings are another common cause of low test in milk from certain farms. But it is apparent that the position is considerably aggravated by seasonal and nutritional conditions.

The branch is co-operating with officers of the Division of Dairying in investigating the importance of low protein and low roughage intake in reducing fat percentages. A number of farms are under observation and special feeding programmes have been adopted. Milk samples are being collected regularly for testing.

It is of some interest to note that despite the extensive oat grazing practised on the Darling Downs, no reports have been received of major reductions in butterfat content such as have been reported from New South Wales.

DEMONSTRATION WORK.

Supplementary Feeding Demonstrations.

These demonstrations, initiated last year under the Dairy Industry Efficiency Grant, were continued with some alterations and modifications during the summer.

Six separate demonstrations are being conducted in six typical dairying districts of the State. A move to add two further districts has been postponed because it has not been possible to establish herd recording units in the areas where the demonstrations were to be set up.

It has been the aim in these demonstrations to show the effect on production of feeding limited amounts of concentrates. Concentrate mixtures of high, medium and low protein content have been used in each district. During the late winter and spring months it became evident that in some districts the value of concentrate feeding was limited by the fact that insufficient roughage was available to meet the requirements of the cow, so that the concentrate portion of the ration was being used for filling and maintenance purposes rather than for production. This was particularly so on the Darling Downs, where dairymen depend on green crops as their chief source of fodder.

Initially, four farms were selected in each demonstration, three herds being fed concentrates and the fourth depending on the usual feeds. After a few months, it became evident that comparisons could not be made between production on neighbouring farms however carefully these were selected. In January, therefore, the design of the demonstrations was altered and now differences between rations of varying protein content and between varying rates of feedings are being demonstrated within the herd by splitting it into selected groups and feeding each group differently.

Analyses of the first year's feeding have been completed in most districts. All the concentrate rations fed, even in very small quantities, were shown to lift production. The greatest lift and most profitable results were obtained by feeding concentrates rich in protein. The demonstrations will be conducted for a number of years to indicate variations which must be adopted to conform with seasonal changes, type of cattle, month of calving, age of herd, and so on.

Demonstration Farms.

During the year an Interdivisional Committee consisting of members of the Divisions of Plant Industry, Animal Industry, and Dairying, was set up in order to plan and supervise the conduct of demonstration farms.

To date, most of the work in connection with these farms has been of an agricultural or dairy hygiene nature, but it is expected that an increasing amount of advisory work in connection with management, breeding and feeding will be required from advisory officers of this branch in the near future.

Calf Feeding Demonstrations.

One of the least efficient of dairy cattle husbandry practices is the nutrition and management of calves, and this has called for work designed to demonstrate ways and means of raising replacement dairy heifers more efficiently both on a skim milk diet and on a limited milk ration.

Another source of loss to the industry is the disposal of dual-purpose types of male calves to the bobby calf trade. Possibly the retention of these calves for raising as steers would be profitable.

Calf feeding demonstrations have accordingly been designed for initiation in various parts of the State. One demonstration has been commenced and more will be under way by the early spring months.

The demonstration now in operation is a small pilot trial in the metropolitan area, where calves are to be raised on limited amounts of milk. Trials with various feeding, weighing and measuring techniques are being undertaken in order to work out an efficient system to be used in the larger demonstrations to commence shortly.

It is anticipated that nipple feeders of both rubber and metal types will be used and that movable feeding bails will be standard equipment in the demonstrations. These features are expected to facilitate rotational grazing of calves and largely to satisfy the sucking instinct, which will help to avoid infections due to contaminated feeding grounds and calves sucking one another.

DAIRY FARM COMPETITIONS.

Through the Interdivisional Committee, the branch has participated in the design of the dairy farm competitions now being conducted with finance from the Commowealth grant.

ARTIFICIAL INSEMINATION.

Considerable interest has been shown by dairymen generally in the possibilities of artificial insemination in this State. There is some misconception concerning the commercial possibilities of artificial insemination. It is much more expensive than is commonly supposed and

this feature is accentuated under Queensland conditions by reason of the wide dispersal of the dairying industry and the absence of really heavy concentrations of animals within the areas concerned. Additionally, bulls of proven value are extremely difficult to obtain at present. It is not anticipated, therefore, that commercial artificial insemination units will feature as an important part of cattle production in the immediate future.

Artificial insemination may, however, have an important application in stud breeding of both beef and dairy cattle, and with that in view the branch has assisted interested stud masters wherever possible.

In November, a second shipment of semen was brought from the State College of Agriculture, New Jersey, U.S.A. to inseminate stud Guernsey cows in the Maleny district. As was the case with the previous consignment, considerable deterioration took place in the semen in transit. Cows were inseminated between 72 and 96 hours after collection of the semen in New Jersey. In the previous year, inseminations were a complete failure, but from the second consignment this year three cows out of eleven treated conceived. One of the cows was amongst the last group inseminated at 96 hours after collection.

A consignment of semen from an imported Jersey bull was flown from southern New South Wales to a stud herd at Kingaroy, but the results of insemination with this semen were disappointing, only two cows proving in calf out of seven inseminated.

One stud beef cattle breeder is anxious to use artificial insemination with an old proven bull which is not able to serve cows because of an injury to one leg. An officer of the branch is assisting this breeder in technical problems of collection, dilution and storage of semen, and the insemination of the stud cows. If this venture is succesful, it is anticipated that it will be of considerable benefit to the beef industry of the State.

SIRE SURVEY.

An officer of the branch has been detailed to co-operate with the Herd Recording Section in designing a system of calf identification as a preliminary to sire surveying.

Sufficient grade herd recording units are now in operation throughout the State to make it worthwhile to survey bulls in these herds. It will be some time before such work can show results, as it is not until several of their calves come into production that the quality of bulls can be assessed.

From the point of view of extension work in breeding, the relatively small number of stud herds undergoing purebred recording is disappointing. An extensive scheme of purebred herd recording is the essential foundation of production improvement through better breeding, and it is to be hoped that both facilities for extensive recording and the participation of more stud masters will be secured at an early date.

EXPERIMENTAL HERD.

A number of Jersey cows was purchased and placed on Kairi Regional Experiment Station in October, 1949. The cows were selected on the basis of constitution and health rather than type. The herd of 23 has proved an average quality dairy herd, with some good producers and some poor producers. It is not proposed to cull cows for production until they are represented in the herd by at least two daughters. By this means, it is hoped to obtain a better picture of the effect of using good bulls to grade up a low producing herd. It is intended to maintain the herd for experimental work and to demonstrate methods of herd management and supplementary feeding.

During the first lactation all cows were maintained on as good a plane of nutrition as was available on the station. This was done in an attempt to assess their production potentials. In future, alterations in management and feeding can be made as desired.

It is intended to put a number of young bulls into the herd and sell each to a farmer after a few heifers have been obtained from it. The bulls will be sold with the option of repurchase so that any shown to be specially good sires may be taken back into the herd. In this manner, it is hoped that potentially good sires will be found at an early age so that they can be used to greater advantage either in the station herd or by individual farmers.

Calf husbandry and nutrition will be an important item of study at Kairi station. Both dairy heifers and steers for beef production will be reared. Owing to the undeveloped facilities, it has not yet been possible to do more than rear the few calves born in the herd.

CROP FATTENING OF BEEF CATTLE.

For more than twenty years, crop fattening of beef cattle has been an important feature of land use in south-eastern Queensland, particularly on the Darling Downs. Cattle are fattened chiefly on winter growing crops, particularly oats, and are ready for market towards the end of the killing season when stock from natural pastures have commenced to lose weight. Increasing prices for grain crops and scarcity of suitable types of store cattle have been responsible for a considerable falling off in the number of cattle fattened in this manner. There has, however, been an increase in farming and crop grazing of cattle in Central Queensland. Although some winter cereals have been used for grazing, summer crops are more favoured in the central districts, as they can be grown with a considerable degree of certainty. Some cattlemen grow sweet sorghum and Sudan grass for feeding in the green state. Others prefer to grow grain sorghum, which may or may not be harvested before grazing.

It is thought that the grazing of summer crops is likely to become increasingly important, particularly in the Dawson and Fitzroy river valleys, and as little information is available concerning rates of gain of various types of cattle on these summer crops, grazing trials have been arranged on a co-operative basis between this Department and the Queensland-British Food Corporation.

It is anticipated that a considerable amount of information concerning the rates of gain of different types of cattle on various crops will be available from this work. Such information will be of value in future extension work in the area.

MINERAL DEFICIENCY.

A deficiency of phosphorus is apparent over very large areas of cattle country in Queensland. Remarkably low soil phosphate figures have been shown for soil samples taken at random in the cattle country at the base of Cape York Peninsula. Phosphoric acid was as low as 19 parts per million in some soil samples. In the better class basalt country, the figure was approximately 450 parts available P_2O_5 per million. Such figures suggest that property improvement, management and breeding alone will not be sufficient to bring this type of country into full production.

Large areas of relatively heavily stocked country in central and southern Queensland also are deficient in phosphorus.

Bonemeal licks have proved only partially effective in overcoming deficiencies. Cheaper licks and more effective methods of administering phosphates are required. For this reason, the suggested use of superphosphate in drinking water is receiving consideration.

In the case of milking cows, it is usually advised that they should be fed bone flour in the grain mixture. Analyses of blood samples from cows in the Gympie district indicate that too small a percentage of bone flour has been recommended. Cows receiving a concentrate mixture containing one per cent of bonemeal at the rate of two pounds per gallon of milk over a period of eight months gave blood phosphate figures as low as 2.5 mgm. per cent.

Blood samples from selected cows in some herds are being regularly analysed in the Chemical Laboratory in order to obtain a more complete picture of the phosphate position in doubtful districts.

STERILITY.

Sterility is an outstanding problem of dairy cattle husbandry and a most important source of loss to the industry. There is an increasing volume of evidence from herd recording to show that it is much more profitable to calve cows during a short period of two or three months rather than at any other time of the year. The value of information of this nature is considerably decreased when farmers are unable to get their cows to hold to any particular service.

Officers of the branch have been making preliminary enquiries in cases where farmers are experiencing trouble, but full investigation of sterility is one for detailed work by an officer who can give a considerable portion of his time to the problem.

The common form of sterility experienced is of a temporary nature; it frequently affects most or all cows in the herd at one time. It is not confined to any one season of the year, though it is probably more apparent in the dry spring months when no green feed is available. When a large proportion of the herd is affected, temporary sterility is often accompanied by severe vaginitis.

It is hoped that an officer will be available for more detailed work on this problem early in 1951.

ROAD TRANSPORT OF FAT CATTLE.

The difficulty, sometimes amounting to impossibility, of moving fat cattle from fattening grounds to abattoirs is an important source of loss in the beef industry. In years when stock routes are closed, fat cattle in the far western districts frequently have to be held for another year before marketing. Even in normal years there is a considerable wastage in weight when cattle are moved on the hoof over hundreds of miles of eaten-out stock routes to the railhead.

Trials with road trains or transporters have given considerable promise, and with the construction of new roads into the beef country it is possible that road trains will play an important part in reducing wastage of beef, particularly in far western areas.

There has been an increasing use of road transport by Northern Territory and western Queensland companies; officers of the Division have taken the opportunity to travel with these road trains in order to observe travelling conditions and later the cattle have been inspected at meatworks on slaughter.

Where distances of up to 250 miles are travelled, bruising is generally not more severe than in the case of railed cattle. This is of course the case when good surfaces, such as are provided by bitumen roads, are available.

When cattle are travelled by rail subsequent to being travelled by road train, there are strong indications that they should be spelled at the completion of the journey by road, otherwise severe bruising is likely while they are on rail.

Report of the Poultry Branch

Mr. P. Rumball, Officer in Charge.

Poultry raising is carried on in all parts of eastern Queensland under many varying conditions, but it is engaged in more extensively from Bundaberg south to the border because of facilities which exist for the export of surpluses. However, some large units are situated in the closely settled northern coastal areas. There are few farms devoted to other agricultural pursuits which do not have a few, if not many, head of poultry providing eggs and poultry meat for local and farm consumption.

With the expansion of the industry in recent years, there was an increasing demand for day-old chickens. These are supplied either as "mixed chickens"—i.e., chickens whose sex has not been determined—or as pullet or cockerel chickens. Today over 200 hatcheries with their own or associated breeding flocks supply replacement stock to a large proportion of the commercial poultry farmers of Queensland. In addition, an increasing interstate trade is being built up. Air transport has also facilitated the expansion of an export trade in day-old chickens to New Guinea and the Northern Territory, and enquiries for chickens have been received from as far afield as Malaya.

As hatcheries are the main source of supply for day-old chickens, it will be realised that unless their owners operate efficiently and are aware of the necessity for the strictest attention to sanitation and act accordingly, hatcheries can become grave potential sources of the spread of disease.

Because of this, much of the work of the branch has been directed towards the improvement of the quality and health of the birds by encouraging better husbandry practices and stricter attention to hygiene in these establishments. An endeavour is being made under the provisions of *The Poultry Industry Act of* 1946, not only to exercise the strictest control over disease but also to raise the standard of the breeding flocks.

During the past few years an overseas export market has been built up for poultry meat which has brought a return of at least a quarter of a million pounds to the industry annually. This has for some time past assured the producer of a ready market for table poultry. However, with the termination of the British food contract, this market may be lost unless the industry can compete successfully with other overseas exporting countries.

EGG PRODUCTION.

It is estimated that the intake of eggs by the two Egg Marketing Boards of the State was 10·75 million dozen as compared with 11·64 million dozen for the previous year. The commercial production of eggs in districts outside the Egg Board areas coupled with that in household flocks throughout the State may aproximate the intake of these boards.

Egg production in southern Queensland until November, 1949, was maintained at almost the same level as in the previous year. From then on production steadily decreased, the decline becoming increasingly pronounced from February onwards. The South Queensland Egg Marketing Board reports that the intake for the last six months of the financial year was approximately 16 per cent. lower than for the corresponding period in 1948-49.

The prolonged wet season contributed somewhat to the lowering of production, as it had the effect of causing many pullets just coming into lay to moult. The cost of feeding and the good returns from the sale of culled hens have encouraged more extensive culling, and this has been a contributory factor to lower egg production.

A perusal of Table 5 discloses that, in the Brisbane district, which is the main egg-producing area in Queensland, 193,733 chickens fewer than in the corresponding period of 1948-49 were sexed, which suggests that returns from cockerel rearing on egg producing farms have been such as to lessen the demand for sexed chickens.

Officers stationed in central and northern Queensland report the closing down of many farms in those areas. During the war period cheap feed grains were available and there was an assured demand for eggs, this resulting in a rapid expansion of the industry. Inefficiency is frequently associated with cheap feeding and this occurred during the war period.

The difficulty experienced by farmers in obtaining the necessary ingredients to prepare suitable feeding mixtures themselves has brought about an increased demand for prepared mashes for poultry feeding. This increased demand, coupled with the shortages of protein-rich foods, has resulted in a general lowering of the quality of these mashes; this, it is felt, is contributing to the smaller output per bird and the lower economy of production.

The accepted and proven universal protein level in laying rations is an overall level of 15 per cent. crude protein. To maintain this level a prepared mash should contain a minimum of 17 per cent. so as to make due allowance for grain fed in conjunction with mash. Prepared mashes sold in Queensland vary in protein content from 15 to 18 per cent. with the majority at 16 per cent.

TABLE POULTRY.

During the period under review ducks were realising 1s. 6d. per lb. liveweight, which gave a great stimulus to the production of this class of poultry meat. Since the termination of the contract with Great Britain, however, the price receded to 1s. 4d., then to 1s. 2d., and is now 1s. per lb. liveweight. Hen prices have fallen from 1s. 5d. per lb. liveweight to 1s. per lb.

Cockerel prices have advanced since the termination of the contract from 1s. 6d. to 1s. 10d. per lb. for birds of export quality. This price will give a stimulus to cockerel

production and may encourage egg producers to engage in this business at the expense of egg production.

TABLE 1.

SLAUGHTERINGS OF POULTRY AT VARIOUS ABATTOIRS.

Group.	1948–49.	1949–50.
1	945,911	934,680
2	*185,718	263,507
3	*99,400	101,258

* Estimated.

In Table 1, Group 1 gives the slaughterings of two establishments engaging extensively in the export trade for several years; Group 2 two additional establishments engaging in both local and export trade; and Group 3 the killings of several small establishments engaged in local trade only.

An examination of the killings made at the abattoirs in Group 1 indicates that on a weight basis ducks constituted 19 per cent. of the total for 1948-49 and 25 per cent. for 1949-50.

Poultry exports are shown in Table 2.

TABLE 2.

DRESSED POULTRY EXPORTED.

—	1948–49.	1949–50.
	Lb.	Lb.
Boilers (Hens)	1,792,000	1,684,480
Chickens (Young males) ..	1,169,280	1,238,720
Ducks	389,760	1,025,920
Turkeys	49,280	67,200
Total	3,400,320	4,016,320

NUTRITION EXPERIMENTS.

During 1949 a chicken-rearing experiment was conducted at Kairi Regional Experiment Station on the Atherton Tableland. The primary object of this experiment was to determine to what extent locally grown products could be incorporated in chick rations to avoid the increased costs associated with the long haulage of foodstuffs from the south.

The rations shown in Table 3 were used in this experiment:—

TABLE 3.

RATIONS USED IN FEEDING EXPERIMENT.

Ingredient.	Group 1. (Check).	Group 2.	Group 3.	Group 4.	Group 5.
	Lb.	Lb.	Lb.	Lb.	Lb.
Maize meal	30	40	50	60	70
Wheat meal ..	20	14	9	..	..
Bran	14	10	5	5	5
Pollard	18	15	11	7	..
Meat and bone meal	15	15	16	16	17
Linseed meal ..	2	3	4	5	5
Lucerne meal ..	1	3	5	7	3

In addition, these mashes were supplemented with a fish-oil containing vitamins A and D_3. Because of the absence of riboflavin-rich foods—e.g., buttermilk powder, whey powder, and liver meal—synthetic riboflavin was added to the rations. As all rations with the exception of the control ration were deficient in manganese, manganese sulphate was also incorporated.

Riboflavin and manganese sulphate were intimately mixed with common salt in the following proportions:—

Common salt	30 lb.
Manganese sulphate ..	6 oz.
Ribon	4 grams

This mixture was used at the rate of 1 lb. to every 100 lb. mash.

A total of 625 Australorp day-old pullets was used in this experiment, consisting of five groups of 125 chickens each. Each group was divided into five sub-groups of 25 each and identified by toe-marking. Weekly weighings of the groups were carried out by weighing the five replications in each group.

The results from this experiment did not reveal any significant differences between groups and thus between rations. It is intended to repeat this experiment during the coming year.

A laying experiment commenced in February, 1949 ran for 48 weeks, terminating in January, 1950. This test was designed to determine, as in the chicken-rearing experiment, to what extent maize could be utilised in laying rations. Three rations with maize contents of 55 per cent., 62.5 per cent. and 70 per cent. were fed to six pens of 45 birds per pen, a total of 270 birds in all.

Results from this experiment showed only small variation in egg-production between groups but large variations in the production between individual pens on the same ration.

In view of the fact that these pullets were secured as day-old chicks from three different local sources, it is thought that strain variation played a large part in the inconclusive results obtained.

A repetition of this laying experiment, with the stock from the 1949 chick-raising experiment, using identical laying rations, was commenced on February 27 for a period of 48 weeks. The number of layers has been doubled so that 540 birds comprising six pens of 90 each are now under test. This test has now been running for 14 weeks. Results to date do not indicate any significant difference between groups.

REGISTRATION OF POULTRY STOCK SUPPLIERS.

No person is now registered as a stock supplier until his flock has on test been shown to contain not more than 5 per cent. of reactors to the pullorum disease test. The reactors are of course removed from the flock immediately after test.

It is pleasing to be able to report that among the flock registrations made during the year are 87 which had not more than 2 per cent. of reactors, and that in turn 34 of that number had less than 1 per cent. of reactors and 11 had no reactors.

The practice of restricting registrations to those flocks with less than 5 per cent. of reactors has necessitated holding up some registrations until the applicants' flocks could be retested.

Conditions have been drawn up for the accreditation of hatcheries, which it is hoped to be able to put into operation during 1951. Under the accreditation scheme, the incidence of pullorum disease must be reduced to 1 per cent. or less in two consecutive tests not less than five weeks and not more than six months apart.

During the testing of flocks for pullorum disease officers cull birds which are not fit for

breeding purposes. Almost as many have been rejected for this reason as have been rejected for disease.

From Table 4 it will be noticed that there has been a reduction in the number of persons registered for the supply of eggs for hatching purposes. This is to some extent due to the discontinuance of this class of business by those engaged also in the business of hatching chickens for sale.

TABLE 4.

REGISTERED STOCK SUPPLIERS.

—	1948.	1949.	1950.
Hatching chickens for sale ..	169	186	188
Supplying fowl eggs for hatching..	90	76	46
Poultry dealers	3	4	4

SEXING OF CHICKENS.

During the year 31 persons, qualified to determine the sex of day-old chickens, renewed their license to engage in this activity. Three examinations were conducted during the year but all three candidates were unsuccessful.

Table 5 gives particulars of sex determinations made during the past three years.

TABLE 5.

SEXING OF CHICKENS.

District.	1947–48.	1948–49.	1949–50.
Darling Downs ..	425,210	556,928	542,988
Ipswich	128,495	131,969	128,663
Brisbane	1,461,062	1,368,167	1,174,434
Nambour	173,515	151,123	173,353
Gympie	..	6,355	7,420
Maryborough ..	5,908	5,276	7,200
Bundaberg	122,297	143,761	144,445
Rockhampton ..	23,170	3,200	..
Mackay	..	..	..
Townsville	..	..	..
Cairns	..	..	..
Atherton	..	..	..
Total	2,339,657	2,366,779	2,178,503

DISEASE AND PEST CONTROL.

There is close co-operation between officers of the Poultry Branch and officers of the Veterinary Services Branch of the Department. The major outbreaks of disease recorded by officers of the branch in the course of their duties whilst on inspection of farms were made up as follows:—

	%
Avian leucosis	39
Coccidiosis	21
Fowl pox	14
Coryza	10
Cholera	6
Vitamin A deficiency	6
Others	4

Avian Leucosis.

From the above summary it will be seen that avian leucosis, a disease of near adult and adult birds, is the major disease problem confronting poultry raisers in this State. The distribution of this disease is widespread among commercial flocks throughout the State as well as in household flocks. The mortality throughout the year in some flocks may be as high as 30 per cent. Every effort is being made by officers of the branch to encourage farmers to breed from aged birds as these have a degree of resistance to the disease and such resistance is apparently hereditary.

Coccidiosis.

Caecal and intestinal types of coccidiosis have again been fairly prevalent. The intestinal type, however, owing to the relative difficulty the farmer has in detecting this disease, is responsible for the production of unthrifty birds, necessitating fairly heavy culling of pullets. Sulpha drugs have been used extensively for control and as in previous years have proved highly effective.

Fowl Pox.

This disease appears to have been more prevalent than in previous years; outbreaks of coccidiosis prevented vaccination of birds against fowl pox at a suitable age and this was in part responsible. Vaccines for the purpose of controlling this disease are freely available in Queensland. At present all are of the fowl pox variety, but the use of pigeon pox virus in certain circumstances is foreshadowed.

Coryza.

Outbreaks of coryza have been successfully controlled by the use of sulpha drugs.

Cholera.

Although this disease is not widespread, in its chronic form it has been responsible for relatively heavy losses in a few flocks. Mortality has been arrested by the use of sulpha drugs, but as it is impossible to clean up the infection on the farm, losses recur from time to time. It has been more severe among ducks than in fowls.

Vitamin A Deficiency.

Despite extension work on this matter, cases of vitamin A deficiency still occur. Although in many cases green feed was supplied, it was often unsuitable because of its high fibre content and low provitamin A value due to maturity.

Pullorum Disease.

Only eight outbreaks of pullorum disease in both young and adult poultry came under notice during the year. This is in striking contrast to the position which existed a few years ago and illustrates the effectiveness of control measures recommended by the Department.

During the year officers of the branch tested for registered stock-suppliers and others 279,154 head of poultry as compared with 275,283 for the previous year. The testing for the various districts was as shown in Table 6.

TABLE 6.

PULLORUM TESTING.

District.	Number Tested.	Reactors.	Percentage.
Toowoomba ..	34,937	469	1·3
Ipswich	11,361	544	4·7
Brisbane	188,524	6,579	3·4
Bundaberg	19,274	371	1·9
Rockhampton ..	3,492	266	6·1
Townsville	8,200	122	1·4
Atherton	13,366	228	1·7

EXTENSION WORK.

Twenty-two lectures have been given dealing with general husbandry practices with special attention directed to nutrition and breeding.

Field days were held at Rockhampton, Bundaberg, Beerburrum, Wynnum, Gympie, and the Animal Health Station, Yeerongpilly. At the field day at Yeerongpilly there was an attendance of 150 farmers.

Officers of the branch made 3,188 farm visits during the period under review. These visits offer an excellent opportunity for advising upon measures that will bring about greater efficiency, resulting in economic production.

Three radio broadcasts, featuring nutrition and breeding, were made during the year.

A series of articles dealing with the principles of feeding and breeds of poultry have been published in the *Queensland Agricultural Journal*. The most comprehensive of these articles was reprinted by the New South Wales Egg Marketing Board in its official paper *The New South Wales Poultry Farmer*.

DIVISION OF DAIRYING.

Report of the Director of Dairying (Mr. E. B. Rice).

STAFF.

A number of appointments to the staff were made in connection with projects being developed under the Dairy Industry Efficiency Scheme, for which funds have been provided for a period of five years by the Commonwealth Government. Several promotions and transfers of permanent officers were also necessitated through resignations which took place among the field staff during the year. From successful candidates at an examination conducted for appointment as dairy officer, six appointments were made, and the new officers have either taken up duties in country centres or are undergoing training in Brisbane preparatory to being stationed in the field. Expansion of grade herd recording resulted in an increase of nine in the staff of the herd recording section.

A scholarship to the Agricultural Science Degree course (Dairy Technology option) at Massey Agricultural College, University of New Zealand, was awarded to a student who had completed his first year studies at the University of Queensland. Two of the scholarship holders at present studying at Massey College will complete their degree course in December, 1950, and will return to take up duties in the Division after obtaining a few months additional experience in New Zealand factories.

SEASONAL CONDITIONS.

Seasonal conditions in the first two months of the period were rather dry in most dairying districts. However, pasturage, although barely providing the maintenance needs of dairy cattle, was abundant. Good plantings of spring fodder crops were made, and with the early September rains, growth of fodder crops and pastures was stimulated and production commenced to rise steadily. Good soaking rains which were experienced in the dairying districts during October, and followed by further falls in the second half of November, coincided with the commencement of the new lactation period among a high proportion of cattle in most herds, and a sharp increase in milk and cream supplies resulted.

A setback to production was given by a short dry spell in December and early January, but production recovered with the onset of soaking rains late in January. Production for the months of February, March and April, 1950, was on a high level due to the continuous general rains. Pastures were productive during the summer months, but they tended to seed early and become sour in the coastal districts because of very wet conditions. In the sub-coastal districts, however, pastures have seldom been better. The persistent summer and autumn rains interfered with the preparation of land for winter fodder crops in some districts. In the final two months of the period under review, production continued on a satisfactory level; ample paddock feed was available, stock were generally in good condition, and water supplies were adequate.

NUMBERS AND PRODUCTION.

The number of dairy cattle in the State at 31st March, 1949, was 1,423,000, which represented an increase of 40,000 over the preceding year's figure. It is of interest to note that the number of farms having herds in excess of fifty cows has shown an increase in the past few years.

Better seasonal conditions in the past couple of years, and the gradual recovery of the industry from the difficulties associated with dairying during the war years, are reflected in Table 1, which gives the estimated total milk production in Queensland for the years 1944-45 to 1948-49 inclusive.

TABLE 1.

ESTIMATED MILK PRODUCTION IN QUEENSLAND.

Year.	Gallons.
1944-45	247,253,000
1945-46	269,390,000
1946-47 (drought)	207,465,000
1947-48	272,791,000
1948-49	276,158,000

FARM PRACTICES.

Milking Technique.

Interest has been stimulated in the application of recent developments in milking shed routine. The omission of the hand stripping of cows is gaining momentum, while in a further endeavour to meet the dearth of rural labour, farmers are showing considerable interest in the non-legroping of cows and in the maintenance of farm dairy machinery in an efficient state to promote faster milking. Observations have shown that on neighbouring farms there may be considerable difference in the times taken to milk herds of similar size, and consequently there appears to be considerable room for more efficient shed practices.

Farm Refrigeration.

The Queensland Butter Marketing Board makes dairy farm refrigerators available to Queensland dairy farmers on a long-term repayment basis. Since the introduction of the scheme in 1947, about 300 units have been acquired by dairy farmers. The cooling of milk and cream may be regarded as a most important factor in the improvement of the quality of Queensland dairy produce. From data collected by field officers of the Division, it was found that during the summer months the cream supplied from most farms equipped with a refrigerator had an acidity considerably lower than that of cream from farms not so equipped; in fact, there have been instances where floods have prevented cream from being supplied to the factory for over a week, and it was impossible to tell the oldest from the freshest cream when the cream had been kept in a farm refrigerator. It is to be hoped that this progressive action of the Board will be fully supported by Queensland dairy farmers.

Cream Price Differentials.

There is no doubt that the present price structure, which provides for a difference of only ½d. per pound commercial butter between choice and first grade cream, does not sufficiently reward the supplier of cream of choice quality.

The matter of a review of the price structure, to provide an inducement to the consistent producer of high-quality milk or cream, is deserving of the fullest consideration of the dairying if a substantial improvement in quality of dairy produce is to be brought about.

The deductions of ½d. per lb. commercial butter for first grade and 1½d. per lb. commercial butter for second grade were introduced in 1935, when the average return received per lb. commercial butter was 9½d. During the intervening period, the return to the farmer for choice grade cream has risen through 1s. 1½d. per lb. commercial butter, in 1938-39, to 2s. 4½d. in 1949-50. The penalty suffered for lower grades has therefore varied on a percentage basis, as shown in Table 2.

TABLE 2.

DEDUCTIONS FOR VARIOUS CREAM GRADES.

Year.	Price of Choice Cream per lb. Com. Butter.	Deduction.
	s. *d.*	
1935 ..	0 9½	1st grade— 5·2% 2nd grade—15·8%
1939 ..	1 1½	1st grade— 3·7% 2nd grade—11·1%
1949 ..	2 4½	1st grade— 1·7% 2nd grade— 5·2%

BUTTER INDUSTRY.

Production and Value.

The out-turn of factory-made butter was 107,957,851 lb., which was 2,237,311 lb. above that of the previous year. This is the highest output since 1942-43. Under the guaranteed prices plan, the net return to the producer was increased by 2½d. per lb. commercial butter, to bring the return up to 2s. 4½d. per lb. The overall value of Queensland butter for the year is estimated at £14,000,000. This constitutes a record monetary return.

Quality.

The quantity of butter graded officially by Commonwealth and State grading officers was 1,648,146 boxes which represents 85.5 per cent. of the total amount produced. The official classification is shown in Table 3.

TABLE 3.

SUMMARY OF OFFICIAL GRADES OF BUTTER, 1949–50.

Grade.	Boxes.	Per Cent.
Choice	818,363	49·65
First	741,605	45·00
Second	80,648	4·89
Pastry	7,086	0·43
Prohibited from Export ..	444	0·03

It is gratifying to be able to report that the percentage of choice grade butter was 7.38 per cent. higher than in the previous year. The favourable conditions during the spring of 1949 were conducive to the growth of milk and cream tainting weeds, which, unfortunately, caused considerable degrading of butter. The C.S.I.R.O. has carried out extensive investigations on methods aimed at removing or reducing weed taint, but it appears that neither chemical treatment of affected cream at the factory nor alterations to processing are likely to be commercially feasible.

Apart from weed taint, which was the most serious cause of degrading of butter when officially examined, other causes which were of importance during the year were sourish flavour and fermented flavour, due to the inclusion of a proportion of inferior cream during the hot months of the year. Colour defects which have been troublesome in the winter months in recent years, were less noticeable during the year under review.

As a result of the close link between the grading service, the field staff and the factories, the proportion of butter graded below the quality marked by the factory was kept to a reasonably satisfactory level during the year. It is felt that the system introduced in the past couple of years of advising factories and district officers, each week, of the results of official grading is assisting materially in the reduction of degradings. Special attention has been directed by officers to processing, and to necessary advisory follow-up work among suppliers of inferior quality cream to factories which have had butter degraded to an appreciable extent.

A survey of procedures for the cleaning and sterilizing of equipment at butter factories was carried out during the year, with a view to the preparation of standard recommendations for each piece of equipment. The formulation of standardised techniques is at the present time receiving consideration. Similarly, field officers have co-operated with the Dairy Research Branch by periodically obtaining samples of water from all factories so that after analysis specific directions can be given to the individual factories as to means whereby water may be conditioned for boiler and other factory purposes.

Factory Processes.

With a view to economising in costs, reducing time and to some extent improving the yield of butter from the quantity of cream purchased, a number of factories have in recent years made butter without washing the butter granules. The Dairy Research Branch is making a thorough investigation of the process, in which field officers and several factories are collaborating.

Triple Vacreation of Cream.

The use of the vacreator for the pasteurisation of cream has made such progress in Queensland that at the present time 34 factories are equipped with either a solo or a tandem vacreator. The Port Curtis Co-operative Dairy Association Ltd. during the past year installed an additional solo unit at four of its factories which were previously equipped with a tandem vacreator, thus converting to triple vacreation. The marked improvement in the quality of the butter manufactured in the factories so equipped has created widespread interest in the industry, and it seems safe to predict that this process will be adopted by many more factories in the near future.

Butter Improvement Service.

The standard of manufacture, composition and bacteriological quality of butter made in most Queensland factories is high, as is indicated by the success attained by Queensland factories in overseas and Australian butter competitions.

The efficiency in manufacture can be attributed in no small measure to the service being rendered to butter factories under the Butter Improvement Service of this Department, for which a grant is made annually by the Queensland Butter Marketing Board. The service was further strengthened during the year; this enabled not only an increased number of tests to be carried out, but also the regular provision to factories of information on the pH of butter.

From the results of the official grading of his produce and the laboratory examinations, the factory manager is able to take appropriate action to remedy factors associated with the grading of cream supplies and manufacture which may be responsible for quality trouble in the butter, unsatisfactory biological condition of factory equipment, or failure to achieve good compositional quality. A pleasing feature of the past few years has been the improvement effected in the bacteriological quality of butter and compositional control. The control of moisture has shown a steady annual improvement since 1943-44.

CHEESE INDUSTRY.

Production and Value.

Cheese production was somewhat lower than in the previous year, the comparative totals being 20,231,397 lb. in 1949-50, and 21,018,093 lb. in 1948-49. Varieties of cheese other than cheddar produced during the year were Gruyere, Roman, Gouda, Cottage and several special varieties made under factory trade names.

The average pay-out to suppliers to cheese factories was approximately 3s. 2½d. per lb. butterfat. The value of cheddar cheese produced is estimated at £1,450,000, compared with £1,400,000 during the preceding year.

Table 4 sets out the State's annual cheese production and gradings for the past five years.

TABLE 4.
CHEESE PRODUCTION AND GRADES.

Year.	Quantity.	Gradings (Per cent.)			
		Choice.	First.	Second.	Third.
	Lb.				
1945–46 ..	26,931,781	1·39	69·07	28·06	1·48
1946–47 ..	17,291,768	1·92	70·27	25·88	1·93
1947–48 ..	21,595,525	1·45	61·55	34·40	2·44
1948–49 ..	21,033,063	0·28	71·19	27·61	0·92
1949–50 ..	20,231,397	0·6	79·2	19·54	0·66

Quality.

The official gradings for the past year, as shown in Table 5, are the best yet recorded in this State. However, there is still about one-fifth of the cheese produced in the State which is below first grade. Several factories showed a particularly marked improvement in the quality of their output. A defect which was of rather serious consequence during the year was cracked rind; affected cheeses, which were prohibited from export, were taken for processing purposes.

TABLE 5.
CHEESE GRADINGS, 1949–50.

Grade.	Quantity.	Per Cent.
	Lb.	
Choice	64,300	0·6
First	8,520,409	79·2
Second	2,102,094	19·54
Third	70,724	0·66
Rejected	3,577	..

Factory Equipment.

Cheese factory buildings and equipment were maintained in reasonable condition during the year and programmes of further improvement have been authorised by some associations.

Improvement in the facilities for the propagation of starters was made at a number of factories; the isolated starter room and starter propagation facilities at the Mount Tyson cheese factory, which were completed during the year, are very good indeed. Hydraulic cheese presses, automatic milk can tipping and sampling machines, and a straight-through can washer installed at the Toowoomba factory have materially assisted in the improvement of the quality of the cheese produced. Hydraulic cheese presses have not only resulted in improved textured cheese, but have relieved factory staff of the fatigue associated with the gang press.

Separation of Whey.

The separation of whey for the recovery of its butterfat content was undertaken at the Mount Tyson and Pittsworth factories during the year. Whey separators are also in use at the Quinalow and Toowoomba factories. It is expected that these machines will be installed in two other factories within the next few months.

Cheese Composition.

Field officers have co-operated with the Toowoomba laboratory in a survey being made of the composition of Queensland cheese. The field officers carry out butterfat and casein tests on the bulk milk at the factory and send a sample of the cheese to the laboratory for analysis. This survey will not only provide information on the main factors affecting the seasonal variations in the cheese-yielding capacity of milk and the composition of cheese, but will also provide factories with guidance as to the composition of the cheese produced.

Cheese Starters.

Officers have been active in efforts to have adequate provision made at factories for the efficient control of the propagation of starters and the minimising of slow vats due to bacteriophage. The Department is now in a position where it can confidently recommend measures which, if scrupulously applied, will enable factories to avoid any serious defect in the normal development of acidity during cheese manufacture. However, it is clear that, irrespective of the facilities for starter propagation, a rigid adherence to detail in propagation and in factory hygiene is essential if success is to be assured. It is apparent from field surveys that faulty cleaning and sterilizing of factory equipment will result in a build-up of phage within the factory itself which will lead to delay, and even complete stoppage, of acid production in the milk during manufacture.

Rennet Powder.

It is customary for Queensland cheese factories to use liquid rennet. However, a powdered rennet has recently become available in Australia, and at the request of the Queensland Cheese Manufacturers' Association, trials were made with this product at several factories.

MARKET MILK AND OTHER PRODUCTS.

Market Milk.

The increase in the number of milk pasteurisation factories in the State in the past few years has necessitated vigilance by field officers to ensure firstly that the quality of the milk meets the requirements of the market milk trade, and secondly, that pasteurisation and subsequent handling of the milk are efficient.

In connection with the Milk Quality Improvement Scheme in the Brisbane area, field officers of the Brisbane Milk Board have continued their co-operation with Departmental officers. There were 1,875 farm advisory visits and 280 factory and depot visits made in connection with the Brisbane milk supply during the year.

The pasteurised milk factory of the Port Curtis Co-operative Dairy Association Ltd. at Bundaberg, commenced operations in April, 1950. Franchises for the supply of pasteurised milk in the Nambour, Cairns and Maryborough areas were granted during the year on the recommendation of the Milk Tribunal.

The Toowoomba milk factory installed automatic milk tipping and sampling machines, and similar equipment is in the course of installation at the Warwick factory. Several installations of up-to-date equipment were also made at other country pasteurisation plants. Interstate and overseas dairying authorities who visited Queensland during the year expressed the view that the equipment in Queensland plants is of a high standard.

Milk By-Products.

A roller drier was installed at the Toowoomba factory and trials were carried out on the drying of whey, buttermilk and separated milk. It is proposed to instal four additional units at this factory. The South Coast Co-operative Dairy Association has for some years been condensing milk at Southport for supply to an ice-cream manufacture and also has a roller drying plant for the conversion of surplus milk into roller dried powder. Two other companies in Queensland which intend to embark on the manufacture of milk products are shortly to commence the erection of the necessary factory buildings and it is expected that plant will be installed and operations commenced by the end of 1951.

A company was also formed for the purpose of establishing at Gympie a milk condensery and milk powder factory. Several other factories have planned to instal equipment for the drying of either buttermilk or separated milk.

This awakening of factory directorates to the necessity for the fullest utilisation of milk and milk by-products is a sign of a progressive outlook and augurs well for the future wellbeing of the dairying industry of Queensland.

During the year a committee consisting of Departmental and industry representatives was constituted for the purpose of reporting to the Minister on the possibilities of the better utilisation of milk and milk products. The committee has met on several occasions and its report is in the course of preparation.

HERD PRODUCTION RECORDING.

Production recording is basic to the raising of the average productivity of dairy cattle consistent with economy. The many applications which are being received for the formation of herd recording groups indicate an increasing recognition of this.

Pure-Bred Production Recording.

The revised rules govering the production recording of pure-bred dairy cattle for entry into the Advanced Register of the various dairy cattle herd-book societies were effective from 1st July, 1949. The chief amendments to the rules were referred to in last year's annual report.

Recognising its value to dairy farmers of the State, many studbreeders wholeheartedly supported the revised scheme, but some breeders, who were desirous of recording only a selected few animals which could be fed specially and often uneconomically, withdrew from participation in the pure-bred recording scheme.

As the majority of commercial herd owners procure their bulls from pedigree herds, the quality of the pedigreed stock of the State must be maintained at a level appreciably in advance of the average producing quality of the grade herds. This can only be achieved by continuous and intensive selection in pedigreed herds, which, in effect, necessitates the continuous recording of the herd. It is to be regretted that some pedigreed herd owners apparently wish to use recording for the purpose of advertising, rather than as a necessary adjunct to herd improvement.

The number of herds of the various breeds recorded during the year is shown in Table 6. It should be noted that, when the revised rules were introduced, cows being recorded under the old rules were allowed to continue until they completed their lactations.

TABLE 6.

Breed.	Herds under Old Rules Only.	Herds under Old and New Rules.	Herds under New Rules Only.	Total.
A.I.S.	32	36	7	75
Ayrshire	2	5	1	8
Friesian	..	1	1	2
Guernsey	4	7	2	13
Jersey	24	36	10	70
Total ..	62	85	21	168

The number of herds recorded had to be restricted in some districts to avoid interference with advisory work of field officers. This resulted in the rejection of twelve herds for which applications were received. In consequence of an increase in field staff, it is hoped to be able to accept all entries in the coming year.

Table 7 shows the number and percentage of cows of each breed which completed their lactations during the year in comparison with 1948-49.

TABLE 7.

NUMBER OF COWS COMPLETING LACTATION.

Breed.	Total.		Passed.		Failed.		Withdrawn.	
	1948–49.	1949–50.	1948–49.	1949–50.	1948–49.	1949–50.	1948–49.	1949–50.
	No.	No.	No. and %	No. and %	No. and %	No. and %	No. and %	No. and %
A.I.S.	660	611	314 (47·6)	278 (45·5)	140 (21·2)	165 (27·0)	206 (31·2)	168 (27·5)
Ayrshire	43	79	15 (34·9)	40 (50·6)	12 (27·9)	31 (39·2)	16 (37·2)	8 (10·1)
Friesian	7	8	3 (42·8)	2 (25·0)	..	4 (50·0)	4 (57·2)	2 (25·0)
Guernsey	72	101	42 (58·3)	66 (65·3)	12 (16·7)	23 (22·8)	18 (25·0)	12 (11·9)
Jersey	645	519	385 (59·7)	294 (56·6)	141 (21·9)	158 (30·4)	119 (18·4)	67 (12·9)
Dairy Shorthorn ..	..	3	..	..	..	3 (100)	..	..
Total	1,427	1,321	759 (53·2)	680 (51·5)	305 (21·4)	384 (29·1)	363 (25·4)	257 (19·4)

It will be seen that 680 cows (51·5 per cent.) passed the required standard as compared with 759 cows (53.2 per cent.) in the previous year.

Table 8 shows the average production for each age group of the different breeds for cows which completed lactations during 1949-50.

TABLE 8.

BREED PRODUCTION AVERAGES FOR REGISTERED HERD BOOK STOCK WHICH COMPLETED LACTATION RECORDS OF 273 DAYS DURING THE YEAR ENDED 30TH JUNE, 1950.

Breed.	J.2.	S.2.	J.3.	S.3.	J.4.	S.4.	Mature.	All Ages.
A.I.S.—								
Number of Cows ..	129	93	53	38	26	19	85	443
Average Milk lb. ..	6,359	6,617	7,520	7,499	8,458	7,189	9,972	7,502
Average Butterfat lb.	253	286	310	307	337	285	402	306
Average Test Per cent.	3·98	4·31	4·11	4·09	3·97	3·97	4·03	4·08
Ayrshire—								
Number of Cows ..	23	7	10	5	4	2	20	71
Average Milk lb. ..	5,789	5,120	6,964	6,041	8,334	6,930	8,828	6,938
Average Butterfat lb.	236	275	278	259	326	270	329	279
Average Test Per cent.	4·07	5·36	3·99	4·28	3·9	3·88	3·72	4·02
Friesian—								
Number of Cows ..	1	..	..	..	..	1	4	6
Average Milk lb. ..	6,556	..	..	..	..	9,089	10,474	9,590
Average Butterfat lb.	233	..	..	..	..	318	351	326
Average Test Per cent.	3·55	..	..	..	..	3·49	3·35	3·39
Guernsey—								
Number of Cows ..	30	6	12	9	3	4	25	89
Average Milk lb. ..	5,384	6,627	6,075	6,424	6,680	7,310	7,142	6,290
Average Butterfat lb.	260	301	312	331	304	376	357	311
Average Test Per cent.	4·82	4·54	5·13	5·14	4·55	5·14	4·99	4·94
Jersey—								
Number of Cows ..	127	79	62	35	28	25	96	452
Average Milk lb. ..	4,832	5,553	5,637	6,178	6,221	6,016	6,687	5,718
Average Butterfat lb.	291	289	364	300	328	316	360	320
Average Test Per cent.	6·02	5·2	6·45	4·85	5·27	5·26	5·38	5·59
Dairy Shorthorn—								
Number of Cows ..	..	1	1	..	..	1	..	3
Average Milk lb. ..	..	3,903	5,394	..	..	4,020	..	4,439
Average Butterfat lb.	..	156	195	..	..	138	..	163
Average Test Per cent.	..	3·99	3·61	..	..	3·4	..	3·67

All ages and all breeds :—Number of Cows.—1,064 : Milk, 6,608 lb; Butterfat, 310 lb ; Test, 4·69%.

No production records were broken during the year.

Approval has been granted for the publication of the results of all pure-bred recording in a supplement to the *Queensland Agricultural Journal*. This will enable the dairy farmers of the State—both stud breeders and commercial herd owners—to gauge the merits of the various herds.

Sire Surveying.

Rules to govern sire surveying have been drawn up, and some preliminary work on this important subject has been started. It is proposed to introduce a calf identification scheme, which is basic to sire surveying.

GRADE HERD RECORDING.

Farmer's Own Sample Method.

Since group herd recording units were first established in 1948, the farmer's own sample scheme has been restricted to farmers who are not in districts where herd recording groups are operating. During the year 26 herds were recorded. The number of cows in these herds was 1,235, of which 342 completed lactations. The average production for the completed lactations was 3,198 lb. milk, the average test 4.26 per cent., and the average butterfat 136 lb.

Table 9 gives, according to various ranges of production, a summary of the results for the year.

TABLE 9.

RANGE OF BUTTERFAT PRODUCTION.

Butterfat (lb.).	Number of Cows.	Percentage of Cows.
Less than 100	107	31·29
From 100–149	115	33·62
From 150–199	77	22·51
From 200–249	25	7·31
From 250–299	12	3·51
Over 300	6	1·75

Group Herd Recording Scheme.

This scheme is being well supported by dairy farmers, 38 groups having been in operation during the year. It was hoped to increase the number of groups to at least fifty, but shortage of equipment, particularly Babcock milk test flasks, prevented the desired expansion. Difficulty was also experienced in securing herd recorders. These two difficulties necessitated deferment of the formation of 15 groups for which applications had been received.

In the 38 herd recording groups which were operating, there were approximately 40,000 cows. Three of the groups ceased to function, withdrawals of farmers not permitting the full-time employment of recorders. In two cases, withdrawal of farmers was caused by inability to obtain early replacement of a herd recorder who had resigned.

The herd recording year closed on September 30, 1949. Up to that time 25 units had been operating long enough to have cows with completed lactations. In all, 17,216 cows in 507 herds completed lactations for an average production of 144 lb. butterfat.

Table 10 gives the number of cows and their average production according to age groups.

TABLE 10.

NUMBER OF COWS AND THEIR AVERAGE PRODUCTION ACCORDING TO AGE GROUPS.

Age Groups.	Number of Cows.	Average Milk Yield.	Average Butterfat Test.	Average Butterfat.
		Lb.	Per cent.	Lb.
2 years	1,013	3,016	4·5	136
3 years	1,024	3,162	4·4	140
4 years	952	3,279	4·5	148
Mature	3,388	3,668	4·3	160
Unknown ..	10,839	3,208	4·3	139
Total.. ..	17,216	3,289	4·3	143·5

The average production of cows in herd recording groups in the various districts is as shown in Table 11.

TABLE 11.

DISTRICT AVERAGE PRODUCTION.

District.	Average Milk Yield.	Average Test.	Average Butterfat.
	Lb.	%	Lb.
Darling Downs	4,018	4·3	173
South Coastal Areas ..	2,822	4·5	128
Brisbane Valley	2,756	4·2	116
South Burnett	3,187	4·1	131
Upper Burnett	3,799	4·2	160
Atherton Tableland ..	3,690	4·3	160

Automatic recording machines were installed in the Government Statistician's office to replace manual calculation of individual cow records. This will greatly facilitate the work, ensure accuracy, and enable a speedier furnishing of results to farmers.

Analyses of data available from herd recording have been made. The information obtained is used in discussions at field days and in the preparation of advisory leaflets. The following subjects are being investigated:—

(*a*) *The effect of the month of calving on the production of milk and butterfat.* This survey shows that cows which calve during June to September (inclusive) give higher production than cows calving in other months. The lowest average yield of butterfat (115 lb.) in 1949-50 was from cows calving in February, and the highest (165 lb.) in August.

(*b*) *The effect of the length of lactation on production.* This preliminary survey shows that the average production of cows increases in accordance with the length of lactation, thus showing the necessity to feed and breed cows which will milk for a long lactation period in order to obtain the maximum production.

The average length of lactation for cows with completed lactations was 220 days. The average production according to length of lactation was as shown in Table 12.

TABLE 12.

LENGTH OF LACTATION AND PRODUCTION.

Days	30	60	90	120	150	180	210	240	270	300	330
Butterfat (lb.)	17	32	49	69	93	116	143	161	179	209	223

Cows should calve yearly, and as they require a spell of six to eight weeks prior to calving, the above figures indicate the necessity for cows to milk for the full period of 10 months.

(*c*) *The relationship of test to production of milk and butterfat.* This survey was made on all cows irrespective of breed. In future it is hoped to be able to furnish particulars according to breed.

The survey shows that higher yields of milk were given by cows within the butterfat test range of 3·8 to 3·9 per cent. and higher yields of butterfat by cows producing milk within the 5·5 to 5·9 fat percentage range. This information is important to farmers and breeders in focussing attention on selecting breeding stock from animals within the test range conducive to the greatest production of milk or butterfat,

according to their individual requirements as suppliers of whole-milk or cream.

(*d*) *Herd wastage.* Since herd wastage is of great significance in the economics of dairy farming, it is important to know which are the chief factors affecting the cullings of cows from herds. A preliminary survey, published during the year, showed the wastage rate in this State to be 13·1 per cent., while in addition, 6·5 per cent. were sold for dairying purposes.

The chief causes of wastage were:—

	per cent.
Old age	24
Udder troubles	18
Low production ..	17
Brucellosis	7
Sterility	4
Accidents	4
Calving troubles ..	3
Tick fever	2
Tuberculosis	2
Dingoes	1
Sundry causes	10
Unknown causes ..	8

The survey also showed that 45 per cent. of all calvings took place from October to January, inclusive, and that 70 per cent. of all heifer calves are reared. Other information obtained was:—

33% of all calves were sold as bobbies;
23% of all calves were slaughtered on the farm;
1.5% of all calves died;
.6% of all calves were stillborn.

The average carrying capacity of the farms from which data were obtained was 5·3 acres per head of dairy stock.

On the average one bull is kept to every 40 cows and heifers.

DAIRY INDUSTRY EFFICIENCY SCHEME.

This scheme was inaugurated in 1948 in consequence of a grant by the Commonwealth Government of £250,000 annually to the States for five years. The allocation to Queensland is about £68,000 yearly. The main projects undertaken during the year are briefly reviewed hereunder.

Demonstration Farms.

A total of 54 farms has been selected in eight dairying districts. The work being carried out on the demonstration farms covers all aspects of dairy farming, including (*a*) improvement and management of pastures and the growth and conservation of fodder crops, aimed at raising the productive standard of the herd; (*b*) milking procedures; (*c*) improvement of the quality of milk and cream; and (*d*) production recording of the herd. The owner himself carries out the various demonstrations in accordance with advice from Departmental officers. In each of the districts, a temporary officer has been appointed to supervise the work, to record the production of the herd, and to make any necessary observations. Even though work on the demonstration farms is now only reaching a stage where results are becoming apparent, it is evident that the scheme is justified and that a keen interest is being aroused among the farmers in the districts where the demonstrations have been set up.

Grade Herd Recording.

This has been referred to in an earlier section of the report. However, in connection with grade herd recording, the funds are being used for the analysis of data for the purpose of surveying various phases of dairy farming economy, such as the cause of cullings from herds, milking techniques, the effect of month of calving on production, and the capacity of bulls to improve the production of herds in which they are mated. Already some useful information has been obtained and two short papers published in the *Queensland Agricultural Journal.*

Dairy Farm Competition.

A dairy farm competition inaugurated during the year attracted entries from 137 farmers in the various districts. Competitions of this kind are expected to stimulate interest in better farming practices.

Mobile Film Unit.

The mobile film unit again made a circuit of dairying districts. Keen interest is shown in the screenings of films on dairying and related subjects.

Dairy Farm Handbook.

Officers of the Division co-operated with officers of other Divisions in preparing material for a dairy farm handbook, the cost of which is to be met by the Commonwealth Government. The handbook, which will cover all phases of dairy farming in Queensland, will be distributed free to every dairy farmer in the State. It is expected to be ready before the end of 1950.

Supplementary Feeding and Calf Rearing Demonstrations.

These are being carried out under the scheme, but as they are supervised by officers of the Division of Animal Industry, they are referred to in the report of that Division.

MISCELLANEOUS.

Many miscellaneous matters which in the aggregate occupy much of the work of the Division were dealt with during the year. These include the control of milk and cream transport, the inspection of factory accounts, examinations for certificates of competency under the Dairy Produce Acts, grading and other statistics, and the pure-bred sire freight rebate schemes.

Other important features of extension work were the preparation of papers for the *Queensland Agricultural Journal,* and industry journals, organising of field days, and addressing various industry conferences and meetings.

Report of The Dairy Research Branch.

Mr. L. E. Nichols, Senior Dairy Technologist.

The advisory and technical services of the Dairy Research Branch were continued during the year at the Brisbane, Toowoomba and Hamilton laboratories. Advice and assistance have also been given to the control laboratories operated by the Atherton Tableland Co-operative Dairy Association, at Malanda, and the Downs Co-operative Dairy Association Ltd., at Toowoomba. Apart from progress made with investigational work, there has been a steadily increasing volume of work in connection with control and advisory services.

Features of the year's activities have been the increased amount of work conducted in the chemical laboratory of the branch, the further expansion in routine laboratory control of market milk, and the determined effort made to solve cheese and butter quality problems. As a result of farm survey investigations on 54 demonstration farms, it has been possible to apply several technical improvements, which are being readily adopted by farmers, with a saving in time and labour and improvement in quality.

Details of investigational and routine work are indicated under the sectional headings which follow.

MARKET MILK.

The importance of the market milk industry and its development throughout the State have necessitated a continuation and extension of research and control work at both the Toowoomba and the Brisbane laboratories.

Seasonal Variations in Milk Composition.

The first section of this work, initially requested by the Brisbane Milk Board and the Commonwealth Sub-Committee on Dairy Production, has been completed. Wide seasonal variations in the fat and solids-not-fat, and particularly a conspicuous decline during the late winter and early spring, have been noted on farms selected as representative of those in the Brisbane Milk District. Figures 1 and 2 show the trend in composition. More extensive work on a State-wide basis shows similar trends. The variations in milk composition according to season affect both the market milk trade and cheese factory supply.

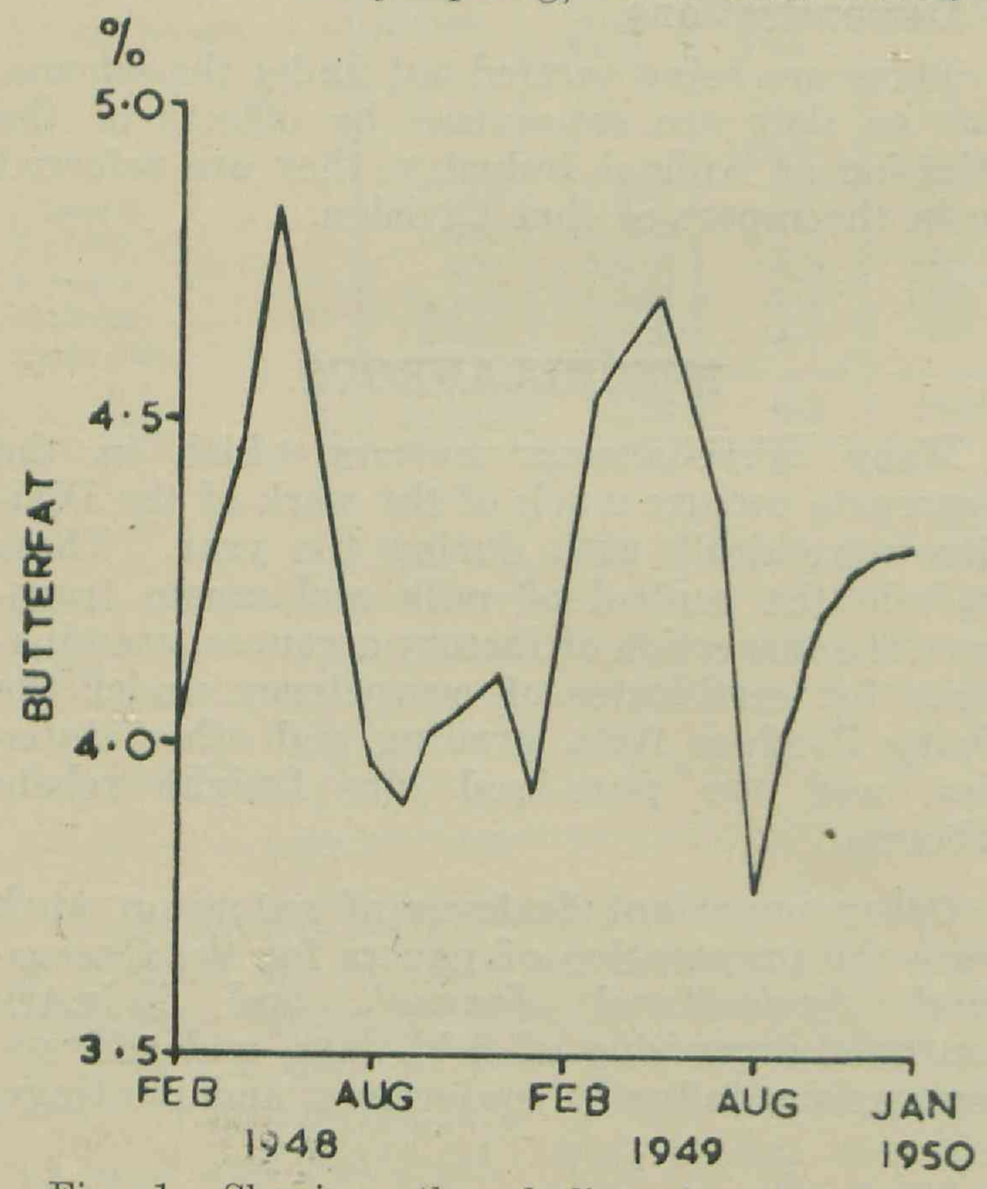


Fig. 1.—Showing the decline in the butterfat content of milk during the late winter and early spring. The figures are the averages for 800 cows in 20 herds.

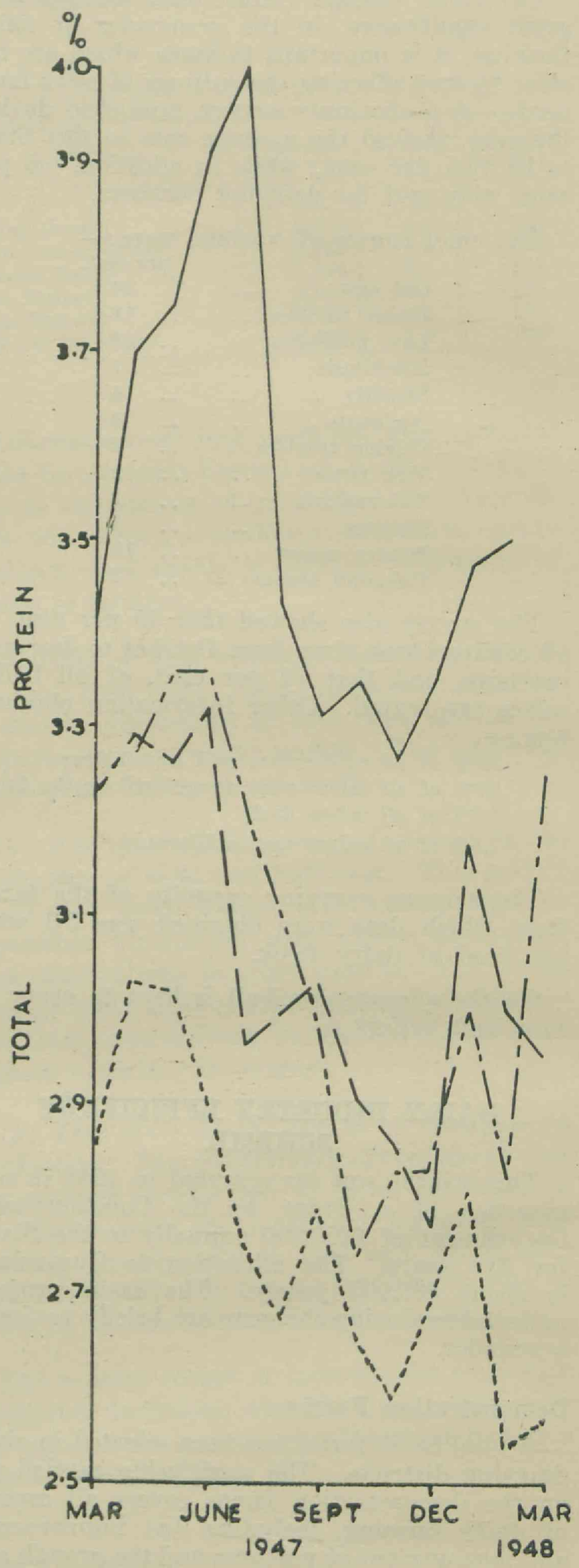


Fig. 2.—Showing the decline in the total protein content of milk for four typical herds during the late winter and early spring.

A joint project has been planned in co-operation with the Divisions of Plant Industry and Animal Industry with a view to ascertaining the factors connected with the variations in the composition of milk.

Detergents and Chemical Sterilizers.

To determine the relative efficiency of various combinations of detergents and sterilizers, the following experiments are proceeding:—

(*a*) The survival of bacteria on farms following the use of combinations of detergents, hypochlorites and a quarternary ammonium compound. Evidence gathered has shown that gram-negative bacteria are the principal types affecting the quality of dairy produce. The relative destructive powers of these preparations on gram-positive and gram-negative bacteria are being noted. Results so far indicate that some of the combinations may prove valuable in saving time during cleaning operations while effectively cleaning and sterilizing equipment.

(*b*) Laboratory procedures for evaluating the practical performance of quaternary ammonium compounds and other germicides. Obvious deficiencies in the phenol co-efficient method for the evaluation of the germicidal efficiency of these products have led to investigations of other methods. The latest American methods have been tested, and give promise of being satisfactory. The selection of activators of a suitable type has also proved helpful in furthering this work.

CHEESE STARTER INVESTIGATIONS.

Lytic Action of Bacteriophage.

For some time difficulty has been experienced in reproducing plaques confirming the lytic effect of bacteriophage in cultures. As a result of improved media and a modified technique, it is now possible not only regularly to reproduce such plaques but also to determine phage concentrations and specificity more accurately for the various cultures distributed to the industry (See Plate 14, facing page 84). This advancement will help greatly in future systematic work on bacteriophages affecting starter cultures in this State.

Morphology Starter Cultures.

With the use of photomicrography it has been possible to record permanently the morphology of the different strains of cultures at various temperatures. Any divergence from the normal can thus be readily detected. Some strains show involution forms after incubation at 37 deg. C. for five hours, and, when examined microscopically, are sufficiently characteristic to be more readily identified.

Modified Vitality Test.

For some time it has been felt that the previously recommended vitality tests have not given a realistic picture of starter vitality under practical conditions. Modifications have been made and the test conditions now compare more closely with practical cheese factory conditions.

Metabolic Studies.

Work is proceeding in an effort to isolate improved starter strains. Certain substances which give promise of encouraging growth rate, size and vitality of the organisms are being added to the culture media.

Freeze-drying of Lactic Cultures.

An apparatus has been assembled in the laboratory which permits the drying of lactic cultures on cellophane, then hermetically sealing in sterile glass containers. The method offers possibilities for treatment of stock cultures, facilitating transport and storage over extended periods and emergency use at cheese factories.

Penicillin and Cheese Manufacture.

With the increasing use of penicillin for the control of mastitis in dairy herds, it has been suspected that the residual penicillin in the udders of treated cows may be responsible for a slowing up of starter streptococci in the cheese-making process. Where there is clinical evidence of mastitis, obviously milk from affected quarters is rejected. However, to effect a greater measure of control and prevent the spread of mastitis, many farmers treat the whole of the herd with penicillin. It is this milk containing residual penicillin which is thought to be responsible for delayed acid production during cheese manufacture where bacteriophage has not been isolated. Work has been planned to determine the potency of residual penicillin against lactic streptococci and to ascertain the period after treatment during which milk may not be acceptable for cheese making.

Refrigerated Milk for Cheese.

As planned last year, several batches of cheddar cheese were manufactured from farm refrigerated milk. The quality of the resultant cheese was inclined to be variable in the early batches, and there was evidence that manufacture was unduly delayed. However, further trials in which the technique of cheese making was modified have given promising results.

The trials to date indicate that high quality cheese can be satisfactorily made from refrigerated milk without undue delay in manufacture and with normal acid development, provided the manufacture is suitably modified and the starters used are of good vitality. The experiments will be continued for at least twelve months so that the influence of varying seasonal conditions may be studied.

Powdered Rennet Trials.

The possibility of a shortage of liquid rennet for cheese making suggested the desirability of testing powdered rennet for the purpose. Experiments initiated in the laboratory were later extended to field trials. Commercially, rennet powder has distinct possibilities. However, for favourable coagulation of milk it was found necessary to use in excess of the amount prescribed by the manufacturer. At the increased dosage rate it compared favourably with standard liquid rennet. Normal acidity development occurred with comparable yields and loss of fat in the whey. The resulting cheese was of normal flavour, body and texture.

Treatment of Whey.

It is impracticable in Queensland to return whey to the farms other than in the milk cans provided by the farmers. Investigations into the most effective and economic method of treating whey have begun.

BUTTER INVESTIGATIONS.

Keeping Quality of Butter.

Studies commenced last year on this subject were continued. Twenty-nine butters entered in a keeping quality competition were examined before and after cold storage for three months at 10°F. The butters were subjected to bacteriological examination, chemical analyses for moisture, salt, curd, fat, pH, fatty acid value, peroxide value, softening point of the fat, copper and iron, and microscopic examination to determine the distribution of moisture.

The need to extend existing knowledge on the keeping quality of butter is well illustrated by the results of the 60 butters examined in the last two years. Of these, 38 (or 63%), were, after the storage period, reduced to a grade lower than the original choice grade. This work should assist in determining factors which may be responsible for the decline in grade.

Manufacture of Unwashed Butter.

In view of the interest created in the omission of washing of butter granules during butter manufacture, and its economic importance, investigations into the manufacture and keeping qualities of unwashed butter were commenced. To date, 28 churnings of unwashed butter and their control churnings from the same cream have been made by three co-operating factories. These have been graded initially, and after varying periods of storage at 10°F. and 50–60°F., chemical, microscopic and bacteriological examinations made.

Little difference in the keeping quality of washed and unwashed butter in cold storage has been evident in the trials to date. The keeping quality of pats of unwashed butter at temperatures normally met during distribution will require investigation. It appears that under Queensland conditions it is necessary to churn the cream to be used for unwashed butter at a lower temperature than normal to obtain a good textured butter.

It is now proposed to include additional factories in the trials, preferably those with wash waters considered to be of doubtful quality and which treat lower grade creams.

Factory Water Supplies.

A survey of dairy factory water supplies was commenced during the year and already 48 waters, representing 30 factories, have been examined. When analyses of waters from all factories are completed, consideration will be given to recommending suitable treatments where necessary.

Iron and Copper in Butter.

A survey of the iron and copper contents of Queensland butter is now well under way. The part played by these metals in affecting quality of dairy produce emphasises the need for this work. It is thought that the increasing incidence of "metallic taint" in butter may bear some relation to the iron and copper content.

Mould Rot in Churns.

A local manufacturer of butter churns has experienced difficulty in preventing the development of a mould rot, which appears to be restricted to one species of timber. Investigations are proceeding with a view to overcoming the trouble; zinc naphthenate is being used as a wood preservative and a synthetic formaldehyde resin as an outer coating. The object of such applications is to prevent the mould gaining entrance through the outside surface. However, care is necessary to avoid any possible contamination of buter with the chemicals used, and therefore many tests will be necessary before a final recommendation can be made.

Timber for Butter Boxes.

In view of the projected acute depletion of timbers hitherto used in the manufacture of butter boxes, tests were made in conjunction with C.S.I.R.O. and the Forestry Sub-Department as to the suitability of other timbers for this purpose. The practical work was completed last August, and of the twelve varieties tried, grading comments indicated that seven were satisfactory. However, further reports covering other aspects of the investigation are awaited.

FARM SURVEYS.

The development of 54 demonstration farms in eight districts has permitted the application of recommended procedures for the production of high quality milk and cream. The readiness with which such methods have been applied with a saving in time and labour, and yet with an all-round increase in efficiency, is encouraging.

The practices being demonstrated include:—

1. *The use of improved dairy cleaning and sterilizing techniques,* using various mixtures of detergents and such sterilizing agents as hypochlorite and quaternary ammonium compounds.

2. *The combining of cleaners and sterilizers.* In an endeavour to speed and simplify operations for the farmer and to offset the carry over of contamination in the cleaning of dairy equipment, sterilizing compounds have been incorporated with detergents.

3. *The use of various paints and limewashes* for dairy buildings in combination with DDT for fly control.

4. *Heat sterilization.* The relative advantages and conveniences of high pressure units, low pressure units, electric boilers and wood fire coppers, are being compared.

5. *The efficient cooling of dairy produce.* Comparisons concerning efficiency and cost are being made of (*a*) refrigeration, (*b*) evaporative water cooling tower, (*c*) charcoal coolers, and (*d*) concrete troughs.

6. *The use of new milking equipment.* A new type of strip cup has been designed to facilitate the detection of cows yielding abnormal milk. The apparatus is painted black to clearly demonstrate clots in the foremilk and is designed to permit easy cleaning and to avoid spillage. A dual compartment udder wash container has been designed to permit the more effective washing of udders. The use of a cleaning solution in one compartment and hypochlorite in the other prevents rapid deterioration of the hypochlorite.

7. *Modern milking methods.* On at least four farms in each group of demonstrations the economic advantages of modern milking methods are being shown. The eagerness of farmers to train their cows to these new practices clearly demonstrates their success.

Chemical and bacteriological checks on the efficiency of the above practices have been made where necessary.

BUTTER IMPROVEMENT SERVICE.

The work performed during the year included routine bacteriological and chemical examinations of butter samples taken at random from the boxes at the time of grading, advisory services, factory surveys and investigations into several problems.

For some years determined efforts have been made to improve the quality of butter by intensive processing of low grade cream. Officers have carried out investigations into the relative efficiency of single and dual vacreation and other methods of cream pasteurisation.

The benefits of more intensive cream processing in pasteurization have been clearly indicated,

both bacteriologically and in resultant cream quality. The method applied has proved of special benefit with border-line cream, but extension of the practice to high acid cream also shows promise.

In the meantime, one large co-operative dairy association, appreciating the benefits of more intensive processing, has added a third unit to the present system of tandem vacreation, with satisfactory results. The addition has also permitted a stepping up in the capacity of the pasteurising plant.

Whilst grading results show the degree of improvement effected, the questions of economy of operation and relation to keeping quality have yet to be determined.

Bacteriological and Chemical Quality.

The routine examination of 2,226 churnings of butter from 45 factories involved the performance of 8,900 bacteriological tests in an endeavour to assess factory hygiene standards and to indicate the main sources of contamination. The average bacteriological quality index for the year was 236—a slight improvement on the previous year's results.

Guidance to factories in standardising the chemical composition of butter produced involved 2,200 moisture and salt determinations.

For those factories under the Butter Improvement Service, the average composition of butter produced is estimated as moisture 15·56 per cent., salt 1·32 per cent., curd 0·88 per cent., fat 82·24 per cent.

For all factories (after making an allowance for the Port Curtis group) the estimated composition is moisture 15·60 per cent., salt 1·36 per cent., curd 0·88 per cent., fat 82·16 per cent.

These figures indicate a very high standard of compositional control.

The estimation of the pH of the butter serum has been continued as part of the service, and involved 1,234 estimations during the year. So far little stress has been laid on bringing pH into the range recommended (6·8-7·2). This range was chosen following the recommendations of the majority of authorities. The lower limit of the range seems to be well substantiated, but considerably more evidence is needed before it will be possible to emphasise any upper limit. Such evidence is being collected in keeping quality experiments. In the meantime the results are providing useful information on neutralisation procedures in Queensland factories, as well as a check on any tendency towards inefficient methods in the factories. An interesting feature of the results to date is the strong tendency for the pH to vary towards the alkaline side in the colder months. This is well shown in Table 1.

TABLE 1.
pH of Butter Serum.

Quarter.	Percentage Distribution of Samples. pH Range.			Arithmetic Mean.
	5·6–6·7.	6·8–7·2.	7·3–8·2.	
July-September, 1948 ..	7	32	61	7·46
October-December, 1948 ..	12	31	57	7·32
January-March, 1949 ..	9	42	49	7·26
April-June, 1949	5	24	71	7·42
July-September, 1949 ..	4	27	69	7·40
October-December, 1949 ..	8	41	51	7·32
January-March, 1950 ..	12	42	46	7·22
April-May, 1950	3	28	69	7·41

It will be noted that the arithmetic means for corresponding quarters agree closely.

Microscopic Examination of Butter.

Further work has been performed in developing this method for use in experiments involving the texture of butter and in routine Butter Improvement Service reports. The necessary equipment has now been obtained and the method will be put into general use during the coming year.

Field Work and Advisory Services.

Twenty factories were visited and bacteriological surveys conducted so as to give advice on some specific aspect associated with factory processing or defect in butter. Two of the visits were made in an endeavour to ascertain the cause of unusual degrading. One outbreak was found to be due to heavy bacteriological contamination from a damaged item of equipment. The other case was found to be due to a chemical taint arising from the factory water supply.

CHEESE QUALITY.

Much detailed work on starter cultures has been carried out with benefit to cheese quality. Over 1,000 cultures of lactic acid starters have been forwarded to cheese factories. The use of modified medias, continued purification, and regular vitality testing have maintained the cultures at a very high standard. In addition, many overseas strains have been tested for suitability under Queensland conditions. Tests are being continued to isolate new strains phagically unrelated, and to encourage the use of different strains in rotation.

Plates 15 and 16, facing page 84, show the degree to which starter equipment at factories has improved and the elaborate nature of these developments.

With the application of improved manufacturing techniques in conjunction with starter control, there has been a further percentage increase in the amount of choice and first grade cheese manufactured.

The wider use of hydraulic presses as now developed by one association should also help to improve the texture of cheese.

Several factories have maintained a high standard of quality, even over the summer months, indicating the value and importance of payment for milk on a quality basis as determined by the methylene blue test.

Homogenised Cheese for the East.

Further consignments of homogenised cheese were made during the year as part of an order for tropical countries. With further modifications in manufacture, it has been possible to improve vat working. This cheese was originally developed in Queensland because of its non-fat-leaking characteristics and suitability for tropical conditions.

Shelf Protection and Mould Control.

A request was received regarding the possibility of protecting the shelves of cheese cool stores from the effects of fat and lactic acid exudation and mould. The use of a special anti-mould enamel as a shelf covering, with a selected undercoating, is receiving attention.

Field Work.

A number of visits were made to cheese factories during the year for the purpose of conducting phage surveys and carrying out investigational work or giving advice on technical aspects of starter propagation and manufacture.

USE OF MILK BY-PRODUCTS.

Advice has been given to a number of factories contemplating the roller drying of buttermilk, whey and separated milk. Several factories have also commenced the reclamation of butterfat lost in the whey by whey-separation. It is pleasing to see an increasing number of factories now attempting to utilise milk by-products to better advantage.

MARKET MILK QUALITY CONTROL.

Laboratory and field advisory services on behalf of the Brisbane Milk Board were continued. The increasing consumption of milk within the Brisbane Milk District and the extension of pasteurisation plants throughout the State have increased the responsibilities of the branch in this important work.

In addition to the servicing of Brisbane's pasteurising milk plants and district depots, regular bacteriological surveys have been conducted and advice given to plants at Southport, Toowoomba, Warwick, Murgon, Nambour, Malanda, Innisfail, Cairns and Rockhampton.

Summary of Results.

Table 2 summarises the work done in comparison with the previous year, and the degree of improvement attained.

TABLE 2.

SUMMARY OF TESTS, &C.

	1948-49.	1949-50.
Platings—bottled pasteurised milk	952	1,497
Presumptive coliform tests ..	978	1,242
Phosphatose tests—		
Number	486	807
Percentage negative ..	97	99
Methylene blue tests at depots—		
Number	82,242	77,970
Percentage below 4 hrs. ..	11.0	8.7
Microscopic examinations ..	4,183	5,004
Fat tests at depots—		
Number	24,755	27,998
Percentage below 3.3% ..	14	12
Pasteurised milk fat tests ..	1,234	1,859

The number of platings, coliform and phosphatase tests performed emphasise the expansion which has taken place in the market milk industry.

The use of the presumptive coliform test for detecting the efficiency of treatment and post-pasteurisation contamination has been extended during the year. Despite the increased number of tests there has been a reduction in the number of recorded positive results.

The rise in the percentage of negative phosphatase tests this year indicates that the efficiency of pasteurisation has increased. This is attributed to the highly efficient pasteurising equipment now installed.

Improved Quality Raw Milk.

The recorded percentage of suppliers' milk below four hours on the methylene blue test is steadily declining. This year 8·7 per cent. was reported, as compared with 11 per cent. last year, an improvement of 2·3 per cent.

Fat Content of Milk.

The results show a further reduction in the percentage of milk below the legal fat standard. There is, however, still much room for improvement. One of the main contributing factors is the uneven intervals between milking —morning milk being chiefly affected. The average fat content of raw milk received was 3.73 per cent., whilst pasteurised milk showed an average fat content of 3.83 per cent.

Farm and Factory Visits.

Field and laboratory officers made 340 visits to milk depots for the purpose of conducting bacteriological surveys, inspecting plant and equipment or correcting some fault in processing. Nearly 2,000 visits were made to dairy farms for purposes of quality improvement.

Improved Laboratory Techniques.

Considerable attention has been paid to the improvement and extension of the laboratory techniques applied to market milk control. Investigations along these lines have included:—

(1) Trials with filtered, unfiltered and centrifuged media for determining the viable count of pasteurised milk.

(2) The use of the presumptive coliform test and the presumptive coliform incubation test as indicators of post-pasteurisation contamination.

(3) The application of (*a*) the temperature distribution test, and (*b*) the temperature recovery test in determining the efficiency of water baths used in dye reduction tests for market milk.

(4) The effect of storage temperatures on the pasteurisability of milk.

(5) Keeping quality tests on pasteurised milk.

Counts of Thermobacteria.

Some progress has been made in ascertaining the thermobacteria count of raw milk, as facilitated by the use of the roll tube method. This readily permits of the examination of a large number of milks at the one time and the determination of their suitability for pasteurisation purposes.

GENERAL ANALYTICAL WORK, &c.

There has been a considerable increase in the amount of routine analytical work, involving analyses for engineering purposes and numerous determinations in connection with investigational projects.

As a result of the enforcement of regulations respecting dairy glassware, the standard of quality is steadily improving, with a declining number of rejections following laboratory testing.

Thirteen visits were made to farms and factories for the purpose of investigating chemical engineering problems, the most important of which include water treatment, waste disposal, brine refrigeration, and cooling efficiency.

Laboratory staff have contributed articles to the *Queensland Agricultural Journal* and the *Queensland Journal of Agricultural Science*, as well as giving radio broadcasts and attending field days. Lessons have been prepared for the correspondence course in Dairy Manufactures conducted by the Brisbane Technical Correspondence School.

Some assistance has also been given to the preparation of Show exhibits, as well as conducting schools of instruction for new Dairy Officers.

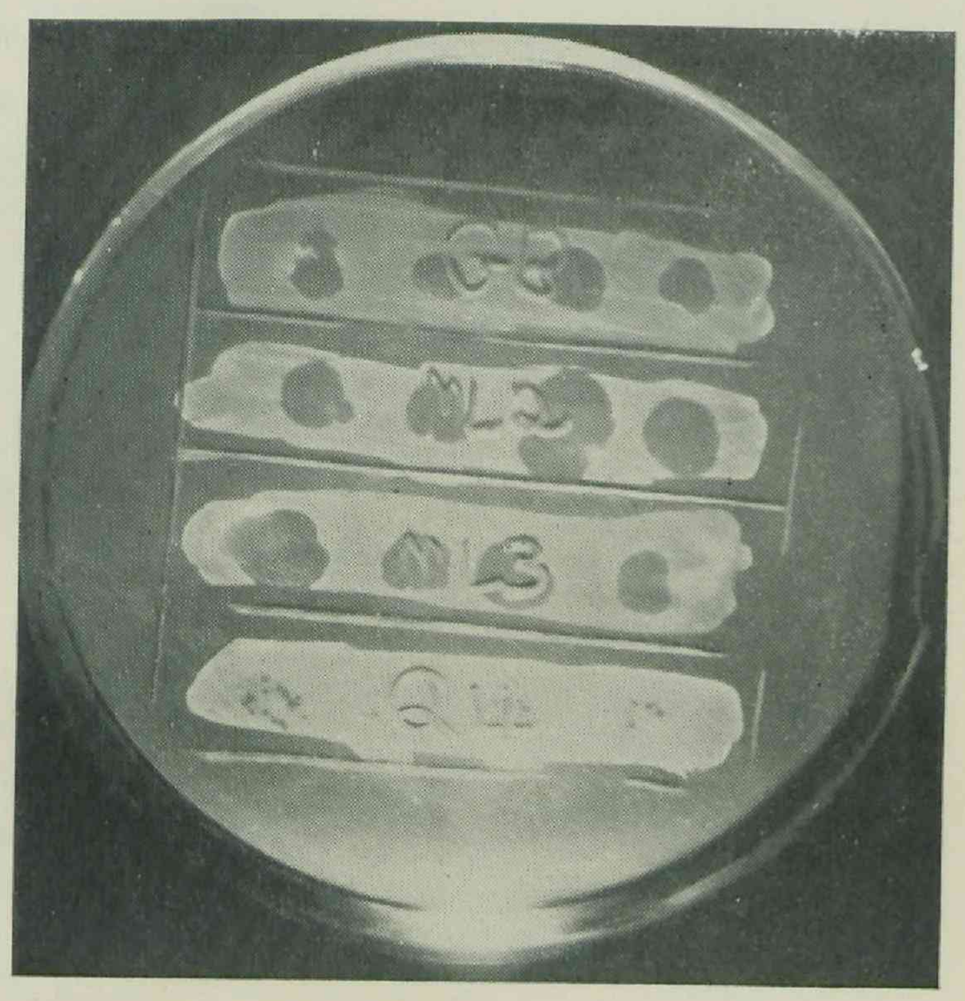


PLATE 14.

A Sample of Photographic Evidence of Bacteriophage in Cheese Starter Cultures. The cleared areas show complete lycis; Q4 shows partial breakdown.

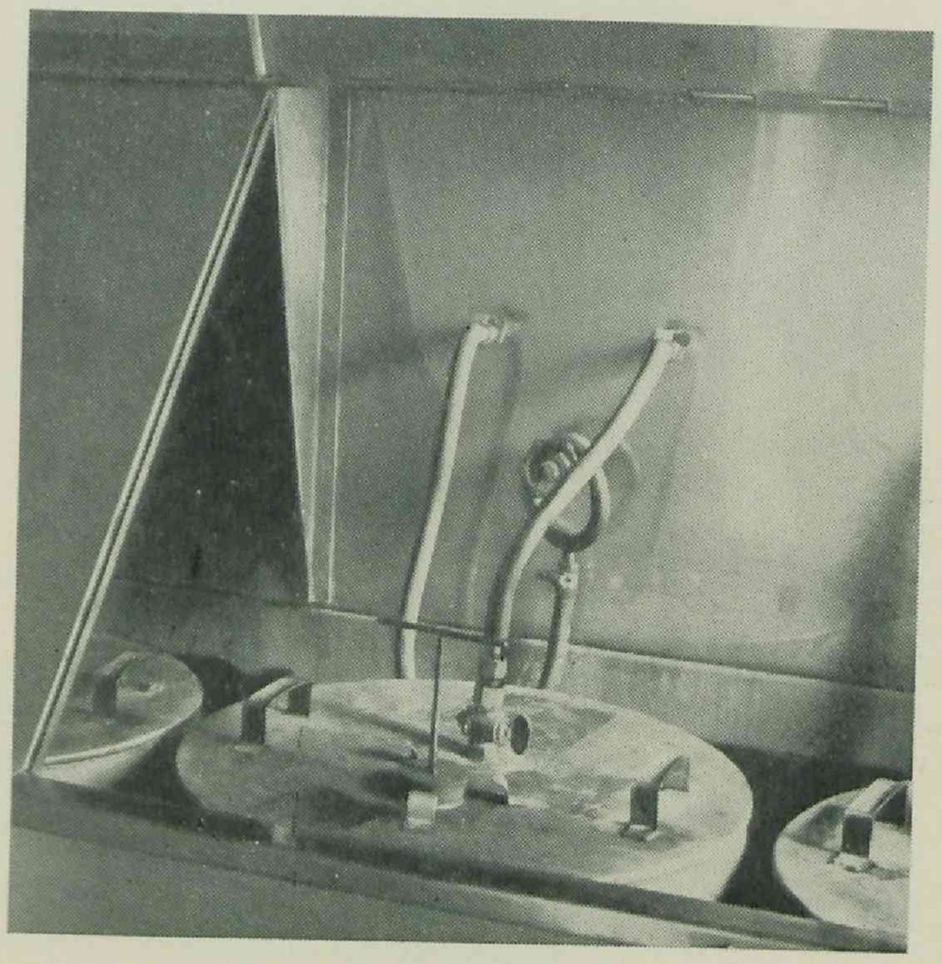


PLATE 15.

Improved Bulk Starter Equipment.

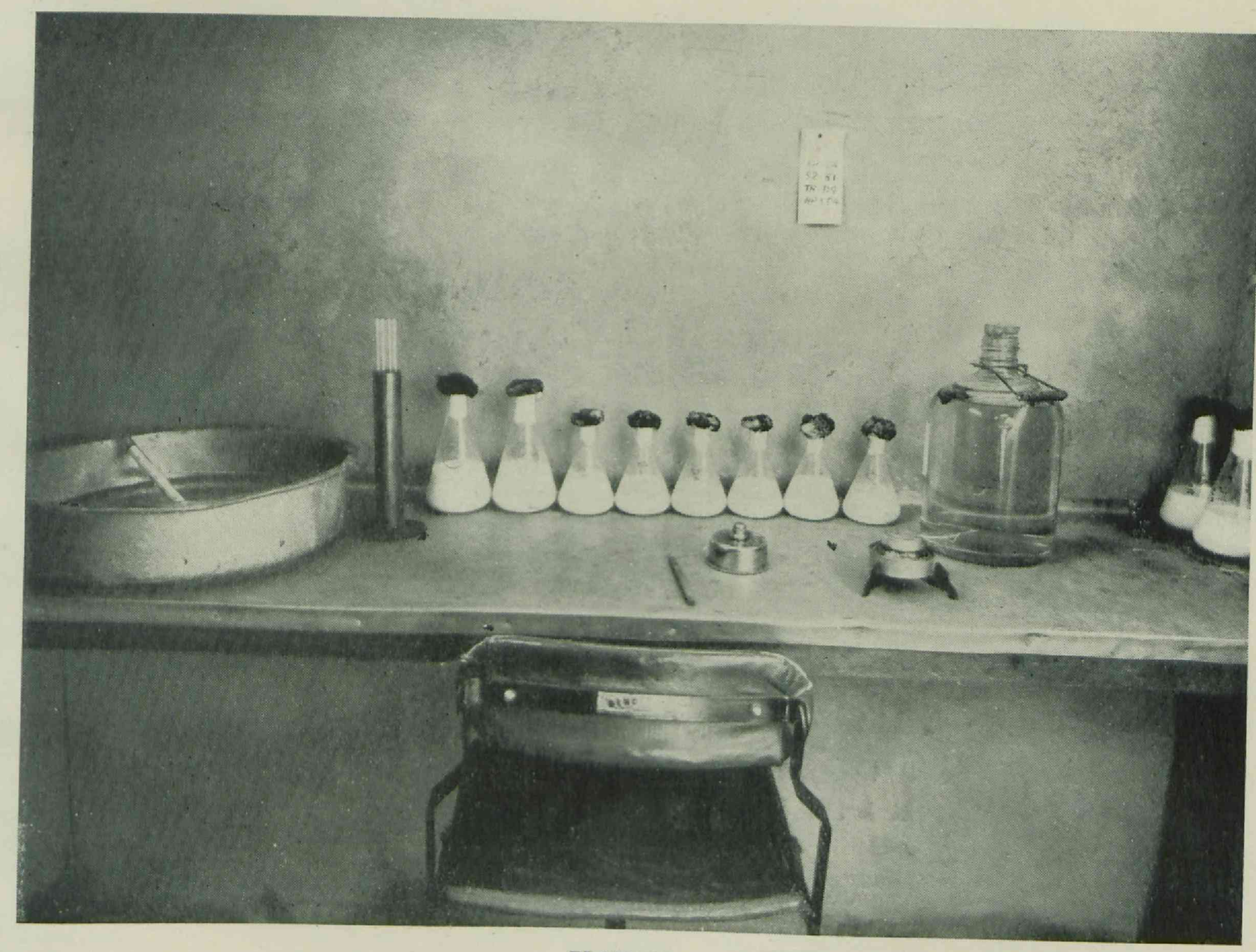


PLATE 16.

Improved Equipment for Propagating Mother Cultures at Cheese Factories.

DIVISION OF MARKETING.

Report of the Director of Marketing (Mr. H. S. Hunter).

Detailed reports concerning the activities of the two branches, Marketing and Standards, which comprise the Marketing Division are appended hereto.

The Standards Branch has continued its regulatory functions covering standards of seeds, fertilizers and other farmers' requirements and has intensified the development of and its association with the various seed certification schemes now being developed by the Department. Country inspections have been more adequately dealt with during the year following the provision for branch use of a motor vehicle, which has considerably enhanced the efficiency of this work.

The Marketing Branch has been characterised during the year by a consolidation of the pattern established over the past few years rather than any widening of activity. Staffing difficulties have restricted any further expansion although some preliminary work has been carried out with a view to including peanuts, tobacco and eggs in the crop reporting service. Particular attention has had to be paid during the year to the problems of the more recently constituted commodity boards.

A detailed statistical account of the activities of the various Marketing Boards (of which the Director of Marketing is *ex officio* a member) will be given in the Annual Report of the Director of Marketing to the Honourable the Minister as required under *The Primary Producers Organisation and Marketing Acts*, 1926 *to* 1946.

STAFF.

The Marketing Branch is still without the services of a Production Statistics Officer, a position which became vacant when Mr. C. H. Defries in 1947 succeeded to the position of Assistant Director of Marketing rendered vacant by the resignation of Mr. H. K. Lewcock. Production statistical work is performed nevertheless with the part time assistance of officers employed mainly in other sections of the Branch.

It has not been found possible to secure the services of staff to perform necessary work in junior capacities, and the position has had to be met by the employment of two temporary assistants. One of these is engaged in the reporting of prices in the farm produce markets and one in general clerical and election duties.

Since the number of Boards for which the Department conducts triennial elections, referenda and by-elections to fill casual vacancies has now increased to eighteen, the absorption of this work as a part time duty by officers otherwise fully employed periodically disturbs the smooth and efficient operation of the Division.

In the Standards Branch, the services of one assistant and a typiste were lost by resignation. A temporary assistant has been added to the Branch.

During the year extended leave was taken by three officers of the Marketing Branch and three officers of the Standards Branch.

MARKETING BRANCH.

General.

In general, marketing conditions during the year have remained buoyant. Commercial and industrial activity and development, together with the increasing population of the Commonwealth, have maintained home markets, whilst the devaluation of sterling has served to boost overseas markets in terms of Australian currency. In instances, such as some of the cereal and food grains, this has resulted in the modification of a definite downward trend in overseas prices. However, there are some disturbing features in the present situation. The surplus of many commodities available in the world for export trade tends to grow, particularly in the dollar areas. The existence of vast stock piles of cereals, feed grains, tobacco leaf, etc., which cannot be disposed of through normal channels owing to currency difficulties, is an ever-present threat to the market position. Particularly is this so when it is realised that about two-thirds of U.S.A. agricultural exports are financed by foreign aid programmes and that the extent of this finance depends upon year-to-year appropriations.

Contract prices or trade agreements such as those for dairy produce and wheat provide a definite stabilising influence in some major industries. However, some markets, such as for instance those for rabbits and poultry meats, have taken a decided downward trend; flour has been much more difficult to dispose of than for many years; whilst in others, of which canned pineapples is a notable example, there are signs that there will be a substantial increase in future competition.

Continued high prices for wool, as instanced by an increase in the average price of greasy wool of 22.5 per cent., and to a lesser extent, meat, are in fact disguising a downward trend in overseas income from other rural exports. The heavy increase in income from wool, which was £53 million greater for the nine months ended March, 1950 than for the corresponding period of the previous year, adequately illustrates the significance of this industry in the Australian economy, where it is the greatest single influence on economic conditions. The Commonwealth Government recently enacted legislation to provide funds for a marketing plan in the wool industry to replace Joint Organisation. This provides for a levy of between 5 and 10 per cent. on wool and will have the effect of removing some of the excess funds from its present influence on the economy.

The problems attendant upon the marketing activities of the newer boards, such as those constituted for potatoes, onions and tobacco, have received considerable attention during the year. These organisations have been required to give close consideration to matters in which no precedents are available for guidance and where detailed examination is essential to ensure that policies are soundly based and that equity is achieved for all interested parties.

Some time has been devoted during the year to the compilation of factual material and data

relevant to the bulk handling of wheat. Enquiry into this matter, during the course of which visits were made to other States, has been influenced by the growth of the wheat industry in the face of labour shortages and possible jute shortages together with the upward trend of costs under existing methods of handling. The substantial volume of information which has been compiled, with conclusions and recommendations relating to possible application of bulk handling methods in Queensland, is now being examined by the industry.

Officers of the Division have continued their association with the various voluntary pools established by producers for the export of coarse grains. Other conferences in connection with such matters as the marketing and utilisation of oil bearing seeds, fruit cases, jute and bag supplies have also occupied the attention of officers.

During the year, officers of the Division have taken part in the talks transmitted by the Australian Broadcasting Commission in its Country Hour Session.

For the first time in the history of organised marketing in Queensland, extending over more than three decades, a marketing board was voted out of existence by its growers. The Board in question, The Honey Marketing Board, was originally constituted on March 7, 1929 to control the marketing of honey and beeswax produced in Queensland for a period of five years, and by consent of the beekeepers concerned its operations were extended from time to time until March 8, 1950. However, by ballot held on February 28, 1950, beekeepers decided by 168 votes to 124 against the further continuance of the Board, the affairs of which are in process of being wound up by order of the Supreme Court.

The Dairying Industry.

Although the high production figures established in 1939-40 and the State record in 1938-39 have not been approached, it is certain that, because of increased prices on both the domestic and the export markets, the return to the butter industry for 1949-50 will constitute a record. Distribution to the butter factories has been estimated at £14,000,000. some £1,500,000 in excess of last year's record return, while payments to cheese manufacturers will be in the vicinity of £1,500,000.

Following the survey by the Joint Dairying Industry Advisory Committee last year, which established an increase of 2½d. per lb. (commercial butter) on the previously recognised costs of production, an increase in subsidy to cover this increase was approved by the Commonwealth Government for the period from July 1, 1949 to December 31, 1949, and later extended to June 30, 1950.

At the same time as the 1949 report was submitted, the industry through the Commonwealth Dairy Produce Equalisation Committee Ltd. presented a case for an increase from 2.55d. per lb. to 3d. per lb. (commercial butter) to cover increased manufacturing expenses. This increased cost is now also being met by the Commonwealth Government.

A further cost of production survey has now been completed and at the time of writing negotiations between representatives of the industry, the Commonwealth Government and the State prices authorities are proceeding.

Trade with the United Kingdom, Australia's main export market, is based on an agreement under which available surpluses of butter and cheese are exported at a price negotiated annually. The agreement contains a clause which permits a variation not exceeding 7½ per cent. above or below the previous season's prices. This is regarded as some safeguard for the industry in the face of the rapid revival of dairying in European exporting countries, and the incidence of steadily increasing costs of production on the industry in Australia. The present agreement, which is an extension of the four-year contract which terminated in June, 1948, is current to June 30, 1955.

An export outlet, important as it may be for the stabilisation of the dairying industry, cannot be considered in the same light as in the pre-war years. Changes are taking place in the utilisation of milk, such as its diversion from butter and cheese manufacture to meet increasing domestic consumptive demands for whole milk and processed milk brought about by the wants of an expanding population and by changes in dietetic habits. This increasing demand for whole and processed milk will tend to minimise the dependence of the industry on the United Kingdom market for butter and cheese.

Dairy production in Queensland during the year 1949-50 was maintained at a high level. The output of butter and cheese from Queensland factories amounted to 1,927,825 boxes and 20,273,644 lb. respectively. These figures compare favourably with the corresponding production of 1,858,302 boxes of butter and 21,599,643 lb. of cheese manufactured in the year 1947-48, in which butter production was the highest since 1942-43.

A dissection of sales of Queensland butter in 1949-50 taken into account for equalisation purposes is set out in Table 1. For information, a comparison has also been made with the two previous years.

TABLE 1.

BUTTER—DISSECTION OF DISPOSALS, 1947–48 TO 1949–50.

Year.	Quantity Manufactured.	Commonwealth Sales.		Export.			Grand Total Sales.
		Queensland.	Interstate.	Ships' Stores and Countries other than Great Britain.	Great Britain.	Total.	
	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.
1949–50*	1,927,825	476,850	191,124	127,717	1,132,129	1,259,846	1,927,820
1948–49	1,887,886	432,377	133,339	66,130	1,256,084	1,322,214	1,887,930
1947–48	1,858,302	450,851	126,017	63,250	1,250,734	1,313,984	1,886,743

* These figures are subject to revision.

A dissection of disposals of cheese for the year 1949-50, compared with the years 1948-49 and 1947-48, is given in Table 2.

TABLE 2.

CHEESE—DISSECTION OF DISPOSALS, 1947–48 TO 1949–50.

Year.	Local Sales.	Sales for Processing .	Overseas Sales.	Total Sales.
	lb.	lb.	lb.	lb.
1949–50*	9,215,313	4,195,911	5,983,857	19,395,081
1948–49	7,500,540	3,516,442	10,029,541	21,046,523
1947–48	7,416,313	4,423,675	8,140,756	19,980,744

* These figures are subject to revision.

The difference between production and disposals represents shrinkage and the difference in stocks at the beginning and the end of the year.

The Egg and Poultry Industry.

The main problem at present facing the egg industry in Australia, particularly in exporting States such as Queensland, is the reconciliation of increasing production costs with a weakening demand from the main overseas market for the industry, the United Kingdom. Consequently, although the actual exports of eggs in shell to the United Kingdom in the 1949-50 season amounted to 664,596 cases (of which 10.7 per cent. originated in this State), compared with 587,742 cases in the previous season, the prices realised were by no means as satisfactory as the prices realised on the domestic market and other export avenues.

This increased export, moreover, cannot be unreservedly accepted as indicative of near future trends. Figures published recently reveal the upward trend in production in the United Kingdom itself, in Eire and in European countries, and it is evident that the United Kingdom is becoming less dependent on the egg producers of Australia than in 1948 when the current five-year contract was signed. In 1946, eggs imported into the United Kingdom totalled 8,133,000 great hundreds, of which 18.03 per cent. was of Australian origin and 11.41 per cent. was from foreign countries (as opposed to the Commonwealth countries). In 1949, although total imports had increased to 20,989,000 great hundreds, only 9.88 per cent. was of Australian origin, while the imports from foreign countries had increased to 59.94 per cent. A similar movement is observed in egg products.

Meanwhile, negotiations with the British Ministry of Food for increased prices over the 1949-50 prices have failed in respect of shell eggs and dried eggs, although an increase of nearly 6 per cent. has been granted in the price of egg pulp under the terms of the agreement between the Ministry and the Australian Government.

This agreement, as is the case with the Dairy Products Agreement, allows for an annual variation not exceeding 7½ per cent. of the previous year's prices. Figure 1, which shows total receivals and exports to the United Kingdom of eggs in shell and the equivalent in eggs in shell of egg pulp during the years 1939-40 to 1949-50, illustrates the importance of this market to growers supplying the South Queensland Egg Marketing Board.

The market for dressed poultry, although not subject to control by the Egg Marketing Board,

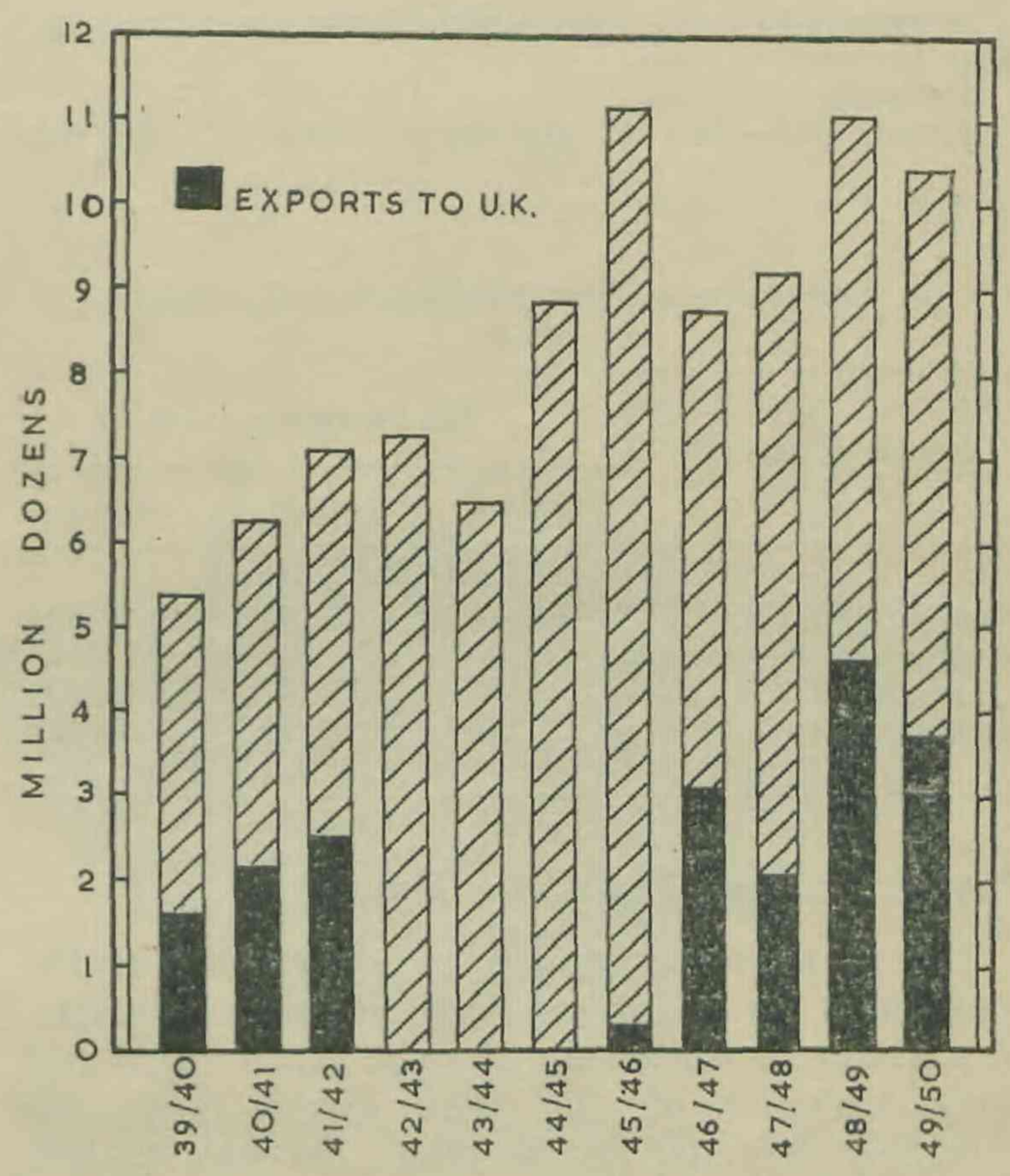


FIGURE 1.

Eggs.—Total receivals and exports of eggs in shell and the equivalent in eggs in shell of pulp exported to the United Kingdom by the South Queensland Egg Marketing Board during the years ended 30th June, 1940 to 1949 inclusive.

has as a result of good prices in recent years had a stabilising influence on the industry in Queensland. However, the relinquishing of price control of poultry meat and the decision of the British Ministry of Food not to renew the agreement will impose a further problem on the industry.

Egg production in Queensland during the year, although maintained until midsummer, subsequently declined rather steeply. This decline was attributed primarily to the extremely unfavourable seasonal conditions. Receivals by the South Queensland Egg Marketing Board for the year ended 30th June, 1950, totalled 10,441,391 dozen eggs, which represented a decrease of 5.52 per cent. on receivals for the previous year.

In Central Queensland the Egg Marketing Board, which during the year took over the operation of its own grading and sales floor previously conducted through the agency of the Central Queensland Meat Export Company Ltd., also experienced a decline in receivals amounting to 30.65 per cent. of the previous year's figures.

A dissection of the manner in which eggs were disposed of by the Boards during the year, with comparative figures for the two previous years, is given in Table 3.

TABLE 3.

EGGS—DISPOSALS BY THE EGG MARKETING BOARDS IN QUEENSLAND.

(*a*) THE SOUTH QUEENSLAND EGG MARKETING BOARD.

Method of Disposal.	Egg Disposals (dozens).		
	1947–48.	1948–49.	1949–50.
Eggs in shell (local) ..	4,738,233	4,400,175	4,025,338
Eggs pulped (local) ..	1,506,069	1,840,892	1,570,482
Eggs pulped (export)	590,654	2,261,702	1,811,616
Eggs in shell packed for export to U.K.	1,470,060	2,465,730	2,088,390
Eggs exported to other destinations (including interstate)	309,660	557,551	823,200

(*b*) THE CENTRAL QUEENSLAND EGG MARKETING BOARD.

Method of Disposal.	Egg Disposals (dozens).		
	1947–48.	1948–49.	1949–50.
Eggs in shell (local) ..	209,140	231,970	172,651
Eggs in shell packed for export to U.K.	22,200	111,330	44,600
Eggs pulped (local) ..	252,167	250,158	199,322

The Fruit and Vegetable Industry.

The past twelve months have seen favourable conditions for the fruit and vegetable industry as a whole. Production of some small crops and early varieties of the 1949 citrus crop was adversely affected by weather conditions, but yields from most main crops were good and wholesale market prices generally were very satisfactory. The Stanthorpe fruit crop was heavy. Stone fruits suffered severely from brown rot, but the apple yield was of excellent quality. Coincidental with a poor crop in southern States, prices for apples marketed to date have been very satisfactory. The exceptional quantities of Granny Smiths placed in store have caused an acute shortage of storage space for late pickings.

As time goes by the significance of the role of the Northgate Cannery as a stabilising influence for a large section of the fruit industry becomes more and more apparent. The cannery has of course passed through the initial stages of its development with the advantage of a seller's market for the greater portion of its output, and in the future increasing competition both at home and overseas can be expected. However, the degree of control that growers can exercise over this vital aspect of the disposal of fruit by reason of their ownership of the cannery and the outlet it affords in itself for such a diversity of fruits provide ample demonstration of its key position in the industry and the need for its continued success.

The 1949-50 cannery pack of pineapples was a record for Queensland. A large proportion of this pack was exported to dollar countries. The financial benefits secured from the variation in the exchange rate of the Australian pound with dollar areas gave a very strong fillip to the industry generally. Not only did growers receive upwards of a 33 per cent. increase in values for factory deliveries but this indirectly stabilised the fresh fruit market at record high levels. Apart from pineapples, a notable activity of the cannery was the increased quantity of strawberries handled. Factory price for the 1950 strawberry crop of 1s. 5d. and 1s. 5½d. per lb. guarantees advanced stability to a rapidly expanding strawberry industry in Queensland.

The protracted coal strike and dislocations to rail transport in New South Wales due to floodings from late June to early September, 1949, presented grave problems for the marketing in Sydney and Melbourne of the large quantities of primary produce usually going forward to those centres from Queensland at that time of the year. The Committee of Direction played a paramount part in the organising of road tranportation and air freighting to southern markets. Some appreciation of the task can be obtained from the figure of 154,373 packages amounting to 3,556 tons moved by the Committee of Direction alone by road transport to the south. The experience gained in the air freighting of fruit and vegetables because of emergency will no doubt result in greater use being made of this mode of transport under normal conditions. Preferential demand by southern buyers at considerably higher rates for air freighted goods, particularly beans and to a lesser degree strawberries, has shown the grower that goods can be profitably airfreighted.

The retail distribution of fruit and vegetables in country centres by the Committee of Direction was extended by the addition of branches at Longreach and Southport. The main feature of the Southport branch will be the use of a mobile shop in door to door selling similar to that in operation at Roma. Apart from the above-mentioned, branches are operating at Innisfail, Charters Towers, Bowen, Mackay, Rockhampton, Charleville, Stanthorpe, Gympie, and Nambour.

A development in the fruit industry which may have far reaching advantageous economic results is the artificial ripening of papaws. From experiments commenced some two years ago, the Committee of Direction was able during the past twelve months to develop the process on a commercial basis. Present plans visualise artificial ripening during the colder months of the year, i.e. from May to August. This will have the effect of lengthening the marketing period for the papaw crop by some three months. A large percentage of papaws marketed during that period under the new process would not otherwise be ready for sale until the heavy cropping months of late August, September and October, when in some past years glut supplies have resulted in very low prices.

There has been a slight improvement in the general supply position of fruit cases during the year, but in most fruit growing areas there is still difficulty in maintaining regular deliveries. The increasing popularity of the cardboard commodity case has probably eased the pressure of demand on case timber generally.

The Peanut Industry.

Plantings of peanuts for the 1950 crop, which totalled approximately 26,000 acres, showed no tendency to return to the high level of the 1947 crop, when 38,800 acres were harvested.

Demand remains favourable for this crop, so that the decline in acreage appears to be related, at least in part, to factors other than marketing prospects, although good prices for other crops,

notably maize and sorghum, have no doubt influenced the decision of growers to decrease the acreage planted to peanuts. Probably soil exhaustion and the consequent increased need for crop rotation have led to a reduction in the percentage under cultivation devoted to peanuts on most farms, particularly in the South Burnett district. In addition, diseases, notably crown rot, have introduced a considerable element of uncertainty into an industry where yields are always likely to be substantially reduced, as they were in 1948, by protracted wet weather at harvesting.

Receivals by The Peanut Marketing Board from the 1949 crop totalled 11,073 tons harvested from an area of 24,290 acres.

Allocation of edible kernels to the Board's customers was continued throughout the year, while kernels for oil extraction were also distributed on a quota basis amongst the four major processors. The selling prices for edible kernels and oil kernels were increased from 9d. per lb. and 4d. per lb. respectively to 10½d. per lb. for edible kernels and 5d. per lb. for oil kernels as from September 21st, 1949. The Board also made limited sales in shell of graded peanuts to Victoria, Tasmania, South Australia and Western Australia at 10d. per lb. From the 1950 crop the Board intends to make sales of graded peanuts in shell throughout Australia. The Board's selling prices for the 1950 crop are 1s. per lb. for edible kernels, 6d. per lb. for oil kernels and 1s. per lb. for graded peanuts in shell.

The Potato Industry.

Deliveries to The Potato Marketing Board from the 1949 autumn crop in South Queensland amounted to 13,447 tons and from the 1949 spring crop 14,823 tons, while the intake from the 1949 North Queensland crop was 3,985 tons. Plantings for the 1950 autumn crop were approximately the same as in 1949, but the prolonged rains during February and March caused heavy losses, so that the total intake from this crop is expected to be little more than half that of last year's autumn crop.

This is the first year in which the three Queensland crops produced each year have been marketed by The Potato Marketing Board. The Commonwealth marketing scheme, which was set up under the National Security (Potatoes) Regulations on 27th April, 1942, terminated with the disposal of the 1948 North Queensland crop.

Consumption of potatoes in Queensland is in excess of 50,000 tons per annum, so that at present nearly one half of Queensland's requirements is imported, chiefly from Tasmania and to a lesser extent from New South Wales and Victoria. Throughout the year there have again been occasional shortages. These have invariably resulted from delays in transport of imported potatoes.

During the year ended March 31, 1950, 28,821 tons of locally grown potatoes were consumed in Queensland; the remaining 3,434 tons (all from the spring crop) were exported to New South Wales. Imports from Potato Marketing Boards in other States during the same period amounted to 22,044 tons, of which 15,956 tons came from Tasmania, 3,566 tons from New South Wales, and the remaining 2,522 tons from Victoria. This marketing pattern is shown diagramatically in Figure 2, which clearly illustrates the extent to which Queensland depends on external sources of supply to supplement its own production. This dependence on shipping and interstate rail transport for the balance of Queensland's requirements is the chief problem in attempting to maintain a steady flow of potatoes on to the market, particularly in view of the disinclination of the parties involved to take the financial responsibility of bulk storage under Queensland conditions.

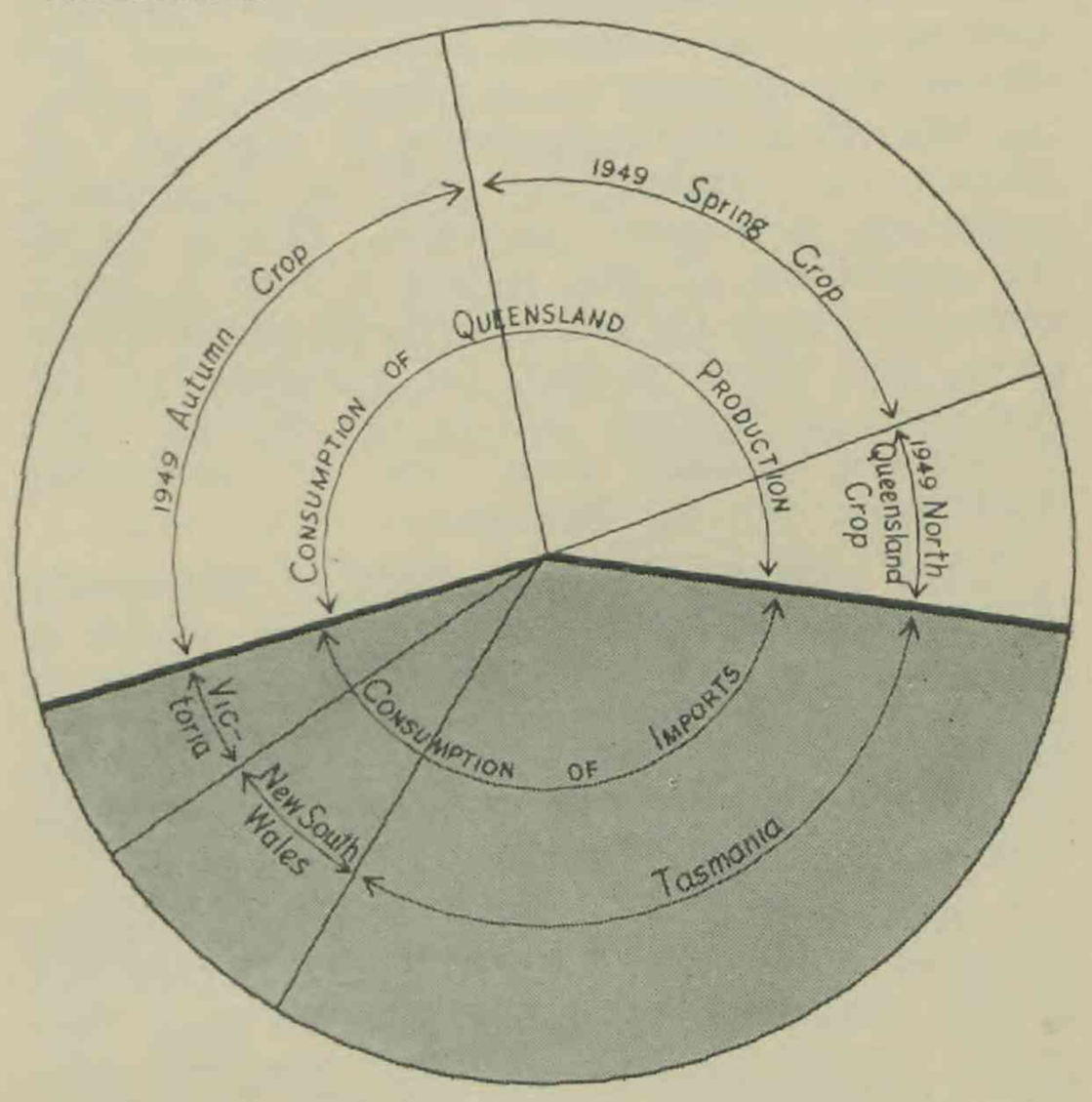


FIGURE 2.

Potatoes.—Commercial production and consumption of potatoes in Queensland during the year ended 31st March, 1950.

The Tobacco Industry.

Under the stimulus of higher prices since the inception of The Tobacco Leaf Marketing Board, the downward trend in tobacco production in this State has been reversed, and production for the 1948-49 season showed a marked increase over that for each of the previous five years. A further increase resulted in the 1949-50 season and it is estimated that approximately 2,600,000 lb. of leaf was cured from this crop, compared with about 2,250,000 lb. for the previous season.

The upward trend in production following increased prices is clearly illustrated in Figure 3. The rapid decline in production

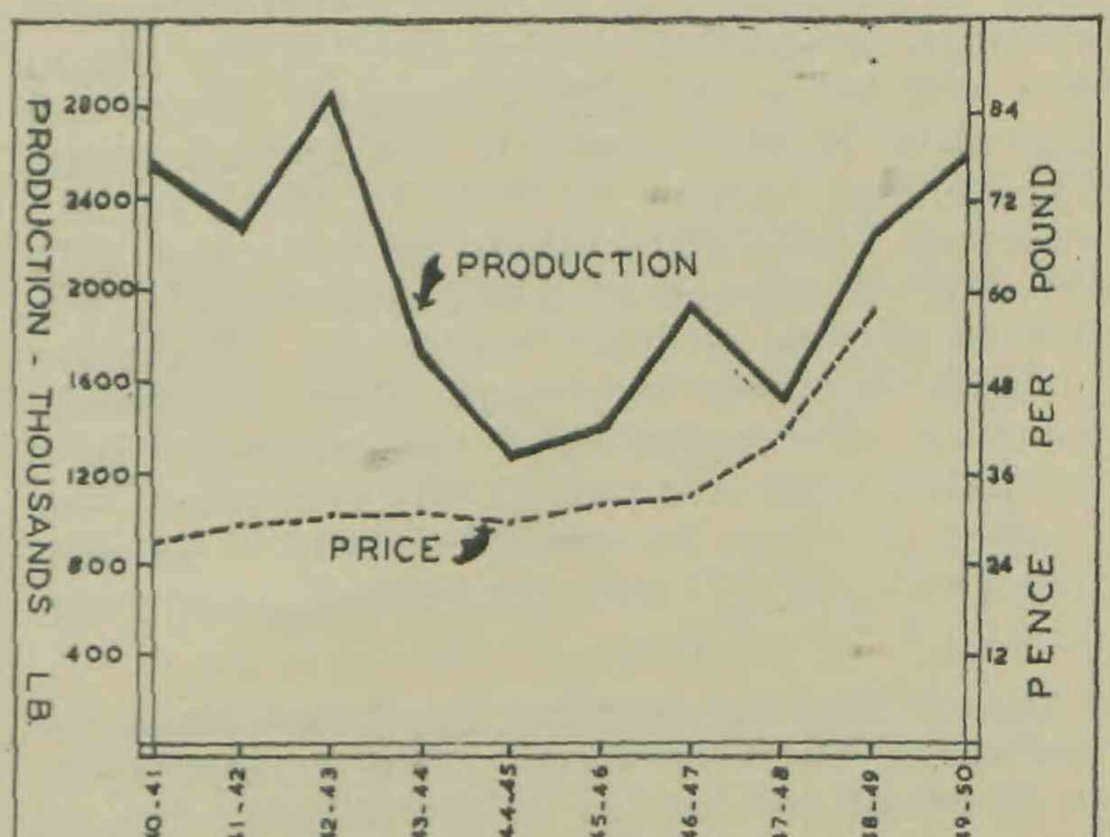


FIGURE 3.

Tobacco Leaf.—Production of tobacco leaf in Queensland and average price per pound of leaf marketed for the years 1940-41 to 1949-50 inclusive.

from 1942-43, which was due partly to war conditions and partly to the more or less constant price level in a period of rising costs, is also readily apparent.

It should, however, be borne in mind that price has not been the sole determining factor in the change from a downward to an upward trend in production. It might be said that, whilst increased prices have provided the main stimulus to increased production, irrigation and other developmental projects have greatly facilitated the induced expansion and are placing the industry on a firm basis by reducing the effect of the vagaries of seasonal conditions on production, and so minimising variations in farmers' incomes. This is taking the expansion of the industry into a much wider field than the main northern and southern areas, and developments, for example, on the Burdekin, at Ingham and in the Miriam Vale-Bundaberg coastal area, are of particular significance for the future.

When considered in the light of the steady increase in Australian consumption, which is now in excess of 33,000,000 lb. per annum, it is clear that the industry has a great field for expansion. The estimated production of 2,600,000 lb. for 1949-50 represents only 7·9 per cent. of Australia's total requirements.

Imports of tobacco from the non-sterling group of countries accounted for £5,125,305 out of the total imports of £141,317,525 from that group during 1947-48 (the last complete year for which figures are available) and consequently represent a very large item of expenditure in "hard currency" areas. The increase during 1949-50 of approximately 1,000,000 lb. over the 1947-48 Queensland production of 1,581,440 lb. therefore represents a real saving in "hard currency" expenditure. On 1947-48 import values, this saving would amount to over £A180,000 or U.S. $400,000.

The level of prices at sales to date of new season's leaf is substantially higher than that ruling during 1949. However, as there is much leaf yet to be sold it is not possible to give an indication of probable average price per pound for the 1949-50 season. Nevertheless, it may be well in excess of the average of 57·65d. per lb. realised for 1948-49 leaf.

The Wheat Industry.

Expansion of the wheat industry in Queensland is continuing at a fairly rapid rate, and although production during the 1949-50 season was well below the 1948-49 record, this is not indicative of any change in the upward trend. The smaller harvest in 1949-50, which is estimated at 11,800,000 bushels, as compared with the 1948-49 harvest of 14,317,422 bushels, was due to adverse weather conditions. The areas planted in these two years more accurately represent the expansion of the industry. It is estimated that a total of 670,000 acres was planted to wheat for grain for 1949-50 as compared with 630,000 acres for 1948-49, an increase of some 6 per cent.

Apart from the opening up of new lands for settlement of ex-servicemen, the main stimulus to increased production in the industry has, of course, been the relatively high returns to growers during recent years resulting from high export prices, and as these returns are being maintained there is every indication that the State's wheat area will continue to expand. It is estimated that the area planted to wheat in 1950 will exceed 700,000 acres. The relative movements in production and returns to growers for Q. 1 milling wheat are shown in Figure 4. However, when drawing conclusions therefrom it should be borne in mind that the tremendous dip in production in 1946-47 and the lesser dip in 1949-50 were due entirely to weather conditions.

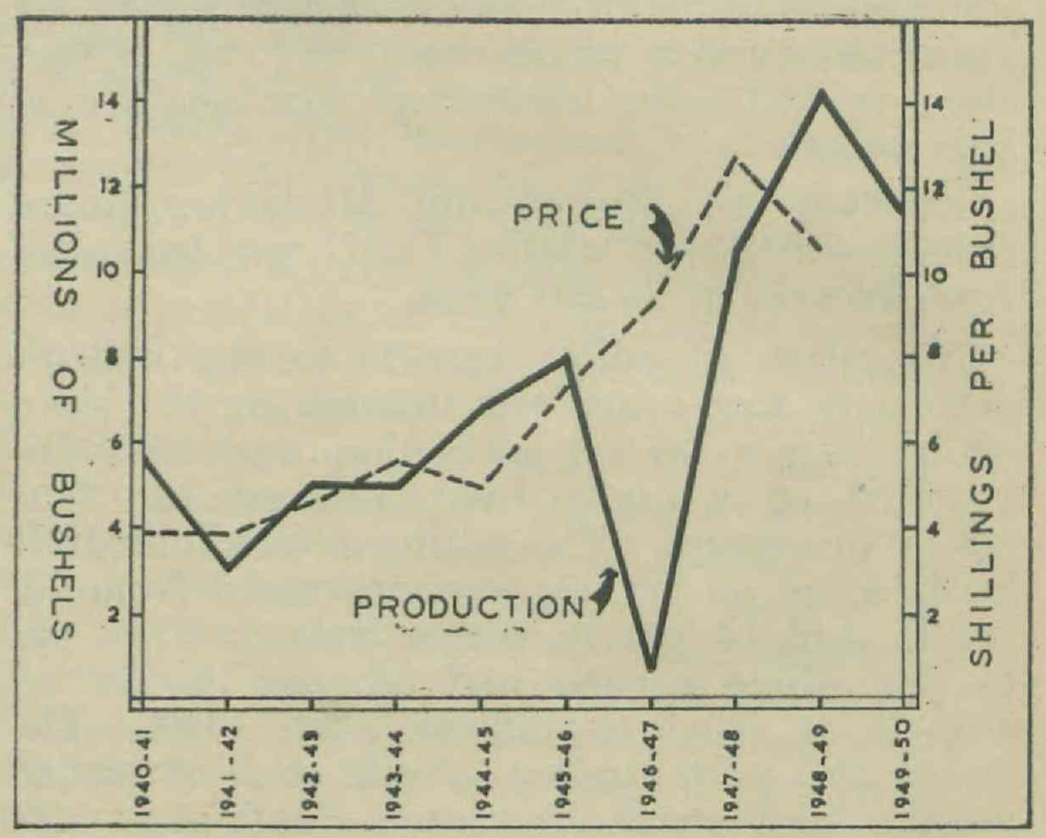


FIGURE 4.

Wheat.—Production of wheat in Queensland and average returns per bushel Q.1 wheat to growers for the years 1940-41 to 1949-50.

A further factor influencing the expansion is the existence of a Commonwealth-wide wheat industry stabilisation scheme which ensures the safety of a grower's investment, and provides for a guaranteed return until the 1952-53 season regardless of any fall which might be experienced in export price. The guaranteed price under this scheme for the 1949-50 season, after adjustment by means of an index of costs of production, was 7s. 1d. per bushel.

The need for enlarged storages and more rapid handling facilities in the face of labour shortages and increasing costs, together with possible difficulties in jute supplies, has naturally directed attention to whether bulk handling would be a practicable proposition in the Queensland industry. Preliminary enquiries have been made with a view to obtaining a clear picture of all of the implications involved and reports were prepared during the year following visits to New South Wales and Victoria by the Director and Assistant Director respectively.

This examination of the position in Queensland and in other States has clearly shown that the subject opens up many problems of great complexity in Queensland right from the farm to the flour mill or wharf. These will require careful analysis by the various authorities involved. In the meantime, proposals are being elaborated for the examination of certain technical aspects of the storing of wheat under bulk conditions in Queensland.

The Cotton Growing Industry.

The Report of the Commonwealth Tariff Board on its enquiry held in May, 1949 into the cotton industry, on the application of the Cotton Marketing Board and the State Government, for a five-year guaranteed price to growers of 32d. per lb. of raw cotton, was published in October, 1949. The Tariff Board recommended against the requested guaranteed price, but in

view of the fact that greatly reduced production had placed a proportionately heavier burden on the remaining growers consigning to the Cotton Marketing Board, it was recommended that the debt of £66,932 (as at December 31, 1948) in respect of advances made by the Commonwealth Bank for the purchase of capital equipment be liquidated by the Federal Government. These recommendations were accepted.

This reduction in overhead charges, in conjunction with marked increases in import prices for American and Brazilian cotton, enabled the Cotton Marketing Board to pay an average net return of 8.55d. per lb. of seed cotton (equivalent to 24.73d. per lb. of raw cotton) for the 1949 crop. This is the highest price ever paid to Queensland growers.

The future of the cotton growing industry is at present uncertain. Despite the recommendation of the Tariff Board, there have been strong demands for a price guarantee over a term of years which would give the industry a stability similar to that enjoyed by the dairying industry. Only by some such action joined to a substantial increase in mechanisation can there be any possibility of a revival of the industry on any scale.

Miscellaneous Commodities.

The years following the outbreak of war saw the extended planting of certain crops, the Australian requirement of which had for the most part been previously imported. The oil bearing seeds, linseed and sunflower, are examples of crops whose production was thus encouraged and has subsequently been sustained by high prices resulting from world shortages. In the pre-war years, small acreages of linseed were planted in Victoria, to which State the industry was confined. In Queensland the plantings for 1949 totalled nearly 14,000 acres, while the 1950 plantings have been estimated at 11,000 acres. In regard to sunflower seed, the same trend is observed, planting in Queensland having increased from an average of less than 100 pre-war to 2,800 acres in 1949. It is estimated that over 5,000 acres were harvested this year apart from production on the Queensland-British Food Corporation's farms.

Navy bean growing was given an impetus in northern New South Wales and southern Queensland by service demands. The Navy Bean Marketing Board was established in this State in 1946. Acreages have increased from 940 in 1943 to approximately 3,500 in 1949, while it is estimated that about 4,500 acres were planted for the 1950 harvest.

While the above crops have expanded, minor crops such as broom millet and arrowroot have continued to decline in spite of the incentive of relatively high prices. The decline can, to a large extent, be attributed to the difficulty in securing labour combined with the profitability of alternative crops. Broom millet received by The Broom Millet Marketing Board has declined from 99 tons in 1940-41, which realised an average price of £36 16s. 8d., to 63 tons in 1948-49, at an average price of £85 1s. per ton. Again, in the case of arrowroot, receivals by the Arrowroot Marketing Board have declined from 10,881 tons of bulbs in 1942 to only 3,070 tons in 1949, although over the same period returns to the grower increased from £2 5s. 3d. to approximately £6 9s. per ton.

Coarse Grains Export.

A feature of the year under review has been the continued buoyancy of overseas coarse grain prices which in large measure resulted from the sterling devaluation. The Commonwealth Government has retained its policy of control over export of these grains so as to ensure that the internal market is not denuded of supplies.

The Queensland Grain Producers Co-operative Association Limited shipped 7,000 tons of grain sorghum from the 1948-49 crop to the British Ministry of Food at £15 5s. 3d. per ton f.o.b., and a smaller parcel of 500 tons to Portuguese India at £17 10s. per ton f.o.b. From the 1949-50 crop, the Commonwealth Government has agreed to permit the export of up to 1,000,000 bushels (26,000-27,000 tons) on the condition that exporters place at least 40 per cent. of receivals on the domestic market.

Approval to export 8,000 tons of maize from the 1948-49 North Queensland crop had been granted to The Atherton Tableland Maize Marketing Board in May, 1949. During the year, further approvals were obtained, and a total of 11,000 tons was shipped from this area. The first shipment of 8,500 tons realised £17 15s. per ton f.o.b. Cairns. Prices firmed during the year, the second sale of 2,000 tons being at £23 5s. per ton. f.o.b., which was followed by a parcel of 500 tons at £22 10s. per ton f.o.b. The Board has already concluded sales from the 1950 harvest for shipment during June to October, amounting to 10,400 tons, at £23 15s. per ton f.o.b. Cairns for 8,400 tons and £23 10s. per ton for the remaining 2,000 tons.

Approximately 7,350 tons of southern Queensland maize were also exported during the year by The Maize Growers' Co-operative Association of Southern Queensland Limited, at prices ranging from £18 10s. f.o.b. Brisbane to £22 per ton ex store.

The export market for barley still remains firm, and during the year 1,900 tons, or approximately 85,000 bushels, exported to Antwerp by The Barley Marketing Board realised 12s. 9d. per bushel f.o.b. Brisbane, compared with 10s. 6d. per bushel realised for the 52,264 bushels exported to India during the previous season.

Crop Reporting and Forecasting.

The Crop Forecasting Service was inaugurated by this Division during the year ended June 30, 1947, when two reports on the autumn potato crop were issued. Since that date, the service has been extended to include the grain crops, wheat, maize, barley and grain sorghum, and in the year just concluded, seventeen reports were issued. Preliminary surveys are now being made with a view to extending the service to the tobacco, peanut and poultry industries.

While the number of reports has been extended since the inauguration of the service, every endeavour has also been made to improve the quality of the reports with the co-operation of officers of the Division of Plant Industry and by personal contact with honorary crop correspondents. The personnel of the body of correspondents has been kept constantly under review and the aim has been, guided by experience, to ensure that their geographical dispersal is such

as to give an adequate coverage of the particular crops. Farmers who act as correspondents are proving most co-operative and helpful in the scheme.

The number of honorary crop correspondents enrolled as at June 30, 1949, totalled 249, comprising 56 reporting on potatoes and 193 on one or more grains. During the year, this number was increased to 292 and now includes, in addition to 56 correspondents reporting on the potato crop, 36 correspondents reporting on peanut crops.

The various crop forecasting reports and the production trend reports are intended not only to give some indication of the ultimate harvest, but also to provide a complete geographical coverage on the progress being made through the various stages of cultivation, planting, crop development and finally, harvesting. This information assists farmers in their production programme, and gives early indications to the various institutions and firms upon whom various growers of that particular crop are dependent for supplies, machinery, finance, &c., and assists them in their organisation to meet any probable demands. The reports are also circulated to various Government departments, both State and Federal.

The interest shown in the crop forecasting reports is evidenced by the increased circulation which, compared with the year 1947-48 for each type of report, is as follows:—

	1947-48.	1949-50.
Potatoes	234 ..	346
Wheat	282 ..	419
Grain Sorghum ..	266 ..	407
Barley	196 ..	316

In addition to the crop forecasting reports the Division has continued to issue the "Monthly Report on Production Trends." Every endeavour is made to issue this report on the tenth of each month, and thereby provide information which is topical, consistent with accuracy. The report covers progress in production over the whole field of primary industry in the State during the previous month. The report itself has been enlarged during the year by the inclusion of additional sections dealing with cold storage and milk consumption in the metropolitan area, and by the presentation of some of the data in graphic form.

This report, as in the case of the crop forecasting reports, is designed to give up-to-date and informative data to the farming and also the business community supplying goods and services for their use. On the free monthly mailing list are both interstate and overseas addresses.

The extent to which the report is appreciated by the business and farming interests is evidenced by the fact that the number of addresses on the free mailing list, which totalled 250 at June 30, 1950, has doubled during the past twelve months.

Market Price Reporting.

This service, which aims at providing to all interested bodies up-to-the-minute accurate and representative wholesale prices and prevailing market conditions of a wide range of farm produce, was continued throughout the year.

The "Daily Official Market Quotations" contain details of wholesale prices realised in Brisbane for fruit, vegetables and farm produce and prevailing conditions of supply and demand in those markets. This information is disseminated daily by radio and the press and in addition some 110 copies of the quotations are despatched daily to interested parties in all parts of Queensland and to New South Wales, Victoria and the Australian Capital Territory.

As an example of the dependence placed on the quotations it is mentioned that the increase in circulation from 62 to 110 copies, during the last twelve months, was largely the result of requests from consumers. Growers, wholesalers and other interested bodies, such as hospitals and government departments, have long realised the utility of this service.

A special report for other States in respect of fruit and vegetables sold on the Brisbane market is furnished each day to the Australian Broadcasting Commission for inclusion in its daily broadcast of interstate market reports. The knowledge of ruling prices in the various principal markets of the eastern States is of importance to growers as a guide to the most profitable market for their produce; further, with an expanding preferential demand from the south for air transported as against rail transported supplies of certain commodities, growers are able to gauge the advisability of air freighting. The knowledge of this up-to-the-minute information of prices in markets upwards of 3,000 miles distant, if availed of by farmers and used judiciously, can be of valuable assistance to orderly marketing.

The Weekly Market Report prepared each Friday summarises the week's trading in the Brisbane Wholesale Fruit, Vegetable and Farm Produce Markets and also includes ruling wholesale prices for wheat, flour, bran, pollard, butter, cheese, bacon, ham, lard, honey, beeswax, and eggs. The present mailing list of persons who receive regular copies of this Report totals 63, as compared with 47 in June, 1949.

Complete and detailed records of daily wholesale prices of fruit, vegetables and farm produce are kept by the Division. From these records weekly, monthly and yearly average wholesale prices are calculated. This information, it is anticipated, will be subjected to analysis and will provide valuable statistical data. The work, however, has been held in abeyance up to the present owing to the pressure of other duties on existing staff.

Primary Producers' Co-operative Associations.

During the year two new Associations were registered under the *Primary Producers' Co-operative Associations Acts.*

The South Queensland Tobacco Growers' Co-operative Association Limited was formed by tobacco growers in south-western Queensland, no doubt stimulated by the successful results of co-operation on the part of their fellow growers in the Mareeba-Dimbulah area of North Queensland. The association, as the agent of The Tobacco Leaf Marketing Board, has opened a selling floor in Brisbane, and successfully conducted the first of the 1950 Brisbane tobacco leaf sales on behalf of the Board. It is the intention of the association eventually to engage in the manufacture of tobacco.

Peanut growers in North Queensland have formed the Northern Peanut Growers Manufacturing Co-operative Association Limited with the object of processing peanuts and manufacturing peanut by-products.

The continued progress being made by co-operation among the farming community is demonstrated by the fact that since 1940 membership of primary producers' co-operative associations has increased by more than 17,000, total annual income by more than £5,000,000, and assets by more than £3,500,000.

The Marketing Division has continued the policy of active association with the co-operative movement. During the year the Registrar, Mr. A. J. Everist, on the invitation of the Co-operative Union of Queensland, delivered a report on the progress of primary producer co-operation in Queensland at the Annual Co-operative Congress.

Standards Branch.

Mr. F. B. Coleman, Standards Officer.

During the year under review, 369 sellers of agricultural requirements were visited, as against 321 in the previous year.

Inspections were carried out covering the following territory:—Brisbane, South Coast, Fassifern Valley, Lockyer Valley, Darling Downs to New South Wales border, North Coast-Gympie, Mary Valley Line, South Burnett, Maryborough, Bundaberg, Mackay, Bowen, Home Hill, Ayr.

During the period under review, the inspectorial staff was augmented by the promotion of a branch officer. The use of motor transport during the last six months of the period has made it possible for inspectors to intensify country inspection work and to visit a large number of premises off railway lines that had not previously been contacted, and has enabled a much quicker approach by return visits in order to check up on deficiencies. The full effect of this will not be seen until the motor vehicle has been in use for at least twelve months.

At the Royal National Show, Brisbane, the Branch exhibited a working model of a lime quarry and kiln with appropriate cards indicating the quality of different types of lime for agricultural uses.

Seed Examination.

Table 1 sets out details of seed samples examined at the Brisbane Seed Testing Station.

TABLE 1.

Summary of Seed Examinations.

—	1947–48.	1948–49.	1949–50.
Samples received from—			
Inspectors of Branch ..	1,529	4,398	3,769
Dealers	3,258	2,227	2,532
Buyers	62	23	64
Government Departments	988	616	961
Experimental Test Samples	2,765	2,840	1,188
	8,602	10,104	8,514
Inspectors' samples failed to comply—			
(i.) Farm Seeds			
(*a*) Low Germination	18	24	46
(*b*) Purity	26	15	160
(ii.) Vegetable Seeds ..	118	279	328
(iii.) Made-up Packets ..	608	323	624
Germination Tests carried out	8,602	10,104	11,016

The disparity between the number of samples taken in the past two years is due in part to the absence on extended leave of three officers, and in part to the need to undertake the examination of many peanut samples.

Actually over two-thirds of these samples were taken after January 1, when motor transport became available to the branch.

The number of samples received from seed sellers was maintained. Sixty-four samples were received from buyers, compared with 23 last year. Considering that this is a free service to growers, it is not availed of sufficiently, and one could assume that buyers of seed for their own sowing are quite satisfied with the quality available. However, officers of the branch are far from pleased with much of the seed now being sold and a close scrutiny of seed quality will be maintained.

Farm Seeds.

Inspectors in the course of their duties obtained 1,336 samples of farm seeds. Of these 3.9 per cent. failed to germinate up to the prescribed standard, the principal failure being Rhodes grass, only one-third of which reached the minimum germination of 30 per cent. Unfortunately, due to various causes, the quality of Rhodes grass seed has fallen off of late, with little, if any, signs of improvement. This is to be deplored, as there is a considerable demand overseas at a price that would give very satisfactory returns.

Twelve per cent. of the Rhodes grass samples contained too much foreign material, such as prohibited weeds, weed seeds, or inert matter; 51.9 per cent. of the barley samples failed because of excessive amounts of prohibited seeds and insects; 55.5 per cent. of paspalum samples contained too much ergot, which is difficult to remove by machinery; 16.5 per cent. of the oat samples contained excessive amounts of prohibited seeds; and 30.6 per cent. of the Sudan grass samples contained inert matter and weed seeds in excessive quantities, six containing the prohibited seeds of Johnson grass, a most objectionable weed.

Four hundred and forty-nine samples of lucerne seed were examined, each representing one bag; 4.5 per cent. contained excessive amounts of inert matter and weed seeds.

Vegetable Seeds.

Of 1,969 samples of vegetable seeds being offered for sale taken by inspectors, 8.2 per cent. of the bean samples failed to germinate up to the required standard. This represented a total of 4,678 lb. (over two tons) which had to be destroyed, making a loss to sellers of over £400 for this line alone.

One-quarter of the cabbage seed, 19.5 per cent. of carrot, 40.8 per cent. of lettuce, 44.4 per cent. of marrow, 21.8 per cent. of melon, 17.4 per cent. of pumpkin, and 14.9 per cent. of tomato seeds sampled had to be condemned because of loss of germination.

In all 7,820 lb. of vegetable seeds, against 3,659 lb. last year, had to be destroyed.

Table 2 sets out details and comparisons with two previous years' work relative to action taken with seeds found not to comply with the Acts' requirements.

The high humidity resulting from the abnormal rains can be held partly responsible for the loss of germination in many seeds. This explanation is not applicable to the poor quality of some of the French beans being offered for sale which originated from southern States.

TABLE 2.

ACTION TAKEN ON UNSATISFACTORY SEEDS.

—	1947–48.	1948–49.	1949–50.
Cleaned under Supervision of an Inspector—			
Farm Seeds	345 bags	10 bags	1,931 bags
Destroyed—			
(i.) Farm Seeds	36 bags	302 bags	113 bags
(ii.) Vegetable Seeds	2,468 lb.	3,659 lb.	7,820 lb.
(iii.) Made up Packets	619 packets	321 packets	624 packets
Processed for Stock Food, &c.—			
(i.) Farm Seeds	225 bags	268 bags	844 bags
(ii.) Vegetable Seeds	..	750 lb.	3,630 lb.

The principal prohibited seeds found in samples taken by inspectors and the number of times they occurred were—

Carthamus lanatus (Saffron thistle)	17
Datura spp. (thorn apples)	44
Ipomoea spp. (Morning glory, Bell vine)	62
Salvia reflexa (mint weed)	117
Sorghum halepense (Johnson grass)	6

Restricted seeds (i.e., those which are permitted only up to a certain maximum) found in inspectors' samples were—

Argemone mexicana (Mexican poppy)	22
Polygonum spp. (Wireweed) ..	188

Greater care is needed by all concerned if these objectionable seeds are to be eliminated from seeds being sold for sowing.

Cleaning Machinery.

There are in Queensland some efficiently operated seed cleaning plants, but there are, unfortunately, quite a number of people who consider that the mere possession of cleaning machinery is all that is required to produce seed free from impurities. The efficiency of any cleaning machinery is governed by its intelligent operation and this involves attention to cleaning, changing the sieves, and keeping them in good repair and adjustment, otherwise the machine cannot be expected to operate at its maximum efficiency. Seldom do two samples of the same kind of seed require the same treatment, and only by experience and careful adjustment to all portions of the machine can success be achieved. More attention will be paid by the branch to this matter in the future.

Seed Certification.

During the year additional crops brought within the seed certification scheme were—

Hybrid maize—Q462, Q467, Q658, Q724, Q440, Q789, Q793.

Sweet sorghum—Honey, Atlas, Italian, Saccaline.

Table 3 sets out the amount of certified seed which has been produced since the scheme came into operation in 1946-47.

TABLE 3.

PRODUCTION OF CERTIFIED SEEDS.

Year.	Hybrid Maize.	Sorghum.			French Beans.	Tomatoes.
		Grain.	Sweet.	Roma Sudan.		
	Bush.	Bush.	Bush.	Bush.	Bush.	Lb.
1947–48	..	600	..	..	..	..
1948–49	306¼	523	..	..	2	218¾
1949–50	1,314	5,416	..	516	201	128¼

Seven growers satisfactorily completed a probationary period to grow hybrid maize, three did not plant, four failed to complete the period, and one had his plot destroyed by flood.

Two acres planted to hybrid maize for seed certification purposes were not harvested. In addition, an area of six acres was cancelled due to maize being planted within the isolation limits required, and 4½ acres were rejected

owing to a nearby field of open pollinated maize tasselling while some receptive silks were still present on the ear parent plants of the crossing plot.

It has been found necessary, in the production of certified tomato seed, in order to safeguard against eventualities, for each grower to plant two separate seed-beds at an interval of approximately three weeks, the seedlings to be transplanted to two separate areas of one acre each. When the crops approach maturity one area of each variety is selected for seed production, whilst the other is picked for the fresh fruit market. Even with this safeguard no Q4 seed was produced owing to one area being destroyed by hail and the other rejected for seed certification purposes due to the high incidence of bacterial spot in the growing crop.

Wet weather at the time of harvest caused the rejection of 1,182 bushels of Roma Sudan grass seed, the germination percentage being well below the minimum prescribed by the *Seeds Acts*.

Eight acres of Sugardrip sweet sorghum were destroyed by frost.

Ten acres of Kalo and 35 acres of Wheatland grain sorghum were rejected because in the case of Kalo off-type plants were not rogued prior to pollen shedding, and excessive weed growth was present in the growing crop of Wheatland. Owing to the inability of one grower to obtain suitable seed, eight acres registered for the production of Early Kalo were not planted. In addition, Wheatland and Roma Sudan Grass were not planted on 50 and 60 acres respectively. Eighty acres of Roma Sudan grass were abandoned for certification purposes as continuous rain at harvesting time caused the crop to lodge.

The area planted to Brown Beauty beans was increased sevenfold over that of last year. However, fourteen acres were rejected for seed certification purposes due to the presence of bacterial blight in the growing crops, and heavy weed growth in another plot of half an acre caused the crop to be rejected as a second pathological inspection was impossible.

One acre of land was registered for the production of certified papaw seed. However, to date harvesting has not commenced.

During the year three meetings of the Seed Certification Committee and nineteen meetings of its sub-committees were held.

During March of this year, a conference at which all States were represented was held at Melbourne under the Chairmanship of Dr. Dickson, C.S.I.R.O., when a basis for uniformity of seed certification schemes was laid down.

It is pleasing to record that the Queensland schemes for the certification of seeds are in accordance with the uniform basis.

The conference recommended that the seed certification programme be reviewed in about three years time, when the results achieved during that period can be seen and consideration given to any new problems which have arisen.

Registration.

During the year, 866 preparations were registered under the Fertilisers, Stock Foods, Veterinary Medicines and Pest Destroyers Acts, and 678 licenses were issued to dealers in fertilizers and veterinary medicines. The Pest Destroyers and Veterinary Medicines Boards held 35 meetings to consider claims made regarding the efficacy of 342 preparations which dealers were desirous of placing on the Queensland markets. Sixteen preparations were refused registration.

Inspectors submitted 244 samples, this being an increase of 93 over the previous year; 130 of these samples were analysed by the Agricultural Chemist and 70 were examined by officers of the Standards Branch. Where deficiencies occurred, suitable corrective action was taken with the firms concerned.

The number of samples submitted by buyers —eleven—is comparable with the number submitted in previous years and would seem to indicate that buyers generally are satisfied with the quality of the article they obtain. Details are given in Table 4.

TABLE 4.

SUMMARY OF ACTION IN REGISTRATION SECTION.

—	*Pest Destroyers Act.*	*Veterinary Medicines Acts.*	*Fertilisers Act.*	*Stock Foods Acts.*	Total.
Samples received from—					
Inspectors	1	..	89	154	244
Buyers	..	..	3	8	11
Samples analysed by Agricultural Chemist ..	..	1	75	54	130
Samples examined by Standards Branch ..	..	..	..	70	70
Licences issued	..	411	267	..	678
Registrations effected	255	71	254	286	866
Registrations refused	2	14	..	..	16
Destroyed—packages	151	106	..	..	257
Reconditioned—packages	29	423	73	90	615

Six fertilizer mixing plants are now in operation in the State, one at Stanthorpe, three in Brisbane, and one each at Mackay, Townsville and Cairns. The superphosphate plant in Brisbane is now meeting full requirements. The wisdom of the establishment of superphosphate manufacturing in the State is exemplified by the difficulties experienced in obtaining transport from New South Wales, which has at times seriously interfered with the supplies of sulphate of ammonia from southern factories.

Supplies of sulphate of ammonia were available during the year to the extent of 41,364 tons, but this unfortunately was some 10,000 tons short of requirements. The outlook for the ensuing year is brighter.

Supplies of other fertilizers were equal to the demand.

Fertilizer prices for various years are given in Table 5.

TABLE 5.
FERTILIZER PRICES.

Name.	1938.	1940.	1943.	1947.	1949.	1950.
	1st February.	March.	1st January.	January.	November.	1st July.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Nitrate of Soda 16% Nitrogen ..	13 0 0	16 17 6	18 10 0*c*	18 10 0*c*	*d*	*d*
Sulphate of Ammonia 21% Nitrogen	12 0 0*a*	14 15 6*b*	18 10 0*b*	18 17 6*b*	22 17 6*b*	26 17 6*b*
Superphosphate—						
22% P_2O_5	5 6 6	5 18 6	7 19 6	7 4 0*c*	7 10 0*c*	9 15 0*c*
18% P_2O_5	..	..	..	6 19 6	..	..
Blood	10 15 0	11 0 0	11 0 0	..	..	..
Blood and Bone 5 : 15 : 0 ..	7 10 0	7 15 0	7 15 0	7 15 0	8 10 0	8 10 0
Bone 3½ : 23 : 0	7 10 0	7 10 0	7 10 0	7 10 0	..	..
Sulphate of Potash 48% K_2O ..	15 10 0	17 7 6	21 10 0	..	..	..
Muriate of Potash—						
50% K_2O	13 10 0	19 7 6	25 15 0	..	..	..
60% K_2O	..	..	30 18 0 (Aug. 1943)	30 18 0	30 18 0	34 8 0

a Discount if paid within 30 days, 2½ per cent. *b* Less 7s. 6d. for cash. *c* Less 5s. for cash. *d* Supplies not available.

The maximum price of mixed fertilizers is ascertained by taking the unit values as set out in the Prices Commissioner's Schedule and making a calculation where necessary, taking into consideration the degree of fineness, mixing charge, and any other allowances that may be provided for.

The rise in the price of superphosphate is due to removal of the subsidy of £2 5s. per ton.

Imports and Exports.

Details of the goods examined at the port of Brisbane for the purpose of the Quarantine Act and/or Commerce (Trade Description) Act and/or to comply with contracts where the terms of sale specify that a Government Certificate is required as to the specific quality are set out in Table 6.

TABLE 6.
IMPORTS AND EXPORTS EXAMINED.

Kind of Seed or Grain.	1948–49.	1949–50.
Imports—		
Miscellaneous Vegetables ..	3,226 lb.	2,200 lb.
Beans	..	4 bags
Garden Peas ..	896 bags	73 bags
Farm Seeds ..	12 bags	463 bags
Parcel Post ..	104 parcels	92 parcels
Exports—		
Seeds	1,433 bags	1,263 bags
Grain—		
Cereals ..	34,693 bags	90,065 bags
Millets ..	77,214 bags	30,325 bags
Canary ..	274 bags	1,572 bags
Sunflower ..	150 bags	242 bags
Bird Seed Mixture ..	10 cases	10 cases
Parcel Post ..	104 parcels	38 parcels

CLERICAL AND GENERAL DIVISION.

Report of the Assistant Under Secretary (Administrative) Mr. W. T. Gettons.

The Clerical and General Division is that section of the Department which provides the clerks, clerk-typists, accountants, transport officers, information service officers, and miscellaneous workers, necessary to a Department with a staff of nearly 1,000 (including temporary officers) and with offices throughout the State.

The Division also takes a part in activities not especially allotted to the production and marketing divisions, such as matters arising under the *Farm Produce Agents Acts* and the consideration and payment of claims for allowances under *The Re-establishment and Employment Act*, 1945, to discharged members of the Forces engaged in agricultural occupations.

Although the number of clerical workers joining the Department is still inadequate, some increase in numbers may be expected following the recent increase in salary rates, the classification of a number of positions previously unclassified, and the reviewing and raising of classifications attached to other positions.

Approximately 60 per cent. of the permanently employed male clerks in the Department hold classified positions. The majority of those not classified are young officers who have been in the Public Service a comparatively short time.

The Farm Produce Agents Acts, 1917-1932.

Under these Acts supervision is exercised over farm produce agents in their dealings with principals.

During the year the books and records of many agents were checked to verify that compliance was being made with the Acts and that consignments were being accounted for correctly. Complaints by growers were investigated and the growers were advised of the result of the enquiries. Inspections revealed that agents were complying with the Acts. Minor irregularities in the keeping of books in some cases were noticed and were rectified, while advice leading to the more effective keeping of records was tendered.

There are 156 licensed farm produce agents in Queensland and of these 89 are in the Brisbane area.

Re-establishment Allowances.

Since the Department took over in 1946 the administration of that portion of the Commonwealth *Re-establishment and Employment Act*, 1945, relating to the payment of allowances to discharged members of the Forces engaged in agricultural occupations within the State of Queensland, 2,286 ex-servicemen have received assistance. The recipients were engaged in the following branches of industry:—

	No. of Applicants Engaged.
Wheat growing	64
Cattle grazing	57
Sheep grazing	45
Dairying	351
Pig raising	20
Mixed farming	503
Market gardening	389
Orcharding	51
Banana growing	143
Viticulture	5
Poultry raising	131
Apiculture	7
Nurseries	9
Pineapple growing	138
Sugar-cane farming	246
Tobacco growing	25
Cotton growing	6
Peanut growing	16
Miscellaneous	80

The allowance is a Commonwealth grant made to eligible ex-servicemen to ensure that they receive an adequate living allowance during the first twelve months of their recommencing in an agricultural occupation after discharge from the Forces.

An amendment to the time factor affecting the period within which an application for this allowance must be made was gazetted on 25th March, 1950; and it is now necessary that applications be made within five years of any of the following rates, whichever is the latest—

1.—

(*a*) The cessation of hostilities;

(*b*) The date on which the applicant ceased to be engaged on war service, provided such date was not later than 30th June, 1949;

(*c*) The termination or completion of any training which the applicant received under Part III. of the *Re-establishment and Employment Act*, 1945; or

2. Where the applicant is a widow, within five years of the latest of any of the undermentioned dates—

(*a*) The cessation of hostilities;

(*b*) The date on which the applicant's husband ceased to be engaged on war service, provided such date was not later than 30th June, 1949;

(*c*) The termination or completion of any training which the applicant's husband received under Part III. of *The Re-establishment and Employment Act*, 1945.

The Department has been advised by the prescribed authority that in dealing with the applications under this Act, 2nd September, 1945, is to be regarded as the date of cessation of hostilities. Those persons who were discharged on or before that date will cease to be eligible to apply for agricultural re-establishment loans as from 2nd September, 1950. Ex-servicemen who were discharged after 2nd September, 1945, will, of course, be able to apply at any time up to five years from their date of discharge from the Forces, provided such date of discharge was not later than 30th June, 1949. If they received rural training under Part III. of the Act, the maximum period of five years for lodgment of applications will commence to run from completion of such training.

Those persons who enlisted before 30th June, 1947, and who were still in the Forces at 30th June, 1949, other than on a career basis, are deemed to be discharged at 30th June, 1949, for the purpose of calculating the five-year period from the date of discharge, within which application must be made.

Information Services.

The Information Branch has now been functioning for two years as an integral part of the Department's advisory services, and a close liaison with the numerous "production" branches of the Department has been achieved. Several media are employed by the Information Section in supplementing personal contact by field officers, field days, correspondence, and other general advisory activities of the various branches. These media include the "Queensland Agricultural Journal," the metropolitan and country newspapers, radio, and visual aids.

The circulation of the Department's monthly journal—the "Queensland Agricultural Journal"—has increased to 14,000 copies per month from a maximum of 12,000 copies during the previous year. There are some 50,000 farmers and graziers in the State, and consequently there is room for considerable expansion in the distribution of the journal. As it is to the advantage of the State to place the journal in all farm homes, steps are being taken to acquaint more producers of the existence of the journal and the advantages of receiving it regularly.

During the year, advisory matter on soil conservation has been featured in the journal with the object of informing readers of the need for conservation measures and the means of providing them. Considerable space was devoted also to the newer types of weedkillers and their use on farm and station for the control of noxious weeds. A series of articles on the main agricultural and horticultural districts of the State was continued with the twofold purpose of acquainting local readers with features of districts other than their own and of providing in reprint form brochures for the information of people contemplating settling on the land in Queensland. Items of interest to farm women are also included.

Photographs and drawings are being used to an increasing extent to illustrate methods, practices, etc., and to increase the readability of the articles.

The journal has also been used to publicise various services—such as seed testing, soil analysis, supply of legume seed inoculum, etc. —provided by the Department, and has carried lists of tuberculosis-free cattle herds and of production records of purebred dairy cows for the information of prospective livestock buyers.

Many manufacturers and distributors of farm requirements use the advertising section of the journal. When materials such as pest destroyers, stock foods, fertilizers and veterinary medicines are the subject of advertising matter submitted for publication, steps are taken to ensure that the matter conforms to the requirements of the regulations under the appropriate State Acts. All other advertising matter is also scrutinised closely in order to prevent anything being published in the journal which might be misleading to primary producers.

The journal is used by branches of the Department as a source of reprints for distribution as advisory leaflets and pamphlets. The journal issues of 1949-50 yielded reprints of 73 articles totalling nearly 100,000 copies for distribution by fifteen branches.

The issue of a weekly Press bulletin of topical items of use to the man on the land was instituted in July, 1949, and throughout the year has been used to a gratifying extent by newspapers, trade journals, and rural broadcasters. Each week the bulletin carries three or four items of a length convenient for newspapers and their readers. Information on departmental activities is supplied from day to day to the metropolitan newspapers and country news services, and in addition a good deal of special information is supplied to newspapers at their request.

Scientific papers recording the results of research work conducted by officers of the Department were published as usual in the Department's quarterly "Queensland Journal of Agricultural Science." Articles published in this journal during the year comprised contributions from the Horticulture, Science, Chemical Laboratory and Bureau of Sugar Experiment Stations branches of the Division of Plant Industry, the Animal Health Stations branch of the Division of Animal Industry, and the Dairy Research branch of the Division of Dairying. They dealt with potato tuber moth control, mulga management, cheese mite control, soil surveys, cane breeding technique, cane grub control, and other investigational activities of the Department on which progress or final reports could be made.

Further progress has been made in the preparation and printing of new editions of the four volumes of the "Queensland Agricultural and Pastoral Handbook" issued some years ago. Though publication of the most advanced volume—that dealing with pests and diseases of plants—was not effected during the year as anticipated, the volume is now in its final stages and should soon be available to farmers, teachers, students and others desirous of purchasing it.

Several branches of the Department collaborated in providing material for the Queensland section of the State edition of "Dairy Farming in Australia," a comprehensive hand-

book on dairy farming being published by the Commonwealth Government for free distribution to dairy farmers.

The value of broadcasting as a means of conveying information and advice to primary producers is now well established. The Department again co-operated with the Australian Broadcasting Commission in supplying speakers and material for various national and State programmes. Approximately 60 talks were given during the year, most of them on Tuesday's Country Hour Session. Field officers report that these agricultural sessions are very popular with farmers, and that regular talks by specialist officers do much good. Though the talks emanate from Brisbane, many country officers are included in the broadcasting roster.

Coloured film slides—mounted 35 mm. transparencies—have become very popular in the United States and Canada in recent years, as they have advantages over black-and-white slides and film strips. The Information Branch has collaborated with various branches of the Division of Plant Industry in producing four series of coloured film slides on weeds, pastures, poisonous plants, and pests and diseases of plants. These were shown during the year at the Brisbane, Kingaroy and Wondai Shows, where they were well received. Natural colour reproduction makes this type of slide particularly useful for showing farmers weeds and poisonous plants.

The Photography Section completed much the same volume of work as in the previous year. Visits were made to a number of districts for the purpose of photographing aspects of Departmental field work and for securing matter suitable for illustrating advisory literature. Printing, developing and enlarging work was carried out for many branches as well as for other Departments, and lantern slides and film strips were prepared for lecture purposes.

There was no opportunity during the year of making any moving pictures of agricultural interest. However, in addition to screenings by the mobile film unit operated by the Division of Dairying, films were shown to a number of groups.

The Australian National Film Board has in recent years supplied a number of modern films on agricultural subjects to the State Film Centre, and greater use is being made of these films in acquainting urban people with the primary industries and showing country people facets of primary production with which they may not be familiar.

Expansion of the Department's technical staff and a greater degree of decentralisation have resulted in heavier demands on the services of the Central Library. It has been difficult for the depleted staff to meet these demands and at the same time cope with the rapidly increasing volume of library accessions. Reorganisation of the library's holdings, begun last year, is consequently proceeding slowly. The library benefited during the year by a large number of new exchanges effected with overseas institutions, and many purchases were made to keep the library up to date.

The volume of world scientific literature in agriculture and cognate fields is now so great that it is impossible for the research worker to read all that is printed on his particular subject in even his own language. Ways and means of keeping scientists informed of developments in their particular spheres—for example, by issuing abstract journals without delay—are being investigated by various international organisations. The Department has promised its co-operation as both publisher and purchaser of scientific journals.

Transport.

The Department has a total fleet of 180 motor vehicles. Under ordinary circumstances it might be considered that the Departmental transport position was quite satisfactory. However, because of several factors this is not yet so and further purchases are imperative before the lag caused by inability to purchase new vehicles during the war and for several years thereafter is overtaken.

Some of the official vehicles being used by officers are up to sixteen years old and have covered big mileages on country roads. As a consequence they have reached a stage where it is not possible to maintain them economically in roadworthy condition. Furthermore, as many of them are American models, they are often out of service for unduly long periods because of the scarcity of replacement parts.

Formerly many officers stationed in country districts used private motor vehicles for the performance of official duties and were paid a mileage allowance therefor. However, a number of officers have found that as their vehicles have become worn out they have not been able to replace them because of financial reasons and it has therefore become necessary for the Department to provide these officers with official conveyances to enable them to perform their duties satisfactorily.

New appointments in the several Divisions of the Department have also imposed a strain on transport resources. Whereas previously a proportion of the new appointees would have been able to provide private transport for official use the majority are not able to do so now because of the high cost of new cars.

By Authority: A. H. Tucker, Government Printer, Brisbane.