QUEENSLAND

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ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE AND STOCK

FOR

THE YEAR 1947-48

1948.

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PRESENTED TO PARLIAMENT BY COMMAND.

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ORGANISATION OF THE DEPARTMENT.

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.A.C.I.
Assistant Under Secretary (Technical) .. .. R. Veitch, B.Sc.Agr., B.Sc.For., F.R.E.S.
Assistant Under Secretary (Administration) .. W. T. Gettons, A.I.C.A.

DIVISION OF PLANT INDUSTRY—

Director of the Division .. .. W. A. T. Summerville, D.Sc.

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, 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.

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DIVISION OF ANIMAL INDUSTRY—

Director of the Division .. .. W. Webster, B.V.Sc.

Veterinary Services and Acts Administration—

Chief Inspector of Stock .. .. J. C. J. Maunder, B.V.Sc.

Animal Health Stations—

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Sheep and Wool Branch—

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Officer in Charge .. .. F. Bostock.

Poultry Branch—

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

Cattle Husbandry Branch—

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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.

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.

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TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

DEAR SIR,—I have the honour to submit herewith the Annual Report of the Department of Agriculture and Stock for the year ended 30th June, 1948.

It is very desirable, and indeed essential for rational progress, that an organisation's development and progress be periodically reviewed and assessed. For several reasons the present appeared an opportune time for such a survey, and the operations of the Department over the past decade have been scrutinised and stock taken of what has been achieved, what portion of the work has been unproductive, and what problems of the primary industries merit the Department's increased attention. Accordingly, the usual brief summary of the activities during the past year is prefaced by an outline of the highlights of the last ten years, which will indicate to some extent not only departmental achievement during that period but also deficiencies in particular services which are now in process of being remedied.

Following the summary of activities during 1947-48 will be found the reports of the Directors of the various Divisions of the Department. These reports summarise seasonal conditions, crop and livestock production, and the work of the component branches of the Divisions during the past year; they are supplemented by more detailed records of Branch activities.

Yours faithfully,

Under Secretary.

HIGHLIGHTS OF THE PAST DECADE.

Special War Activities.

The past ten years included, of course, almost six years of war. Apart from attention to technical problems associated with the field culture of crops, the raising of livestock, the production and treatment of dairy produce, and the development of new rural industries, the Department provided many special facilities essential to the war effort.

Among these were the machinery of rationing of fertilizers and stock foods; the provision of a Central Executive and the organisation and direction of 40 District War Agricultural Committees for which the field staff acted as executive officers; the apportionment and part-control of members of the Australian Women's Land Army; and the allocation of certain types of farming equipment and supplies.

Rationing of fertilizers and stock foods during the war and to some extent since the cessation of hostilities was a tremendous task, and at times as many as 60 officers were involved in this work. From 1942 to 1946 the applications of some 10,000 growers each year received individual consideration and an aggregate of nearly a quarter of a million tons of fertilizer was rationed.

Stock food rationing lasted for 17 months, during which period a quarter of a million permits were issued to 130,000 applicants for 55,000 tons of food.

From 1943 onwards District War Agricultural Committees investigated 16,000 applications for releases of personnel from the Services for rural work. The committees also acted as recommending authorities for the placement of 1,197 prisoners of war on farms and pastoral holdings, organised transport and equipped the permanent or seasonal camps for members of the Australian Women's Land Army, and arranged the individual billeting of an additional 150 Australian Women's Land Army women.

Because of heavy Service demands and restricted output, many essential materials were in short supply during the war. To ensure equitable distribution District War Agricultural Committees, through the departmental officers, became recommending authorities for the distribution of a wide range of agricultural requirements, including wire of all types, galvanised iron, electrical equipment, irrigation piping, tyres, vehicles, liquid fuel, and so on. It is estimated that from 1943 to 1946 more than 180,000 applications for materials were dealt with. Machinery control was also administered by the Department, and in two years nearly 25,000 applications for tractors, engines, windmills, shearing equipment, irrigation plants, headers, &c., were dealt with, and nearly 12,000 releases made.

Most of these thousands of applications required individual investigation by field officers, while their collation and direction to the proper authorities made a heavy call upon the services of the Head Office staff. It should also be remembered that during this period one-third of the staff were absent on duty with the armed forces or other branches of national service.

In both military and civil spheres the staff of the Department of Agriculture and Stock responded worthily to the exigent calls of war.

Towards the end of the war the Department was basically reorganised, so that with the return to normal conditions it could function more efficiently as a service organisation for the primary industries. Results achieved within the past three years have fully justified this re-orientation of the methods of approach and attack in relation to problems of crop and live-stock production, marketing, and distribution.

Increasing Crop Yields.

The work of the Division of Plant Industry consists very largely of the development of better crop and pasture plants, the elaboration of better methods of crop and pasture production, and the dissemination of knowledge among the farming community. The degree of success attending these efforts is difficult to measure in terms of pounds, shillings, and pence, but it may to a large extent be gauged by the progress of the crop industries to which the Department has devoted special technical effort.

In the case of almost every crop it may be said that yields have been increased as a result of recommended use of fertilizers, pest and disease control, or the planting of superior varieties of crop plants bred or introduced by the Department.

As examples may be cited cane sugar production, in which, until the serious disabilities of wartime shortages of essential materials were experienced, remarkable advances in efficiency had been made (unit yields were increased by nearly 50 per cent. in a decade); grain sorghum culture, which has moved ahead following the introduction of dwarf varieties by the Department, and which in 1947 cropped more than 3,000,000 bushels; peanut production, which has rapidly advanced from a minor crop to one worth more than £1,000,000 to the State; and wheat production, which owes so much to departmental efforts in the field of plant breeding, as indicated later, and also to the assistance given to the Wheat Board in a comprehensive scheme of seed selection.

With respect to fruit crops, it might be mentioned that 15 years ago it was estimated that not more than 60 per cent. of the citrus trees in the State were of first grade, whereas to-day at least 95 per cent. of commercial trees are of this standard. In the same period the pineapple crop has almost doubled for only a 40 per cent. increase in acreage; what is even more noteworthy is that discoveries by departmental investigators saved the industry from near-extinction. "Pedigree" stocks of pineapple plants have now been established at the Maroochy Station, and it is expected that in a few years all commercial plantings will be of pedigreed stock, thus making for a more uniform and reliable product.

Yield of bananas per acre has been maintained, despite the incidence of bunchy top disease and a marked fall in the quality of the land now used for this crop; the location last year alone of 10,000 diseased plants, followed by their destruction, represented a substantial contribution by the Department's technical services to the stability of the industry.

These instances illustrate only a few of the many improvements in crop production which have been made very largely as a result of the work of technical officers of the Department. The steps taken by the Department in recent years to start new agricultural ventures off on a firm footing should be of considerable value to future growers of linseed, canning beans, soybeans, and other crops new to the State.

Breeding Better Crops.

Improvement in per-acre yields of most of the important farm and orchard crops may be attributed to a great extent to the activities of departmental plant breeders. Wheat varieties bred by the Department comprised 80 per cent. of the acreage which yielded last year's record crop of 10½ million bushels, and a very substantial contribution by these and earlier departmental varieties has been made to the Queensland crop for many years past. Local varieties constituted 42 per cent. of the tonnage of the 1947 sugar crop, and it is apparent that this proportion will increase greatly in the next few years when superior varieties emerging from test are extended to commercial plantings. It is estimated that 90 per cent. of the commercial peanuts produced in Queensland are from superior yielding selections made by the Department. Plant breeding and selection have played a big part, also, in the improvement of the Queensland maize crop. Grain sorghum varieties have been improved, not only as to yield, but in the matter of varieties more suited to the humid conditions of the coast. The whole of the State's cotton crop is planted from seed selected by departmental field officers.

Since 1934 the Department has supplied nurserymen with approximately 1¼ million buds of citrus and has disseminated superior planting material of other fruit crops, notably pineapples. Papaw plant improvement is close to the stage at which it can be translated to commercial growing, and the same applies to some other horticultural crops, such as the avocado.

The success attending the efforts of the plant breeders fully justifies an extended plant improvement service when suitable recruits become available. Maize, lucerne, legumes, and vegetables would all repay intensified attention.

Plant Protection Services.

Pest damage has always been a serious factor in Queensland agriculture, but striking improvements have been made within very recent years. Control measures have been determined for pests of citrus and deciduous fruits which would otherwise exact a heavy toll from orchardists. Some vegetable pests which a few years ago seriously limited production of certain vegetables have ceased to be important since the introduction of newer methods of control. Likewise, effective control measures are now available for some of the most important pests of field crops, such as sugar cane, tobacco, potatoes, and onions.

Departmental plant pathologists have been responsible for providing remedies for many diseases of field and orchard crops, in many cases without any guidance from practices adopted elsewhere. Pineapple wilt investigations led to the stabilisation of the pineapple industry on the near North Coast, and control measures are now available for water blister, another serious disease of pineapples. Considerable reduction in losses from squirter disease in bananas has been effected by the application of fungicidal treatment, in the elaboration of which departmental pathologists played an important part. The remarkably effective

organisation which has been set up for the control of sugar cane diseases has kept losses to very small proportions, in spite of the presence in Australia of almost every important disease of sugar cane.

Forestry, too, has benefited from the activities of scientists attached to the laboratories of the Department of Agriculture and Stock. Effective treatments for various pests and diseases of trees have assisted foresters in reforestation work, and on the milling side the industry has recently profited from the elaboration of a treatment of sawn timber against borer attack as well as in other directions.

The promotion of a number of members of the staff of the Science Branch to senior technical executive positions has unfortunately depleted the ranks of entomologists and pathologists, and recruitment to this section is now receiving consideration.

Pastures and Fodder Plants.

Grass is by far the most important crop in Queensland. It is the nutritional basis of the sheep, cattle, and dairy industries which together, normally, contribute some two-thirds of the income from primary production.

Rule-of-thumb methods of management of both native and sown pastures were inevitable in the early days of livestock production and dairying in Queensland, since practically nothing was known of the reaction of the various plants to grazing under local conditions. Inevitably, also, such methods of management were responsible for a good deal of pasture degeneration, especially when linked with drought conditions.

The introduction and testing of new pasture plants for the various grazing industries has long been an important activity. Within recent years the most notable development along these lines has been the testing of introduced grasses and legumes for use in the exploitation of new country for cattle-fattening purposes on the tropical North Coast. From work carried out at the South Johnstone station vigorous and nutritious pasture mixtures have been developed and are being successfully used by tropical coast graziers. An associated sub-station is now being developed at Utchee Creek, where problems of pasture and stock management will be studied. The installation of weighing scales will enable a full check on growth of bullocks fed on these pastures.

In the more southern coastal areas the utility of mechanical treatment such as drastic harrowing in the renovation of paspalum pastures was long ago demonstrated by departmental officers, and many farmers are employing this treatment, in some cases using ex-Army equipment, such as Bren-gun carriers, to haul renovating implements. However, fractious soil-types in some areas, and the distribution of the rainfall, are factors militating against effective renovation by the use of fertilizers and clovers, and these aspects of the problem are to be closely studied with the assistance of an advisory committee of industry and departmental representatives.

Suitable pastures for the fertile but dryish areas beyond the coast ranges present problems and large numbers of new varieties are now being tested at the new Regional Station at Warwick, and at Biloela. A great deal of work has been done with Rhodes grass at Biloela, and the value of a Rhodes grass-cotton rotation has been demonstrated.

The native pastures of the West provide an immense field for investigation, and the fact that pastoral industries are responsible for so much of our State income makes it imperative that increased attention be given in the future. Already the Department has collected much information on the major constituents of these pastures, their behaviour under various conditions, and methods for their improvement and conservation. This work, which was interrupted by the war, is about to be resumed and it is hoped to build up a small group of "western" specialists. In some parts of the West fodder trees are of considerable value as a supplement to grass and other herbage during dry periods. Here, again, a good deal of information was collected prior to interruption by the war, and this is now being increased, particularly in regard to regrowth, regeneration, methods of mechanical treatment, and so on.

Soil Conservation.

With examples of land deterioration through erosion confronting the traveller wherever he moves, there is no need to stress the importance of education and research in soil conservation. Departmental efforts to encourage landholders to adopt soil-conserving practices were initiated in the late 'thirties, but, owing to diversion of staff, were continued during the war years only in the South Burnett area, where several thousand acres of land have been terraced.

A Soil Conservation Section was established within the Division of Plant Industry in the latter part of 1947, and in the intervening period a number of farm demonstration projects have been set up with the threefold object of training staff, demonstrating the soundness of the recommended measures, and obtaining additional information. Six officers are receiving basic training, and it is proposed to allot them to districts for the planning of the conservation measures required on the farm of any farmer who is desirous of adopting such a programme.

The incidence of intense storm rainfalls characteristic of the Queensland summer create special problems in soil erosion which are not commonly met in the United States and the southern States of the Commonwealth. Consequently, it will be necessary to carry on a good deal of investigation work to ensure the development of the best practices for Queensland conditions.

Fodder Conservation.

One of the most disappointing lines of departmental endeavour during the past decade has been the effort to stimulate the conservation of fodder on farms. Even in the immediate pre-war years and in the early war years, during which farm labour was not particularly short, relatively few farmers could be induced to put away any appreciable amount of fodder for use in dry times. Various reasons were advanced for declining departmental assistance in the construction of silos, and even farmers with first-class storage facilities neglected to fill them.

The severe drought of 1946, which cost the livestock industries millions of pounds, and the high prices which have ruled for supplementary

feeds during the past couple of years, have stirred a fair amount of interest in fodder conservation, in the dairying districts particularly. This has been reflected in the increased demand for the loan of the Department's silo-building equipment, which now comprises moulds, special jacks, and motor-driven concrete mixers; a fairly constant call on the services of the Department's silo construction officer; and the formation of machinery pools in some districts.

If costs of production can be kept down to a reasonable figure, and labour requirements met, the case for fodder conservation is unanswerable. While the Department is not a constructing authority, it is prepared to do anything within the ambit of its approved operations to facilitate the provision of reserve foodstuffs on dairy farms and other livestock properties.

Cotton Stimulation.

In the cultivation of exotic plants for crop production purposes, agriculturists meet a certain proportion which are regarded as "touchy" —that is, they require a good deal of experimental work before it can be said that they are "safe" crops for the average farmer to grow. Cotton is one such crop, but for more than 20 years an experiment station and the services of a considerable field staff have been devoted to production problems. Following on extensive investigational work on varieties, cultural methods, irrigation practices, and pest control, the foundation has been laid for the development of an agronomically-sound cotton-growing industry in Queensland.

The Department has certainly played its part, and, given equitable price treatment in regard to competitive crops, the industry can achieve important status in Queensland. Improved varieties and a vast amount of technical knowledge are available should the industry be resuscitated by satisfactory price guarantees.

Mysteries of the "Minors."

Until comparatively recent years there was no very great appreciation of the fact that the so-called "minor" constituents of soils and waters are essential to the healthy development of plants and animals, nor that even a slight excess of one or other of these constituents in soil, plant, or water can lead to disorders of various kinds.

As the mystery surrounding various more or less obscure disorders of plants and animals in Queensland is being unravelled, it is becoming obvious that these minor or trace elements are playing an important part in plant and animal nutrition. On the one hand we have deficiencies of particular elements causing ill-health (such as zinc deficiency in deciduous fruit trees) and on the other hand excess of an element causing serious disorders (such as fluorosis in sheep).

The tracking down of minor-element deficiencies and excesses and the elaboration of ameliorative treatments has been proceeding in Queensland for a number of years, and departmental officers have had conspicuous success in connection with quite a number of ailments of animals, crops, fruits, and vegetables. It is a fortunate circumstance that, once the identity of the deficiency has been determined, the application of the small amounts necessary does not involve any great expenditure.

A "Free-nitrogen" Service.

The ability of leguminous plants, such as lucerne, clovers, cowpeas, and lupins, to attain maximum development depends to some extent on the presence in their roots of certain bacteria. These bacteria, when living in association with a particular legume, enable that legume to secure its requirements of nitrogen, an important plant food, from the air, thus relieving the farmer of the expense of using costly nitrogenous fertilizers for the legume crop and, to some extent, any immediately succeeding crop.

Many soils are lacking in the requisite bacteria, or at any rate in highly efficient forms of the bacteria, and to ensure maximum growth it is necessary to add them to the soil. This is effected by inoculating the crop seed at the time of sowing, the process consisting of sprinkling the seed with skim milk to which the bacteria have been added.

For some years past the Department has been sorting out the most effective strains of bacteria for the various legumes grown commercially, and good types are available to farmers for the inoculation of seed. In the past year alone over 1,000 bottles of inoculum were supplied to farmers for the treatment of lucerne and other field crops, and, in addition, hundreds of cultures are forwarded each year by the Bureau of Sugar Experiment Stations for the inoculation of green-manure crops in cane areas.

Fruit and Vegetable Transport.

The warm climate of Queensland has been responsible for a tremendous amount of spoilage of perishable fruit and vegetables, both in transport to market and during distribution to consumers. Some parts of the State have been deprived of some of the more perishable commodities altogether because of the impossibility of landing consignments in good condition with ordinary transport facilities.

Two years ago officers of the Horticulture Branch, in co-operation with the Committee of Direction of Fruit Marketing and the Railway Department, began to investigate the problem of providing adequate facilities for the carriage of perishable fruit and vegetables from the producing areas in the southern portion of the State to the far north and west in the warmer months of the year.

It has now been shown, as a result of tests on experimental consignments, that certain types of railway rolling stock can be converted to ice refrigerator wagons in which perishables can be successfully carried. A number of commercial consignments in such wagons have been made and there is no doubt that this method of transport will be widely used in the future.

Year-round availability of fresh fruit and vegetables is one of the essential amenities that will hold the population of the more remote areas of the State. Departmental efforts to overcome technical difficulties in the way of providing such commodities have universal approval.

Eradication of Tuberculosis in Dairy Cattle.

The importance of a tuberculosis-free milk supply in maintaining the health of the community is widely accepted.

The Queensland Parliament in 1944 passed an Act to provide for the compulsory testing of all herds supplying milk for human consumption. The provisions of the Act were first applied to the Brisbane area, and later extended to all milk-supplying herds on the South Coast; the ultimate objective is a State-wide scheme.

Very pleasing progress has been made in the elimination of tubercular cattle from dairy herds included in the testing scheme. Already herds representing 40,000 cattle have been tested and infection reduced from an initial average of 13 per cent. to an average of one per cent., and this initial figure will shortly be infinitesimal. About 7,000 reactors have been destroyed, with benefit not only to the health of the community but also to the average per-cow production of milk. Since the majority of pigs are raised on dairy farms the incidence of tuberculosis in pigs is also declining in these parts.

Special steps have recently been taken to accelerate the testing of herds in various parts of the State by attracting private veterinary practitioners to the State under contract, and very appreciable benefits in public health and in the economy of milk production are forecast.

Strain 19.

Some of the materials, such as pest destroyers and weedkillers, which have come on to the market in recent years have as their active ingredients substances with extremely long chemical names which the average user cannot even pronounce, let alone commit to memory. There is a tendency, then, for such materials to become known by initials and symbols, such as DDT. and 2, 4-D, which eventually become household terms throughout the farming districts. In the field of veterinary medicine, "Strain 19" is assuming this status in Queensland, largely as a result of an educational drive linked with field demonstrations. Strain 19 is a recently developed vaccine which is proving valuable in the prevention of brucellosis (a contagious disease often accompanied by abortion), which it is estimated affects at least 20,000 cows in Queensland, reducing production and in many cases causing sterility.

Within the last year departmental officers have inoculated 11,000 calves with Strain 19 and a progressive decrease in the incidence of the disease is confidently expected.

Confining the Buffalo Fly.

A few years ago grave fears were held that the cattle-worrying buffalo fly, which had entered Queensland through the Northern Territory, would quickly make its way from the northern areas of infestation to much of the southern cattle country, thereby causing considerable loss in both the beef cattle and dairying industries. This invasion did occur to some extent, but intensive experimental work demonstrated that DDT is an effective killer of the fly. Steps were then taken by the Department in charging strategically-placed cattle dips with this insecticide, the use of mobile sprays, and exercising strict control over cattle movements. Coincident with these measures the spread of the buffalo fly towards the dairy and beef herds of the Burnett, Brisbane Valley, and other fly-free southern districts, has been stopped, and the southern boundary of fly-infested country is gradually moving northwards again.

Cattle Tick Control.

The control and ultimate eradication of cattle ticks would eliminate one of the greatest headaches of the cattle industry. Despite the proclamation of cleansing areas and the adoption of precautions against the extension of the "ticky" areas, very slow progress in tick eradication was made with the then available tickicides.

A few years ago graziers' troubles were increased, and the tick control campaign seriously affected, when there developed strains of ticks resistant to the standard arsenical dip mixture. However, experimental work soon demonstrated the efficacy of DDT against all ticks and provided the opportunity for a vast reduction in tick infestation.

The Department grasped this opportunity by charging its own key dips and encouraging owners of private dips to follow suit. The widespread use of DDT as a tickicide would certainly reduce the tick problem to such an extent that the way to economic eradication would be prepared; at the same time it would assist in the control of buffalo fly.

Other promising chemicals are now the subject of investigation by the research section of the Division of Animal Industry; as yet the cost of these preparations is high, but in past experience, this may be expected to decline as use and production expand.

Combating the Blowfly.

Attack by the sheep blowfly still constitutes one of the biggest sources of loss to the wool industry, a conservative estimate being £500,000 each year. Once it was demonstrated that the Mules operation could afford up to 90 per cent. protection against crutch strike, and that its adoption could be defended on humanitarian as well as economic grounds, the recently expanded Sheep and Wool Branch inaugurated a series of demonstrations throughout the sheep areas, with the result that an estimated two million sheep have been treated as a direct consequence of departmental endeavours. These demonstrations and advocacy of the Mules operation are being energetically continued with the object of eliminating the blowfly as a continual major problem in sheep raising.

Saving Sheep in Drought.

Since it is physically and economically impracticable to shift all sheep from drought areas on to agistment country in dry times, graziers are continually faced with the question of whether hand-feeding of sheep in drought-stricken areas can be undertaken with a reasonable chance of saving the sheep and without courting financial disaster.

In this connection the Department has provided a drought-feeding advisory service, and in many cases has initially supervised the actual feeding. The service includes advice on the most economical maintenance ration, having regard to current prices and relative feeding values of available foodstuffs, and also advice on the actual mechanics of hand-feeding. This latter point is of particular importance where it is essential that every pound of food is eaten and that each animal gets its fair share.

As mentioned elsewhere, steps have been taken to initiate an investigation of methods of pasture improvement and conservation in western areas.

Experience gained by the Department in its association with drought feeding on individual holdings should provide a valuable contribution to the success of any national scheme of drought feeding which may be instituted.

Agricultural Climatology.

The broad question of climatological studies in relation to the development of rural industries has received passing attention from time to time, but in 1946 officers of the Divisions of Animal Industry and Plant Industry commenced a study of the problem of the effect of climatic conditions in the semi-arid pastoral areas on vegetation, sheep husbandry, and wool production.

Changes in vegetation types have been closely correlated with certain factors constituting the climate of the semi-arid areas. On the animal husbandry side it has been possible to delimit broadly the areas suitable for breeding as well as wool production from those suitable only for wool production. The importance of such studies in determining land utilisation will readily be appreciated. Drought studies based on climatological factors also show promise of yielding useful results.

Cattle Husbandry.

While the Department has always devoted a substantial proportion of its resources to the control of pests and diseases of cattle, and has assisted the industry to a marked degree in this protective field, it has tended to lag in investigations into more directly productive aspects of animal industry, such as feeding and breeding.

The formation of a Cattle Husbandry Branch this year is an earnest of the Department's intention to interest itself actively in what have been more or less neglected aspects of animal industry. As staff and facilities become available, the whole matter of improved pasture utilisation for maximum returns in beef and dairy products will receive attention, the crop fattening of cattle in suitable areas will be investigated, and studies on supplementary feeding generally will be made. Other aspects of cattle raising will also be studied as circumstances permit.

Poultry Nutrition.

For a number of years the Poultry Branch carried out and supervised experiments on the feeding of poultry for egg production, and suitable feeding standards for various classes of birds were devised. Unfortunately, the supply position has latterly been such that the industry has been unable to maintain the desired standards, and there has arisen a need for enlightening poultry farmers in the enrichment of crushed grains—the most common available poultry foodstuff—with essential vitamin-rich products to offset to some extent the shortage of mill offals and meatworks by-products. This work has yielded good results so far as reduction of the incidence of vitamin deficiency trouble is concerned, but the question of alternative protein-rich feedstuffs to meatworks by-products remains a pressing one; it appears that a permanent changeover from such by-products to feedstuffs such as lucerne chaff, for at least a proportion of the flocks of the State, will have to be given serious consideration. A poultry section has now been established in association with the Atherton Tableland Regional Station at Kairi, and nutritional studies are in train.

Poultry Improvement.

The egg-laying capacity of a bird is an inherited characteristic and if the potential production of flocks can be raised by rigorously excluding poorly bred types an overall improvement in the industry must result. Improvement of stock is one of the main objectives of the Poultry Industry Act, and it has been achieved to some extent by the testing of birds for pullorum disease, a departmental service which covered nearly 205,000 birds in 1947. Work is visualised on the breeding of strains of poultry showing resistance to diseases of pullets and hens and on the tying-up of fecundity with table qualities in the one bird. The dressed poultry trade is now quite substantial and for export purposes particularly it will be necessary to improve table quality.

In order to advise and assist the Minister and officers of the Department in its activities for the improvement of technical efficiency in the poultry industry, a Poultry Advisory Board was appointed under terms of the Poultry Industry Act, and held its first meeting last year. The industry members of this Board also act in a liaison capacity.

Dairy Farm Efficiency.

In an industry with over 20,000 producers, farming a variety of land types under a wide range of climates, and still to some extent under pioneering conditions, there is bound to be much room for improvement in overall efficiency. No one examining the production figures for the dairying industry can doubt the need for improving yield per cow, and in all districts production per cow can be raised by the adoption of better methods, including improved methods of pasture management. The quality of dairy farm products also leaves much to be desired.

It is the Department's business by advisory, and if necessary by regulatory, means to improve dairy production and raise the quality of milk and milk products. Intensive educational drives, backed by technical knowledge, have in the past succeeded in improving production and quality. As an example may be quoted the cheese industry drive of the early war years which raised production tremendously, while the percentage of second-grade cheese fell from 63 to 26.

A sustained effort is necessary, however, if the bulk of the producing farms are to have their efficiency raised. The opportunity for an efficiency campaign of some magnitude has been provided by the allocation to Queensland by the Commonwealth Government of an annual sum in excess of £60,000 for the next five years for that purpose. The basic object of this grant is to translate the "know how" of the scientist into everyday dairy farm practice. The Department's plans embrace pasture improvement demonstrations, education on better feeding of livestock, measures for disease prevention and control, herd recording and culling, and uplift of quality. The programme will be pushed ahead to the limits imposed by the current acute and general shortages of trained personnel and equipment.

Herd Recording.

The testing of cows for butterfat production was initiated in 1916, when pure bred herd recording for Advanced Register purposes was undertaken. In 1923 testing was extended to grade cows, the samples being sent by the farmer to a central testing depot. By 1933-34 a total of 892 herds, comprising 29,500 cows, was being tested under this scheme. Subsequent drought conditions and the outbreak of war brought this peak down very considerably, and after the war it was decided to introduce an amended recording scheme for grade herds.

This scheme, which was started in January, 1948, provides for the testing of herds in small units, a herd recording officer being allocated to each unit of up to 24 herds. Ten such testing units are now operating, covering 165 herds and 5,600 cows, and other units are in course of establishment, or projected.

The value of this scheme lies in the fact that each month each member obtains not only the tests from his own cows, but also the averages for other herds in the unit. He thus receives a direct comparison of the performance of his own herd with those of other herds in the same small area, under the same climatic conditions, and for the most part on the same sort of soil. The system becomes, in fact, a form of the mutual control which has proved so beneficial in the sugar industry, and most farmers receiving sub-average returns will certainly seek the reason why. Already the scheme, where it has operated, has been responsible for an increased interest in efficiency of production.

Dairy Herd Wastage Survey.

The inclusion of a number of herds in a closely supervised herd recording scheme, such as the foregoing, provides an excellent opportunity for an examination of the causes of wastage in dairy herds. In order to concentrate attention on overcoming the most important factors in loss of production in dairy herds it is essential to pinpoint the main sources of loss. To what extent, for example, do mastitis, brucellosis, and sterility contribute to production losses? Further, what factors in animal husbandry most tend to throw cows out of production? These are questions to which answers should be provided and at the present time over 200 farmers are co-operating with the Department in securing relevant information.

Improvement of Dairy Products.

The Department's Dairy Research Laboratories, established in 1935, have made a marked contribution to the raising of quality of milk, butter, cheese, and other dairy products, and improvement in manufacturing efficiency.

A butter improvement service, which has operated since 1940, has assisted factories to standardise the composition of their product, has simplified water treatments at factories which could not otherwise have manufactured unsalted butter, and by carrying out thousands of chemical and bacteriological examinations has enabled various defects to be corrected.

Twelve cities and towns in Queensland are now provided with milk pasteurising equipment. Unless pasteurising plants are operated efficiently, the consumer will be offered milk which is not in fact effectively treated. The Department has for some years not only exercised close control over pasteurising processes, but has also kept a close watch on handling methods, on the farm and in transit, which may affect the pasteurising quality of milk. As a result, pasteurisation is now uniformly effective, and in addition a vast improvement in the quality of milk graded on arrival at the depots has been effected by means of follow-up visits to farms. Many thousands of samples of milk are annually examined microscopically and, with practice, the technician is able to recognise the contaminant bacteria at sight, and so advise farmers as to the source of contamination of their milk and the remedial measures to be employed.

An outstanding wartime achievement of .the Dairy Research Laboratories, working in association with the dairy industry, was the preparation of a non-fat-leaking cheddar cheese which can be marketed and held in hot areas without refrigeration. While wartime transport conditions did not deteriorate to such an extent that ordinary cheddar cheese could not be shipped to Great Britain because of lack of refrigerated space, the process was available to the industry in such a contingency. There is no doubt that a non-fat-leaking cheese will be very acceptable in tropical countries and in the warmer parts of Australia where ordinary cheddar tends to leak badly.

Organised Marketing.

In the early 'twenties there was instituted in Queensland a system of marketing of primary products which was to evoke world-wide interest. The essential feature was provision for the setting-up, by producers of a particular primary product, of a commodity board to receive and market the whole of the produce grown in the board's area. A second type of organisation was also provided for, this being a non-marketing producers' organisation, also on a compulsory basis, to speak for the industry and to handle many of its needs.

This type of organisation has found great favour and at the present time there are 20 commodity marketing boards, handling products ranging from ginger to timber, and three non-marketing producers' organisations (sugar and dairying industries and the Council of Agriculture). For the five-year period ending 1947 the average annual value of produce subject to the operations of marketing boards (excluding the meat, milk, and sugar boards created under individual Acts) was over £12 million. Two additional boards were established during the year to undertake the marketing of potatoes and tobacco.

The boards are grower-managed, with one Government representative on each board, acting in a liaison capacity. A number of the boards have latterly expanded their activities in the direction of processing their commodities.

Crop and Market Reporting.

The efficiency of crop and livestock production is increased if landholders, machinery distributors, fertilizer suppliers, and other interested parties, can be assured of a timely and reliable statement of production trends within a particular industry. The Department has set out to provide such a service in the form

of production trend reports, which record monthly prospects for the major rural products. Initiated two years ago, these reports enjoy a wide circulation and are sought by producers, Governments, mercantile houses, and financial institutions.

In addition, an individual crop reporting service is now operating in respect of potatoes, wheat, maize, and sorghum. Selected farmer observers in the main producing areas provide up-to-the-minute information on areas planted and crop prospects in their particular districts; this information is supplemented by departmental field officers and periodically throughout the growing season of the crop a statement is issued to farmers and others as to the state of development of the crop and the likely harvest.

Growers of fruit, vegetables, and farm produce generally, are keenly interested in the prices offered or given for these farm products at the day's sales in the Brisbane wholesale markets. Not only does a consignor wish to get early information on the probable or actual price received for his own produce, but intending consignors are anxious to know the state of the market. Retailers who are unable to attend the markets to make purchases in person also find it useful to know what prices various lines of farm products are bringing on the Brisbane market. Information compiled and disseminated by interested parties can be very misleading, so the Department in 1947 instituted a daily market reporting service which now covers Brisbane wholesale prices of fruit, vegetables, and farm produce. Reliable market price reports are made available by 11.30 a.m. daily to the press and radio stations for the information of landholders and others concerned.

Maintaining Standards of Farm Supplies.

Queensland has long been in the forefront of the Australian States in protecting the farmer and grazier against unscrupulous traders in such farm needs as fertilizers, veterinary medicines, stock foods, pest destroyers, and seeds for sowing. The regulatory work under the various Acts relating to standards of farm supplies of this nature is carried out by the Department and there is no doubt that the continuous review of standards to meet existing conditions, and the maintenance of inspection services, have enabled the primary producer to place a high degree of reliance in the goods he purchases. This is particularly the case in the present unsettled times.

The standards service goes beyond the setting of standards and their policing—an endeavour is made to assist producers of various farm requirements to reach and maintain the standards laid down. In the case of seeds for sowing, for instance, the Standards Branch has interested itself in seed-cleaning machinery, in the problems associated with the storage of seeds in humid climates, in the production of certified seeds, and so on.

Under the auspices of a new seed certification service a gradually increasing number of seeds will be propagated under departmental supervision and may then be sold as "certified" seed. Such seed will be true to type and not the hotchpotch of mixed strains and varieties frequently sold.

Factory Operation Assistance.

In processing and manufacturing the raw materials of agriculture, there are often involved chemical, physical, and biological processes which need to be very carefully controlled if a product of high quality is to result. Cheesemaking, for example, calls for the use of particular strains of bacteria, which must be free from contamination from other bacteria; in the buttermaking process a certain degree of acidity must be developed in the cream; in the extraction of sugar from cane, rigid control of some of the chemical and manufacturing processes is essential for maximum recovery and the outturn of a good refining sugar.

As a contribution to the primary industries, the Department supplies a factory operation control service in respect to dairy products such as milk, cheese, and butter, and to sugarcane. Such service includes the supplying of certain biological products, bacteriological and chemical analysis of raw and semi-manufactured materials, testing of items of equipment, and general advice on efficiency of operation of plant.

This factory control service is much appreciated by the industry; it is particularly valuable to smaller mills and factories which cannot staff or maintain a laboratory sufficient to provide for their needs.

Experiment Station Work.

During the early part of the decade under review, the Department was not very well provided with experiment stations. The Bureau of Sugar Experiment Stations had its specialised stations at Gordonvale, Mackay, and Bundaberg; agricultural research stations were operating at Biloela and South Johnstone; and the long-established animal health stations at Yeerongpilly and Oonoonba continued to serve the animal industries. For the rest, the Department had perforce to rely upon private landholders to provide land, crops, and certain other research needs.

The farm-plot system of experimentation has a very prominent part in the research set-up, but only as a subsidiary to experiment station operations and not as a substitute for them. Moreover, the experiment station provides facilities for the practical training of junior officers, enabling them to "rub their hands in the dirt," which is so necessary for the full understanding of their work and the ultimate guidance to practical farmers. The need for extension of experiment station facilities was obvious, and particularly the establishment of stations on which regional livestock problems could be investigated concurrently with regional agricultural and pasture problems.

Four such regional experiment stations are now operating to serve the requirements of the various production Divisions of the Department. They are situated at Kairi (Atherton Tableland), Ayr (Burdekin delta), Biloela (Callide Valley), and Hermitage (eastern Darling Downs). Herds or flocks of the types of animals appropriate to the several regions will be established on the stations and the investigation of a wide range of problems involving not only crop production and animal husbandry but also the inter-relationship between these two forms of agriculture is projected.

A horticulture experiment station has been established near Nambour and a property has been acquired in the Redlands area for the establishment of a vegetable experiment station. A sub-station for the study of tropical fruit culture problems is now in use at Kamerunga, near Cairns.

The important pasture and cattle-fattening work being carried on at South Johnstone will be extended by the maintenance of a semi-commercial cattle fattening property at nearby Utchee Creek. About 50 acres of this property have been cleared and grassed to date.

The leasing of a tobacco farm at Mareeba has now been concluded and the officer in charge of this new experiment station will take up duties in September. Problems associated with both dry farming and irrigated production of tobacco will be investigated here and on two sub-stations now in operation in the Herbert and Burdekin districts.

In conjunction with the Bureau of Investigation of Land and Water Resources an Irrigation Research Station has been established in the Lockyer Valley. This station will be of the greatest value in view of the projected substantial increase of irrigation in Queensland.

Finally, the Department has under discussion with the Council for Scientific and Industrial Research and the Australian Meat Board the joint operation of two cattle research stations in Queensland, while plans are being formulated for the opening of two small exploratory farms in the Gulf country for the investigation of fodder crop production.

With the implementation of these plans Queensland will be very well endowed with experiment stations.

Departmental Correspondence.

The volume of correspondence handled by a Department whose functions are to a large extent advisory is some indication of its usefulness to the community. Mail arriving at the Head Office of the Department alone includes a daily average of well over 400 letters, and the total number of items of correspondence handled by the Records Branch in a year amounts to nearly 150,000. Ten years ago the total items handled was 100,000 and from this, perhaps better than from any other pointer, may be gauged the increasing ramifications of Departmental activities.

Improvement of Extension Services.

There has been a growing world-wide appreciation during the past decade or so of the value of the extension worker in the improvement of agriculture. The advisory officer working in the field has a splendid opportunity to disseminate information on improved practices throughout his district, and in fact personal contact between advisory officers and the farming community is the only way in which a certain proportion of producers can be effectively informed and instructed. About 500 primary producers receive visits from officers of the Department of Agriculture every day.

While the potentialities of the field advisory system are enormous, the fact remains that the adviser must have special qualifications and training if he is fully to achieve his objectives in his particular district. One of these qualifications is obviously up-to-date knowledge of the subject on which he is imparting instruction. In past years, and in all countries with agricultural extension services, the field officer has rarely been kept abreast of the most recent developments in the various fields of agricultural or veterinary science with which he should be acquainted if he is to do his job properly.

In an endeavour to overcome this defect so far as it relates to Queensland, the Department has greatly extended not only the training of its staff members before sending them to country centres, but also the periodical instruction of staff in recent developments in their own lines of work and in ancillary subjects. Since the conclusion of the war "refresher" courses have been conducted for field advisers in general agriculture, horticulture, animal health, cattle husbandry, sheep husbandry, and poultry husbandry.

The post-war years have also seen an increase in the number of field officers serving the various primary industries. The number of holdings and the distances are so great, of course, that no staff of reasonable proportions could hope to provide individual instruction for all landholders. This disability is being overcome to an increasing extent by the holding of field days and other types of gatherings of primary producers, where new methods and ideas are presented to a cross section of the district's farmers or graziers.

In keeping with the times, the Department has within recent years made good use of radio as a medium for imparting advice to producers, and also as a means of keeping city dwellers informed of the land industries.

In 1943 the utility of the Department's monthly journal, the *Queensland Agricultural Journal*, was increased by limiting its scope to purely advisory matter and publishing strictly scientific papers in a separate Departmental journal. The scientific quarterly, called the *Queensland Journal of Agricultural Science*, is widely read by scientists both in Australia and overseas, and the Central Library of the Department has benefited greatly by exchanges for this journal.

Just before the war the preparation of a series of handbooks on various phases of agriculture was commenced to meet the needs of farmers and students who required authoritative information on technical and practical aspects of crop and livestock production in Queensland in a collected form. Four handbooks were issued dealing with Farm Crops and Pastures, Horticulture, Pests and Diseases of Plants, and Sugar Cane Culture. The last-named was supplied to all canegrowers and the others met with a very ready sale. Reprinting of some of the volumes and printing of additional volumes is now receiving attention.

The standard of the advisory literature prepared by the Department for distribution to farmers has improved with the years. As printing trade difficulties grow less it will be possible to present this material in its most effective form, embodying the free use of colour and other devices for attracting and holding the attention of the not-too-avid reader.

For the better dissemination of information and items of interest to primary producers and the public, plans for the creation of an Information Branch within the Department have been finalised. The object of this Branch will be a steady output of advice and information in form suitable for all purposes.

Co-operation in Research.

A gratifying feature of recent years has been a change in outlook on the question of co-operation in research work. Previously a good deal of lip service was paid to this very desirable feature of the operations of Commonwealth and State agencies, but in many cases no real co-operation was obvious.

It may now be said that the research agencies, whether Commonwealth, Department of Agriculture and Stock, or University, do not enter a field of investigation in which another agency is particularly interested without the sphere and scope of operation of the various bodies within that field being fairly well defined in conference. This co-ordination of activities has obvious advantages and where discussions are entered into amicably beneficial results are sure to follow.

Co-operation in the provision of facilities and the actual conduct of research has been fairly extensive during the past few years. On the one hand State organisations have entered into agreements with Federal organisations in relation to research work in such matters as tobacco growing, pasture improvement, and various livestock activities. In recent years this State has provided the Council for Scientific and Industrial Research with land, buildings, or other facilities for the conduct of apple investigations at Stanthorpe, pasture research at Gatton, Ayr, and St. Lucia, tobacco investigations at Ayr, pasture and sheep investigations at Cunnamulla, and meat preservation and transport at Cannon Hill.

At the beginning of 1948 the Commonwealth Government, with the concurrence of the State Government, appointed the writer to the positions of a Council member of the Commonwealth Council for Scientific and Industrial Research and also Chairman of the State Committee. This is the first time the permanent head of a State Department has been appointed to membership of the Council.

SUMMARY FOR THE YEAR 1947-48.

STAFF.

Because of the highly technical nature of much of the work required of the Department in the improvement of Queensland agriculture, the low outturn of suitably trained men and women from the Universities and technical institutions during recent years has curtailed to some considerable extent the expansion of the Department's activities.

Research, extension and inspectional services have all suffered from shortage of staff, not only of technical officers but also of clerks and stenographers, who are important cogs in the machine. Fortunately, there were few resignations during the past year, but the retirement of several senior officers has created gaps which will necessitate some staff readjustments.

A number of senior technical positions was created during the year in specialised sections of Departmental activity, including agronomy, plant breeding, soils technology, entomology, soil conservation, toxicology, cattle husbandry, and information service. All were filled by the promotion of officers already in the Department. Sectionalisation of this nature, with competent men as leaders, will conduce to most efficient working and, incidentally, make the Department a more attractive sphere of service for technical men.

The low intake of veterinarians into the Department has been offset to some extent by granting to private practitioners contracts to perform specified veterinary work for the Department within specified areas. This scheme has already attracted several new veterinarians to this State. The policy of veterinary scholarships has been continued and five were granted during the year.

Additional staff is urgently needed for the newly-formed Cattle Husbandry Branch, which has a vast field of work confronting it in raising the level of feeding and management of beef and dairy cattle, as well as in the numerous other aspects of cattle husbandry requiring investigation.

Examinations for appointment to various inspectorial grades were held during the year and yielded a number of additional officers and prospective appointees.

The opportunity is taken to express the appreciation of the Department of the services of the officers who retired from the permanent staff during the year under the retiring age regulations. Mr. S. A. Clayton, of the Division of Dairying, and Messrs. J. L. Hodge and W. Dixon of the Division of Animal Industry, gave valuable service to primary producers. As editor of the *Queensland Agricultural Journal* and radio commentator, Mr. J. F. F. Reid for 27 years performed valuable work in the extension field. The name of Mr. R. E. Soutter will long be associated with the Queensland wheat industry, for which over a very long period he has continued to provide improved varieties that today constitute a very substantial proportion of the wheat crop. All of these officers served the Department and the primary industries long and well.

STAFF TRAINING.

The training of technical staff has proceeded along three lines during the year.

One important phase has been bringing field men up to date in their particular subjects. The training has taken the form of refresher courses for field men of the Agriculture, Horticulture, and Poultry Branches and training courses for Sheep and Wool Advisers and newly-appointed dairying officers before their formal appointment to country districts. Plans have been completed for the conduct of a course in cattle husbandry to be attended by some 50 officers.

Steps have also been taken to provide special training and study for specialist officers. One agricultural officer proceeded overseas during the year to become acquainted with modern advances in soil science and sugar cane culture in other countries, and another investigated sugar cane milling processes in Hawaii. Other officers have had periods of study at specialist institutions in other States. Mr. A. K. Sutherland, Senior Veterinary Pathologist, returned to duty after a year's study and travel in the United States.

The recruitment of technical staff for the research activities of the Division of Dairying has long presented a problem, since no Australian University provides a degree course with a strong bias towards dairy science. To meet this situation the Government, at the request of the Department, made available two scholarships tenable at the University of New Zealand, which provides a course with special emphasis on dairying; the selected students are now pursuing their studies in New Zealand and will enter departmental service in due course.

RESEARCH WORK.

The appended reports of the various production Divisions show that good progress was made during the year on many research projects. An increased degree of co-operation within and between Divisions has been effected, and co-operative work by the Department and other agencies, such as the Commonwealth Council for Scientific and Industrial Research and the Bureau of Investigation of Land and Water Resources, has increased. Such co-operation not only eliminates duplication of effort but enables more work to be undertaken. Co-operation between institutions has been extended into the Experiment Station field, the Department and the Council for Scientific and Industrial Research now conjointly operating the new Regional Experiment Station in the Burdekin Delta.

The regional experiment stations generally, which have so far been mainly crop and pasture improvement centres, will shortly be provided with herds and flocks of various animals so that their scope and objectives will be much wider in future.

Research on Crops and Pastures.

From the report of the Division of Plant Industry, it will be noted that plant improvement activities, such as breeding and selection, have proceeded with useful results in sugar cane, wheat, sorghums, cotton, maize, cowpeas, citrus, papaws, pineapples, and other field and orchard crops.

A wide range of field trials, embracing fertilizer, varietal, cultural, and irrigation investigations, was conducted with sugar cane, wheat, oats, potatoes, maize, peanuts, lucerne, tobacco, sorghums, linseed, soybeans, sunflowers, pastures, pineapples, papaws, tomatoes, grapes, and other crops. Particular interest has attached to trials with linseed. Under the stimulus of a market assured by contracts the planting of linseed has reached 5,500 acres in two years and it promises to become a major crop on the Darling Downs within a short space of time.

Plant protection activities were maintained by pathologists and entomologists, with particular attention being given by the latter to the newer insecticides, such as DDT. and benzene hexachloride. Advanced studies of the use of benzene hexachloride against soil-inhabiting pests of sugar cane have placed the farm use of this material on a firm basis, and investigations have been extended to the use of this insecticide against white grubs affecting pastures. Problems arising from the use of DDT. against various insects have been investigated.

Very good progress has been made in testing newer types of weedkillers against a wide range of weeds and poisonous plants; with prices for these products decreasing, there is every prospect of a rapid extension of their use on farms and grazing properties for the control of many important weed pests.

Problems connected with the storage and transport of fruit and vegetables have received a good deal of attention, and largely as a result of the past season's work, commercial refrigerated transport of perishable horticultural products to northern and western areas is operating in the warmer months of the year. Initial steps have been taken in the establishment of a cool-storage laboratory to undertake investigations into storage behaviour of fruit and vegetables, with special reference to canning and quick freezing. With the extension of fruit canning in Queensland during the year, special attention was given to problems connected with the canning of tropical fruits.

The regional experiment stations at Hermitage and Kairi are now emerging from the early period of preparation and with the Biloela station are performing useful functions for various branches. Good progress has been made with the development of an additional regional station at Ayr. The sugar experiment stations and the agricultural and horticultural branch experiment stations at South Johnstone and Nambour (Maroochy) are continuing important investigations on field crops, pastures, and horticultural crops. The new Redlands station of the Horticulture Branch has not yet been brought into production, while the new sugar experiment station at Ayr and the tobacco experiment station and two sub-stations are likewise only in the developmental stage.

Dairy Research.

The activities of the Division of Dairying cover dairy products from the drawing of the milk from the cow to the transport of the manufactured milk product. Within this field there is naturally a wide range of problems; many of these are being investigated in the Department's central and two branch dairy research laboratories.

Tests of milk quality have been further developed in the direction of enabling causes of deterioration in milk quality to be determined in the laboratory. This enables the rapid issue of advice on corrective measures to suppliers of lower quality milk.

Problems of the cheese industry include the control of bacteriophage, which spoils starters in cheese factories, and the occurrence of non-acid milks which interfere with the cheese-making process. Both of these problems are being actively investigated, as is the control of cheese mite in stored cheese.

The problem of "flat-flavour" in export butter, presumably due to faults in the neutralisation of cream at butter factories, is being considered. Quick tests for the detection of unsatisfactory butters are also being developed and examined.

The engineering, investigational, and advisory service is meeting continuous and increasing demands for assistance from butter and cheese factories and milk treatment plants.

Research on Animal Health.

Tick control experiments were continued. At Oonoonba Animal Health Station, benzene hexachloride gave a satisfactory kill and the fresh preparation compared very favourably with DDT.

Studies on the seasonal occurrence of internal parasites of dairy cattle have been continued in co-operation with C.S.I.R. A survey of internal parasites of horses in the south-west was undertaken in order to ascertain to what extent worm burdens contribute to the occurrence of Birdsville disease.

Investigations of cases of spirochaetosis in poultry have suggested that some vector other than the two usually held responsible for the transmission of the disease is operating. New drugs have been tested, with promising results, for the treatment of acute caecal coccidiosis of poultry.

Interesting observations which have been made at the Animal Research Stations are the effect of DDT in ridding cattle of cattle lice, and the cleaning up of sarcoptic mange of pigs by the use of benzene hexachloride.

EXTENSION WORK.

All branches with field responsibilities have continued to give educational and advisory service to farmers and graziers. The Sheep and Wool Branch had a particularly fine record for the year, having conducted well over 200 field days and demonstrations. Such an effort must have a marked effect on the extent to which improved husbandry practices are adopted.

Officers of the Division of Dairying have continued their good work in assisting farmers to produce dairy products of high quality and reduce losses due to spoliation. One avenue of approach was the preparation of an instructive exhibit which was shown at six country agricultural shows during the year.

Veterinary, agriculture, horticulture, pig and poultry officers have all utilised the field day as a means of conveying information to farmers. The use of radio as an extension medium is fully exploited and regular broadcasts were made throughout the year. Field officers moving through the country report a very large listening public for Departmental talks, which are heard quite well in most districts.

The Department's monthly journal is read by many thousands of farmers and the information contained in it is further disseminated in leaflet form. All growers of sugar cane have received the "Canegrowers' Quarterly Bulletin," which is also published by the Department.

A large proportion of close on 100,000 letters received by the Department during the year requested advice on various subjects, indicating an appreciation of the services available.

The Queensland press, and particularly the country press, have greatly assisted the Department in conveying information to landholders.

SPECIAL SERVICES.

In addition to research, inspectional and field advisory work, the Department provides a number of services to the primary industries, and these have been maintained at a high level during the year.

Fodder Conservation.

One of these special services is the encouragement of fodder conservation by the provision of assistance in the way of loans of moulds, jacks, and concrete mixers, together with the services of a silo construction specialist. While material shortages militate against very rapid progress being made in the provision of farm storage of fodder reserves, facilities provided by the Department have been in fairly regular demand and a substantial number of silos, both concrete and trench, have been constructed with Departmental assistance. In addition, groups desirous of forming machinery pools for the purpose of facilitating fodder conservation have been given every encouragement and assistance.

Soil and Water Analysis.

Farmers are becoming increasingly aware of the usefulness of soil analysis in planning cropping practices and treatments, and a very large number of samples have been handled in the laboratories of the Division of Plant Industry. Likewise, many analyses of water samples intended for the irrigation of crops or the watering of stock have been made.

Quality of Dairy Products.

The system of quality control of milk and milk products, operated by the Division of Dairying, was maintained during the year. The system involves the supervision of operations at depots and factories both to check on the quality of the raw materials received and to correct faults in manufacture. Well over 100,000 milk quality tests were made on milk received at depots and these revealed a marked improvement in bacteriological quality and fat content over the previous year's receivals. Examination of bottled pasteurised milk showed that the standard of pasteurisation efficiency at

the various depots in very high and that considerably over the minimum fat percentage required by law is contained in the milk bottled. Various practices and conditions adversely affecting butter quality were traced down by Departmental officers and remedies suggested. Special facilities are provided by the Division of Dairying in connection with cheese manufacture, in which bacteriological products play an important part.

T.B. Testing.

The testing of milk-producing herds for tuberculosis has proceeded satisfactorily and in the Brisbane area alone nearly 10,000 animals were tested by Departmental officers. The number of diseased cows found in previously tested herds has been very small. Contracts for the testing of cows on behalf of the Department have been taken up by private practitioners and since the first contract was signed in March, 6,263 head have been tested on a contract basis.

Brucellosis Control.

The plan of campaign for the reduction of the incidence of brucellosis in cattle has changed somewhat, with the emphasis now being placed on vaccination with Strain 19 rather than on blood testing, as the freeing of complete herds has been found very difficult.

Pullorum Testing.

Over a quarter of a million head of poultry were tested by Departmental officers for pullorum disease during the year under the plan for the improvement of poultry flocks. While the percentage of reactors was not appreciably lower than in previous years, there has been a material reduction in losses of chickens from this disease.

Marketing Activities.

The Division of Marketing has, as usual, provided Government representation on the various commodity boards operating in Queensland. During the year it has had additional work in connection with the establishment of new boards and temporary co-operative associations set up to dispose of maize and grain sorghum for which export licenses were given under special conditions. The transfer back to State boards of controls which were taken over by the Commonwealth during the war years has also caused extra work.

The crop reporting and forecasting service, which up to this year had operated only for potatoes, was extended to cover wheat, maize, grain sorghum, and barley, and is now providing a very worthwhile service to various branches of the primary producing and distributing industries in enabling them to receive reliable forecasts of production. The Department is grateful to the honorary crop correspondents, without whom the service could not be operated.

The market reporting service, which provides accurate information on prices ruling on the Brisbane market, was extended during the war to cover wholesale farm produce sales held at Roma Street. A commencement has also been made on collecting and recording ruling prices for wholesale lines such as butter, cheese, eggs, honey, flour, bran, &c.

Regulatory Activities.

The Department is responsible for the enforcement of regulations under the various Acts dealing with primary industries. Under present conditions, strict compliance by the farmer with some of the regulations is extremely difficult and they cannot be enforced to the extent desired. However, farmers are expected to meet the rquirements of the various regulations in cases where non-observance is not readily excusable, and particularly where neglect to take certain prescribed action constitutes a danger to other producers or to consumers.

A strict view is taken of breaches relating to the standard of materials offered to the farmer as stock foods, veterinary medicines, pest destroyers, seeds for sowing, and fertilizers, and inspectional activities will be increased in order to protect the farmer as far as is practicable from sub-standard preparations.

DIVISION OF PLANT INDUSTRY.

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

Though the repercussions of war are still very much in evidence in certain phases, the year just ended has to a large extent seen a decided return to normality in the activities of the Division of Plant Industry. Shortages of machinery and materials still impede progress, but there has been some mitigaton of that frustration of endeavour to put plans into operation which was a feature of the immediate post-war period and the Division has been able to carry on a programme of experimental, developmental and advisory work with gratifying results.

STAFF.

During the period under review there have been several major changes in senior positions of the Division. In July, 1947, the direction of the Division was changed as a consequence of the appointment of Mr. R. Veitch to the position of Assistant Under Secretary (Technical) after his term of what may be considered formulative years at the inception of the organisation. Consequent rearrangement of staff also led to the necessity for new appointments to the positions of Director and Assistant Director of Horticulture.

The elevation of Mr. A. F. Bell to the Under Secretaryship and the subsequent resignation of Mr. E. R. Behne, who had succeeded Mr. Bell, necessitated similar changes in the direction of the Bureau of Sugar Experiment Stations.

In the Agriculture Branch, too, a temporary loss has occurred through the secondment of the Director of Agriculture (Mr. C. J. McKeon) to a position with the Queensland-British Food Corporation and acting appointments to the positions of Director and Assistant Director were necessary.

Changes such as these in general administration in the three largest branches of necessity create many problems, but difficulties have been largely mitigated by the fact that in each case the replacement called for was possible from the existing staff.

A staff change of particular note was made by the creation of several senior technical positions within the Agriculture Branch, the Science Branch, the Chemical Laboratory and the Bureau of Sugar Experiment Stations. This was done so that work could be more clearly sectionalised—a move which it is considered must result in increased efficiency in both the execution and the overall planning of work. One direction in particular in which improvement has been almost immediately effected has been in the co-ordination of experimental work. Such work is costly, even though long-term results may be more than commensurate with outlay, and it becomes a matter of moment to avoid both gaps and overlapping. It is evident that sectionalisation such as has now been placed on a sound basis will increase efficiency in this direction.

The strength of the soil conservation staff has been increased by the appointment of three new officers, but is still below requirements and it is hoped to increase the total by at least three new appointments in the next financial year. It must be emphasised that suitable recruits are difficult to obtain, since soil conservation work calls for a very sound agriculturist and not, as is sometimes assumed, merely a man with a knowledge of one branch of engineering.

The appointment of a Senior Plant Breeder within the Bureau of Sugar Experiment Stations has been made to facilitate intensification of the programme for the production of improved varieties. Two officers of this Bureau were given opportunity for overseas study: the Senior Mill Technologist spent three months in Hawaii and the Assistant Director will return after an absence of six months during which he will have visited a number of countries recognised as being in the forefront in research work on soils.

During the year two scientific officers resigned, and Mr. R. E. Soutter retired after serving the Department for more than 40 years. Few officers have such a record of achievement as Mr. Soutter; this is evidenced by the fact that of the 500,000 acres of wheat grown in the State last season, more than 80 per cent. was planted with varieties produced by him.

The work of the Regional Experiment Stations has proceeded to such an extent that it became desirable to constitute a branch separate from general administration to take care of this phase of Divisional activity, and the Director of Regional Stations was relieved of certain other duties in order that he might devote the whole of his attention to the development of these stations.

The Refresher Course for field officers mentioned in last year's report has been found to be fully justified by results. Apart from the stimulus of free exchange of ideas and information, the broader outlook of many officers in soils problems has already been noted, and no doubt remains in the minds of those conducting the course as to the wisdom of the innovation.

SOIL CONSERVATION.

The work on soil conservation has been continued along the lines reported upon in the 1946-47 report. For the dual purpose of bringing the urgency of conservation measures to the notice of farmers and showing something of the methods to be used, Demonstration Areas have been laid down in those localities where the loss of soil by erosion is most pronounced. Thus, one such area has now been commenced in each shire on the eastern Darling Downs and on the Atherton Tableland. Similar work is to be undertaken in the Upper Burnett and South Burnett immediately. It is proposed to increase the number in these districts and also to initiate similar demonstrations in other districts in the near future. On Demonstration Areas already established, 375 chains of waterways have been constructed and sown to stabilising vegetation, 235 chains of pondage banks constructed, and 580 chains of contour banks built.

In general, there has been a very satisfactory awakening of interest, and field days and lectures have been excellently attended. It may be claimed that farmers and others are becoming conservation-minded, but there is an unfortunate tendency for many to think that soil conservation is wholly a matter for Governmental or Departmental activity. It is essential for all concerned to realise that soil conservation means essentially correct land usage and therefore is not only a matter of vital interest to the farmer but something in which he must take a leading part and assume major responsibility.

PASTURE IMPROVEMENT.

Following the setting up of a Dairy Pasture Advisory Committee comprised of representatives of the Division of Plant Industry and darying industry organisations, a comprehensive programme of pasture investigations was drawn up for the dairying areas.

On the South Coast and near North Coast, where the investigations were in charge of the Agrostologist stationed in Brisbane, 13 separate trials were laid down. These included paspalum and kikuyu pasture renovation and topdressing trials; replacement of second-class or weedy plants such as blue couch, blady and carpet grasses and bracken fern with more useful species; and testing of winter pastures and fodders. The centres at which trials were established are Beaudesert, Worongary, Dayboro, Upper Caboolture, Peachester, Maleny, Cononndale, Kenilworth and Cooroy, and preliminary work for further trials was carried out at Oxley, Mt. Mee, Nambour and Traveston. While floods and temporary shortages of seed and lime delayed the initiation of some of the trials, seasonal conditions generally were favourable and progress in all trials is regarded as satisfactory.

The Head Office Agrostologist acted in an advisory capacity on pasture plant nursery work and hillside pasture investigations at Hermitage Regional Experiment Station and in the establishment of pasture trial blocks on the Irrigation Research Station at Gatton.

Other pasture work is discussed in the reports of the Acting Director of Agriculture, the Director of Regional Experiment Stations, and the Agricultural Chemist.

WEED INVESTIGATIONS.

During the year a substantial amount of additional information was secured on the use of hormone-type weedkillers and many new names were added to the list of susceptible weeds. These weedkillers are being extensively used in Queensland and a very large number of enquiries on their usefulness for specific weeds was handled during the year. The importance of the weed problem in Queensland and the great potentialities of new types of weedkillers warrant the services of at least one full-time investigation officer.

BRANCH ACTIVITIES.

The reports of the chiefs of the component branches of the Division are submitted herewith. It will be seen from these that in each case the various staffs have been very active throughout the year. Points of special interest to which attention might be drawn are mentioned hereunder.

Agriculture Branch.

Generally favourable seasonal conditions have prevailed and the volume of production of most of the important crops was well maintained. The work of the branch has covered virtually all aspects of crop production, such as breeding for both improved quality and disease resistance, cultural practices and soil fertility maintenance and improvement.

Tobacco has been given considerable attention and during the year three leases were entered into to enable the establishment of tobacco experiment farms. These are located near Mareeba, Ingham and Ayr. Except at Mareeba, the programme of work will be carried out in conjunction with the Commonwealth Council for Scientific and Industrial Research. A comprehensive programme of investigational work has been planned for all three stations and the preliminary work has actually been started in each instance. The approach to the problem of increasing tobacco production and improvement of quality of product has been fully discussed by representatives of this Department and Commonwealth Government officers and it is felt that we are working along sound lines to obtain such information as is required to develop this potentially very important industry.

The excellent overall crop and, in many cases, the extremely high average yields of wheat have shown the value of breeding varieties suited to the locality in which they are to be grown. Work on these lines is continuing not only with wheat but with other crops such as sorghum, cotton, maize and cowpeas. In every case it can be claimed that worthwhile results have been secured.

Though suitable sites have been selected, shortages of materials and particularly the provision of living quarters have delayed development of exploratory farms in the Gulf region.

Horticulture Branch.

Though seasonal conditions have been very variable as between different parts of the State, on the whole fruit and vegetable growers have enjoyed a reasonably favourable year, both gluts and periods of under-supply being transient. Heavy plantings of bananas in both New South Wales and Queensland have caused some concern, but there has seldom been over-production of good quality fruit. Insistence on quality of all fruits and vegetables has been and must continue to be recognised as the basis of much of the work of this branch. As an aid in this, it is believed that the *Fruit and Vegetable Act* passed by Parliament last year will be of considerable value.

The Maroochy Experiment Station has been developed appreciably during the past year and it is felt that fruitgrowers on the near North Coast, and more particularly pineapple growers in all districts, will soon receive much valuable assistance and information as the result of the work being done there, especially that in connection with the production of superior planting material and soil management.

The Redlands Experiment Station, on which vegetable work will be concentrated, is making but slow progress due to difficulties in obtaining materials; nevertheless, it is anticipated that experimental work will commence within a few months.

Outstanding results have been obtained in the tomato improvement work in the Stanthorpe district and similar work has now been commenced at four new centres, including one in North Queensland.

The best methods of handling and transporting horticultural products have been the subject of further work and it can be claimed that worthwhile results have been obtained. It may be mentioned that regular shipments of these products in refrigerated rail waggons were made last year to northern and western centres.

Bureau of Sugar Experiment Stations.

The work of the Bureau of Sugar Experiment Stations encompasses virtually all aspects of sugar production, as will be seen from the subjoined report. While the 1947 crop must be regarded as satisfactory under the circumstances, it is pleasing to note that the prospective crop for the current season is estimated to exceed it by about 2,000,000 tons of cane and will probably be greater than any previous crop except that of 1939.

Problems in soil fertility, entomology, plant pathology, breeding and manufacturing have all received attention and worthwhile positive results have been obtained in each field of work. That almost 42 per cent. of the cane grown is of Queensland origin is evidence of the value of pursuing breeding work. Also gratifying are the results of some newer insecticides in combating the cane grub. The disease position generally is very satisfactory, though constant vigilance must continue since several potentially serious species are still threats at least in circumscribed areas.

The opening of an experiment station in the Burdekin area will fill a gap in the chain of these all-important units on which continued advancement so largely depends. The commencement of a venture such as this in these times of shortages is difficult and the Director's fear of possible delay will be readily appreciated.

Regional Experiment Stations.

The work of developing the regional experiment stations is that phase of the activities of the Division in which shortages of materials and equipment are most acutely felt. Nevertheless, considerable progress can be reported and a full programme of work has been initiated at each of the three longer-established stations—Hermitage, Biloela and Kairi. Some progress has also been made at Ayr, where experimental work on subsidiary crops is now in progress.

Besides providing facilities for officers of other branches to carry out investigational work, and facilities for practical training in agriculture for young officers, these stations serve another important and far-reaching purpose in that on them can be tested farm practices as a comprehensive whole. It may be sufficient here to draw attention to the work of these stations in investigations into rotational practices, in which stress is laid on correct land usage with insistence on the proper place of grasses which are to be regarded not only as a truly economic crop but as a safeguard of the soil both in erosion correction and in maintenance of soil structure and fertility.

Insofar as these regional stations can prove the correct economic relationships of crops and animals and bring the results before the farmer, it is felt that a most useful purpose will be served.

Science Branch.

The Science Branch represents the Departmental safeguard against many of the biological enemies of the farmer, be these insects, fungi or higher plants, and the work of the branch is directed largely to that end. Thus, during the period under review, many of the major pests and diseases of crop plants have been further investigated by the Entomology and Plant Pathology sections, much of the work having as its primary objective the assessment of newer insecticides and fungicides. Inevitably, DDT has been placed in the forefront of many entomological investigations and considerable success has attended the use of this material against such pests as codling moth, fruit fly and banana rust thrips. However, DDT has at times after-effects on the incidence of other pests and this complication has demanded and received investigation.

The Plant Pathology Section has attacked disease problems of a wide variety of crops and an appreciable amount has been added to the store of knowledge available for use by farmers. Special reference might be made to the virus diseases of strawberries. In other States these diseases have almost destroyed the industry and the steps being taken here to combat the trouble are amply justified. That the Walsh variety of linseed has exhibited rust-resistant qualities is of particular interest.

The Botany Section has had a very busy year, as is shown by the fact that more than 10,000 determinations of identity of plants have been made. This is important work, not only for its more direct value but also because exploitation of useful species, eradication of harmful weeds and recognition of poisonous species demand in many instances correct identification.

Important work which this section is now handling is that in connection with western pastures and fodder trees, paying particular attention to Mitchell grass and mulga.

Chemical Laboratory.

Much of the work of this branch finds its way to the farmer through other branches of the Department. It is often not realised that behind the recommendation for fertilizer treatment, an insecticide, a weedicide, or the balanced nutrition of an animal lies a great deal of analytical work which in itself frequently requires prolonged careful investigation in the first instance.

As will be seen from the following reports, the work of this branch touches a wide variety of subjects of direct interest to the primary producer. Features to which attention might be drawn are those connected with DDT, minor element toxicities and deficiencies, and soil surveys connected with both settlement of ex-servicemen and forestry projects.

Report of the Agriculture Branch (Mr. D. O. Atherton, Acting Director).

SEASONAL CONDITIONS.

During the year under review, the weather conditions were generally favourable in most agricultural districts. The July, 1947, rainfall was below normal, but earlier rains had been ideal for the main wheat sowings and subsoil moisture was ample to maintain satisfactory growth in July.

August was favoured by valuable rains, particularly in the northern districts; these rains, which came at an opportune time for autumn and winter sown crops, were followed in September by phenomenally good general falls of up to three inches, sufficient to maintain excellent growing conditions. The spring and early summer period was exceptionally favourable for pastures and for the early summer cropping programme. Variable storm rains in October gave above-average recordings in most districts, including the Maranoa and the Downs, where the wheat harvest had commenced. The seasonal storms continued at frequent intervals during November, being heaviest towards the end of the month.

The heavy December rainfall in the agricultural districts yielded from 7 to 10 inches on the south coast and from 5 to 6 inches on the Downs. Notable December rains were Springbrook 1,503 points, Harrisville 1,259, Murgon 1,416, and Nanango 1,270. The January-February period, though favourable in the north, was comparatively dry in the main southern agricultural areas until 28th February, when moderate to heavy rains brought welcome relief. The late February and early March rains included some flood falls in the northern and central districts, and these rains continued at frequent intervals, culminating in the heavy flood rains on the south coast late in March, when potatoes and other crops suffered. Late April and early May were remarkable for the late cyclonic disturbance which brought heavy flood rains to the coastal region from Rockhampton to the New South Wales border. On the Downs, the rain was lighter but sufficient to be of value for early winter cereal sowings. Very little rain was recorded throughout the remainder of May, when late-maturing summer crops were harvested. The year concluded with frequent early June rains and a cyclonic disturbance in which 7 to 11-inch rainfalls occurred in the south-eastern corner from Caloundra to New South Wales. The eastern Darling Downs also received heavy rains in mid-June which retarded wheat-sowing in affected districts.

CROP PRODUCTION.

Wheat.

Seasonal conditions were favourable for early planting and a record area was sown on land that was in good condition. Most crops made excellent growth and a record harvest was in sight by October, though owing to the unusually humid spring conditions rust was prevalent. It was gratifying that several of the Queensland-bred varieties—notably Puseas, Puno, Puora, Three Seas and two new crossbreds as yet unnamed—all withstood rust attack reasonably well and compared favourably with the rust-resistant New South Wales varieties Charter, Gabo and Kendee. Other varieties were susceptible to rust and in many crops the grain was more or less severely pinched.

Record yields were obtained, several farmers harvesting at the rate of 60 bushels per acre from some fields. Rain interfered with the harvest and in November thousands of bags were left standing in water for many days before they could be removed to safety. This resulted in some outright losses and considerable loss of quality, but the final intake from nearly 500,000 acres was approximately 10,500,000 bushels.

Maize.

This crop was adversely affected in most districts by the prolonged dry period experienced in midsummer. Crops planted early were tasselling in dry weather, and intended December-January plantings were delayed so long as to be affected by early frosts. As a result the State yield is not expected to be much more than half the average of the past few years. In the far north, however, seasonal conditions were more favourable, and it is expected that a normal crop will be harvested on the Atherton Tableland.

Grain Sorghum.

The drought resistance of this crop, compared with that of maize, was emphasised during the summer dry spell, particularly on the Darling Downs. In some cases yields of over 100 bushels per acre were obtained, but the total crop was much less than that of the previous year because the area sown to the crop was much smaller. The wheat crop had been a very good one; therefore grain growers planted reduced areas of grain sorghum.

Though the majority of sowings produced satisfactory yields, some crops were adversely affected by dry weather, particularly where early cultivation and soil preparation were faulty. In the central district (Emerald-Springsure) the effects of the dry weather were much more pronounced than elsewhere and the yield from several hundred acres was at the rate of 12-15 bushels per acre.

Sunflower Seed.

Increased prices have given an impetus to the cultivation of this crop, and during the year under review some reasonably good yields were obtained. Giant Russian, Mennonite and Sunrise continue to be the most popular varieties and the first-named appears to give the highest yields. Farmers on the Downs are harvesting this crop with strongly-built makes of wheat harvesters after making suitable modifications. In one instance a crop of Giant Russian up to 12 ft. in height and yielding 1,500 lb. per acre was successfully harvested by machine.

Linseed.

The small areas planted to linseed produced good yields of approximately 10 bushels per acre from 130 acres. It is unlikely that such a good season will occur again for some time, but the encouragement afforded by the season's experience has been such that some 5,500 acres will be planted during 1948.

Lucerne.

The season was generally favourable to this crop, though some damage was caused by flooding and excessive rains. In the Lockyer Valley stands recovered from the heavy insect attacks of the previous year and under irrigation monthly cuttings of one ton of hay to the acre were common in the summer. On farms where lucerne hay is conserved, the reserves consumed during the 1946 drought were restored in stacks and barns.

Canning Beans.

Decreased returns compared with last season were the general rule in all districts where the crop is grown on a commercial scale, and few fields, if any, yielded in excess of 12 bushels per acre. Two of the factors contributing to decreased yields were excessive weed growth, which could not be controlled during the long wet spells, and the prolonged dry weather towards middle and late summer.

Soybeans.

The expansion of the soybean growing industry has not been pronounced. However, many farmers are interested in the crop and once an assured market is available and varieties more suitable for machine harvesting are stabilised further expansion should occur.

Peanuts.

Variable weather conditions, and on many fields the severe effects of monoculture, were not conducive to good yields. High returns from the previous season's crop encouraged further expansion of the area planted to peanuts in all districts where they are grown commercially. This effect was quite obvious even in the South Burnett, where the practice of planting peanuts following peanuts is too prevalent. During the long dry periods many shells were developed without kernels and so a high proportion of "pops" was observed.

Potatoes.

Reasonably good returns were received from both spring and autumn crops, though the former was better than the latter at least in the Lockyer Valley. Generally, the spring planting was favoured with excellent growing conditions, though harvesting was hampered by excessive rains in early summer. The autumn planting was made during the unseasonably dry period of February, and the resulting strike was rather uneven in some cases. The various district average returns fluctuated from about two tons per acre for the autumn crop in the Mackay district to about five tons per acre for the spring crop in the Lockyer Valley.

Tobacco.

In the far north, most of the irrigated early-spring tobacco was seriously affected by blue mould in the field. Some damage was caused to the irrigated crops in other districts also, though the losses were not as severe as those experienced in the far north. The crops grown without irrigation in the Mareeba-Dimbulah districts and further south at Miriam Vale came through the season very well, and some very good yields were reported. The extremely satisfactory yields of cured leaf obtained in the Burdekin and Herbert River areas can be regarded as a good augury for future development of these districts. The average yield of cured leaf from something less than 100 acres planted was more than 1,200 lb. per acre, and one farmer cured and sold 2,000 lb. of leaf per acre.

In the south-western border districts, humid weather in the spring adversely affected the crop, and though nearly 1,000 acres were planted it is not expected that the yields will be much more than half those obtained last season.

Cotton.

The cotton crop was the lowest recorded for many years. The low financial returns from cotton compared with the present high prices for other agricultural produce, and to some extent labour shortages, are probably the most important factors contributing to this unfortunate result. Low yields were the rule in most districts, and in this connection the prolonged dry periods in midsummer and late summer were important factors. So much shedding occurred during these dry periods, and good rains came so late in summer that the plants were unable to recover. District average yields were in the vicinity of 300 lb. per acre in some cases, though a small number of plantings would yield much better. In one instance 2,000 lb. of seed cotton per acre were obtained from a very small irrigated field.

FIELD TRIALS.

Potatoes.

Various trials were conducted in the Fassifern Valley, Lockyer Valley, and Lower Burdekin areas. A closer spacing of the setts than that normally adopted has been shown to increase yields in trials conducted in the Lockyer Valley and Lower Burdekin.

A furrow versus spray irrigation trial in the Lockyer showed no significant difference in yield when equal quantities of water were applied by these two methods. In fertilizer trials it was found that, with increasing applications of phosphate, the response to nitrogen decreases. This shows the importance of the N.P. ratio and indicates that a mixed fertilizer containing phosphate would not increase the yield as much as a straight nitrogenous fertilizer supplying the same amount of nitrogen.

In the Lockyer, a deficiency of nitrogen has been found to occur in several places and to a greater degree on the soils of lighter texture than on those of heavier texture. Deficiencies of potash also occur, but these seem to be characteristic only of the heavy-textured soils of certain localities. No phosphate deficiency has been found. The importance of green manures in correcting nitrogen deficiency has been stressed in the past and in this connection it is noteworthy that a trial conducted during the year on an area where a green manure had been ploughed under gave no response to nitrogen.

In the Fassifern, nitrogen responses are general in the limited number of trials conducted so far. On one of the best potato soils of the district, the increased yield of first-grade tubers following a moderate application of sulphate of ammonia was more than two tons per acre.

The results in the Lower Burdekin vary according to the soil type; while responses to nitrogen and potash have been obtained, further investigations are required to clarify the position.

Maize.

On the Atherton Tableland, a maize-peanut rotation experiment has entered into its second year. The object of this investigation is to test the value of the rotation against continuous maize. Fertilizer trials also have been established on areas of typical forest and scrub soils.

Other fertilizer trials were established in the Boonah and Kingaroy districts. The treatments comprise nitrogen, phosphoric acid, and potash at three levels and in all combinations.

Peanuts.

There is a steadily increasing practice in the Kingaroy district of using superphosphate for peanut production. Some investigation was needed to determine the requirements for phosphate of the two main broad soil types. At the same time it was considered desirable to investigate the value of a silico-phosphate in relation to other phosphates on the red loams. In two trials which have been established, serpentine superphosphate is included in the four phosphate fertilizers under test.

Lucerne.

Further evidence of lucerne responding to applications of superphosphate on soils containing abundant quantities of available phosphates has been collected. It is considered that the response is due to sulphur supplied in the superphosphate as calcium sulphate, and this view is supported by observations in the Lockyer Valley following applications of gypsum (calcium sulphate). An extension of the investigations into the Fassifern Valley and Beaudesert areas is contemplated. Evidence of potash deficiency has also been obtained in some important lucerne-growing areas.

Tobacco.

In the summer of 1945-46 an experiment was established at Miriam Vale that had as its objective the restoration of the productivity of allegedly worn-out tobacco land. The treatments comprised various grasses and legumes in a two-year and three-year rotation with tobacco. Now, at the end of the three-year period, it has been concluded that tobacco, following either one or two years of Rhodes grass, yields almost as well as on the virgin soils, and that tobacco following one year of the legume *Crotalaria goreensis* also yields almost as well as on the virgin soils. After two years of the legume, the yield of cured leaf approached 1,000 lb. per acre, which is as good as, if not better than, the yield obtained from virgin soils. In the same trial tobacco following tobacco failed in each season.

On the Lower Burdekin, fertilizer and variety trials were established at Pioneer and Clare. Because of insect damage no important data were obtained from the fertilizer trials. Satisfactory results were obtained from the variety trials, in which some new varieties showed considerable promise.

Sorghum.

Varietal trials embracing both grain sorghums and fodder types have been continued in several districts, and in some cases new strains being developed by the Branch have been included. This work has now reached a stage where it is hoped to eliminate very soon some of the less promising varieties.

An extensive trial of row spacing and rate of seeding, using the variety Kalo, was conducted on the Darling Downs. Results from this indicate that, in the season under review, a high seeding rate appeared to give higher yields than a low rate of seeding.

Oats.

A seed increase and variety trial, 15 acres in extent and embracing the varieties Fulghum x Victoria, Richland x Victoria and Klein, was established on the Darling Downs. The land used had been fallowed for a long period and was in excellent condition for planting. Seed was sown in mid-June at the rate of 50 lb. per acre, this high rate being adopted because the seed had been held over on the farm from the previous year, when the weather was too dry for planting. All three varieties grew well, and, though some rust was present, a good crop of seed was harvested, the yields in bushels per acre being as follows:—Richland x Victoria 63, Fulghum x Victoria 58, and Klein 41.

Linseed.

Earlier work with variety trials and seed increase plots was continued. Three of the varieties included in these trials—Morocco, Bolley Golden and Malabrigo—though not yet commercially grown in Queensland appear to be quite promising, and yields of up to 18 bushels per acre were obtained.

Soybean.

Field trials with this crop were again limited to variety trials. It is now apparent that the number of American varieties so far included in the trials may be reduced to 25 for further testing. At least two of the imported varieties, as yet unnamed, are considerably better on the Darling Downs than Lincoln or Kabott, the varieties most favoured at present.

Sunflower Seed.

Variety trials were continued and seed increase plots were established. The standard tall variety, Giant Russian, yielded at the rate of 1,705 lb. per acre compared with 914 lb. per acre from Mennonite and 619 lb. per acre from Sunrise. Sunrise appears to be the most stable variety of the three mentioned.

Pastures.

In most of the dairying districts, pasture trials of various kinds were instituted or continued under the supervision of field officers. Much useful information is being obtained from this long-term work. Propagation plots maintained by the Branch have been drawn upon for planting trials of relatively new grasses not yet in commercial use, and a good deal of material was supplied to landholders.

A small trial plot of irrigated pastures including Para grass, molasses grass, Guinea grass, and several tropical legumes was established in the Mackay area. Preliminary results

indicate that in this area Para grass alone, under irrigation, is capable of producing an excellent pasture for dairy stock.

Rice Grass.

This introduced species (*Spartina townsendii*), which has been considered to have some value on coastal flats, has been established on the bank of the Pioneer River at Mackay; the original planting appears to have become established and is gradually extending.

Sweet Potatoes.

Variety trials and a number of propagation plots have been established in several areas. It is expected from results so far obtained that eventually several varieties more satisfactory than those at present planted commercially will be made available to farmers.

PLANT BREEDING AND SEED SELECTION.

Plant breeding within the Agriculture Branch was applied principally to wheat, sorghums, cotton, and maize, though some attention was devoted to oats, soybeans, cowpeas, field peas, and tobacco.

Wheat.

Hermitage Regional Experiment Station was the main centre for wheat breeding, with subsidiary plots at Biloela, Lawes, Roma, and Yarrala. The wet season at the end of November seriously hampered harvesting, and much of the grain was badly weathered and ruined for seed purposes.

The hybrid progeny plot occupied some 700 rod-rows, from which selections were made for further fixation and purification. Observation plots, comprising some 200 named varieties and fixed hybrid selections, were planted at Hermitage, Biloela, Yarrala, Lawes, and Roma, to determine rust reactions under a range of soil and climatic conditions and to provide selections for replicated field-plot testing. The great majority of the newer hybrid selections are highly resistant to the prevalent forms of stem rust, while many are virtually immune. Some selections also show definite resistance to the less troublesome leaf rust, but there are no indications of overall immunity to this disease. From these plots data on yield, maturity, and lodging were also secured.

Replicated trials were conducted with a range of back-cross material supplied by the Waite Agricultural Research Institute of South Australia. The tests showed clearly that it has been possible by the back-cross method to develop strains almost identical with their respective recurrent parents, but carrying in addition near-immunity to stem rust.

Three important advances made during this season were—(i.) the initiation of a back-crossing programme for rust resistance, (ii.) the introduction of replicated nursery field trials for new hybrid selections, and (iii.) the large-scale use of the Pelshenke test for quality testing in newly-bred material.

The back-crossing programme involved crossing each of seven popular Queensland varieties with the stem rust resistant variety Charter. Back-crosses will be made in each case to the respective local parent, and selection will be based solely on rust resistance in the hybrid progenies. To date, F1 crosses have been made with Flora, Puno, Currawa, and Cailloux, first back-crosses with Seafoam and Puora, and second back-crosses with Pusa 4.

The initial nursery strain trial comprised 1/250-acre plots of 25 strains, replicated four times. Useful data on yield and agronomic characters were obtained from this trial, in which the hybrid selection TS KPF–4601 headed the yields with 61·9 bushels per acre. Of the two named varieties included, Gabo was in second position with 60·2 bushels per acre, and Charter 22nd with 47·7 bushels per acre. Many of the newer hybrids yielding well in this test also gave good figures for fermentation time (Pelshenke), and all were resistant to stem rust.

Triplicate Pelshenke tests for gluten quality were carried out on a large number of the new hybrid strains included in the strain trial and observation plots. Times for breaking of the dough-ball ranged from 35 minutes to four hours, indicating a very considerable variation in gluten quality. This test, though by no means absolute, provides a very valuable basis for elimination of the low-quality combinations.

As in previous years, officers of the Agriculture Branch co-operated with the State Wheat Board in making field selections of wheat crops intended for seed. District wheat crop competitions conducted by agricultural show societies greatly simplified this seed selection.

Sorghums.

Breeding work with sorghums was centred at Biloela Regional Experiment Station, but the breeding programme proper was greatly curtailed by the shortage of brown paper bags for the self-pollination of individual heads. Many hundreds of hybrid progenies were held over on this account.

The breeding nursery comprised F_1s of two new crosses and a back-cross, and F_2s of four crosses and two back-crosses. Of these hybrid families three were discarded for reasons of height or other unwanted attributes, while suitable head selections were made from the remainder.

Progeny rows were reduced to 48, all being important strains of major varieties, or uniform selections from early crosses of which small quantities of pure seed were urgently required. These were grown under irrigation, and the requisite seed supplies were produced under bag. Detailed agronomic observations were made for the establishment of inter-strain differences and the provision of accurate varietal descriptions.

Small progeny increases of the newly developed strains EK.1 (Early Kalo), EK.7 (selection ex Early Kalo), and K.8 (Kalo) were planted in isolated areas. The seed secured from hand-harvesting and threshing will be available as mother-seed for certification plots and for purposes of regional testing of the new variety EK.7.

A 10-acre observation plot of the new Wheatland selection 11s was grown under somewhat droughty conditions, and yielded at the rate of 33 bushels per acre. This represented the first field-scale planting of the new strain and its performance was very creditable. Heading

was at a very uniform double-dwarf height, and harvesting was easily accomplished by commercial header. The strain is of the same approximate growing period as standard Wheatland, but the heads are quite distinctive and the grain smaller.

Replicated strain trials were designed to test six strains of Kalo, five of Kafir x Milo, four of Wheatland 11s and 10 of Early Kalo derivatives. The first three trials were grown under irrigation and produced useful yields, while the last was ruined by drought. These trials were successful in establishing differences in yield and agronomic characters as between strains within each varietal group. A further trial located on the central coast near Rockhampton included Coastland (Open Wheatland) strains and hybrid selections chosen for openness of head. Self-fertilized seed was obtained from all rows, and the more promising strains will be tested in replicated plot trials with the object of providing a suitable open-headed variety for use in coastal districts.

The major varietal trial at Biloela comprised six replications of 13 varieties, including the standard commercial varieties and a number of newer selections. Drought ruined all prospects of a payable primary crop, and the recovery was so poor after the late February rains that the secondary crop was considered unworthy of being harvested. The outstanding variety in primary cropping was the earliest in maturity, viz., a double-dwarf Kalo selection (10-2-2-5-1). This was followed in order of preference by Martin, Plainsman, and Early Kalo. In secondary cropping, following the late-season rains, EK.7 (ex Early Kalo) was outstanding, followed by Hegari, Kalo, and Early Kalo, in that order. Many of the early-maturing varieties (e.g., Martin and Plainsman) showed no recovery whatever following the rain.

During the season the strain EK.1 of Early Kalo established itself throughout the Callide Valley as a new variety. Its earliness of maturity coupled with its powers of recovery following a severe check made it a popular choice for early planting, and its yields for the season appear to have justified that choice.

In the South Burnett district the Wheatland variety has been re-selected for the provision of new foundation stocks for seed certification purposes. A nucleus of seed for increase has been obtained from hooded heads of these re-selections. Twelve additional varieties of grain sorghum and 15 varieties of sweet sorghums were also planted for pure-seed selection. Pure-seed increase plots of the sweet sorghum varieties Sugardrip, Atlas, Italian, and Saccaline were established under isolation for the provision of mother-seed for seed certification purposes; it is anticipated that some bushels of seed will be harvested from each of these varieties.

Cotton.

Biloela Regional Experiment Station plantings comprised a hybridisation plot, increase plots for hybrid progenies, and jassid-resistant Miller selections, strain trials, and drought resistance trials.

The hybridisation plot, grown under irrigation, included progenies of earlier crosses intended for inbreeding and further back-crossing. These hybrids were based on the jassid-susceptible varieties Lone Star, Triumph, New Mexico Acala, and Miller as the one parent, and one of the highly resistant varieties, such as Ferguson or a Rhodesian strain, as the other. While segregation was apparent in most of the progeny rows, certain of the back-crosses showed satisfactory uniformity for open plant habit, large boll size and prolificacy. Cuttings carried over the previous winter from selected New Mexico Acala x Ferguson back-crosses were rooted and planted out, and the resultant plants were again back-crossed to New Mexico Acala. Satisfactory supplies of pollinated seed were obtained from all families.

The hybrid increase plot, grown under dry farming conditions, comprised 12 advanced generations of both fourth and second back-cross families. The most promising were of the series B2-8-1-5-0-1-0-0 and closely related lines, which are all highly jassid-resistant and give indications of yielding ability coupled with good boll size.

The jassid-resistant Miller plot was also planted in isolation and under rain-grown conditions. It comprised (i.) commercial resistant varieties for examination and mass selection, (ii.) progeny increases of new strains of which seed is required for extensive testing, and (iii.) progeny rows stemming from the three important initial selections III-17, III-26 and III-165. Plant growth was good, and while the plot was severely affected by the dry weather of January-February good increases should be obtained. No jassid attack was experienced, but all strains with the exception of the commercial lot 41J are known to have high resistance.

A small exploratory plot was planted on a sandy well-drained soil in order to determine whether there was evidence of correlation between hairiness and drought resistance. The results suggested that the hairy varieties Lot 1 and Umil 12 may, even in the absence of jassids but under conditions of water stress, produce and retain more bolls per plant than the current commercial Miller.

Lint samples from commercial varieties and newly-bred strains growing under comparable conditions were prepared for submission to the Shirley Institute in England for evaluation of their spinning qualities.

Varietal selection within the southern and Burnett districts was applied to the varieties Triumph, Lone Star, Miller 610, and the new introductions Locket and Deltapine 14. Of the Triumph progeny plots, that of OS.39-1-0 withstood the dry season satisfactorily, providing a range of new selections and a promising progeny increase. The Lone Star progeny plot was adversely affected by drought, but useful selection was possible and the quality of the fibre was classed as very good. A moderate yield was obtained from the Miller 610 progeny block, providing scope for new selections and two progeny increases. The new introduction, Locket, grown under irrigation on a sandy alluvial at Gayndah, yielded more than 2,000 lb. of seed cotton per acre; the variety proved most prolific and the fibre was of good length and uniformly strong. Selection was directed towards suitability for mechanical harvesting.

The plot of Deltapine 14, another recent introduction, largely succumbed to disease, but sufficient plants recovered to provide a seed increase.

Maize.

Maize improvement has been restricted to mass selection within the varieties Improved Yellow Dent, Reid's Yellow Dent, Star Leaming, and Funk's Ninety Day. All of these varieties had suffered from inattention during the war years, and seed stocks of the last two had been reduced almost to the point of extinction. Attention was therefore directed towards the building up of seed stocks of the two varieties in short supply, and to the purification of all four varieties for future seed increase. Small plots of each of the four varieties were established in the Mary Valley district. Rainfall, though plentiful, proved too erratic in its distribution for successful maize culture, and crops were therefore only fair.

Improved Yellow Dent plots yielded a field selection of 166 lb. of seed after a range of ears had been set aside for a modified form of ear-to-row testing. Barn selections of this variety should provide 45 to 50 bushels of seed for sale to farmers. Field selections were made within the plots of each of the other three varieties. From the harvested ears a special selection of 10-20 ears was made in each case for detailed study and ear-to-row planting. Residual ears were then culled and the remainder shelled for the provision of foundation stocks for commercial increase.

Other Crops.

Fifty-five hybrid selections of cowpea were planted at Roma, from which descriptive data were obtained and seed samples secured for further testing. A similar range of material from the pea crosses Roma 3011 x Telephone and Daisy x Mackay was grown at Moggill, and seed increases obtained. A limited programme of selection within introduced soybean varieties has been carried out concurrently with the field testing of these introductions; major objectives are yield of pulse and suitability for mechanical harvesting. Selection has been carried out at Hermitage within progenies from the oat cross (Bond x Victoria) x Hajira. Most of the plant-rows are still segregating conspicuously and selection is being based primarily on resistance to crown rust and stem rust. In tobacco, new seed stocks have been imported to replace old stocks whose purity had become suspect during the war years. Careful control is being exercised over seed production, and new varieties will be introduced into the scheme as they prove their superiority in replicated field trials.

SOILS INVESTIGATIONS.

Where soil fertility problems have been involved on and in the vicinity of the various Regional Experiment Stations, the Senior Soils Technologist has co-operated in planting crop trials. This Officer has also continued in co-operation with the Department of Public Lands in making surveys of lands under consideration for the settlement of ex-servicemen.

A reconnaissance survey of the soils of the Lower Burdekin basin was made in conjunction with officers of the Bureau of Investigation of Land and Water Resources and the Council for Scientific and Industrial Research. During this survey, the potentialities of the area for development under irrigation were provisionally assessed.

Other soils inspections have been carried out at various places, and details of soil types recorded. One of these inspections, made by the Senior Soils Technologist and the Director of Agriculture, covered the Cooktown, McIvor River and Laura districts, which are of special interest in view of their possibilities for agricultural development, in particular tobacco growing.

TROPICAL AGRICULTURE.

At the South Johnstone Station attention was again concentrated on investigation of pasture establishment and management under tropical conditions. This work has been the main feature of Bureau activities in recent years and results to date have been encouraging. An extension area has been established at Utchee Creek for larger trials under conditions in which tropical pasture may subsequently be of considerable importance. Attention was also given to tropical crops, including rice, derris, tea, ramie, and sweet potatoes.

Rainfall distribution was good during the year under review, and pasture growth for the most part was well maintained in all months, though somewhat excessive during February, March, and April and slightly depressed in May and June. Otherwise the season favoured the growth of all tropical crops on the station.

Station Pasture Investigations.

The season was so favourable to pasture growth that the additional two-acre-unit area of grass introduced into the rotation last year on the station was not used in the grazing trials. Consequently, the 18 acres of pasture maintained 16 head of steers for a complete year. Even at this rate of stocking, the mower had to be used on several occasions early in 1948 to handle excessive growth in some unit areas. Though the pasture mixtures had not developed dense swards, observations suggested that for the first four months of the calendar year the pastures could have carried approximately two beasts per acre.

The grazing period was varied slightly to the extent of allowing 16 head access to a two-acre field for five days and then spelling for 40 days. Each unit area of two acres was grazed in randomised order. During the summer months a 40-day spell proved to be too long and, with pasture mixtures containing Guinea grass (*Panicum maximum*) particularly, a 20-day spell may have been more satisfactory. Stock on the grazing trial were in prime condition during the last six months and will be disposed of when replacements arrive.

A survey of the pastures after the second year of grazing has revealed some interesting information. Where calopo (*Calopogonium mucunoides*) and molasses grass (*Melinis*

minutiflora) were planted in a mixture, the animals tended to avoid the former during the summer wet season. As a result, the vigorously growing calopo dominated the stand and by the end of June had practically overrun the grass. In the mixture of purple-top guinea grass (*Panicum maximum* var. *coloratum*) and centro (*Centrosema pubescens*), the latter appeared to be too vigorous for the grass, but with common Guinea grass and stylo (*Stylosanthes gracilis*) the grass dominated. Centro is normally grazed by stock but purple-top Guinea is very palatable and was favoured by the animals, thus allowing centro in the mixture to grow with comparatively little check. In the summer months the legume gained a distinct advantage as a result of this selective grazing. On the other hand, common Guinea grass is less palatable but more vigorous than purple-top Guinea grass and in mixtures maintained a better balance of grass and legume.

Observations to date indicate that more suitable grass-legume combinations would be (*a*) common Guinea grass and centro; (*b*) purple-top Guinea grass and stylo. There is evidence also that Para grass (*Brachiaria purpurascens*) and puero (*Pueraria phaseoloides*) would be a good mixture if not grown in swampy localities.

Grass and legume introduction plots were continued. In the small grass-legume association plots *Desmodium canum* and *D. heterophyllum* combined well with *Brachiaria miliiformis*, and stylo with *Panicum maximum* var. *coloratum*. *Andropogon gayanus* appeared to be a promising species among the new grass introductions.

Utchee Creek Reservation.

Late in 1947, 40 acres of virgin scrub were felled and burnt. The area was divided into 10 paddocks each comprising four acres, and immediately following the burn each paddock was sown with a grass or grass-legume mixture which had been selected as promising from the main station trials. A good establishment was obtained in all paddocks, and in the near future arrangements will be completed for a continuous grazing investigation.

The two 10-acre blocks established previously made good progress. The original clearing remained very clean, but the area cleared in 1946 developed sucker growth in some patches despite the excellent grass cover and will need to be controlled.

Preparations have been made for the building of yards, the installation of a weighbridge, the reticulation of water to each paddock and the completion of fencing.

Tropical Crops.

Rice.—Seven varieties of rice were included in a trial at the Station. All grew well and produced yields varying from 12 to 47 bushels per acre. Mekeo, a strain introduced from New Guinea, was the most promising variety in the trial. It is a tall late-maturing variety which yielded 38 bushels per acre, and in respect of its ability to withstand wet and windy conditions was superior to the others.

A larger trial embracing 12 varieties with three replications was planted at Tully on black tea-tree swamp country unsuitable for other cropping. No irrigation was given and all varieties suffered from inadequate soil moisture in April. Harvesting was not completed, but indications were that yields would be considerably below those obtained at the Station. Observations suggested that problems requiring investigation are sowing rates, weed competition, and the most suitable time for planting.

Derris.—A stage-of-maturity trial was planted and a good strike secured. Selections of high rotenone-yielding material were made and small plots with three replications of each selection were planted.

Weather conditions prevented the initiation of mechanical harvesting trials, but work along these lines and a fertilizer trial are planned for next season.

Tea.—All tea plants at the Station were allowed to seed. Over 250 lb. of seed and 2,000 plants were forwarded to the Papua-New Guinea Department of Agriculture. Pruning of the trees was carried out with the object of developing a new type of bush, and small plants were tubed for the purpose of establishing a small observation area on higher ground at the Bureau.

Ramie.—The ramie plot at the Station yielded at the rate of eight tons of green material for a 12-month period. Indications are that liberal applications of fertilizer will be required to maintain yields. Attacks by a Chrysomelid beetle (*Rhyparida* sp.) proved to be severe.

Sweet Potatoes.—The varietal plots of sweet potatoes did not thrive. An infestation of sweet potato weevil (*Cylas formicarius* Fabr.) occurred following the introduction of new material and a new area will have to be established.

Miscellaneous.—The Badila sugar cane, planted on land which had carried a stand of the legume puero continuously for five years, grew very well and the yield per acre is estimated at 50 tons of cane. The result is a clear indication that this legume may play an important part in raising the fertility of old cultivations in coastal North Queensland.

Report of the Horticulture Branch (Dr. S. A. Trout, Director).

The Horticulture Branch has been very actively engaged on advisory and investigational work, market inspection, quarantine administration and overseas export supervision. The need for increased advisory services has become more urgent because of the number of new growers without sufficient horticultural experience, and because low prices received for some fruits and vegetables have brought home to many the need for more efficient production methods. Unpayable prices have also emphasised the need for plant improvement in order to obtain varieties reasonably resistant to disease, of high yielding capacity, and of good storage qualities. Investigational work on plant selection and improvement has, therefore, been intensified over a wide range of growing conditions. The maintenance of soil fertility is particularly important, and increasing attention is being given to erosion control, watering practices and plant nutrition.

While field investigations have taken up the greater part of the time of the horticultural officers, progress has been made in regard to marketing and distribution. The appointment of additional inspectors has enabled some inspection to be carried out at loading centres, but a heavy demand is still being made on the services of market inspectors. Steps have been taken to provide the inspectors with much wider powers and a new *Fruit and Vegetables Act* came into force in December, 1947. This Act contains clauses specially framed to prevent the practices of topping, falsely marking and improper handling of fruit and vegetables. Regulations covering maturity and grade standards are being drawn up for all fruits and vegetables of commercial importance in Queensland. Wastage in the market has been greater this year because of unfavourable weather conditions during harvesting and because interruption to rail traffic caused temporary gluts on the Brisbane market, as country outlets were not available.

SEASONAL CONDITIONS AND PRODUCTION TRENDS.

Weather conditions in North Queensland were favourable for the production of horticultural crops, as periodical rains during spring and early summer maintained vigorous growth and no flooding occurred during the summer months. The area of bananas and citrus has increased slightly, while some expansion in pineapple production has taken place on Magnetic Island and in the Bowen district. There was a light crop of mangoes, but the production of papaws has been in excess of requirements because of the difficulty of finding more distant markets. The tomato crop in Bowen was a record, but owing to the extremely mild winter, which enabled crops to be grown over a longer period, there was considerable competition from growers in southern Queensland and New South Wales. The area under other vegetables in North Queensland has decreased very considerably following the withdrawal of military forces.

The conditions in central coastal Queensland were good and production from standing crops has been well maintained. Supplies of truck crops were in excess of requirements in the spring, but insufficient in late summer and autumn. There was a heavy summer crop of pineapples and bananas, and some further expansion in these crops has taken place. Additional plantings of papaws have been made, but severe losses were experienced through disease.

A particularly good season was experienced on the near North Coast, but cyclonic rains in April and May damaged the bean crop. The summer crop of pineapples was approximately 900,000 cases, but the fresh fruit market has been stabilized by diversion of a considerable proportion of the fruit to canneries. Bananas were in over-supply during the early summer months, but conditions improved considerably later. Some expansion has taken place in both pineapples and bananas.

In the Brisbane area, weather conditions have been very unsatisfactory, as excessive rains caused heavy losses during the harvesting of the late spring and early summer crops, while cyclonic conditions during the autumn severely affected winter crops. Because of low prices received for vegetables and the prospect of a heavy demand from processors at a very satisfactory price, many more growers have turned to strawberries and it is anticipated that this crop will continue to increase in importance both in this district and on the near North Coast. Papaws, as in other districts of Queensland, have suffered a severe setback because of disease. The production of grapes is increasing, but only a fair crop was harvested last year.

In south-eastern Queensland generally, and particularly in South Coast districts, mild conditions were experienced in winter, spring and summer, and this may have resulted in a somewhat lower incidence of bunchy top in bananas. During the early summer months there was an over-supply of Cavendish bananas, and, with resultant low prices, growers eradicated marginal areas. There has been a record number of new plantings, but, owing to the difficulty of obtaining suitable land, many plantations are being established in inaccessible areas. Considerable damage to the South Coast banana crop was caused by cyclonic conditions in the autumn.

Conditions in the Lockyer district have been satisfactory, and some expansion of tomato growing has taken place.

The grape crop in Roma was the lightest on record.

A comparatively mild winter was experienced in the Granite Belt and little damage was caused by frost. However, an unusually wet spring and early summer caused severe losses in grapes through mould wastage. Somewhat drier midsummer conditions were unfavourable for the early sowing of cover crops. The northern end of the district was severely affected by hail storms, resulting in a considerable loss of fruit. The apple crop was less than in the previous year, but there was a good average crop of other fruits and vegetables. A considerable number of apple trees was re-worked to other varieties, but supplies of young trees of the good varieties were not sufficient for requirements.

EXPERIMENT STATION ACTIVITIES.

Maroochy Experiment Station.

The development of the Maroochy station is proceeding satisfactorily. A new road has been constructed across the creek to the permanent buildings; additional equipment has been provided; and machinery and packing sheds have been erected. Several more small areas have been brought under cultivation for papaws and citrus.

Two acres of citrus trees, worked from buds taken from parent trees of superior qualities, have been planted out to serve ultimately as a source of selected budwood for nurserymen. This establishment of pedigreed citrus plots is still in progress and further plantings will shortly be made at the station and also at Lawes.

A large trial has been planted out with the Bettina variety of papaw with the twofold object of obtaining further information on the effect of lime and of eventually securing a supply of seed of this variety for distribution to farmers.

The multiplication of selected pineapple material is proceeding satisfactorily. Experiments are being carried out to compare the effect of hormone sprays with that of calcium carbide on flower induction in pineapples.

Trials with annual and perennial legumes have taken place in order to determine their suitability as cover crops. Attention has also been given to erosion control by the use of cover crops and planting on the contour.

Further work with ginger has indicated that to obtain the best combination of yield and quality the crop should be harvested in April. Two applications of 4-12-4 fertilizer, six to eight weeks apart, appeared superior to one single application in the spring. As rainfall during the season was well distributed, the yield of ginger from the sawdust mulched plots was no greater than that from the bare plots, but sawdust mulch considerably reduced weed growth.

Redlands Experiment Station.

The development of the Redlands station has been greatly impeded by the lack of buildings, but an army hut has now been erected as a temporary residence for a Manager or Foreman and considerable progress can be expected once this officer is appointed and takes up residence. About four acres of land were cleared and planted with Poona pea in the spring and barley in the autumn. A fair flow of water has been obtained from a bore and this will be a useful supplement to the Hilliard Creek supply. An attempt is now being made to obtain suitable irrigation equipment.

Kamerunga Field Station.

Development of this station will now proceed more rapidly with the provision of a tractor and cultivating equipment. Cultural trials with bananas and breeding programmes with hermaphrodite papaw strains are in progress. Mango seedlings have been raised for subsequent budding, while trials with stringless beans, sweet corn and oriental cucumbers have yielded useful information.

VEGETABLE INVESTIGATIONS.

In the Brisbane area observational trials with 17 strains of several tomato varieties were carried out together with tests of the agronomic characters of 17 fusarium-wilt resistant strains received from the Council for Scientific and Industrial Research. The varieties Sioux and Grosse Lisse, recently introduced to this State, are being planted commercially on an increasing scale. The Stanthorpe tomato programme was carried a step further by a variety trial of eight varieties in which yields of up to 900 half-bushel cases per acre were obtained; by a Rutgers strain trial involving 10 strains in which the best yield was over 1,000 half-bushel cases per acre; and by the continued selection for seed of superior plants in block plantings of the varieties Valiant, Sioux, Rutgers, Grosse Lisse and Rutgers x Marvel hybrid. These varieties have, over a period of several years, given excellent results in the Stanthorpe district, yielding an average of 800 cases per acre, as compared with the district average of about 200 cases, and, in the expectation of a seed certification scheme being initiated in the near future, an appreciable quantity of seed has already been collected to serve as mother-seed for next season and for bulk disposal to growers. Variety trials are also being carried out at Bowen, Cairns, and Rockhampton, in the Lockyer Valley and on the South Coast. In each district single plant selections of the most promising varieties will be made.

Lettuce trials carried out in the Toowoomba and Brisbane areas have shown that the Great Lakes variety is at least as suitable as any other variety for summer use. The production of summer lettuce is a difficult matter in this State and any addition to the varieties which may be successfully grown at this time of the year is welcome.

Trials have also been carried out with cauliflowers in the Stanthorpe and Brisbane districts in an attempt to assess the value of new varieties, particularly for early crops. In the Stanthorpe district also there is a need for varieties better suited generally to the local conditions; standard varieties produce an undue proportion of poor heads, irrespective of time of planting.

FRUIT INVESTIGATIONS.

Custard Apples.

An investigation of the variable yield of custard apples in southern Queensland has been initiated, and varieties grown in Queensland are being classified in co-operation with the Botany Section.

Papaws.

Papaw breeding and selection work which had been carried out on a farmer's property in the Nambour district has been largely transferred to Maroochy Experiment Station. Present plantings consist principally of progeny rows of Bettina and Petersen varieties, together with a number of F1 hybrids, in addition to the large planting of Bettina in the trial previously mentioned. Small lots of seed of Bettina and other varieties have been forwarded to growers as part of the experimental programme, but as yet no attempt can be made to supply seed for general distribution to farmers.

This work has as its objective the standardisation of a few varieties which produce fruit of a type calculated to meet market demands and which also have some resistance to ripe fruit rots.

Citrus.

Investigational work on citrus culture will now be co-ordinated under the horticulturist stationed at Gayndah. Trials were continued in the Gayndah and near North Coast districts on fertilizer requirements, grape fruit decline and fruit drop in navel oranges, while the cover crop trials on Maroochy Experiment Station also have direct reference to citrus soil management. Tests with hormones gave inconclusive results with regard to fruit drop. This year approximately 150,000 buds and 217 lb. of seed were supplied to nurserymen under the citrus budwood scheme.

Avocadoes.

Officers have assisted growers in working seedling trees to standard superior varieties. Plans are in hand for the establishment of an experimental block at Maroochy Experiment Station.

Queensland Nuts.

The production of Queensland nuts has increased considerably and last year production was approximately 50 tons. Interest is centred in the thin-shelled type which can be easily cracked and which yields 60 per cent. edible material. The possibility of marketing the nut in a processed form is under consideration. Attempts are being made to propagate Queensland nut trees by asexual methods, using hormones to stimulate root growth from cuttings.

Bananas.

During the year new plantings of bananas amounted to 3,584 acres, while 1,363 acres were eradicated. This brought the total acreage under production in Queensland to 15,426, of which 11,607 are in bearing and 3,819 not bearing. The number of commercial growers has increased from 3,230 for 1946-47 to 3,731 for the year under review. Bunchy top incidence has been considerably less than last year; as previously stated, this may have been associated with the mild summer temperatures. Growers have co-operated satisfactorily with Departmental officers in controlling the disease. There are some indications that the Mons Marie variety is less susceptible to bunchy top than the Cavendish and there has been a considerable increase in plantings of the former variety. Methods for reclaiming old land other than by the use of lantana are being investigated and in this connection a very good stand of pigeon pea was established on a property on the South Coast. Some growers are using Poona pea as a summer cover crop in established plantings to save chipping costs, to reduce erosion and generally to maintain fertility. Further investigation of this practice is necessary as it is obviously fraught with some risk in dry seasons.

Deciduous Fruits.

Soil management work has been continued in the Granite Belt with various cover crops and the effect of fertilizers on lupins has been further investigated.

Exploratory trials on the prevention of bud-shedding in early peaches and dieback in plums were carried out with inconclusive results.

Grapes.

In the preliminary experiment the Casanave Cordon method of pruning continues to give increased yields with some varieties of grapes when compared with the Unilateral Cordon and Bordelaise Espalier methods. The plans to investigate pruning methods more closely, and also planting distances, were proceeded with when the three varieties Muscat Hamburg, Waltham Cross and Purple Cornichon were planted out in the experimental vineyard at Severnlea in the Stanthorpe district. Establishment of the young vines was not altogether satisfactory owing to weather conditions and some replanting is to be done.

Arrangements are in hand for the planting of further phylloxera-resistant stocks on the same site. These vines were obtained from Victoria and have been growing for a period in quarantine at Maroochy Experiment Station.

STORAGE AND TRANSPORT.

Work relating to problems of storage and transport has been conducted in conjunction with field investigations, and has included experiments on maturity standards, storage, refrigerated transport, skin coatings, ripening and packing, and experimental consignments overseas.

Refrigerated Transport.

Refrigerated transport was seriously affected by interruptions to rail services, but supervision was given to experimental consignments being sent to North Queensland and Mt. Isa. Temperature records of every consignment, both refrigerated and unrefrigerated, were taken by officers at Townsville and Cairns in order to determine the period of the year over which refrigerated transport is necessary. The question of installing air circulation in railway wagons, especially for the carriage of bananas from North Queensland, has been considered. Plans are in hand for a co-operative experiment with C.S.I.R. to determine whether refrigerated trucks used for fruit and vegetables are also suitable for the carriage of meat over long distances.

Papaw Canning.

Canning trials were carried out with selected papaw strains to determine their suitability for canning. Bettina, a Nambour-bred variety which has shown considerable promise in field trials, gave a very good yield of canned fruit and a particularly palatable product.

Market Quality of Tomato Varieties.

In conjunction with field trials, experiments are being conducted to determine the carrying quality of tomato varieties. To this end samples of fruit from the field experiments are brought to Brisbane, where they are subjected to rigorous examination of their characteristics from the market point of view. Officers from

the Branch made a survey in the Sydney market during the winter months to determine the market requirements for Bowen tomatoes. The survey indicated that considerable improvement in growing, selection of fruit of correct maturity and packing is desirable and that field trials are necessary to determine whether varieties can be grown which might prove more satisfactory than Bowen Buckeye or Denisonia.

Maturity Standards.

For apples grown in the Granite Belt data are being collected on the time between full flowering and full maturity as judged by colour, palatability, texture and acidity of the fruit. Experiments are also being carried out on the change in chemical composition during maturation of varieties of grapes.

Skin Coatings for Apples.

The use of skin coatings for extending the storage life of Granny Smith apples grown in the Granite Belt is being investigated. Very satisfactory results were obtained by dipping fruit in an alcoholic solution of castor oil.

Packing Experiments with Cases of Various Sizes.

Experiments are being conducted with apples to determine the most suitable case for overseas export. The present dump case of $8\frac{2}{3}$ in. width does not contain sufficient weight of certain varieties, and the question of an increase in the dimensions of the case is being considered.

Pineapples.

Standard Pack for Pineapples: Based on recommendations from the Science and Horticulture Branches, the Committee of Direction of Fruit Marketing agreed to implement a scheme for a standard pack of pineapples with a view to giving the consumer, especially in interstate markets, a more attractive pack, free from wastage during the summer months. Consignments from growers who have qualified for the scheme will be forwarded to various country and interstate branches of the Committee of Direction of Fruit Marketing and possibly to New Zealand. The present methods of harvesting and packing of pineapples leave much to be desired, but it is hoped that some improvement will be effected by the implementation of this scheme.

New Zealand Export of Pineapples: Further experiments with regard to the export of pineapples to New Zealand were handicapped during the summer months by the interruption to rail transport, and trials during the winter have not been made because of the possible development of black heart. Experiments are being planned with a view to obtaining a more suitable container than the tropical case in order to avoid the considerable amount of bruising which has occurred in past consignments. The shortage of suitable shipping and the uncertainty of sailing dates make the planning of experimental consignments very difficult.

Canning Experiments with Pineapples: As canneries were not able to cope with the peak of the summer pineapple crop, large quantities had to be cool stored, and the efforts of several officers were directed towards advising commercial stores on the best methods of storage. The quality of pineapples canned after a period of three weeks at 45 deg. to 50 deg. F. was equal to that of unstored fruit.

Black Heart Investigations: A questionnaire was forwarded to pineapple growers seeking information on cultural practices and on factors associated with the development of black heart. A number of factors which growers have considered to be of importance is being investigated in the field and wastage is being assessed in the cannery. Last year, experiments showed that incipient black heart is present in the fruit at a very early stage in its growth and is only apparent after the fruit has ripened. One very interesting feature is that fruit affected with black heart has a much higher content of reducing sugars and a much lower content of ascorbic acid than sound fruit.

Citrus Transport.

Sample cases of citrus fruit are being forwarded from North Queensland to Brisbane to determine the possibility of marketing this fruit in Brisbane. Northern fruit matures earlier than that in the southern districts and hence it may find a place on the Brisbane market at the beginning of the season. Examinations are being made in conjunction with the Science Branch to determine whether wastage can be reduced by orchard treatment or by improved transport.

Citrus Colouring.

Preliminary investigations have been made of the methods used in colouring citrus fruits and records of temperature, humidity and gas concentration in colouring rooms are being obtained. Considerable wastage frequently occurs through faulty ripening technique.

Bananas.

Investigations in regard to methods used commercially for ripening bananas are being continued and studies are being made on factors associated with rubberiness. Experimental consignments have been made to South Australia to determine the effect of packing in hands, in clusters and in singles on subsequent wastage, especially in regard to losses from squirter disease. As little wastage has occurred in any of the packs, the results have not been conclusive.

Packing Instruction.

Practical demonstration of the method of packing apples and citrus fruits has been given to approximately 200 school pupils in the Granite Belt and the Maroochy district. A considerable number of growers has been given individual instruction.

Cool Storage Laboratory.

Funds have been made available and a site selected for the erection of a laboratory and experimental cool storage chamber. Such facilities are essential in order to obtain data on the storage behaviour of fruit and vegetables grown in Queensland. Attention will also be

given to problems associated with the preservation of fruits and vegetables in the canned and in the frozen state, as interest in these methods of preservation has been stimulated by the erection by the Committee of Direction of Fruit Marketing of a cannery at Northgate and by recent developments in quick freezing.

Overseas Export.

During the year, 136,662 cases of citrus, 27,445 cases of apples, and 7,606 crates of vegetables were exported from Brisbane to Singapore and Hong Kong. Of this quantity, 17,493 cases of apples, 8,140 cases of citrus, and 7,606 crates of vegetables were grown in Queensland. The major portion of these consignments was carried in unrefrigerated ventilated holds and generally arrived overseas in a satisfactory condition. Shipping companies have been advised in regard to correct methods of stacking and ventilation, as extremely hot conditions prevail in 'tween deck holds during transit through the tropics. This year, the quantity of apples sent from the Granite Belt has been very much less than last year, as shipping space was not available until May.

QUARANTINE.

Quarantine inspection has been concentrated chiefly on the importation of logs from Borneo and every precaution has been taken to prevent the entry of timber pests into Queensland. Quarantine conditions for cotton have also been laid down to meet the demands of spinning mills to be established in Queensland and for which considerable quantities of cotton will be imported from overseas. In view of the disease position in America, the importation of avocado trees is being closely watched in order to safeguard the Queensland industry. Quarantine regulations have also been amended for certain seeds, and import permits are now required for linseed, maize, peanuts, soybeans and tobacco.

EXPORTS AND IMPORTS.

The following figures show the exports and imports of fruit and vegetables during 1947-48.

EXPORTS.

Crop.	Quantity.
Apples	9,304 cases
Avocadoes	2,949 cases
Bananas	166,274 cases
Citrus	64,725 cases
Custard Apples	12,202 cases
Egg Fruit	2,499 cases
Grapes	11,017 cases
Mangoes	17,591 cases
Melons	19,830 bags
Papaws	92,336 cases
Passion Fruit	10,346 cases
Pears	2,096 cases
Pineapples	698,567 cases
Strawberries	7,062 trays
Fruits (Miscellaneous)	26,658 cases
Beans	116,501 cases
Beetroot	3,817 bags
Cabbage	3,681 bags
Carrots	8,906 bags
Cucumbers	78,007 cases
Marrows	25,917 bags
Onions	71,326 bags
Peas	10,761 bags
Pumpkins	107,416 bags
Tomatoes	716,039 cases
Vegetables (Miscellaneous)	5,369 bags

IMPORTS.

Crop.	Quantity.
Apples	295,878 cases
Apricots	19,949 cases
Cherries	10,070 cases
Citrus	270,584 cases
Grapes	13,432 cases
Passion Fruit	5,314 cases
Peaches	20,798 cases
Pears	158,594 cases
Plums	13,247 cases
Quinces	3,138 cases
Fruit (Miscellaneous)	160,903 cases
Beetroot	151 bags
Carrots	1,446 bags
Celery	5,131 cases
Onions	89,552 bags
Peas	3,791 bags
Potatoes	385,727 bags
Swedes	7,541 bags
Tomatoes	1,674 cases
Vegetables (Miscellaneous)	37,233 bags

Report of the Bureau of Sugar Experiment Stations (Mr. N. J. King, Director).

SEASONAL CONDITIONS.

The year 1947-48 started with a dry July throughout the sugar belt, but early August rains in most areas provided sufficient moisture for young cane and September falls exceeded averages in all districts except Mackay. October was dry but November rains were good in all areas except the Lower Burdekin and Mackay. At this stage an excellent crop for 1948 was in sight and the wet season ensured its development in the northern and southern areas. Mackay and the irrigated Burdekin area missed the normal wet seasons but fair summer rains produced late crop growth. In both north and south better than average late-autumn weather was responsible for continued development right to the start of harvesting operations.

CROP YIELDS.

The total tonnage of cane crushed during the 1947 season was 4,150,987 tons. This figure was a distinct improvement on the previous year, when the crop amounted to only 3,714,475 tons, but was still considerably below average production for the State. Many mills experienced short crushing seasons and only four of the State's 32 mills exceeded their peak allocation of sugar.

The preliminary estimate of the 1948 crop, made in May, revealed that some 5,600,000 tons of cane would be available for crushing and it was calculated that there would be manufactured therefrom approximately 810,000 tons of 94 n.t. sugar. This figure, if attained, will constitute the second largest production on record. The area available for harvest was estimated at 264,000 acres. Since the May estimates very good rains have been recorded on two occasions in the southern areas and it would appear that estimates will increase in those districts. There is also a tendency to increase the estimated cane tonnage in some of the northern mill areas, so any unpredictable frost damage in parts of the south should be more than offset by late growth in other localities.

SOILS INVESTIGATIONS.

Despite staff shortage a very heavy programme of field experimental work was conducted. Soil fertility surveys were completed in Mossman, Innisfail, North Eton, and South Maroochy areas and the extensive Tully Survey was continued by the Tully mill staff in collaboration with the Bureau. The results of these surveys indicated that the plant food status of many of the soils is still low and that adequate and intelligent fertilizing is necessary to restore the plant foods depleted during the period of war-time fertilizer shortage.

Fifty-two lime trials were harvested during the year, of which 38 gave positive responses to lime. The relatively large lime trial programme is an endeavour to correlate lime requirement with acidity measurements. There is evidence to indicate that subsoil pH figures may play a not unimportant part in the approach to the problem.

Seventeen minor element trials, widely distributed over the main sugar-producing soils, were completed; with one exception they gave negative results. One soil, a poor sandy loam in the Nambour area, is apparently responding to zinc plus copper. It is pleasing to note that Queensland sugar cane soils are, in the main, not yet suffering from these deficiencies.

The standard fertilizer trials were carried out in as many mill areas as possible. These trials are indicating very clearly the need for more attention to balance between nitrogen and potash. It is becoming abundantly clear that in many of these soils the application of ammonium sulphate is of little value unless sufficient muriate of potash is also applied.

The Assistant Director of the Bureau proceeded overseas towards the end of the year to observe soil improvement practices in various countries.

VARIETAL TRIALS.

This aspect of field experimentation formed the major part of the programme. In the far north Eros outyielded P.O.J.2878 and Badila in both cane and sugar per acre, while Trojan in other trials proved superior to Q.53 and Cato. S.J.4 was significantly better than Q.54 and Badila on four farms at Innisfail, while Trojan outyielded E.K.28 and Badila on two farms at Home Hill.

In the Mackay area, Q.50 proved superior to Q.28, Q.44 and others, on three farms, and to Q.28, P.O.J.2878 and Trojan on the Experiment Station. At Bundaberg, C.P.29/116 outyielded Q.28, Q.52 and Co.290 on three farms, Q.49 was superior in sugar per acre to Q.47, Q.52 and P.O.J.2878 on two farms, and C.P.29/116 was better than Q.25, Q.47, Q.48, Q.49 and Co.290 on Fairymead Plantation. In the Maroochy area also C.P.29/116 exceeded Q.28, Q.47, Co.290 and P.O.J.2878.

Variety distributions carried out during the year included Trojan and Q.50 in Mackay, Q.28 in Bundaberg, Co.301, Q.28 and Q.49 in Childers and Q.47, Q.49 and Vesta in Nambour.

GREEN MANURES.

New legume crops received considerable attention. The outstanding success of the cowpea Reeve's Selection, Q.1582, in the northern and central districts, where its resistance to wilt was of such a high order, justified its rapid propagation. Arrangements were made through district canegrowers' organisations to have the seed stocks propagated commercially in seed-growing areas and it is hoped that marketing of this variety will begin in 1949. In all districts velvet beans produced excellent crops under a variety of conditions and, for the south in particular, they appear to be well adapted; drought and bean fly resistance are two of their characteristics.

WEEDICIDES.

Investigation work with hormone-type weedicides was continued during the 1947-48 summer months. Five commercial lines were used in several trials but emphasis was placed on the effects of these substances on nut-grass (*Cyperus rotundus*). Some interesting results were obtained in the killing back of the nut grass to such an extent as to give freedom from this pest in young cane for up to six weeks, but the cost of treatment made it uneconomical at present-day costs of the weedicides. A comprehensive list of weeds which are found in canefields has been prepared indicating resistance, tolerance and susceptibility to these products.

EXPERIMENT STATION ACTIVITIES.

Seedling Propagation.

Seedling production work proceeded as usual at all stations and at the sub-station at Bartle Frere. Following this extension of seedling activities into localities with special environments, a seedling plot was also established this year on scrub soil in Mackay. The majority of seedling canes are specially adapted for the conditions under which they are selected and it becomes increasingly obvious that seedling plots are desirable features of all major cane-growing areas. Selection is then possible under the local soil and climatic conditions.

Field days were held at all three stations during May and June. Very large attendances were recorded at these full-day functions and visiting growers, millers and others interested in the industry had the opportunity, with staff members as guides, to examine the work carried out at the institutions.

Meringa Sugar Experiment Station.

Meringa continues to be the centre of the cane-breeding activities of the Bureau. The appointment of a Senior Plant Breeder fills a long-felt want and ensures an accentuation of the effort to produce a steady stream of more valuable varieties. Some 10,000 seedlings were raised during the year on this station as the result of breeding work. Clearing of forest on the station continues as the increased volume of work makes greater demand on the available acreage. A cane-breeding varietal nursery is maintained at Freshwater, isolation plots at Koah and Bingil Bay, and a disease trial area at Pine Creek. Another varietal nursery is kept planted on the station so that an arrowing failure at one nursery does not so seriously affect the year's operations. Station trials for the year were nearly all associated with the progressive steps of the seedling selection programme.

Entomological work at Meringa this year was concentrated on further benzene hexachloride trials on the greyback and frenchi grubs.

A replicated velvet bean trial with six new varieties was carried out and seed of the best types was selected for further work.

Mackay Sugar Experiment Station.

At Mackay some 7,000 seedlings were raised and planted in the field and the usual selection of previous year's material was made. Some most promising seedling canes are being obtained from the P.O.J.2878 x Co.290 cross. Q.50, which was raised on the station, is fast becoming the most popular variety in the central division and is performing well in other areas also. Station trials this year include, as well as the progressive seedling selection trials, a filter mud experiment, a fertilizer placement trial, a long-range experiment incorporating two-and four-year fallow periods under grass and legumes, a velvet bean variety trial, a minor element trial, and a plant dipping trial using mercurial fungicides.

Bundaberg Sugar Experiment Station.

The major portion of this station is devoted to raising 6,000 cane seedlings annually and to planting out the progressive selection trials in subsequent years. The "D" seedlings are at present in a replicated trial, where the 10 last selections are planted against Q.49 as a standard. These seedlings belong to the families P.O.J.2878 x Co.290 and Q.37 x Co.290 and include some promising types. The remainder of the station area is taken up with the permanent trash trial, a long-range plant residue and fertilizer trial, a filter mud trial, a minor element trial, a long-range rotational trial, and a planting material trial. Selections were made from the velvet bean trial for future propagation. In conjunction with the Bundaberg station a downy mildew resistance trial area is maintained, and supplies of new canes are forwarded to isolation plots in the Childers, Maryborough and Nambour areas.

New Experiment Station.

It was mentioned in the last report that negotiations were in train for the purchase of a property in the Burdekin district for a new experiment station. This matter is now practically finalised and developmental work will begin in the near future. The property adjoins Pioneer mill and is of approximately 90 acres. An adequate water supply has been located. The necessity for a station in this important sugar-producing area for the purposes of local seedling raising and irrigation investigations has long been recognised. Some difficulty is being experienced in obtaining essential materials for inauguration of station activities and this may cause delay.

ENTOMOLOGY.

Pest infestation in sugar cane crops throughout Queensland was generally light, and even where an increase in pest activity was noticed weather conditions so favoured crop growth that only a relatively small amount of cane suffered serious damage. Armyworms and similar leaf-eating caterpillars which caused some concern in a few districts during the previous year appear to have been brought under effective biological control in the past season. In addition, no swarms of the yellow-winged locust (*Gastrimargus musicus*) were reported from the Mackay district, thus confirming an opinion previously expressed that with the return of more normal seasons this pest would soon disappear from all cane areas. The widespread practice of burning cane prior to harvest has been responsible for keeping the weevil borer pest (*Rhabdoscelus obscurus*) depressed to such low levels that losses in most mill areas were too small to estimate. There was, however, a slight upsurge in "white grub" activity, and populations in most districts were such that serious infestations are possible next year should weather conditions prove suitable for the critical egg and early larval stages of the succeeding generation.

Greyback cane beetle (Dermolepida albohirtum).

Despite the relative scarcity of beetles seen in flight in most of the northern cane areas, the resulting grub infestations were more extensive than in 1947, when much heavier flights were recorded. The Mulgrave area suffered the most extensive infestations, and grub populations were probably the densest in localised areas of the Burdekin. Where serious damage did occur it happened fairly late, and since most of the northern mills commenced crushing operations early they were able to accept these damaged crops before any appreciable deterioration ensued.

The area damaged would have been much greater had it not been for the widespread use of benzene hexachloride as a control measure. All available stocks of this insecticide were used in treating approximately 3,000 acres during the spring months of 1947 and satisfactory results were obtained. Benzene hexachloride has now almost entirely supplanted carbon bisulphide for cane grub control.

Experimental work was focussed mainly on determining optimum dosage rates, times, and methods of applying benzene hexachloride to canefields liable to infestation. The previously recommended treatment of 100 lb. of 10 per cent. dust (1.3 per cent. gamma isomer) per acre, applied in the drill some two months before the anticipated beetle flight, will doubtless prove effective for the majority of cases, but it is evident that dosage rates will need some adjustment in accordance with the nature of the soil to be treated and the degree of infestation anticipated. In the Burdekin area the necessity for hilling up the cane rows for the specific purpose of irrigating introduces a problem which can only be solved by the more efficient placement of the insecticide. Correct placement may also go a long way towards the more effective control of some of the two-year cycle species, such as *Lepidicta frenchi*, which in the third larval stage tends to attack the cane stools from directly underneath, rather than by migrating inwards from the interspaces as is the case with the greyback cane beetle.

Broadcast applications were shown to be markedly inferior to drill dressings when made at the same rate per acre. Another important point brought to light during the past season was the extraordinary residual toxicity of benzene hexachloride when applied to the soil. One spectacular case was encountered in which

treatments of 125 lb. per acre applied in November, 1946, showed complete grub control in May, 1948. This important disclosure has been the means of placing a different aspect on the treatment schedule originally recommended, and it may now prove more economical in the long run to apply sufficient benzene hexachloride to the plant crop with the idea of ensuring protection to the following ratoon crop than to apply a further "booster" dressing to the ratoon crop.

Wireworm (Lacon variabilis).

In 1946, investigations showed that effective wireworm control could be obtained by applying 20 lb. of 10 per cent. benzene hexachloride dust per acre mixed with the appropriate fertilizer at planting time. This year confirmatory demonstration trials involving 75 acres and 29 different fields were established in the Mackay district. Though the past season was not characterised by severe wireworm attack, some trials showed outstanding differences between treated and untreated plots. As a consequence many growers now regard this as a reliable form of insurance against crop losses, and they have adopted this treatment as standard practice in fields likely to harbour these pests. It was recognised early that the mixing of benzene hexachloride and fertilizer was not an ordinary farm job; therefore, arrangements were made with the fertilizer companies to have the mixing carried out at their works. A standard benzene hexachloride-fertilizer mixture is now available for wireworm control and already sufficient to treat some thousands of acres has been sold.

ANIMAL PESTS.

Wild pigs continued to give trouble in the far northern areas, where they invaded cane crops adjacent to scrub lands. Despite substantial bonuses paid by different Boards for their scalps, their numbers seem to have suffered no appreciable reduction over the past few years. It would appear that little relief from this trouble can be expected until adequate supplies of galvanised netting are made available. Wallabies were fortunately less active than during the previous season, the reason for this being that the surrounding areas carried better grass. In some areas beagle hounds are proving their value for ridding the adjacent scrub and forest areas of these pests, and their popularity for this purpose is increasing.

The rat pest showed an appreciable increase during the past year, some of the wetter areas recording early damage. Phosphorus and zinc phosphide were the chief poisons used in baits set out to combat these pests.

PATHOLOGY.

The period under review has not yielded any pathology item of particular significance and the various diseases occupy much the same positions of importance as they did in the previous year. In southern Queensland, Fiji disease still causes some concern. In the Bundaberg area the disease appears to be under control except for the plantations at Bingera, where the lush-growing crops and standover practices make eradication by the usual roguing methods a difficult problem. Fiji disease is still a threat to susceptible varieties in the Moreton area and a policy of harvest and plough-out orders on diseased blocks is being continued; in addition, the susceptible cane, P.O.J.2878, is, with the full concurrence of growers' organisations, being removed from the list of approved varieties for the area. At Rocky Point it would appear that control of the disease can be brought about by roguing campaigns and supervision over the source of plants. Downy mildew disease, which only a few years ago was regarded as the major cane disease in Queensland, is now confined to a small part of the Bundaberg district. It is expected that the prohibition of P.O.J.2878 in this locality, brought about by a recent proclamation, will lead to the disappearance of the disease within a few years.

Gumming disease, which is confined to part of the Mossman area, has not shown any further spread and the susceptible varieties such as S.J.4 and H.Q.426 can still be cultivated in parts at the southern end of the district. The other major bacterial disease, leaf scald, was fairly widespread in some northern mill areas and the late harvesting of diseased blocks led to some losses. The varieties Q.44 and Trojan are susceptible to leaf scald but it would appear that as long as farmers procure plants from the better-drained, disease-free areas the disease will not cause much damage, and in the Mulgrave and Hambledon areas at least should be kept under control.

Chlorotic streak disease still remains as a serious cause of reduced crop yields both in North Queensland and at Moreton in the south. In the latter area a trial with P.O.J.2878 showed that diseased material yielded only 24 tons per acre compared with 34·5 tons for plants from a healthy source. Treatment with hot water will control the disease and in this trial treated diseased plants yielded practically the same as the healthy. A trial to determine the losses in other commercial canes is under way.

Dwarf disease, which occurs only in the Mackay district, has been located at Pindi Pindi, well outside the recognised dwarf area at Rosella-Peri. The disease is not present in Q.28 and Q.50 and the replacement of susceptible varieties with these canes, together with a careful selection of planting material, should largely remove any threat from the disease.

The cane-killing weed was reported at many centres in the Mackay district, causing most damage on new land or land being brought into cane again after a lapse of several years. The hormone-type weedicides give promise of controlling this pest.

Red rot again caused some losses in Co.290 in the Moreton area and some of the newer canes also showed a small amount of infection. Red rot is normally regarded as a minor disease, except when dry conditions and late harvesting accentuate the losses, but in susceptible varieties it can do so much damage that it is impossible to grow them. Such a case occurred during the year, when the prevalence of red rot in the susceptible Q.52 led to that variety being abandoned.

The problem in Q.28 at Mackay, when the variety appears to occur in two forms, one of which yields most unsatisfactory ratoons, is still under investigation.

Further experiments with the pre-planting treatment of setts have shown that the dipping of the setts in a solution containing ·015 per cent. mercury in an organic form will lead to increased germination when planting conditions are unfavourable. In the Inkerman area, poor germinations associated with pineapple disease have led to greatly increased costs of production, and several farmers are installing quite elaborate set-ups for the dipping. In the winter of 1948 approximately 140 tons of plants were treated in addition to setts being used to supply misses.

The usual disease-resistance trials were conducted at various centres. Varieties tested included both new seedlings and importations from other countries. Trials included those for mosaic, Fiji disease, leaf scald, chlorotic streak, downy mildew and gumming.

Varieties imported included six canes from Mauritius, two from South Africa and two from New South Wales. Cuttings of various Queensland canes were sent to the Philippine Islands, Mauritius, United States of America and East Africa.

CONFERENCE OF CANE PEST AND DISEASE CONTROL BOARDS.

A conference of Cane Pest and Disease Control Boards which was held in Cairns on 12th May, 1948, attracted 41 delegates representing Boards from Mossman to Nambour, while nine Bureau officers were also in attendance in an advisory capacity. The chief items discussed were the supply of benzene hexachloride, and recommendations regarding its use for the control of different sugar-cane pests. In addition various machines for its application were described and demonstrated. Another matter which engaged the attention of delegates was the necessity for compiling on some uniform basis all data in connection with pest infestation and control.

CANE BREEDING.

Excellent arrowing at Meringa and Freshwater made possible the record number of 102 combinations for the 1948 crossing season. Not only were arrows of most wanted varieties in plentiful supply, but, as is usual with an excellent crossing season, all crosses could be made within a short period, resulting in a considerable economy of time and labour.

The established crosses were well represented, but in addition there were many new combinations, which often include as parents new synthesized seedlings of special bloodlines. The fuzz from these crosses will be used only sparingly for germination this season and will mostly go into storage for 1949. Crosses made especially for breeding purposes are exceptions and will be germinated this year.

Seedlings planted out at Meringa in 1947 and now available for selection consist of 2,547 seedlings sown in February, and planted out in June and 6,741 planted out in November. In addition, a planting of 920 seedlings was made in the heavy rainfall area at Babinda. These, however, were not original seedlings but were setts cut from seedlings already growing on Meringa. The handling of setts instead of potted seedlings at Babinda saves considerable time and labour, and, since seedling runts were not taken from Meringa, produces a more uniform growth than the usually ragged seedling crop. There are also some ratoon blocks of original seedlings for selection at Meringa. At Mackay, the customary summer sowing of fuzz was made and 7,014 seedlings, representing 58 families, were put out into the field in early August. A planting of original seedlings was also made on an alluvial soil away from the station: 21 families were represented in the 1,884 seedlings planted. At Bundaberg, 5,901 seedlings in 33 families were transferred to the field early in November and soon became well established.

Selections from the original seedlings at Meringa in the spring of 1947 yielded 170 canes; major parents represented were Badila (18 selections), P.O.J.2875 (14), Q.10 (19), Q.44 (32), S.J.4 (23) and Trojan (40). Twenty-five selections were made from the Babinda plantings of original seedlings. At Mackay, 95 seedlings representing 25 families were selected. At Bundaberg, growth in the original seedlings had been very poor due to the dry weather and failure of the water supply, but 89 seedlings were selected, three families being responsible for 68. The usual selections amongst the more advanced seedlings were made at the three stations, though one series at Bundaberg was lost owing to the severe drought.

The varietal analysis of the 1947 cane crop shows that Badila has maintained its position as easily the most important variety. The minor placings, however, show some interesting changes: Trojan, P.O.J.2878, and Q.28 are still in the first five but they have been joined by the U.S.A. cane C.P. 29/116, which yielded nearly one-half of the total crop in southern Queensland, representing 10 per cent. of the State's yield. The analysis of varieties according to country of origin as set out hereunder shows that local varieties yielded 42 per cent. of the crop. These included Trojan, Q.28, H.Q. 426, Q.44, Comus and S.J.4, each of which yielded more than 100,000 tons of cane. New Guinea is second as a source of canes, yielding over 1,000,000 tons, chiefly from Badila. The P.O.J. canes from Java give that country third place with 13 per cent. and the tremendous increase in C.P.29/116 gives the United States of America fourth place.

COMPOSITION OF 1947 CROP ON BASIS OF COUNTRY OF ORIGIN.

Country of Origin.	Tonnage Harvested.	Percentage of Crop.
Queensland	1,735,118	41·8
New Guinea	1,175,810	28·3
Java	547,605	13·2
U.S.A.	422,651	10·2
India	150,333	3·6
Mauritius	52,106	1·3
Fiji	40,804	1·0
West Indies	26,560	·6

MILL TECHNOLOGY.

Seasonal Activities.

During the 1947 sugar season the three junior members of the staff were each stationed at a sugar mill for the purpose of gaining experience in sugar mill procedure.

Early in the season a series of investigations into the properties of molasses was conducted at Babinda mill. These tests were necessary to provide information for a series of recommendations made later to that mill for a major increase in the capacity of the plant and the efficiency of recovery of sugar. Later, preliminary tests were made on a Werkspoor crystallizer at Plane Creek, the first of this type in Queensland.

The Mutual Control scheme, in which 23 mills participated, was operated throughout the season.

Laboratory Work.

Cane Wax.—During the 1947 season a group of mills conducted tests, sponsored by the Bureau, on the recovery of cane wax from the filter mud. As a result of these tests a pilot plant for wax extraction was designed. Subsequently, in response to an appeal by the Australian Sugar Producers' Association, it was decided to have this pilot plant erected. The complete design was drawn up by the Bureau staff, and the equipment is now under construction. Meanwhile, preliminary tests with various solvents and methods have been conducted in the laboratory.

Molasses.—Further research has been conducted into the properties of molasses. It is now clear that the equipment available in the Bureau laboratories is unsuitable for the specialised treatment processes involved, and the design of additional units is proceeding. There appears little doubt that further research on molasses is needed; fortunately this can be carried out in the slack season.

Testing.—The technology section of the Bureau acts as a standards laboratory for the industry in many phases of its work. During the year 115 Brix Spindles were tested. Other items tested were 11 pipettes and 23 polariscope tubes. Three polariscopes were overhauled and calibrated, and five sets of weights standardised. A viscosimeter was tested to determine its suitability for work on molasses, and a hand refractometer overhauled.

Overseas Visit by Senior Technologist.

From 14th March, 1948, Mr. J. L. Clayton, Senior Mill Technologist, spent approximately three months in Hawaii investigating the Hawaiian sugar industry. His report, which is in course of preparation, will include recommendations for the adoption by the Bureau of several practices of the Sugar Experiment Station in Hawaii.

Work in Hand.

Plans are now being made for seasonal work in the mills during the 1948 crushing. Further investigations are to be made on the Werkspoor crystallizer, and two new types of vacuum pans will be tested. The pilot plant for the extraction of wax will be put into operation at the earliest opportunity.

Report of the Director of Regional Experiment Stations (Mr. W. G. Wells).

Satisfactory progress was made during the period under review in the development of the Regional Experiment Stations which have been planned to provide facilities for the various production divisions of the Department to conduct investigations into the many problems confronting the primary producers of this State. In addition to the expansion of operations at the three centres discussed in the 1946-47 report, namely Hermitage, Biloela and Kairi, the area known as the Commonwealth Vegetable Farm, which had been developed at Ayr by the Commonwealth Department of Commerce and Agriculture during the war was taken over for development into a Regional Experiment Station. The more important features of the developmental work and the results obtained in the programme of investigations conducted at each centre are reported in the following summaries for each of these stations. At all four centres facilities were provided for investigations conducted by other Branches of the Department; references to these are made in the appropriate Branch reports.

HERMITAGE.

The climatic conditions experienced during 1947-48 at this centre, which is located 4 miles from Warwick in the Swan Valley on the eastern Darling Downs, may be described as having been very suitable for the growth of winter cereal crops but excessively wet during much of their harvesting period, fair for summer grown crops, and very satisfactory for starting off the winter cereal crops for the 1948 season. The rainfall for the 12 months totalled 32·6 inches, five inches above the yearly mean for Warwick. Altogether an area of some 170 acres was put under cultivation. The following summaries are presented to indicate the nature of the investigations conducted and some of the more important results obtained from them:—

Oats.

The investigations on winter-growing cereals, which were started in June, 1947, and were outlined in last year's report for this centre, yielded some most interesting results. In the trial to ascertain the best variety of oats for grazing during the autumn and early winter prior to the production of a grain crop, Victoria x Richland led in both grazing value and grain yield. This is a very attractive oat, which also showed a satisfactory degree of rust resistance under conditions favourable for both leaf and stem rust. In the trial of purely grain-producing varieties, Orient, a Victorian variety, showed promise for the Swan Valley. Facilities were provided for the Agriculture Branch to study 58 varieties of oats and 174 Bond x Victoria x Hajira selections segregating for rust resistance and other characters.

Wheat.

The results obtained in the investigations relating to the production of wheat were also satisfactory as a whole. In the standard varietal trial, which embraces the 10 Queensland varieties most extensively grown in the eastern Darling Downs and Gabo and Yalta (two reported rust-resistant varieties from New South Wales), Gabo outyielded the other varieties. The results have to be considered with caution, however, for in the previous season under very less favourable conditions Gabo reacted severely to dry conditions experienced during the period of development of the grain. It is necessary, therefore, to conduct such trials over a series of seasons before the full value of a variety can be determined. This trial has therefore been designed to be repeated for several seasons to provide data and grain for analyzing the effect of seasonal conditions on varietal yields and the quality of grain produced.

Seed multiplication plots of Gabo, Yalta and Puora were grown to provide foundation stocks of these varieties for pure seed centres. Seed increase plots of the most promising of the newer strains evolved by the plant breeding staff were also grown. Facilities were likewise provided for the Agriculture Branch to carry out a yield trial of 25 of the more advanced Queensland-bred strains of wheat and the growing of some 1,000 hybrids and parents thereof in breeding plots.

Barley.

In a barley varietal trial embracing Cape and Victorian Bethges, the latter led with a yield of 68 bushels per acre.

Linseed.

Seed increase plots of the most promising of the varieties of linseed that have been tried in Queensland yielded well, with Walsh and Morocco showing decided promise for Hermitage conditions.

Grain Sorghum.

The excessively wet conditions experienced in late November and in December handicapped greatly the preparation of not only the seed-beds for summer crops following wheat but also those following winter fallows. Prolonged dry conditions prevailed for some weeks after this wet period and as a result many of the proposed plantings of summer crops had to be either curtailed or omitted. A standard grain sorghum varietal trial was eventually planted in January on a winter fallowed area of heavy black soil alluvium and in spite of the late planting and following dry conditions produced surprisingly good yields. The leading variety, which produced at the rate of 36 bushels per acre, was Wheatland 11S—a strain evolved by the Department's Senior Plant Breeder. Facilities were provided for the Agriculture Branch to conduct a grain sorghum row and rate of seeding experiment and observation plots of some 54 grain and 20 saccharine sorghum varieties.

Miscellaneous Summer Crops.

Other plantings made of summer crops were a maize varietal trial embracing the standard Leaming variety and two double hybrids bred at the Queensland Agricultural High School and College, Gatton, and which unfortunately failed through dry weather; and for the Agriculture Branch, a soybean varietal observation and seed multiplication area, a canning bean varietal trial and seed multiplication area, and a seed increase area of several varieties of cowpeas.

Pastures.

The climatic conditions experienced during the season provided an excellent test of the merits of the wide range of grasses and legumes, embracing in all some 85 species and strains, that are under investigation in the pasture nursery area at this centre. An interesting feature has been the behaviour of the various wheat grasses and brome grasses imported from overseas. Most of these species are winter-hardy type which can be expected to survive the cold conditions of the Darling Downs, but their possible behaviour under the summer conditions of this district is less certain. Several rusted severely during December and one or two wilted badly after five weeks of fairly dry weather during January and February, but most of them had an attractive appearance as a whole. Some species began to set seed in February, though all but one bore very lightly, which may prove to be a serious drawback to their successful establishment and maintenance on an extensive commercial scale in this district.

Of the summer-growing species of grasses under trial, a locally acclimatized strain of Rhodes grass (which has been named the Hermitage strain), Kafue Rhodes grass (a strain introduced from Southern Rhodesia some years ago), Guinea grass, blue panic and *Paspalum scrobiculatum* all performed satisfactorily. Kafue Rhodes grass is of interest in that, though not planted until October, by the end of January it had spread extensively by runners and gave promise of being a suitable species for grassing waterways constructed in soil conservation programmes. In addition it did not set seed until late summer, several weeks after other strains of Rhodes grass, which may indicate that it can provide pasturage of a high quality longer than the other strains of this species.

A feature of the legumes under trial was the persistency of Auburn woolly-pod vetch, which grew well right through the summer months. Black medic also persisted through this period, though not producing as well as the former. Red clover made satisfactory growth until the long dry period in February caused its complete disappearance after it had set a heavy crop of seed.

The investigations conducted on the hillside pastures on soils of both basaltic and sandstone origin are yielding interesting results. By retiring these pastures from grazing for two years it has been possible to improve them from a condition of very low carrying capacity and quality to a state in which they provide at the end of the summer season a dense cover of highly nutritious grasses intermixed with a range of native legumes and in places good populations of burr medic. In contrast, all-season heavily grazed comparable hillside areas on adjacent farms contained little or no native legumes and poor stands of only inferior grasses at the end

of this season. Preliminary trials on small quadrats conducted by the Agrostologist during the previous winter and spring yielded very promising indications that, where burr medic was absent or in insufficient quantity to provide a balanced pasture, the position could be greatly improved by sowing seed of this species on pasture topdressed with superphosphate at the rate of 1 cwt. per acre. As burr medic is becoming an important legume in some sections of the district, large-scale plots were laid down in March, 1948, by the Agrostologist on various types of soils and pastures on the hillside area of the experiment station to test the merits of planting burr medic and black medic separately with and without applications of superphosphate.

Soil Fertility.

As mentioned in the 1946-47 report, analyses of some of the Hermitage soils indicated that their supply of organic matter, nitrogen and phosphoric acid may be deficient for successful crop production. Accordingly an experiment was started in 1946 to test the merits of ploughing under green manure crops produced with and without an application of 190 lb. superphosphate per acre. An overall response to the superphosphate was obtained in the green manure crops and also in the following wheat crop grown on the residual phosphate. No improvement in yield of wheat was obtained from any of the green manure crops, which included legumes and non-legumes alone and in combination. Blue lupin grown for green manure on a soil derived from sandstone also showed a marked response to an application of 1 cwt. of superphosphate per acre. The combined results obtained from all crops receiving an application of superphosphate indicate that on the less fertile soils of the sloping areas of the station response to superphosphate can be anticipated.

Soil Conservation.

The soil conservation structures built on the station towards the end of 1947 both in cultivations and on the hillside pastures withstood good tests during the rainfall group yielding approximately 12 inches in November-December and again during June, 1948, when six inches fell. The latter rainfall caused some of the most severe and widespread sheet and rill erosion, both in bare fallows awaiting planting to wheat and in planted fields where the wheat seedlings did not exceed three to four inches in height, that has ever been experienced on the Darling Downs. Bare fallows on slopes not exceeding five per cent. when protected by contour banks experienced little or no sheet erosion. The value of large absorption banks and their trapping channels in hillside pastures to reduce the run-off of storm rains on to lower cultivations was also well demonstrated. Water was trapped in the channels behind the absorption banks to a depth of two feet during the December rains and later soaked into the subsoil and thence downhill under the banks. The resultant growth during the long following dry period of both Rhodes grass sown on the banks and native grasses below them clearly indicated the benefit to be derived from this conservation of water where it fell on the hillside.

Soil moisture investigations conducted during the season yielded data which indicated that pastures on the upper slopes also reduced run-off of storm waters. After the December rains, the moisture content of all soil types on the station was maintained at or near field capacity to within four to six inches of the surface in bare fallows during the following four weeks of dry weather. In pastures, however, by the end of this period the top foot of soil was dry and cracking. The pasture areas were thus in a far more suitable condition to absorb storm rains from then on than would have been adjacent old cultivations in bare fallow in preparation for the sowing of winter cereals. Undoubtedly, pastures should have an important place in hillside soil conservation measures.

BILOELA.

The climatic conditions experienced at this centre were characterized by a very dry period from June, 1947, until good rains at mid-August, followed by most unusual rainfall early in September, ushered in what promised to be a very good season. The rainfall from then on, however, was subnormal (except for November) until the end of February, when a cyclonic disturbance yielding 8·29 inches spread over three days greatly relieved conditions. Abnormal rainfall was also received in May and again in June, the 12-month total amounting to 34·15 inches, approximately six inches above the annual mean rainfall over the 24-year life of the station.

The crop yields obtained under such conditions clearly demonstrate the fallacy of assessing the agricultural possibilities of a district by its total annual rainfall. As in the 1946-47 season lack of winter rains resulted in a complete absence of subsoil moisture at the start of summer except where ploughing had been done at the end of the preceding summer after rains that penetrated deeply into the subsoils. Consequently, the success of all of last summer's crops and grasses sown on winter-prepared seed-beds was dependent on ample supplies of moisture being received at appropriate periods during their growth. The occurrence of such irregular and mostly subnormal rainfall as was experienced during the critical stages of plant development thus resulted in much of the acreage of rain-grown cotton, grain sorghum, and cowpeas producing very poor yields. Where these crops were planted on seed-beds ploughed soon after the preceding wet season, and maintained in clean fallow until planting time, much better yields were obtained. Undoubtedly rotations which allow of the provision of ample subsoil moisture at planting time should be practised in this and adjacent districts with comparable climatic conditions.

A total of 213 acres was devoted to experiments of various types on crops and pastures. The following brief summaries present the most outstanding features of the programme brought through. In some instances the final harvesting of the experiment had not been completed by 30th June, so that a complete summary of the season's operations cannot be presented at this stage.

Cotton.

A total of 51 acres of cotton was planted, of which 19·2 acres were grown with supplementary irrigation. The rain-grown experiments were mostly planted early in October after good planting rain and made fairly rapid plant growth until late in December when, following the light rainfall of that month, a slowing-up of growth resulted in a good setting of flower buds and young bolls. Some experiments called for November plantings and the plants in these areas made a better type of growth during December than the earlier plantings, whose growth was stimulated excessively by the frequent falls experienced during November. Had normal January rainfall been experienced most of the experiments would have produced heavily. However, subnormal rainfall occurred, the deficiency from the previous mean for this month amounting to 3.25 inches. Under such conditions shedding occurred heavily by early February and with a continuation of the dry weather until the end of that month plant growth practically ceased. All yields of rain-grown cotton were naturally very poor. Once again, however, cotton planted in the first year after early-ploughed Rhodes grass outyielded all other rain-grown cotton, and cotton in the first year after Rhodes grass outyielded cotton on land in the third year of cropping after Rhodes grass irrespective of the time of ploughing.

Under such adverse midsummer climatic conditions the value of supplementary irrigation was clearly demonstrated in the experiments embracing crop rotations, time and quantity of spray irrigation applications, varietal trials, entomological problems and bulk areas for testing the merits of mechanical harvesting. The harvesting of the top crop of most of these plantings had not been completed by 30th June owing to the heavy rainfall experienced during the latter part of that month. Most of the more important experiments had yielded to that date, however, an average of about 1,400-1,500 lb. seed cotton per acre and in some instances individual treatments or varieties had yielded upwards of 1,800 lb. per acre with an appreciable top crop still to be harvested. No summary of results can be presented, but it can be said that in the time-of-irrigation experiment the yields after two pickings tend to indicate that the treatment receiving the most water by planting time would probably outyield all of the other five watering time-tables of the experiment. This treatment experienced 7·04 inches of rainfall in the 2½ months before planting and 18·55 inches during the effective growing season, plus 12·9 inches of spray irrigation in four applications after planting.

An event of note was the testing of the one-row mechanical cotton picker manufactured by the International Harvester Company of America. A machine of this type was purchased conjointly by the Commonwealth Department of Commerce and Agriculture, the Queensland Cotton Marketing Board and the Queensland Government. Unfortunately, the machine did not arrive until June, and as all areas which had been planted for testing the machine were left unpicked to provide cotton for it much of the crop was hanging out of the bolls when the trial was carried out. The June rains also occurred before the machine could be tried in this cotton and consequently the trials had to be conducted in a crop little suited for machine harvesting. The picker performed surprisingly well under such adverse conditions, harvesting 85.7 per cent. of the crop. The long exposure to the weather dulled the colour of the lint so that even clean hand-picked cotton was only Middling grade compared to low side Strict Low Middling in the machine-picked cotton, the latter containing much "pepper" and small pieces of leaf. No difference was discernible between machine-picked cotton which had been dusted with aero-defoliant before frosts had occurred and cotton defoliated by the frosts, both pickings being carried out a good fortnight after frosts had killed the crop. Bits of old dried-up leaves and pieces of the very brittle bracts appeared to be the main components of the trash in the machine-picked cotton. The results of the trials were so encouraging that an extensive trial of the machine is planned for the coming season.

Sorghum.

A total area of 15·5 acres was made available to the Agriculture Branch for the planting of pure seed increase plots of the more advanced strains of grain sorghum bred at the station by the Senior Plant Breeder, and for planting varietal and strain trials.

Cowpeas.

In the redesigning of the station preparatory to placing a dairy herd on it for the Division of Dairying, it has been necessary to provide more pasturage than was previously included in the cropping rotations. Investigations at this centre have shown that the growing of cowpeas as a green manure crop prior to planting Rhodes grass greatly improves the growth of the grass in at least the first two seasons of its establishment. Accordingly, some 46 acres were planted to cowpeas during spring and late summer for green manuring purposes.

Winter Cereals.

The dry conditions in the winter of 1947 prevented the planting of the usual bulk areas of oat and wheat grown for hay and the grain and hay varietal trials. Space was made available to the Agriculture Branch for the planting of an observational area of a large number of varieties of wheat; the area had been summer fallowed and contained wet subsoil to a depth of at least 3 feet. The seed was planted in the dry and germinated with an inch of spray irrigation; no other water was applied for the rest of the season. The results obtained indicate clearly the value of having available an area of well-fallowed land with ample subsoil moisture for planting winter cereals whenever a suitable planting rain occurs.

Rhodes Grass.

Once more this well-tried grass gave clear-cut evidence of its value for inclusion in the dry-land rotations that can be practised on the soils of the station. Accordingly it is being used to establish the main pastures for the dairy herd that will be located at this centre. Altogether 75·1 acres were devoted to pasturage and experiments on this grass. In the 1946-47 report the

results of applying spray irrigation to Rhodes grass pasture during dry periods were described. In an endeavour to improve the yield of the irrigated section of this investigation, applications of sulphate of ammonia were made to small areas in the spring of 1947. Such promising results were obtained that a more comprehensive experiment has been designed to ascertain the economic value of any gains obtainable through the application of this fertilizer.

Pasture Nursery.

Satisfactory progress was made in developing the pasture nursery area, where provision has been made to study grasses and legumes which appear to have promise of being either superior to Rhodes grass or suitable to supplement it in combination or as a separate pasture. A range of grasses was successfully established from material obtained from the former plant introduction area of the Council for Scientific and Industrial Research near Rockhampton. *Paspalum scrobiculatum* (scrobic) obtained from the Lawes centre of the same organization performed well in the nursery area for the second season. Accordingly row cultivated areas of scrobic, blue panic, green panic and Rhodes grass were established during the summer for grazing trials in the coming season.

Soils Investigations.

As in past seasons, determination of the moisture and nitrate contents of the soils played an important part in many of the experiments conducted in 1947-48. The adverse effect of the previous long dry autumn and winter was demonstrated by the fact that in soils where crops had grown until winter the following seedbeds were wet to a depth of only 25 inches at planting time in mid-October, after a total of seven inches of soaking rains had occurred during the spring months. Where ploughing had been performed soon after soaking late summer rains, the soil was wet to depths of 34 to 38 inches. This additional supply of moisture produced appreciable gains of grain sorghum, wheat and cotton. The value of hillside pastures in absorbing rainfall and reducing run-off, discussed in the section of this report dealing with the work at Hermitage, was confirmed by the results obtained in moisture penetration studies in Rhodes grass pastures at Biloela. Following a long dry spell in February, a total of 8·29 inches of rain spread over three days penetrated to a depth of 40 inches in a Rhodes grass pasture of three years' establishment, compared with only 27 inches in an adjacent area that had been cropped repeatedly to annual crops. Once more evidence was obtained that in the first year of cultivation after grassland the rate of production of nitrate nitrogen is reduced to the point where there is a suitable balance of plant foods for cotton production. The need for growing Rhodes grass in rotation with cultivations was amply demonstrated by the fact that at the start of summer all determinations in Rhodes grass areas indicated that there were no nitrates available whereas in adjacent old cotton cultivations upwards of 18 lb. of nitrate per million pounds of top soil were present. Undoubtedly, growing Rhodes grass as a ley of three or four years' duration in a suitable cropping rotation would definitely improve the pastures of the average dairy farm in Central Queensland.

AYR.

The development of a Regional Experiment Station at Ayr will provide much-needed facilities for exploring the agricultural possibilities of this district. Prior to the recent war, sugarcane was practically the only crop grown in this area. During the war, however, a considerable acreage of potatoes, tomatoes, various vegetable crops and cotton was grown and the results demonstrated that under suitable conditions good yields could be obtained. More recently preliminary trials of tobacco have also yielded well. No evidence is available, however, as to the possibilities of pasture production in this district. The district is composed of the delta of the Burdekin River, which extends some 20 miles back from the coast, and stretches of alluvial country of varying widths on each side of the river for some considerable distance. The rainfall at Ayr, in the delta, has averaged 41·88 inches for the last 60 years, with January and February means of slightly over 10 inches and monthly means for May to November inclusive of under 2 inches. Large quantities of water appear to be available at shallow depths under the delta soils and irrigation is practised on most farms during the dry periods. The soils of the delta are largely sandy loams and loams, with some clay loams. A similar range of soils accompanied by some stiffer types is encountered upstream. As the Burdekin River basin experiences sufficient heavy midsummer rainfall to provide irrigation water for a large area, the possibilities of developing an irrigation project of considerable size for raising beef cattle on irrigated pastures and producing appropriate agricultural crops are being explored.

To facilitate investigational work on pastures and agricultural crops, the Ayr vegetable farm of some 112 acres was acquired from the Department of Commerce and Agriculture and the work of developing it into an investigational centre was commenced in 1948. The area had been mostly out of cultivation for a couple of years so that much cleaning up and preparatory work was required, which was carried out under the supervision of the Agriculture Branch until a resident Manager was appointed in May. It was possible, however, to clean up and sow a cover crop on a considerable proportion of the cultivation and to plant a cotton varietal trial to determine the best variety for mechanical harvesting, a cotton plant spacing trial to ascertain the best type of plant for this method of harvesting, a tomato varietal trial, a potato varietal trial, a potato fertilizer trial, a potato insecticidal trial, seed multiplication areas of legumes required for future pasture experiments, tobacco seedling propagation beds, and a double hybrid maize seed production area for the officer in charge of plant breeding at the Queensland Agricultural High School and College.

The programme of investigations planned for the station embraces also the provision of comprehensive facilities for a co-operative project with the Council for Scientific and Industrial Research to test the merits of various grasses and legumes and combinations thereof, under conditions of grazing by beef cattle. It is anticipated that most of this work will be under way in the coming season. Altogether the combined programme planned should make this station a very interesting centre.

KAIRI.

The climatic conditions experienced for the 1947-48 season at this station, which is located 11 miles north-east of Atherton on the Atherton Tableland, may be described as unusually wet during the spring, very dry thereafter until January, about normal for that month, extremely dry in February, normal in March, and characterized in autumn by showery conditions which interfered with harvesting operations. A total of 53½ inches of rainfall was experienced during the year, compared with the previous mean of approximately 48 inches.

Wheat.

The early June planting of Warput wheat referred to in last season's report responded well to the good spring rainfall experienced and produced an average of 30 cwt. of hay of good quality per acre. As indicated in that report, however, the end-of-June plantings of Warput and Charter reacted severely to rust infestation. Another June planting of a bulk area of Warput was made in 1948 to check on last spring's results. In addition, a varietal trial of a range of wheats bred by the Department for hay production under the incidence of rusts was planted in June.

Oats.

The planting of Klein oat, also referred to in last year's report, performed very satisfactorily. The results obtained indicate that, with the availability of the new varieties of fairly rust-resistant oats, this crop may be of considerable importance to the dairy farmers on the Tableland. Accordingly, the investigation of the suitability of the newer types was continued this season with a planting of Klein and the two oats which yielded so well at Hermitage in this past season—Fulghum x Victoria and Victoria x Richland. At the end of June the last variety had made substantially faster growth than the other two.

Maize.

As happened last year, the planting of the maize areas could not be effected until the occurrence of the January rains and once again it appears likely that yields considerably in excess of those normally obtained in late-planted crops will be realised. The lack of heavy leaching rains in February, during the critical formative stage of the maize plants, is again thought to be responsible for the crop prospects. The results suggest, however, that with the return of more normal seasons the application of supplementary fertilizers during the wet season may be beneficial. It is proposed, therefore, to explore this possibility in the coming season if suitable climatic conditions prevail.

Experiments conducted by the Agriculture Branch prior to the war indicated that maize yields may be appreciably improved in some seasons where this crop follows a green manure. Further work appears desirable, however, to explore the residual effect of such a rotation and facilities were made available to the Agriculture Branch to lay down a comprehensive long-term experiment. Preliminary trials of a hormone weedkiller carried out during the winter indicated that this is a very efficient weedicide to use in killing wild hop and wild turnip. Accordingly an area of maize was made available to the Agriculture Branch to carry out an experiment testing the merits of hormones and a dinitro product in controlling wild hop, which is a very serious pest in this crop in the Kairi section of the district, particularly when the planting rains are delayed until January.

Pasture Nursery.

Very promising results were obtained with some of the legumes supplied last season by the Bureau of Tropical Agriculture, South Johnstone. Accordingly, the most outstanding performers—namely, *Centrosema pubescens*, *Clitoria ternatea*, and *Glycine javanica*—are being incorporated in pasture trials that are to be laid down in the coming season.

In the early part of the season indications were obtained that widely-spaced rows of lucerne withstood the dry spring and early summer better than broadcast plantings. As it would be highly desirable to ensure good growth of lucerne being regularly available for grazing during this period, the possibility of developing a satisfactory method of growing lucerne economically in rows was explored. In order to eliminate inter-row cultivation during the wet season when weed growth is very prolific in this district, and also to provide a well-balanced grazing, giant setaria was planted at the start of the wet season in the inter-row spaces. The resultant growth not only largely smothered weed growth but would have provided excellent grazing. The stubble of this crop was cultivated out after the March wet period and the area will be kept clean cultivated until the start of the next wet season, when the operations will be repeated.

The results obtained with cultivated row plantings of scrobic were also promising. Accordingly, a larger area of row plantings of this grass was established during the wet season preparatory to testing the suitability of various legumes under grazing conditions for use as smother crops in inter-row plantings between the scrobic rows in a manner similar to the giant setaria-lucerne combination, it being desirable to obtain a legume to combine with scrobic rather than a member of the grass family.

Soil Conservation.

Following on the establishment of a vegetative cover in the main waterway constructed in the previous season, the Senior Soil Conservationist installed a set of graded banks of varying length, gradients per 100 ft. of length, and spacing interval between banks. These were allowed to settle into permanent position preparatory to cropping in the coming season to ascertain the merits of the various combinations being tried. All banks withstood very heavy rainfall when in a relatively new state and little protected by the cover between the banks. A further waterway was developed during the season preparatory to constructing another set of graded banks in an adjacent field where the efficiency of various crops in preventing soil erosion will be studied. Facilities for studying the merits of pasture furrowing in assisting to reclaim eroded areas were also provided on a badly eroded infertile slope, where furrows combined with various legumes were laid down.

Demonstration Farm.

The work of developing the programme of cropping required for this area was satisfactorily continued. The fields of lucerne are now well established and new plantings of Rhodes grass made satisfactory growth. The maize areas give promise of yielding well for January plantings.

Report of the Science Branch (Mr. J. H. Simmonds, Officer-in-Charge).

That portion of the report dealing with plant pathology has been prepared by the Officer in Charge, Science Branch, who is also Senior Pathologist. The Senior Entomologist (Mr. J. H. Smith) reports the activities of the Entomology Section, and the Government Botanist (Mr. C. T. White) those of the Botany Section.

PLANT PATHOLOGY.

Wheat.

Wet weather in the spring of 1947 when the wheat crop was maturing resulted in early infection by leaf rust followed by isolated heavy outbreaks of stem rust. The extent of the rust losses is difficult to estimate, but they were considerable. Some crops of Ford and other susceptible varieties were so badly pinched that they scarcely warranted harvesting. Rust developed well in Departmental breeding plots and rust ratings made in conjunction with officers of the Agriculture Branch revealed a pleasing degree of resistance in the majority of Departmental crossbred material. The Florence College and Kenya crosses released in recent years have also maintained their resistance under field conditions. Stem-rust resistant wheats from New South Wales, such as Gabo and Charter, have increased in popularity and their availability has renewed a little interest among farmers in summer-grown wheat.

Linseed.

Rust can be a serious factor in the growth of both linseed and flax varieties of *Linum usitatissimum* and in past years has caused complete loss of some varieties in Departmental plots. However, the variety Walsh is resistant to rust and the disease was not even noted in commercial sowings of this variety. It was recorded from a Departmental variety trial, but as the most susceptible types had been discarded it did little damage.

Peanuts.

Peanut crown rot has increased in importance over the last few years and in order to check on the efficiency of the seed treatment at present practised and investigate certain other aspects of the problem a large-scale experiment was laid down at Kingaroy. Of a number of seed treatments tried, those at present in use gave a satisfactory degree of control, but there were indications that two other treatments might be preferable. It was shown that it is the injured kernels in the bulk seed which are responsible for the poor stand obtained from untreated seed. In this connection it was evident that contamination with the rot-producing organism before planting was more important than contamination from the soil.

The question of the economic advantage secured from spraying or dusting peanut crops for the control of leaf spot (*Cercospora personata*) has been under investigation. This year saw the end of one experiment, the results of which were inconclusive, and the commencement of the next. The work is now confined to dusting on a somewhat larger scale than previously by the use of power dusting equipment.

Potatoes.

In the spring potato crop in the Lockyer, leaf roll and mosaic were more prevalent than usual, due doubtless to the shortage of supplies of certified seed from New South Wales. In the autumn crop, wilt was again very serious after a lapse of some years. Losses of up to 50 per cent. occurred in many crops. The distribution of the disease followed much the same pattern as previously; it was bad in the main Lockyer flats from Gatton through to Brightview and much less severe on smaller creek flats. The Fassifern Valley once again had no more than the general slight incidence of wilt. It is still impossible to state what conditions predispose crops to this disease. It is assumed that soil-type and weather are involved, but these factors cannot be elaborated. The disease is naturally causing considerable concern to the growers involved as it constitutes a hazard for which no effective counter can be offered.

Demonstration plots of "Aretan" treatment of potato tubers for the control of scab have met with a mixed fate on the 10 farms on which they were located. Three have been harvested, and figures obtained show the beneficial effects of treatment. Four somewhat later crops were to be harvested at the time of June rains. With water-logged ground, harvesting had to be postponed and their fate is doubtful. Three other plots for various reasons had to be abandoned.

Miscellaneous Field Crops.

Summer-grown field crops such as grain sorghum were largely free from serious disease. Those soybean crops examined were healthy except for a small percentage of mosaic in Departmental plots at Wooroolin. Susceptibility to this disease could well be one factor on which to eliminate some of the large number of strains of this crop under trial. Wallaby ear occurred in late maize.

In irrigated pasture plots at Gatton Irrigation Research Station rust developed seriously in the mid-season strain of subterranean clover. Considerable work has been done in the southern States on the susceptibility of various strains of this clover to rust, and as seed of resistant types becomes available it will have to be used here if subterranean clover is to form a constituent of irrigated pastures.

Stone Fruits.

In the Stanthorpe district, brown rot (*Sclerotinia fructicola*) of stone fruits was more serious than it has been for some years. This was probably due to the unusually early wet season which caught many growers unprepared. A survey of local control practices confirmed the value of sulphur sprays for combating this disease. However, there is a problem in deciding just how often to spray and whether sprays should be applied every season or left until brown rot actually makes its appearance. Few growers follow Departmental recommendations, and it is therefore proposed to institute a demonstration plot next season with a view to showing the extent to which the disease can be controlled by this means and to investigate other lines of attack.

Grapes.

Spraying having failed to prevent serious development of grey mould rot (*Botrytis cinerea*) in grapes in the previous season, trials this year were confined to attempts at reducing the disease by cultural practices. The variants tested were high trellising, berry thinning on the bunches soon after setting, and slicing away a portion of the bunch at that time. High trellising appeared to have a beneficial effect, but this could not be substantiated from the figures obtained on harvesting the grapes. Both thinning the berries and slicing the bunches significantly reduced the percentage of diseased fruit. They also reduced the gross yield, leaving approximately the same quantity of sound fruit to harvest. The reduction in the disease made harvesting operations simpler, and berry thinning, even if there is no net gain of sound fruit, may be worth while.

Citrus.

Brown rot of Emperor mandarins was particularly severe during the past season and in the Howard district heavy fruit-fall resulted. Apparently the early wet weather enabled a rapid build-up which normal spray schedules in some cases were unable to check adequately. Sappy water shoots which develop when abundant rain follows drought conditions on unirrigated orchards appear to be particularly subject to attack and form a source of infection for the young fruit. The results of a farm-to-farm survey suggested that certain orchard practices were contributing to the severity of the disease and hence the assistance of the Horticulture Branch has been obtained in laying down a comprehensive experiment to test out the value of a number of cultural measures and spray schedules.

A survey was carried out on behalf of North Queensland citrus growers to determine the cause of fruit loss in consignments forwarded south. A firm brown rot, commonly of the stem-end type, proved to be the chief trouble experienced. The pathogens associated with this rot are probably *Diplodia natalensis* and *Phomopsis citri*.

Bananas.

Banana leaf spot (*Mycosphaerella musicola*) occurred to a serious extent in North Queensland plantations during the past summer months. The damage was accentuated in many instances by the presence also of the larger leaf spot (*Cordana musae*). Because of their geographical position growers in these areas rely on producing fruit of superior quality to command other than a local market. Leaf spot is responsible for much lowered quality and it may be necessary for growers in these areas to institute a spraying programme, a measure which has not previously been systematically attempted in Queensland.

Several outbreaks of infectious chlorosis of bananas (cucumber mosaic virus) occurred during the early summer months and some confusion with bunchy top existed. In most instances there was a history of the interplanting of cucumbers or tomatoes at an earlier date. No difficulty was experienced in clearing up these outbreaks by eradicating infected stools.

Pineapples.

There was no abnormal development in respect of pineapple diseases during the period under review, except that top-rot losses were somewhat greater than usual. "Grassiness" of pineapples is a relatively severe disease in northern areas and occurs under circumstances that do not make the genetic theory very tolerable. This disease would justify investigation from the virus angle.

Passion Vine.

Investigations in passion-vine woodiness have been continued and considerable progress made. A strain complex has been noted in this disease and segregation of the components has commenced. Information on the host range has been extended. Though the insects associated with the passion vine have been systematically studied, none of those present would adequately account for the extremely rapid spread which occurs. It has been confirmed that mechanical transmission can be a very potent factor in spreading the disease. A single cut of the secateur on a diseased vine followed by one on a healthy plant will result in transmission in over 50 per cent. of cases. High incidence of the virus has again been recorded in young plantations contiguous to old diseased plantings and isolation appears to be the most important single factor in the control of this disease. A tip blight of the vines occurs in the field under some conditions and this symptom has been reproduced in the glasshouse.

Fusarium wilt of the passion vine has been recorded from several new areas and the amount of land infected by the fungus concerned is evidently on the increase. Heavily infected areas such as Mount Cotton are unable to maintain passion-vine production. Breeding for resistance is the obvious approach to the control of this disease and preliminary steps have been taken in this direction.

Septoria leaf spot of the passion vine (*Septoria* sp.) has been responsible for considerable leaf-fall on isolated coastal plantations and in some instances has proved quite as destructive as brown spot (*Alternaria passiflorae*).

Papaws.

Investigations of yellow crinkle of the papaw have progressed considerably. The period of activity of the virus is observed to be bound by the months November and March, outside of

which period new infections do not occur. Losses this year were above average and were more severe in northern areas than in the south. In the former localities losses of the order of 20 to 25 per cent. were recorded. The evidence required for the identification of the virus responsible is now almost completed. A large number of alternative weed-hosts have been discovered and it is considered that these may play an important part in the incidence of the disease in the papaw.

A second virus disease of papaws, namely mosaic, has been differentiated. While not as serious as yellow crinkle, this disease has caused appreciable losses, especially in northern areas.

The incidence of papaw dieback was more serious during the past summer than for some years past and was abnormally prolonged into the winter months. The observational plots have been continued and sufficient data have been collected to permit an examination of the effects of rainfall, temperature, and allied factors on the occurrence of the disease. The exact nature of this trouble is still undetermined.

Strawberries.

A survey of commercial strawberry plantings has shown that the virus diseases, crinkle and yellow edge, constitute a very real problem in Queensland. No planting free from virus was recorded and areas with infection over 60 per cent. were inspected. The highest incidences of crinkle infection were associated with high populations of the aphis *Capitophorus fragariae*.

During the 1947 season a strawberry virus certification scheme was initiated with a view to eliminating the virus menace. The individual response was not great, though universal appreciation of the scheme exists among growers. Eight growers finally qualified for the sale of approved runners. The scheme is in operation again this year with some modifications based on experience gained in the previous season. The response from growers has shown an improvement. The inspections have shown that yellow-edge symptoms are well expressed and easy to detect early in the season in the cooler weather, whereas crinkle is more apparent later.

Tomatoes.

The prolonged wet weather towards the end of 1947 resulted in the widespread development of bacterial spot (*Xanthomonas vesicatoria*) of tomato. The general occurrence of this disease, together with its presence in a fungicide trial, confirmed previous experience that the usual copper sprays do not exercise any appreciable degree of control. Several physiological diseases were also common on tomatoes at this time. Most varieties were affected by an epidermal breakdown occurring usually in the exposed shoulders of the fruit. This trouble appears to follow closely periods of drizzly overcast days. A second trouble apparent in a number of varieties took the form of localised areas of internal breakdown in the fruit walls resulting in a blotchy fruit. This disease appears to be directly connected with heavy shading of the fruit in unpruned ground crops, particularly in cooler weather. Blossom-end rot was also prevalent.

A field experiment with copper sprays was carried out on tomatoes in an attempt to obtain information on (i.) the efficiency of weak spray mixtures, (ii.) the strength of copper dust required to equal the efficiency of a copper spray, and (iii.) the effect of reduced lime in Bordeaux mixture on yield. Owing to the absence of Irish blight and target spot no information was obtained on the first two points. Though the low-lime Bordeaux mixture gave higher yields at each copper strength used the differences were not significant, though suggestive. When copper oxychloride sprays were compared with Bordeaux mixtures for yield the results were unexpected but were explained by the assumption that the crop was growing in a copper-deficient soil and that there was a differential stimulus exerted by the two forms of copper. A pot test subsequently carried out tended to support this hypothesis.

Fusarium wilt was present in several plantings of the Grosse Lisse variety. These observations confirm the grouping of this tomato as a susceptible variety.

Cucumbers.

Because of the poor control obtained by many growers the efficiency of various fungicides for the control of downy mildew (*Pseudoperonospora cubensis*) of the cucumber was investigated. The mildew was particularly severe throughout the period of the experiment, which was completed in April. The copper sprays were the only ones to show any success and even there infection of the leaves was relatively high. A proprietary mercury spray appeared to be definitely phytotoxic as well as to exert no control on downy mildew. There was also the suggestion that sulphur may have some phytotoxic properties when used on cucumbers.

A severe epidemic of anthracnose (*Colletotrichum lagenarium*) occurred in cucumbers in the Redcliffe district. The destruction of foliage was actually complete and the disease advanced to this stage in approximately a week under favourable conditions of temperature and drizzly rain. This disease is usually of minor importance in cucumbers.

General.

Brown patch of turf (*Sclerotinia homeocarpa*) has been particularly troublesome in both summer and winter months. Given sufficient moisture this disease does not appear to be restricted to the warmer weather. Blue couch appears more susceptible than green. Useful control is being obtained with the calomel-corrosive sublimate treatment.

Considerable progress has been made in the compilation of a check list of Queensland plant diseases.

The call for bacterial inoculum for various legumes continues to increase. During the year under review 1,058 bottles, sufficient to treat 2,105 bushels of seed, were supplied. This was an increase of 422 bushels on the previous year. Inoculum is most commonly supplied for lucerne and lupin. Cultures for Poona peas, field pea, clover, and soy bean are called for less frequently, though this is probably related to the total acreages planted.

The efficiency of certain strains for nodule production was submitted to glasshouse tests and more active strains substituted where a loss of efficiency had occurred since previous testing.

ENTOMOLOGY.

Pests of Deciduous Fruits.

During the past two seasons it has been established that DDT sprays give more effective control of codling moth (*Cydia pomonella*) than the insecticides formerly used for this purpose. Investigations in 1947-48 were mainly concerned with some of the problems which arise when such a programme is adopted by growers. Chief among these are the increase in red-mite and woolly-aphid activity on DDT-treated trees and the variable efficiency of DDT formulations as codling-moth sprays.

The main experiment was located at Applethorpe on the late-maturing variety Granny Smith. Treatment schedules were nine in number and these were selected to permit comparisons between dispersible powder and emulsion-type sprays, between hexaethyl tetraphosphate and wettable sulphur as supplements to DDT which could conceivably suppress mite activity, and between spray schedules which begin with the calyx spray and schedules which commence with the first cover spray. Codling-moth activity was considerable but excellent control was obtained from spray schedules based on DDT. However, there is still an element of doubt as to whether or not the grower may safely omit the calyx spray which he has been accustomed to use. This spray is disliked partly because it may, if applied too early, kill some insect pollinators. If the calyx spray is omitted, the consequences should not be serious provided DDT is used in the first and subsequent cover sprays. It would appear, too, that emulsion types of DDT are more efficient than the equivalent sprays prepared from the dispersible powder. Presumably this is due to the greater tendency of the latter spray to weather from the foliage and fruit. Neither woolly aphid nor red mite got out of hand on the experimental trees. The addition of either lime sulphur or hexaethyl tetraphosphate to alternate DDT cover sprays had, however, no apparent effect on the populations present, for the mites were rather more numerous on trees receiving the combination sprays than on those which had received no DDT.

One rather unusual pest attracted attention in the Granite Belt during the year. The light-brown apple moth (*Tortrix postvittana*) is normally rather rare in deciduous fruit orchards. This year it was common in apples, caused a considerable amount of trouble in grapes, and showed a partiality for New Zealand lupins, a cover crop sown in late summer.

Citrus Pests.

Red scale (*Aonidiella aurantii*) still remains a problem in the citrus industry. Control measures which have been fairly effective in the past failed to keep the trees clean. Climatic conditions were favourable for the insect but other factors, such as labour shortages, defective equipment, and modifications in pest- and disease-control schedules following the introduction of DDT for the control of the larger horned citrus bug, may also have a bearing on the problem. It appeared, therefore, that treatment schedules would have to be revised at least in the orchards where gross infestations of the pest occur. Accordingly, some modified pest- and disease-control schedules were tested during the year on a number of orchards. The results suggest that a double treatment in summer can reduce red-scale populations, even in heavily infested orchards, to levels at which clean fruit can be harvested. Such a double treatment may rely on two fumigations or an oil followed by fumigation if the treatments are spaced approximately three weeks from each other. However, such a schedule makes exacting demands on the grower and it can be regarded only as an emergency measure and not as a permanent solution to the problem. Further modifications in the standard pest- and disease-control schedule may be needed.

The Queensland fruit fly (*Strumeta tryoni*) invaded citrus orchards when early varieties such as grape fruit and navels were ripening. At that time, transport services were held up and it was necessary to hold the fruit on the trees two or three weeks longer than usual. Had it not been for the liberal application of DDT sprays during that period, losses would have been much more serious. The outbreak provided a good demonstration of the capabilities of the insecticide for this particular type of problem.

Peach moth (*Dichocrocis punctiferalis*) which is normally a minor pest of citrus fruits, was very active during the summer and autumn. The larvae burrow into the fruit, usually making their entrance where adjacent fruits touch each other. Losses were high in some orchards.

Banana Pests.

Banana pests were fairly active during the year. Red spider (*Tetranychus urticae*) was very troublesome in some districts and even young plantations were defoliated at times. Banana weevil borer (*Cosmopolites sordidus*) continues to shorten the life of some plantations; apparently existing control measures are not quite adequate to meet requirements.

The banana rust thrips (*Scirtothrips signipennis*) again lowered the quality of much fruit cut during the autumn and winter and this reflects the failure of some growers to apply current recommendations for controlling the pest. Last year it was demonstrated that a 2 per cent. DDT dust applied at fortnightly intervals from the time the bunch was thrown would give good control of the banana rust thrips in a moderate outbreak. The 1947-48 programme was partly experimental and partly demonstrational and was carried out with the assistance of officers of the Horticulture Branch. The experimental layout allowed comparisons between DDT and benzene hexachloride dusts separately and in combination. The current year's outbreak reached its peak in early February, but all untreated bunches thrown between December and March showed a blemished skin. A treatment schedule which allows four applications of a 2 per cent. DDT dust at fortnightly intervals from the time the bunch is thrown proved effective. A 4 per cent. benzene hexachloride dust is at least as effective as DDT dusts, but the forms available to the grower at present are unpleasant to use.

The banana aphid, though sometimes very common, is of little interest as a pest except for the part which it plays in the transmission of the virus disease, bunchy top. It is usual to

rely on pouring kerosene down the throat of diseased plants to kill any infective aphids present. It was hoped that some of the newer insecticides might prove more efficient for aphid control, but an experiment at Beenleigh gave disappointing results. The insecticides tested included nicotine sulphate, hexaethyl tetraphosphate, DDT, and benzene hexachloride. Though toxic to the aphid, none of these materials could be forced into sheltered places, such as the margins of the unfurled leaves, where many of the insects occur.

The Fruit-spotting Bug.

The fruit-spotting bug (*Amblypelta lutescens*) was originally studied as a pest of bananas in central Queensland. During recent years it has perhaps been more important as a pest of papaws, which are liable to severe attacks in tropical areas during the summer and autumn months. It has been suspected for some time that the insect may also be responsible for faulty setting in custard apples and some other crops. The evidence for this viewpoint is increasing. During the year, it was demonstrated conclusively that faulty cropping in Queensland nuts could be caused by the insect. The kernel of newly set fruits, when pierced by the bug, loses its firm texture and becomes a jellied mass. Shortly afterwards, the fruits drop from the trees. Superficially the shed fruits show no signs of injury and it would normally be assumed that the shedding was due to physiological causes such as an irregular moisture supply. Small bug populations can cause an immense amount of damage and the pest is obviously more important than was at one time thought to be the case. Fortunately, it can be effectively controlled with DDT sprays.

Mites.

Mites have been very active during the year. In spring, some weeds, notably apple of Peru or wild hops, carried very heavy infestations of red spider in the Cleveland area. Later, crops such as beans and cucumbers were attacked and complete control was seldom obtained by growers even from weekly applications of a sulphur dust or spray. A related Tetranychid was recorded as a pest of citrus for the first time at Mundubbera, the bulk of the infestation being on the lower leaves. Another species occurred on citrus in northern Queensland. It was more or less confined to the lower surfaces of the leaves. The widespread China apple is an alternative host.

An Eriophyid mite caused some damage to paspalum pastures at Maleny. The grass acquired a bluish colour and the stunted leaves stood out from the stem in a semi-erect position. Another species occurred on the unfurled leaves of banana plants in southern Queensland, but, though populations were very high, no ill-effects on the plant were observed. The bud mite (*Aceria sheldoni*) on citrus was more active than usual and caused a certain amount of fruit malformation.

The broad mite (*Hemitarsonemus latus*) destroyed the blooms of dahlias, gerberas, and some other plants. This pest was first recorded from Queensland only a few years ago and it is now a pest of many cultivated plants.

The resurgence of mites has coincided with the widespread use of DDT to control insect pests of cultivated crops. In some instances, the insecticide certainly aggravated the mite position. The activities of mites on non-cultivated crops both in and away from agricultural areas suggest, however, that some climatic condition is responsible for the general phenomenon.

Locusts.

Though several pasture pests have been recorded during the year, the losses caused by them have been less serious than usual, primarily because the damage was largely offset by good rains during the winter and spring months in the more important farming districts.

As expected from field observations during the past two years, the outbreak of the yellow-winged locust (*Gastrimargus musicus*) which had persisted in central Queensland for some time came to an end. The persistence of the pest in the area may be attributed to a succession of dry seasons comparable with those of its normal environment in western areas. The habits of this insect are now fairly well known. The main, though probably not the only, outbreak centre lies in the vicinity of Emerald and Springsure. If conditions in this area first favour rapid breeding and then force the insects to aggregate in limited feeding grounds, migratory habits are acquired and flying swarms invade areas where agriculture is practised. The development of migratory habits is accompanied by changes in the body structure and colour of the insect.

During 1946-47, the Australian plague locust (*Chortoicetes terminifera*) was very active in south-western Queensland and some adjacent agricultural areas were threatened with invasion at a time when the wheat crop was growing. Fortunately, rains in the south-west were such that the insect showed little or no tendency to move eastwards. At Goondiwindi, however, conditions were suitable for testing the new insecticides, benzene hexachloride and chlordane, which promise to supersede arsenicals in locust control measures. They have proved more toxic than arsenic pentoxide, the poison normally used in this class of work, and they have the advantage that they can be used in baits, sprays, or dusts without any risk of stock poisoning. When used as sprays or dusts the difficulty in former control work, viz., getting supplies of the bait diluent (bran) to the infested areas, will be avoided.

The advent of better insecticides for locust control does not overcome the difficulty of organising large-scale control measures at an economic cost. It has been suggested that better results might be obtained by tackling these pests in pastoral areas before they migrate to agricultural districts nearer the coast. The practicability of solving the problem in this way has yet to be demonstrated, but the three eastern States and the Commonwealth have made provisional arrangements for a trial of this kind.

White Grubs in Pastures.

On the Atherton Tableland there were indications last year that white grubs (*Lepidiota caudata*) might be troublesome in pastures during 1947-48. It was decided, therefore, to investigate the possibility of using benzene hexachloride for the control of this pest in pastures.

The insecticide gives good control of related pests attacking cultivated crops such as sugar cane when applied either at the time of planting or as a side dressing later. The control problem in pastures is much more complicated, for it is not easy to get the insecticide into the soil horizon where the grubs occur.

The investigation has three phases. The first is to demonstrate the practicability of treating potential egg-laying sites on the farm so that beetles will be killed when they begin to lay their eggs. These sites are fairly well defined along fence lines, around fallen timber, and in the vicinity of Scotch (spear) thistles which flourish in areas where the grass is thin. The second is to treat the known infested areas—i.e. where the turf is damaged—before the spring flight, in the hope that the beetles will be destroyed as they emerge from the ground. A considerable beetle mortality normally follows such treatment. The final phase is to destroy the white grubs in the field before the rapidly-growing larvae move laterally and cause extensive damage. The work required a long-term experiment, which was established during spring, but results will not be available for discussion until the coming season.

Tobacco Pests.

Since the introduction of DDT to the tobacco industry for the control of leaf miner (*Gnorimoschema operculella*), insect pests have not been troublesome with the exception of the tobacco looper (*Plusia chalcites*). This insect showed some signs of activity during 1946-47, and during the past year it was responsible for a considerable loss of crop. It first appeared in irrigated crops in October, but populations did not decline as they usually do after the completion of the one generation. Most of the infested crops had reached a stage at which arsenicals could not be used owing to residue complications and growers automatically turned to DDT. Results with the dusts were far from satisfactory. This was due mainly to the difficulty of treating tobacco crops so that the undersides of the leaves receive an insecticidal cover.

Nematodes (*Heterodera marioni*) are important pests in the tobacco crop, particularly in localities where the area of suitable land is limited and long-term rotations are not practicable. Further investigations on the merits of DD as a nemacide show that it may be useful for seed-bed work, but its performance in the field has not so far been convincing. Costs of application are such that treatment would only be worth while if effective control over long periods is obtained. Further work on the subject is planned for the coming season, when suitable equipment should be available for applying the fumigant to the soil.

Potato Pests.

Work on the control of potato moth (*Gnorimoschema operculella*) in the field has been continued. For some years the experiments have been located at Home Hill, where conditions are rather different from those in southern Queensland, and it will be necessary to demonstrate the applicability of the main conclusions in the Lockyer Valley during the coming season. The investigation has shown that control of potato moth can be obtained by an application of an 0·1 per cent. DDT spray when the pest is first noticed in the field. This one application may be adequate in some years, but a second applied just about the flowering period is occasionally needed. Unfortunately, once an infestation gets out of hand late in the season, some tuber infestation below ground will occur even if sprays are applied at that time. The grower must therefore regard the treatment as protective and supplement it. where necessary, by cultural measures, such as late hilling, which help to cut down the amount of tuber infestation.

Since the severe outbreak of the potato flea beetle (*Xenidia picticornis*) in the Lockyer during 1943, the pest has been recorded in the more important potato-producing districts every year. Plant failure was fairly common from this cause at Boonah in the 1948 autumn crop but yields were not materially affected. Important wild hosts of this insect are apple of Peru (or wild hop) and Indian gooseberry weed.

Cotton Pests.

Insect pests have not been a limiting factor to the cotton crop during the season. One minor outbreak of corn-ear worm (*Heliothis armigera*) occurred during the summer but the infestation was insufficient to give worth-while results from the experimental work at Biloela Regional Experimental Station. It is already apparent, however, that DDT sprays will give more effective control of the pest than lead arsenate. The emulsions can be used up to concentrations of 0·3 per cent. without difficulty and the dispersible powders at even higher concentrations. Some trouble has been encountered from aphids (*Aphis gossypii*) on cotton treated with both dispersible powder and emulsion sprays. As in the case of lead arsenate, though to a lesser extent, an increase in the aphid population can be expected when DDT is used at these relatively high strengths.

The yellow peach moth attacked cotton, particularly in coastal districts. It was the primary boll-pest during the summer period, a most unusual phenomenon.

Forest Pests.

For some time lead arsenate has been used for the control of the white grub (*Rhopoea magnicornis*) which attacks seedlings in forest nurseries. Materials such as DDT and benzene hexachloride are also lethal to the insect but treatment costs are higher and they are therefore unlikely to supersede lead arsenate unless the latter adversely affects plant growth. The amount of lead arsenate required in the soil to give immunity from white-grub attacks for a period of, say, five years is high. It was obviously necessary to establish the arsenic tolerance of hoop pine, the main reafforestation timber, before lead arsenate applications became general. Rates of application varying from 6 to 60 lb. per 480 square feet of nursery bed have therefore been compared in two soil-types, one an alkaline chocolate loam and the other a sandy loam with an acid reaction. Hoop-pine germination in both cases was good, though plants in some of the beds receiving the heavier treatments showed signs of foliage bronzing during a dry autumn.

However, the seedling percentage suitable for transplanting from all treatments after a period of two years was much the same though the arsenic content of the plants at tubing varied with the lead arsenate content of the soil from 0 to 48 p.p.m.

The resumption of log importations into Queensland from Pacific countries has brought to the forefront some entomological problems which were of no moment in pre-war days. Before the war, logging programmes in the exporting countries were organised so that creosote was applied to the log at the stump before borer infestation had occurred. Recent shipments have not been so efficiently handled and have contained a number of borer-infested logs from which the following insects, among others, have been reared: *Xyleborus cognatus* Bldf., *X. pseudopilifer* Schedl., *X. gracilipes* Eichh., and *Diacavus diaphanas* Schedl. If established here, any one of these could aggravate the timber-pest position. Stringent enforcement of quarantine regulations is therefore imperative.

Legislation.

"*The Apiaries Act of* 1938" was revised during the year. The alterations in registration, apiary classification, and site-protection requirements should do much to meet the needs of the beekeeping industry and permit its expansion in Queensland.

"*The Fauna Protection Act of* 1937" is now administered by the Science Branch, the staff of which is technically well equipped to handle the varied problems associated with legislation of this kind, which is designed to conserve animal and bird life.

BOTANY.

General.

As in previous years, most of the time of the officers of this section has been taken up in determining specimens and reporting on weeds, grasses, fodder plants, &c., submitted by landholders and others. A total of 10,229 specimens was named during the year.

Several hundred specimens of Queensland trees and shrubs were identified in connection with fossil studies of the brown-coal measures of Victoria. The fossil studies, which are connected with the development of the brown-coal industry, are being carried out at the Botany School of the University of Melbourne. This work entailed a considerable amount of field collecting in both the southern and northern parts of the State.

The most important cultivated species of *Annona* in Queensland is the custard apple. The specific identity of the trees yielding this popular fruit in the State has always been in doubt. During the year the section has co-operated with the Horticulture Branch in collecting and examining flowering and fruiting material of the custard apple commonly grown here. As a result, it has been determined that the commonly cultivated species is *Annona squamosa,* a native of tropical America. A naturalised form found in northern parts of the State also belongs to this species. Another species, the cherimoya (*Annona cherimola*), a native of Peru, is now being cultivated on an initial scale. Its fruit has a very attractive subacid flavour which is considered to be superior to that of the custard apple. The pond apple (*Annona glabra*), a very inferior species, is naturalised in some parts of North Queensland. A fourth species, the soursop (*Annona muricata*), is grown to a limited extent in coastal towns from Rockhampton northwards.

A considerable amount of attention has been given by the section to forest botany. As in previous years the Sub-department of Forestry has submitted for identification a large number of specimens of trees from different parts of the State. Many of the specimens were from species which have only recently become important commercially. Up to a few years ago hoop pine was the principal softwood used in building and joinery. In recent years, however, the supply of this pine has greatly diminished and many kinds of rain-forest woods are being substituted for it. In North Queensland, particularly, many species of trees are now being exploited for joinery and cabinet-making.

Throughout the year officers of the section co-operated with the Council for Scientific and Industrial Research in exploring the native flora for plants yielding alkaloids and other chemical constituents of pharmacological value. For this purpose the section was represented on collecting trips undertaken by the Council to North Queensland rain-forest areas and to the Macpherson Range and Mistake Range in the south. In addition large numbers of specimens were identified in the herbarium. Work by officers of the Council has shown that a number of Queensland plants possess alkaloids of remarkable properties. The chief source of these alkaloids so far is the rain-forest constituents.

An important feature of the enquiries received by the section has been the requests from Shire Officers and others for information regarding shade and ornamental trees and shrubs suited to particular local conditions. Appropriate descriptive lists have been supplied.

Noxious Weeds.

Following on representations to the appropriate authority the giant sensitive plant (*Mimosa invisa*) was added to the list of plants declared noxious throughout the State. Advice has been given on the identity and potentialities of new or little-known weeds which have come under notice.

The Government Botanist was appointed a member of the Noxious Plants Consultant Subcommittee of the Co-ordinating Board constituted under *The Stock Routes and Rural Lands Protection Acts,* 1944 *to* 1946.

Mulga and Western Pastures.

A scheme has been drafted for research work on western pasture plants by the section, aimed at finding and developing native pasture plants, particularly legumes, to build up the protein content of the native mixed pastures. It is hoped, too, to find species suitable for growing with intermittent irrigation in the semi-arid regions of the State.

In furtherance of the mulga studies initiated some time ago, visits were made to the Charleville-Wyandra area, where observations were

continued on regrowth, regeneration, and life history of mulga trees and further information was collected on methods of utilisation, particularly mechanical methods. A first attempt was also made to measure the yield of leaf from mature mulga trees. The reaction of mulga to grazing and regeneration and regrowth following different methods of utilisation were studied. Some information was also obtained on the effect of thinning on soil erosion in the mulga country. A comprehensive report setting out the present status of our knowledge of mulga has been prepared and a detailed plan for further research drafted. The aim is to determine for mulga of different types the yield of nutrients per acre, the increment of new leaf in different seasons, the rate of growth of untreated mulga trees, the rate of regrowth and survival following different methods of treatment, the percentage survival, rate of growth and susceptibility to grazing of seedling mulga trees and the most economical methods of using mulga for drought feeding of sheep. In addition, studies on mulga seeds are aimed at finding conditions needed for germination, the percentage of viable seeds, and the length of time during which seeds may remain in the ground without losing their viability.

Poisonous Plants.

In the company of an officer of the Division of Animal Industry, one of the staff made a visit to the St. George district in August to investigate mortalities among travelling bullocks. Deaths were found to be due to the ingestion of large amounts of two species of native tobacco (*Nicotiana goodspeedii* and *N. velutina*). They are dealt with in more detail later.

In November and December, four weeks were spent in the Georgina River region in company with two officers of the Division of Animal Industry investigating the Georgina River disease. This disease, generally believed to be due to the ingestion of some poisonous plant, was first reported in 1895. Since then a number of attempts have been made to find the causative agent, but so far without success. Almost every year thousands of cattle and sheep in the Georgina River region die from this trouble. In the past year, however, seasonal conditions were abnormally good and no cases were seen. Attention, therefore, was concentrated on making a botanical survey of areas known to be affected and of others reputed to be "safe." More than 200 species were listed but no definite clue was obtained as to the possible cause. A few lines of research were suggested and next spring it is hoped to follow these out. Since more than 8,000 square miles of good cattle country is affected, the problem is of major importance to the beef industry of the State. A joint report on the investigations was prepared, summarising results of all previous attempts to elucidate the problem, and this should prove a valuable starting point for future work.

A short article on hemlock (*Conium maculatum*) was published in the *Queensland Agricultural Journal* following the appearance of this plant in fair quantity on Gowrie Creek. An officer of the section accompanied Lands Department officers to the locality to make field studies of the plant.

Botanical inspection of a farm at Biloela revealed that the Darling pea (*Swainsona galegifolia*) was responsible for mortalities in cattle. Poisoning by *Lantana camara* was found to be the cause of deaths in dairy cows at a farm near Strathpine.

Plants thought to be the cause of losses in stock always represent an important part of the specimens received for identification and report. Among those submitted the following are selected as a contribution to the study of poisonous plants in Australia:—

Parsonsia straminea (Monkey rope).—Young plant received from Inspector of Stock, Brisbane; suspected of poisoning a horse.

Epaltes australis (Nut heads).—Received from Millmerran; strongly suspected of causing a strong weed-taint in milk.

Wedelia asperrima (Sunflower daisy).—Reported from near Camooweal as causing rapid death of grazing bullocks in fair condition.

Coronopus didymus (Bitter cress).—Received from Ormiston, near Brisbane; suspected poisonous to chickens.

Haemodorum corymbosum.—Received from Collinsville with the report that cattle eat it, take a drink, and are after found dead. The country was passing through a bad drought.

Albizzia canescens.—Received from Stock Inspector, Sandy Creek, Charters Towers, with the report that it was suspected of poisoning non-travelling mixed store cattle, causing the following symptoms:—Cattle off-colour approximately 1 week; tongue yellow, eyes watering, almost blinded; skin on nose peels badly; holds head extended and continually shaking as if fly worry; continually licking nose with dry tongue; stands against tree with head pressing trunk; later black scouring, bad smell.

Dianella laevis (Blue lily).—Received from Inspector of Stock, Brisbane; suspected of poisoning a horse.

Xanthorrhaea media.—Received from Stock Inspector, Nambour, with the report that several heifers on a property near Coolum, grazing on swampy ground thickly covered with the plants. were noticed to move with slight muscular or nervous inco-ordination, something like the "rickets" developing in cattle which have eaten *Zamia* sp. They also showed very frequent attempts at urination with much straining, very little or none being passed. During the flowering period they had been seen to eat freely of the flower spikes until the seedheads dried out. The condition appeared and developed during the two succeeding months.

Jussiaea repens (Water primrose).—Reputed to have caused the death of nine cattle at Isis. The owner reported that after clearing swamps of this plant no further losses were experienced. Field evidence against this plant is fairly strong, though feeding tests have always given negative results.

Nicotiana goodspeedii and *N. velutina* (Native tobacco).—Investigations in company with a Veterinary Officer were carried out into the deaths of 22 bullocks in a mob of 500 travelling along the stock route south of St. George. These

two species of *Nicotiana* were the most conspicuous features of the ground vegetation on forested sand-ridges carrying trees of carbean, wilga, boonaree, and bitter bark. The two tobaccos showed signs of having been heavily eaten by the affected cattle and there seemed to be some preference for the smaller species (*N. goodspeedii*). Symptoms were typical of tobacco poisoning. Evidence indicated that the beasts had taken some time to die. There were signs of struggling and the ground was deeply marked by paddling action of the legs prior to death. Analyses by the Toxicologist showed dry material of *N. goodspeedii* to contain ·008 per cent. nicotine and *N. velutina* ·0012 per cent.

Verbena tenera (Mayne's pest): Received from Roma with the report that it was strongly suspected of causing the death of fowls in the town and district. Birds described as in beautiful condition one day were dead the next. Those that recovered lost control of their legs for days. They were fond of eating the flower heads of this common weed.

Herbarium and Systematic Botany.

Herbarium work included critical examination of more than 800 specimens collected during the past two years. In connection with the studies of mulga and gidyea it was found desirable to rearrange the whole of the *Acacia* material in the herbarium. At the same time, a check-list was prepared of all Australian species of *Acacia*, the total number of valid species being 606. The rearrangement has been of great value for ordinary routine determinations of *Acacia* specimens.

Nicotiana material in the herbarium has been sorted out into a number of species formerly placed under *N. suaveolens* and several records new for Queensland remain to be published.

Material of *Cassia desolata* and *C. sturtii* was studied critically in connection with the Georgina River collection and considerable confusion in the determinations of this group of shrubs has been cleared up.

Examination of material collected in the Georgina River area has revealed the presence of many species not formerly known to occur in Queensland. The flora of much of the region shows very marked affinities with that of the Kimberleys and parts of the Northern Territory, and the whole region constitutes a very interesting floristic province. It is hoped that time will permit the preparation of a paper on the flora of this region. A few plants new for Queensland were also found among the specimens from the Charleville-Wyandra area.

Critical work on the systematics of a number of Eucalypts from northern and north-eastern Australia was carried out, in an attempt to clear away some of the confusion surrounding the correct names of a number of specimens. The names are urgently required for the labels of specimens and for ecological work in Queensland and the Northern Territory.

Labelling and determination of specimens collected in the Northern Territory, South Australia, and Western Australia was commenced, and about 900 numbers, approximately 5,000 specimens, have been dealt with so far. The determination of the Archbold collections of Cyperaceae from New Guinea is approaching completion.

Several hundred specimens of grasses and Cyperaceae have been received for critical examination from other herbaria, particularly from Melbourne, Canberra, Sydney, Adelaide, and Copenhagen, and from some private herbaria. A large collection of over 200 specimens of Cyperaceae collected in Queensland in 1930-31 by Mr. C. E. Hubbard was determined for the Royal Botanic Gardens, Kew, England.

Revisional work has been carried out in the families *Gramineae*, *Apocynaceae* and *Asclepiadaceae* and good progress can be reported. In this and other taxonomic work the section has been greatly assisted by the co-operation received from other herbaria, particularly by the loan of types and other specimens. The Queensland herbarium was drawn on for reciprocal exchanges of this nature.

A start was made on listing the rare books in the library as part of a general scheme entered into by all the botanical institutions in Australia and New Zealand to prepare a list of the rarer botanical works available in these countries and the libraries where they are kept.

Report of the Chemical Laboratory (Dr. M. White, Agricultural Chemist and Bio-chemist).

GENERAL ANALYTICAL SECTION.

Use of DDT.

Whenever a new drug or medicament becomes available for general use, unwarranted and immoderate accounts of its efficacy usually follow its release. Improper methods of preparation, incorrect dose rates or concentrations and careless administration inevitably bring in their trail complaints from dissatisfied users. These frequently call for investigation, more particularly when the health or life of stock or crops is affected.

The generally favourable seasonal conditions experienced over the past year in both grazing and agricultural areas curtailed the scope of some investigations but there has been no dearth of problems. Some are of localised occurrence, others widespread and part of a general pattern, but all have provided fields for co-operation either between sections of the branch or with other branches of the Department.

The report surveys progress on problems already initiated and indicates work begun in new fields. The first portion of the report has been prepared by the officer in charge of the Branch. The section dealing with plant nutrition is submitted by the Officer in Charge, Plant Nutrition Section (Mr. C. R. von Stieglitz).

When trials with DDT proved its extraordinary efficiency against the buffalo fly and the cattle tick, owners of both beef and dairy

herds were quick to appreciate its value. Some were disappointed. As far as possible the grower is protected from spurious preparations by the appropriate Acts, but there is no protection against improper usage, and it is safe to say that many of these disappointments were from lack of knowledge, not from inferior drugs. But there were anomalies, and it is in this field that the general analytical section has been particularly busy.

The alleged loss of potency (commonly called "tickicide value") in dips charged with DDT preparations has been examined. There are many reasons for this apparent loss, of which human errors are not the least common. The main source of trouble lies in the use of hard waters when preparing the finely dispersed DDT dipping mixture. The drug is not readily distributed through water in the extremely fine form needed for best results without recourse to either oil emulsions or dispersing agents. Most of these are acted upon by the dissolved salts of hard waters. The emulsions which are affected "crack"—i.e., lose their stability and separate in much the way cream does from milk. The dispersed DDT types which are affected either have the dispersing agent altered by reaction with the hard water and consequently lose their ability to keep the DDT in suspension or suffer agglutination of the DDT. The oil types are not widely used for tick control and in this State call for no special comment.

The laboratory has strongly urged all owners who are thinking of using DDT preparations to (*a*) use rain water or (*b*) submit for analysis a specimen of the ground water to be used and indicate what preparation it is proposed to employ. Infrequently-used DDT dips may require up to 200 head passing through to stir the bath to a uniform composition. Obviously the sample submitted for analysis must be representative of the "stirred" dip and the correct procedure is to take the sample while the dip is still agitated by stock.

At this stage a warning might be given with regard to a current practice of adding DDT preparations to an existing arsenical dip. There is reason to suspect that this procedure, especially if full-strength "arsenic" is used, will lead to fatalities. There is no need to subject stock to an unnecessary risk, when DDT or arsenic will, at the recommended strengths, kill ticks.

Miscellaneous Investigations.

A recrudesence of "rubbery banana" disease has given officers of the Horticulture Branch and the Chemical Laboratory yet another opportunity of planning and conjointly following a series of field and laboratory observations on this elusive subject.

An equally evasive problem which was probed again during the year is the so-called "chloride" of tobacco, a supposed cause of inferior leaf.

BIOCHEMISTRY.

Minor Element Deficiencies.

The year saw a marked increase in the number of specimens submitted for suspected minor element deficiencies. These studies and a problem of excess of a minor element (fluorosis) constituted the bulk of the work; consequently some detail of the progress made is given.

Since copper was first recognised as an element essential for terrestrial plants and animals a profuse literature on the subject has accumulated. Though no detailed surveys had been made in Queensland, it early became patent that reasonably large areas of the State suffered from incipient copper deficiency. In some areas the more susceptible plants showed symptomatic lesions and the appropriate copper treatment gave marked curative responses. Even with this evidence available, work on livestock was not initiated. Not until three years ago was the unmistakable evidence supplied by examination of wool and by analysis of sheep livers used to confirm suspicions of copper deficiency in the drier interior. Ameliorative treatments have been formulated by the Officer in Charge of the Sheep and Wool Branch and this section and are now under observation. Field applications of laboratory findings are often difficult and even impracticable. It might be assumed that repetitive oral administration of copper is the simplest form of treatment; this, however, means regular mustering throughout the year, a costly and often impossible procedure. Other methods of supplying the copper are (i.) topdressing of pasture, (ii.) incorporation in a "lick," and (iii.) solution in the drinking water. Each has disadvantages: topdressing is costly and where soils are alkaline in reaction it is possible that much of the copper is rendered unavailable; licks are not taken regularly nor by all of the flock; even when the salts in bore waters do not immobilise the copper the cost of treating any but regulated supplies is high. Nevertheless, some success is being achieved, and though it is too early to measure responses in the final arbiter—the sheep—the work is continuing.

In the higher rainfall coastal areas such index plants as pineapples and citrus have shown that borderline copper status exists and there is some evidence that stock respond to copper treatment. This promises to be a field of considerable economic importance.

Each year the clinical symptoms associated with a negative calcium balance in ewes and dairy cattle are reported. Confirmation is usually obtained by analysis of blood serum and the necessary remedial action taken. Frequently, however, the picture is complicated by a low phosphorus level. In most cases this combined lack of minerals is associated with definite soil types frequently characterised by plants with a low calcium-phosphorus standard of living. There have been cases which do not conform, and an interesting observation has been made in this connection. Fully engorged female ticks were collected and the amount of protein, calcium and phosphorus which they had withdrawn from the host estimated. The not-unexpected conclusion reached was that a heavy infestation of ticks withdraws sufficient of these blood constituents to induce deficiency symptoms even on sound country and that on borderline country a similar result follows continuous light infestations.

Fluorosis.

The experimental sheep penned for this work are now all showing varying degrees of severity in reaction. Hence, attempts at preventive treatment through the diet have not proved

entirely successful. There is not yet sufficient evidence to show whether the ameliorative treatment has been effective.

It is virtually impossible to eliminate all the variables which exist under field conditions and it is therefore to be expected that laboratory findings would not always concur with paddock results. Not only has fluorosis occurred where it might not have been expected but the reverse has also been true. To unravel some of these apparent ambiguities officers made visits to a number of properties in the endemic zones. Seasons influence management and this in turn varies the degree of exposure among the susceptible age groups. This complicates a survey. Nevertheless, most useful data were obtained. The accumulation of fluoride in some tanks and dams supplied by bores proved surprisingly high. The issuing water might be non-toxic, yet at a distant point of the reticulating drain or at a storage tank a dangerous level might obtain. Further, it has been shown that plants growing near the bore drain may contain sufficient fluoride to be a potential hazard in times of drought.

The fluoride intoxication problem has called for some thousands of analyses. The copper deficiency studies have also made heavy demands for analytical work. With the extension of knowledge in both fields it seems likely that some ill-defined sicknesses in stock will be unravelled. For example, it seems reasonably certain that the kyphosis in stock from some areas which had been described as "humpy back" has not been due to poison plants but to chronic fluorosis.

Teart-like Disorder.

In previous reports a disorder superficially resembling the "teart" of Devon and Somerset in England was mentioned. Teart is a wasting disease due to excess molybdate in the pasture. During the past year officers of this section visited the affected area and made exhaustive field and laboratory checks on all aspects of the problem. As a result of their work it now appears quite certain that neither molybdic acid excess nor copper deficiency is the cause.

TOXICOLOGY.

For many years unexplained fatalities in pigs have been investigated. In last year's report it was shown that one heavy "crash" in pigs was due to nitrite poisoning, the nitrite being developed from nitrate in the ground water used in the preparation of food. This year a check on well waters has shown that high levels of nitrate can occur without any visible source of contamination.

A case of cyanide poisoning was solved, and while it presented no unusual features it is recorded for the opportunity it affords to warn all livestock owners of the care necessary when planning drinking facilities for stock in the neighbourhood of industrial processes. All effluents must be regarded with suspicion unless special care is taken to see that suitable treatment is operating to remove toxic by-products.

Over a long period numerous deaths have occurred in an isolated portion of north-western Queensland from what is locally known as Georgina sickness. Numerous plant specimens from the area were submitted for examination during the year, but so far only negative results have been obtained. The distance from railway or air services made the time between collection and receipt a serious obstacle to this work. Frequently an active principle is lost by either evaporation, enzymic action, or oxidation, and as these processes are inseparable from long-distance work it has been planned to send officers to the area when fatalities next occur. The veterinary and toxicological work can then be done under field conditions.

Carelessness with regard to poisons cannot be too strongly condemned. The unlabelled can or box is an ever recurring problem. Two courses are open to the owner: (i.) remove any risk by burying deeply; (ii.) submit to a competent authority for analysis. If these steps were followed many animals would escape poisoning and owners would be saved bitter recrimination.

PLANT NUTRITION.

The past year has again shown an increase in the volume of work and it has been impossible to complete all the analytical work by the end of the year. Soil samples alone totalled 2,119, of which 285 have yet to receive attention.

Soil Samples for Fertility Measurements.

This service, which is carried out free of charge for farmers and graziers, is increasing in popularity and numerous requests were received during the year from producers seeking instructions as to the correct method of taking samples for fertility measurements. Where possible the results obtained by farmers who have received advice on fertilizers are checked and it is pleasing to be able to record that, with one or two exceptions, appreciable improvement in crop yield has resulted from following the advice given. Where no apparent benefit to the crop has resulted an endeavour is being made to obtain, whenever possible, further facts relating to the problem.

Apart from farmers' samples, fertility measurements are being made on representative soil samples from the sites of all fertilizer field trials so that more and more data of a reliable nature may be accumulated in relation to the soil-fertility–plant-growth interrelationships. These investigations are being made in co-operation with the Agriculture and Horticulture Branches.

Water Analyses.

The assessment of the quality of waters for irrigation and stock purposes is an important part of the analytical work carried out for graziers and farmers. As with soil-fertility measurements, an endeavour is being made to accumulate as much reliable information as possible relating to the tolerance of stock and of various crops to saline waters and, where waters known to be of doubtful quality are being used for irrigation, to determine the effect on the soil structure over a period of years.

Apart from the assessment of waters for irrigation or stock use, owners frequently desire to know what measures should be taken to soften the water for domestic purposes, or for use in washing dairy utensils.

All stock waters are now examined for the presence of harmful amounts of fluorides, and if such are present advice is given regarding the best use to be made of such water, keeping in mind the health of the animals forced to drink it. In addition to the usual routine samples, a number of those taken in connection with the State survey for fluoride in water has been analysed by this section as opportunity permits.

Soil Survey Work.

Apart from forestry work the only detailed soil survey was made in connection with one of the experiment stations. This has now been mapped and representative soil samples of the profiles analysed and recorded. Examination of the profile was made at one-chain intervals on two-chain traverses, so that an intimate picture of the sub-surface layers is now on record. It is planned to make similar surveys of the other experiment stations as soon as possible.

Services Related to the Settlement of ex-Servicemen.

Reconnaissance soil surveys for the Land Administration Board have been made of certain areas of land, to assess their possibilities for settlement of ex-servicemen. This involves officers inspecting the area under consideration and taking soil samples of the various types for fertility measurements. The field work is usually done in co-operation with field officers of the Horticulture or Agriculture Branch of the Department, and joint reports of the several officers from the field angle have been submitted. In addition, comments on the general fertility of the soils are made when the analytical figures are available for interpretation. By this means a clear picture is obtained of (*a*) the suitability of the land for horticulture or agriculture, taking into consideration past experience of the area, climatic conditions, &c., and (*b*) the general fertility and texture of the soils.

Numerous soil analyses have been carried out for the Bureau of Investigation of Land and Water Resources and reports on the fertility of the soils submitted.

Work for the Forestry Sub-department.

The Soils Survey Officer has been employed almost continuously on a detailed survey of the Tuan Creek area; a large tract of country has been divided into plantable and non-plantable areas and plantation and firebreak boundaries have been fixed. An initial report, complete with map, was submitted for part of the area during the year and further maps are in process of compilation.

Two investigations of nutritional problems associated with hoop-pine trees were commenced during the year. One was associated with the poor growth of trees in localised areas of certain plantations and the other with chlorosis of seedlings in nurseries. Progress reports on both problems have been submitted to the Forestry Sub-department. Results to date suggest that the partial growth failure of trees in the affected areas of plantations is associated with the texture and structure of the soils in the sub-surface layers.

The problem of chlorosis in hoop-pine nurseries is under investigation and experiments designed to overcome the trouble will be carried out at next planting season at Yarraman.

Soil Structure.

Additional data have been obtained on the water dispersion and sieving method mentioned in last year's annual report. The method should prove of value in assessing changes in soil structure brought about by irrigation and cultivation.

Pasture Studies.

As a continuation of the joint investigations carried out by the sections of biochemistry and plant nutrition, a pasture observational trial was laid down on a dairy property at Springbrook during the year. Previous soil tests had shown the soils to be slightly acid and phosphate-deficient as well as probably deficient in magnesium.

The pasture received renovation with a cut-away disc harrow and was then fenced off from stock. Various plots were treated with lime, dolomite, or phosphate and various combinations of all three. The pasture was mowed several times during the year to keep the growth down. Results to date show that clovers (both red and white) are gradually coming back into the pasture, which consisted previously of paspalum with a little kikuyu grass, but to an appreciable extent only on those plots which have received either lime or dolomite in association with some form of phosphate. The area was recently grazed and then portion seeded, after renovation, to mixed clovers; the portion seeded is a cross-section of all treatments and should provide interesting comparisons. Observations will be taken throughout the season. Further pot experiments are being carried out with a view to determining the optimum conditions for the establishment of red clover in this soil.

As opportunity permits, it is hoped to institute similar observational trials in other districts.

DIVISION OF ANIMAL INDUSTRY.

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

STAFF.

The animal husbandry branches of the Division were strengthened during the year by the appointment of two senior advisers and two advisers in sheep husbandry, one senior adviser and one adviser in pig husbandry, and one husbandry officer and two inspectors in poultry husbandry. The free movement of veterinarians, caused by the shortage of trained men in Australia and elsewhere, resulted in the loss of three veterinary officers during the year, including one who was carrying out most of the research into poultry diseases.

The return to the Yeerongpilly Animal Health Station of Mr. A. K. Sutherland, who had been absent for one year in the United States of America doing special work at the University of Illinois, will strengthen the staff at the station. The experience gained by this officer during his absence will be of considerable value to the Department.

In order to encourage qualified veterinary surgeons to become established in private practice in country districts, the *Diseases in Stock Acts* were amended to provide for payment for tuberculin testing. Up to the present, six men have entered into an agreement with the Department to do this work, three of these being men who have come from other States or who had recently graduated from Sydney University. This has freed Departmental veterinarians from routine tuberculin testing and has made these men available for the staffing of districts where Government veterinary officers have not previously been stationed.

CATTLE PESTS AND DISEASES.

With the exception of one or two small infestations, it can be stated that the buffalo fly has not advanced further south or west and treatment with DDT has been entirely satisfactory. To assist with this control, the Department has charged strategic dips with DDT, which serves the dual purpose of preventing the spread of buffalo fly and destroying the cattle tick.

Experimental work with the new "tickicides" continues. Whilst some very good field results have been obtained, results in other cases have been disappointing. Sedimentation is still causing sampling difficulties and analysis is still not entirely satisfactory. Much more experimental work must be completed before these disadvantages can be overcome.

Tick infestation was very heavy during the past season, as conditions were very suitable for ticks. As would be expected, tick fever was also common, particularly in areas where infestation is usually light. Shortage of the drugs used for treatment of this complaint caused heavy mortality early in the season, but the arrival of supplies from overseas eventually overcame this.

Contagious pleuro-pneumonia has not been serious in southern Queensland and there has been a big decrease in the north, where this disease is endemic. This is due to the preventive inoculations carried out with vaccine manufactured by the Council for Scientific and Industrial Research, and supplied through the Animal Health Stations at Yeerongpilly and Oonoonba.

The control of brucellosis (contagious abortion) in cattle by preventive inoculation with Strain 19 vaccine is extending. Vaccination of calves, both by Departmental officers and by practising veterinary surgeons, is now freely sought by dairy farmers.

PROTEIN SHORTAGE.

There is a constant demand for increased production from all branches of the animal industries. Prices are good but costs are also high. The uncertainty of the food position in the pig and poultry industries is causing a temporary feeling of uncertainty amongst producers. Grains are fairly plentiful but mill offals are in short supply. The outstanding shortage, however, is in protein-rich concentrates which are so necessary for production. Meatmeal is available but not in sufficient quantity. Peanut, linseed and coconut meals are practically unprocurable. In this State, where protein concentrates are so scarce, it is unfortunate that peanuts are sent south to be processed, and it is likely that linseed will share the same fate.

Machinery for the production of meatmeal is difficult to obtain, and much animal offal is lost under the slaughter house system. With the availability of suitable machinery and the establishment of abattoirs in the larger towns, it is expected that increasing supplies of this protein-rich concentrate will become available.

SHEEP AND WOOL.

The outstanding feature of the wool industry in the past season was the high price of wool, approximately 400,000 bales realising £29,000,000. This has caused an unbalanced position in the sheep industry, affecting the development of the lamb trade. The buoyancy of the wool market has discouraged crossbred production, the source of the ewes from which fat lambs are produced. To encourage this production, the purchase of long wool rams has been subsidised by the Department.

Serious drought in the central and north-west has occurred, but this has been offset by the high prices ruling for sheep and some owners have been able to dispose of their flocks.

Valuable climatological survey work has been carried out by the staff of the Sheep and Wool Branch. Such work will be very useful when working out a plan for drought amelioration.

THE PIG INDUSTRY.

The general outlook in the pig industry has been uncertain. Fodder shortages, high costs, comparatively low pig meat prices and shortages of material have created a position from which recovery may be slow. There has as yet been nothing to replace the Pig Meats Acquisition Plan. Fortunately, the contract with the United Kingdom has given more stability to the industry.

The payment of a price from which a fair margin of profit can be made, the grading of carcasses and payment by quality are necessary to place the industry on a sound footing.

Carcass competitions, both fresh meat and cured bacon, have been successfully carried out by the Pig Branch in conjunction with various organisations within the Brisbane and country districts. These competitions are an excellent form of extension work and make it possible for the staff of the Pig Branch to demonstrate, by the finished product, the success or failure of husbandry methods.

EGGS AND POULTRY.

A slightly improved feed position, with a corresponding increase in egg yield, obtained during the year, but production has not yet reached the war-time level. Feeding costs, however, remain high and fair prices must be guaranteed to encourage a continued increase in production.

The establishment of modern abattoirs in Brisbane for the slaughter of poultry is a very interesting development. From these abattoirs thousands of head of poultry are exported each year or go into local consumption. It is expected that in the near future only graded, healthy poultry meat from special abattoirs will be available for export and local consumption in the Brisbane area.

Avian leucosis is widespread and, as in all other countries, this chronic complaint is still causing serious losses. Pullorum testing is still increasing and it is hoped that in the near future the stock of all suppliers of chickens will be tested each year.

CATTLE HUSBANDRY.

During the year a Cattle Husbandry Branch was formed. It is not expected that an appreciable staff will be appointed until 1949, but the Officer in Charge is working to a definite plan and will, for the time being, co-opt the services of officers of other branches and divisions.

The Officer in Charge has been sent to C.S.I.R., State and University institutions in New South Wales and Victoria for special training and schools are being arranged to give training in animal nutrition to officers of the Animal Industry and Dairying Divisions.

EXTENSION WORK.

As part of the general Departmental plan to keep officers trained in modern methods, refresher courses have been held by the Sheep and Wool and Poultry Branches. Similar courses are planned for other Branches.

A symposium attended by workers engaged in sheep and wool research from C.S.I.R. and State Departments was held in Sydney, and plans are now in hand to convey the methods with immediate practical application to field officers for extension to the industry.

Many field days have been organised by or attended by officers of all branches of the Division. Demonstrations in carcass appraisal and sheep blowfly prevention, and post-mortems to demonstrate disease, have been held in various parts of the State.

Officers from husbandry and animal health branches have given radio addresses at least once each month through the Australian Broadcasting Commission's "Country Hour" Session.

SEASONAL CONDITIONS.

Seasonal prospects at the commencement of the year were particularly good in most sectors of the pastoral industry as a result of the late summer rains followed by freshening falls, and stock were wintering well.

In July, useful rains in the southern and far south-western pastoral districts spread eastwards through the Warrego, Maranoa and Darling Downs divisions to the South Coast, but except on the tropical coast gaugings were below the light to moderate July averages. Normal dry winter weather was the general experience elsewhere.

Rainfall during the year in the north-west was variable and below what constitutes a normal season. The highest falls were experienced during the hottest months of the year, and in consequence drying weather dried out the moisture normally retained for plant life under more favourable circumstances. Pastures rapidly deteriorated and surface waters quickly diminished.

Reasonably good conditions prevailed in the Peninsular and far northern coastal areas. However, conditions in the Charters Towers and Hughenden areas and south thereof were less favourable, and though isolated thunderstorms were experienced early in the second half of the year pastures deteriorated considerably, necessitating movements of stock for agistment purposes.

Central coastal areas, the Callide and Boyne Valleys and parts of the Dawson River country experienced excellent seasons, while the far- and central-west and the country north from Clermont and extending southwards to the Springsure-Rolleston district have had to contend with from fair to extremely bad seasonal conditions.

In the Wide Bay and Burnett districts conditions were exceptional, as early spring rains were recorded in August and these were followed by excellent falls at regular intervals until the end of December. A comparatively dry January and February preceded a recurrence of regular rains until the end of June.

Prolonged drought conditions extending over several years in the Charleville district and contiguous country ended in February when excellent rains were registered. Prior to this, stock

losses were exceedingly heavy and stock routes were more or less impassable due to lack of feed and water. During March more heavy rains were recorded and rivers reached flood dimensions. By the end of April, pastures had recovered, ample feed was available and fat stock were more prevalent.

With the exception of a third dry quarter, the Darling Downs and the area extending to the south-west experienced a remarkably good rain distribution and the condition of stock was generally good throughout the period under review.

The dry weather of 1947 was followed by spring rains commencing in September in the south-east and south coastal sector and exceedingly useful falls were recorded until the end of June. During April, cyclonic weather was responsible for the inundation of low-lying coastal country. On the south coast, a considerable amount of damage to farm lands resulted, but stock losses were not heavy.

Report on Field Veterinary Services and Acts Administration (Mr. J. C. J. Maunder, Chief Inspector of Stock).

BUFFALO FLY.

Buffalo fly control was based on the assumption that the pastoral districts of Leichhardt, Port Curtis and north thereof were permanently infested and the country south thereof—namely, Maranoa, Darling Downs, Wide Bay and Burnett and Moreton districts—clean. The principle of treating with DDT all travelling cattle from infested country going into clean country was applied. Railed cattle were treated by spraying on trucks at North Bundaberg and road cattle were treated by use of a mobile spray and by hand-sprays. In addition, strategic dips on stock routes were charged with 0·5% DDT for the dual purpose of buffalo fly and cattle tick control.

That these methods were successful is borne out by the fact that, despite ideal seasonal conditions, the fly was held to the country on the fringe of what is regarded as permanently infested areas. With similar seasonal conditions in 1945-46, the fly spread to Roma, Dalby, Miles, and Wandoan districts.

CATTLE TICKS AND TICK FEVER.

Owing to the very favourable seasonal conditions, a great increase in the tick population of infected areas and a number of fresh outbreaks and extensions from previously infested country occurred. Owing to the generally unsatisfactory cleansing of cattle in arsenical dips, a number of strategically placed vats were filled with 0·5 per cent. DDT, for both buffalo fly and cattle tick control. These were arranged so that dippings in DDT were available to cattle clearing for tick-free areas. A number of other dips were filled with DDT to assist eradication in problem areas.

Mortalities associated with dipping in a mixture of DDT and arsenic occurred and were duplicated by spraying experiments with standard arsenical solutions containing varied concentrations of DDT.

Experimental dipping in benzene hexachloride and DDT is being continued.

Mobile spray plants are being used for the control of ticks in isolated outbreaks where dipping facilities are not available

The use of DDT in preliminary and final cleansing dips has been an outstanding success. For the past few years, many mobs of cattle have been held at clearing dips for five and six dippings in arsenic. During the past season, there have been no such hold-ups and there have been no outbreaks of ticks in clean country due to failure to kill ticks in the dipping mixture. Approximately 150,000 cattle have been treated with DDT in cleansing dips during the six months the dips have been charged.

Tick fever has been extremely prevalent owing to the fact that cattle in marginal areas lost their "immunity" during the dry periods of 1946-47, when tick populations were greatly reduced. The extreme shortage of drugs for treatment aggravated the losses considerably. Though there were a number of outbreaks of cattle ticks in the clean country of the Downs, no tick fever occurred.

Dips at Sedan and Julia Creek have been charged with 0·5 per cent. DDT in an attempt to protect susceptible cattle from infection with pathogenic arsenic-resistant ticks at spelling places such as Sellheim, Bajool, and Bororen. Many losses have occurred in such cattle during past years and the results of this attempt to prevent such losses are awaited with interest.

It is considered that most outbreaks of cattle tick in clean country are due to the movement of cattle from country thought to be clean but actually infested. To ensure up to date and accurate knowledge of the tick status of all properties on the fringe of infested country, new appointments of inspectors are proposed.

CONTAGIOUS PLEURO PNEUMONIA.

Sixteen outbreaks of pleuro were notified in the State during the year. As usual, several outbreaks were due to the one infected mob. Complement fixation tests to detect carriers were used fairly extensively, especially where valuable stud animals were concerned. One property has been released from quarantine after two years following the slaughter of persistent reactors.

The control of pleuro pneumonia in the endemic areas of the far north continues to be a problem under the conditions of large holdings with few facilities for handling cattle. An officer will be stationed in this area in the near future in an attempt to lessen the menace that cattle from the endemic areas constitute to southern country.

TUBERCULOSIS.

Tuberculin testing to ensure a tubercle-free milk supply to Brisbane has been continued and extended to a number of cold milk supplying areas. To encourage the establishment of private practitioners in country districts the Brisbane supply area was divided into 14 districts. Contracts for testing in 10 of these areas were accepted by practitioners and since the first contract was taken up in March, 6,263 head have been tested under contract and 190 reactors detected.

The accompanying table gives details of tests conducted by Departmental officers in the Brisbane area in 1947-48:—

TUBERCULIN TESTS CARRIED OUT IN THE BRISBANE AREA BY DEPARTMENTAL OFFICERS DURING 1947–48.

—	No. of Herds.	No. of Animals.	No. of Reactors.	Percentage Reactors.
Herds Supplying Warm Milk.				
Herds which have undergone—				
One test ..	11	516	52	10·07
Two tests ..	9	479	5	1·04
Three tests ..	48	1,652	11	0·66
Four tests ..	29	1,369	19	1·39
Five tests ..	11	659	14	2·12
Six tests ..	9	852	19	2·23
Seven tests ..	3	302	4	1·32
Eight tests ..	1	34	..	..
Replacements ..	..	1,610	20	1·24
Total ..	121	7,473	144	..
Herds Supplying Cold Milk.				
Herds which have undergone—				
One test ..	177	11,189	892	7·87
Two tests ..	92	5,823	104	1·78
Three tests ..	101	5,573	70	1·25
Four tests ..	20	1,659	7	0·42
Five tests ..	5	633	5	0·79
Six tests ..	2	82	..	..
Replacements ..	..	2,299	76	3·30
Total ..	397	27,258	1,154	..

In addition, a number of herds on the Darling Downs supply milk to the Brisbane area. During the year 6,841 head were tested for 42 reactors.

A considerable amount of testing is carried out in country districts, mainly on herds supplying milk to towns or where the presence of tuberculosis is suspected from pig condemnations. Of 29,727 head tested, 528 were reactors.

Tuberculosis is a problem in some of the beef herds of the State, particularly in North Queensland, and must be investigated in that type of cattle when additional veterinary staff becomes available.

BRUCELLOSIS.

During the past year more attention has been paid to vaccination with Strain 19 and less to blood testing, as the institution and maintenance of brucellosis-free herds has been found difficult and expensive. Some herds are still bled for diagnostic purposes. Approximately 11,000 female calves between 4 and 12 months have been inoculated.

MISCELLANEOUS CONDITIONS.

Mastitis.—Considerable extension work in demonstrating the control of mastitis with sulphanilamide and penicillin was carried out. Good results have been achieved with both methods combined with improved methods of hygiene and management.

Sterility.—Attention has been focussed on the widespread incidence of sterility. It is probable that much of this trouble is not due to vaginitis.

St. George Disease.—This disease was reported from the Burnett district for the first time. Very few outbreaks were notified from other areas.

Glasser's Disease.—This has been found to be more prevalent than previously known.

Salmonellosis.—Several outbreaks of salmonellosis in calves were recorded, with very heavy mortalities.

Ataxia.—Only a small number of cases of ataxia in horses was recorded, many of which recovered. Purgation with arecoline and removal from the affected environment has been practised with good results.

Birdsville Disease.—Considerable attention has been paid to Birdsville disease of horses during the past year, but the cause remains obscure. Field trials have been instituted on one property on Farrar's Creek to test the efficacy of reduced worm burdens in the control of the disease. Regular drenching of all horses with phenothiazine in April, August, and November is being practised.

Botulism.—Sporadic outbreaks of botulism occurred in the cattle country of the central and north-western districts. Confirmation of diagnoses has not been possible, but the evidence is strong and preventive vaccination and provision of mineral supplements have been recommended.

Calf Pneumonia.—In dairying districts considerable losses of calves are experienced from pneumonia. Correction of diet, the control of internal parasites by phenothiazine and rotational grazing, combined with the use of sulphonamides, particularly sulphapyridine, successfully controls the disease.

Ictero haemoglobinuria.—Occasional mortalities are recorded in calves from time to time from widely separated areas; mortality rates are high and the age incidence varies from a few weeks to six months. No further light has been shed on the cause of this disease, either in support or otherwise of the theory of leptospirosis.

Plant Poisoning.—Due to the fact that good seasonal conditions have been experienced over the greater part of the State, mortalities from plant poisoning have been lower than usual. However, mortalities have occurred in coastal belts from both lantana and bracken fern poisoning.

Wallum Disease.—In wallum country good results have been obtained by feeding cattle affected with wallum disease a phosphorus-calcium supplement fortified with cobalt and copper. Investigations are being continued.

STOCK MOVEMENTS.

Trans-border stock crossings during the year were as follows:—

TRANS-BORDER STOCK CROSSINGS.

—	Cattle.	Sheep.	Pigs.
Entered from Northern Territory	61,469	..	..
Entered from New South Wales	16,036	178,314	956
Removed to Northern Territory	1,665	..	..
Removed to New South Wales	281,033	539,914	18,365

SLAUGHTERING STATISTICS.

Below are set out the total numbers of stock slaughtered for local consumption and other uses.

—	Bullocks.	Cows.	Calves.	Sheep.	Swine.
Bacon Factories	18,261	20,426	17,029	236	271,153
City of Brisbane (Abattoir)	46,697	63,126	101,040	476,057	21,586
Larger Population Centres	55,622	62,622	24,248	230,121	33,089
Country Centres	27,813	30,515	14,231	66,536	9,346
Totals	148,393	176,689	156,548	772,950	335,174

In addition, 23,751 pigs were slaughtered in bacon factories for export.

A total of 1,276 (0·43 per cent.) carcases of swine was totally condemned for tuberculosis at bacon factories. In addition, there were 5,401 (1·83 per cent.) partial condemnations.

LIVE STOCK STATISTICS.

The Government Statistician reports the approximate numbers of various classes of live-stock in Queensland at 31st March, 1948, to be as follows:—

Cattle	5,975,460
Sheep	16,742,629
Swine	378,102
Horses	335,581

FEDERAL QUARANTINE.

Strict vigilance in connection with entry and departure of animals has been maintained on all ships entering and leaving ports. During the year, 14 dogs were imported from the United Kingdom and subjected to the prescribed period of quarantine at Lytton. Seizures and destructions were:—1 cat, 10 dogs, and 4 pigeons.

The following is a summary of animals, &c., exported from this State for which permits to embark were issued:—

Class of Stock.	U.S.A.	Papua–New Guinea.	England.	Japan.	N.E.I.	India.	China.
Horses	4	..	..	..	..	20	117
Cattle	..	19	..	..	..	..	..
Goats	..	2	..	..	..	..	..
Pigs	..	28	..	..	..	..	..
Dogs	2	18	..	2	4	1	13
Cats	..	1	..	..	..	..	..
Fowls	..	311	..	..	..	..	..
Day-old chicks	..	5,150	..	..	..	..	..
Turkeys	..	8	..	..	..	..	..
Canaries	..	..	2	..	..	..	..
Geese	..	8	..	..	..	..	..
Ducks	..	14	..	..	..	..	..

BRANDS.

DETAILS OF REGISTRATIONS, TRANSFERS, &c., FOR YEAR 1947–48.

—	Number.	Number since Inception of Legislation.
Three-piece ordinary horse and cattle brands registered (H series finished January, 1947)	..	92,242
Cancelled horse and cattle brands registered	982	10,248
Horse and cattle symbol brands registered	92	2,220
Horse and cattle brands transferred	2,046	70,884
Cattle earmarks registered	515	32,722
Sheep brands and earmarks registered	130	13,205
Sheep brands and earmarks transferred	268	8,070
Distinctive brands registered	5	1,303
Alteration of address of brands	161	..
Brands cancelled	13	..
Earmarks cancelled	155	..

There was a decided increase over 1946-47 in the number of brands and earmarks registered.

There were three prosecutions for breaches of regulations under the Brands Acts, the defendants being convicted and fined in each case. A number of warnings were issued to offenders in connection with minor breaches of the regulations, mainly in respect to careless branding and earmarking.

As previously reported, carelessness is the main cause of most of the irregularities. Owners in their own interests should see that the branding and earmarking of their cattle is effected in accordance with the requirements of the Brands Acts.

A close inspection of brands and earmarks on stock arriving at Cannon Hill saleyards has been maintained and action taken in connection with any infringements of the Brands Acts.

It is expected that the printing of the revised edition of the Queensland Horse and Cattle Brands Directory, which will be complete to the end of the current year, will be proceeded with early next year. The Sheep Brands and Earmarks Directory revised to 31st December last should be available at an early date.

Report of the Animal Health Stations (Dr. J. Legg, Director of Research).

The report of the Yeerongpilly Station has been prepared by the Director of Research and that of the Oonoonba Station by the Officer in Charge (Mr. L. G. Newton).

YEERONGPILLY STATION.

Vaccines and Specimens.

Vaccines supplied to stockowners during the year were as follows:—

Contagious pleuro-pneumonia	161,675 doses
Infectious labial dermatitis ..	274,000 doses
Tick fever (cattle)	18,265 doses

Over 15,000 specimens were received, made up as follows:—

Brucellosis (bovine)	10,265
Brucellosis (porcine)	1,610
Milk samples	805
Contagious pleuro-pneumonia (complement fixation test)	729
Blood smears	192
Other specimens, including animals, animal tissues, plants, &c.	1,637

The number of serum samples received for testing for bovine brucellosis has shown a marked decline. This is undoubtedly due to the dropping of the test-and-slaughter method adopted originally by many owners and the substitution of the use of Strain 19 for the control of this disease.

Milk samples have shown a decline. It is believed that their numbers will fall further now that penicillin in suitable form is available on the market for use by farmers.

Diseases of Cattle.

Tick Fevers.—Because of the high prices prevailing for cattle the market has been active and cattle movements extensive; consequently there has been much inoculation of cattle by graziers. In addition to supplying 18,265 doses of vaccine, the station prepared and sold to graziers 134 steers as reservoirs for tick fever vaccine. It is considered that generally speaking these animals retain their usefulness so long as they are kept on heavily tick-infested country, but as soon as they are placed on clean country or on "marginal" areas they lose their infection and behave like other clean animals.

Altogether, 187 animals were received at the station for vaccination purposes. There were no losses among these.

Several outbreaks of tick fever were reported in the field, some of them in areas which are recognised as being tick infested at all times and among cattle which were grazed on these areas for considerable periods before the outbreaks occurred, and which would not be expected to be susceptible. However, the prolonged drought of 1946-47 had reduced tick incidence and led to the loss of infection by the stock concerned; the good season which followed resulted in a rapid increase in the parasites, which in their turn invoked tick fever in those cattle which had lost their infection.

Parasites of Cattle.

Helminths.—Studies on the epidemiology of cattle helminths were continued in co-operation with C.S.I.R. on dairy farms in the Beaudesert, Pimpama, and Townsville areas. Monthy faecal samples are collected from groups of calves betwen the ages of two and 12 months or more; nematode egg counts are made and the larva differentiated. During the period the farms have been under observation no cases of clinical parasitism have occurred, and in general the calves are carrying only a light nematode burden.

Cattle Lice.—A light infestation of cattle lice (*Haematopinus eurysternus*) in 30 Shorthorn bulls brought to the station for tick fever inoculation was controlled by spraying with 0·5 per cent. DDT (as "Rucide") at the rate of two gallons per beast. The heavy winter coat made wetting difficult but the infestation was checked and no live lice could be found when the bulls left the Station two weeks later.

Cattle Ticks.—The use of new insecticides, such as DDT, the gamma isomer of benzene hexachloride and chlordane, has been extended and some useful results have been obtained, though the work has not gone far beyond the initial stages.

Both DDT and benzene hexachloride are very effective in controlling ticks, including the arsenic resistant strain. Both preparations are insoluble in water and cannot be incorporated

in dipping vats unless as wettable powders or emulsions or in the colloidal form. The wettable powders examined are not suitable as they tend to settle out in the bottom of the vat very rapidly; emulsions have distinct disadvantages in cattle dipping vats though they are suitable for dipping sheep.

In experiments in which sprays were used, both DDT and BHC were effective in controlling ticks at concentrations which were low enough to be economic. DDT was found to have a higher residual effect, which was an advantage, though BHC was more effective in destroying the female adult ticks in their last 3-4 days of parasitic life. Much work has yet to be done with these preparations in order to get some of them into really suitable forms for incorporation into cattle dipping fluids.

Chlordane has recently been tried, using it in an emulsion form and as a spray. The commercial preparation is a heavy, oily liquid insoluble in water but soluble in organic solvents such as benzene and xylol. At an 0·25 per cent. strength it is found to kill all ticks up to the last two or three days of adult life, in this respect resembling DDT. It is quite harmless to cattle at four times this strength (preliminary tests) while observation suggests that its residual effect is very high. This point has not yet been tested under experimental conditions.

Diseases of Sheep.

Georgina River Disease, so called for want of a better name, occurs in the Urandangie district and affects both cattle and sheep. A party of investigators made a special visit to the area late in 1947, at a time when cases might be expected, but unfortunately none was encountered. However, much useful information was obtained from a study of the flora of the area and it is hoped to take up the problem again next summer.

Mastitis in ewes occurred in the Surat district. An organism was isolated from the outbreak, which produced typical lesions when injected into the mammary gland of susceptible ewes. This organism appears to be identical with that producing a similar disease both in other parts of Australia and overseas. The outbreak at Surat suggests that the condition may easily become one of considerable economic importance.

Sheep Blowfly.—During an outbreak of body strike in sheep in the Blackall area in November, 1947, an attempt was made to test the efficiency of DDT as a preventive of body strike under field conditions. Five groups of sheep were partially sprayed with 0·5 per cent. DDT ("Rucide"), using a power jetter. Unfortunately, the blowfly wave terminated at that period, due possibly to adverse climatic conditions, and no body strike developed in either the control or the treated sheep.

Diseases of Horses.

Tallebudgera Horse Disease.—This has been quiescent during the year and no cases were available for observation and post-mortem purposes. If circumstances are favourable it is intended to attempt further feeding experiments during the coming year.

Ataxia (Coastal Staggers).—This disease was apparently not common during the year, though the season was good and past experience suggested that cases should occur during the latter half of and soon after the termination of the wet season.

The disease was reported in the Mackay area, but it is not common there. The affected horses were grazing on an area carrying a heavy cover of gomphrena weed, a plant suspected to be in some way associated with the disease. It is intended to carry out further feeding tests during the coming year.

Field evidence shows that the disease occurs at several points along the coast between Bundaberg and Townsville.

Birdsville Horse Diseases.—Two officers visited the south-western part of the State where this disease occurs. They obtained much useful information from local owners but were unable to find any acute cases of the complaint, though their visit was timed to coincide with that period when such cases have been common in previous years.

It will be necessary for further investigation to be made in the affected localities, as knowledge of the conditions under which the disease occurs is far from complete.

There seems to be strong evidence that the disease is due to the ingestion of a toxic agent common to the whole of the affected area.

In connection with Birdsville disease, it may be stated here that cases of a disease simulating both clinically and pathologically "walkabout" disease—i.e. the condition brought about by poisoning with *Atalya hemiglauca* (whitewood) —are much more widely spread in Queensland than was hitherto suspected.

A survey was made of internal parasites of horses in the area. It was thought that some of these cases were aggravated by heavy worm burdens. The findings are not complete but it appears that the horses examined did not carry heavy infestations. Faecal samples of six horses on one property gave nematode counts of from 200 to 600 eggs per gram. This would suggest only light nematode infestation.

Diseases of Pigs.

Poisoning.—The work on the problem of nitrite poisoning which was reported in last year's report has been continued. The source of the nitrite in the food is the nitrate present in the water which is used to boil the food. There is reason to believe that certain elements in the metal of the containers act as catalysts in reducing the nitrates.

Cyanide poisoning occurred in pigs in the Cracow district. This case is interesting in that the cyanide was not detected in the contents of the stomach but was found in the soup fed to the animals.

Datura stramonium, which is a common weed pest in sorghum crops and the seeds of which are common in the bulk grain obtained from such crops, was suspected of causing sickness in pigs fed milo grain on the Darling Downs. Feeding trials carried out with a mixture of

milo seed (70 parts) and datura (30 parts) failed to produce the symptoms seen in the field, though the experimental animals were fed for a period of 20 days on the mixture.

Sarcoptic Mange.—A severe generalized case was treated with 0·1 per cent. gamma isomer benzene hexachloride by scrubbing with a small brush. In one week the condition had greatly improved. The treatment was then repeated; no further lesions of the disease were detected during the 4 weeks the pig was under observation.

Diseases of Poultry.

Spirochaetosis has been noted both in the Brisbane district and in the north. In some cases the usual vectors (*Argus persicus* and *Dermannysus gallinae*) either have not been found or have not been in sufficient numbers to account for the spread of the infection through the flock.

On one farm the mosquito *Culex fatigans* was common and was suspected as a possible vector. Attempts were made to transmit spirochaetosis experimentally with this mosquito by feeding and also by injecting crushed mosquitoes, but without success.

Coccidiosis.—Both the caecal and the intestinal forms of coccidiosis have been observed.

In connection with the caecal form, experiments were carried out with the sodium salts of both sulphamerazine and sulphamezathine to check their effects on the artifically induced disease. It was observed that the sodium salts of these two sulphonamides in drinking water are efficient in reducing the mortalities from acute caecal coccidiosis.

No signs of toxicity from the drugs could be detected in any of the treated groups and the weight gains after 20 days were comparable. Sodium sulphamezathine appears to be distasteful to the birds, for the water consumption of these groups was lower than the controls.

Poultry School.

In collaboration with the Poultry Branch, a school dealing with the various aspects of the poultry industry, including disease control, was held. This was the first school of its kind held in Queensland and was a complete success. All parties entered enthusiastically into the project and the discussions and demonstrations were of great value to the officers concerned.

OONOONBA STATION.

Vaccines and Specimens.

The following is a summary of vaccines supplied and specimens received during the year:—

	Doses.
VACCINES SUPPLIED.	
Contagious pleuro-pneumonia vaccine	148,600
Acaprin	673
Piroparv	391
Mastitis vaccine	58
Tick fever (cattle) blood ..	3,520
SPECIMENS RECEIVED.	
Brucellosis (bovine)	1,857
Brucellosis (porcine)	132
Milk samples	32
Dip samples	95
Other specimens	465

Diseases of Cattle.

Tick Fevers.—Blood films were submitted from 15 outbreaks for confirmation of diagnosis. The disease was present from Hughenden to Richmond for practically the whole of the year, and cases have occurred also on the Atherton Tableland, at Mackay and at Charters Towers.

The 3,520 doses of blood supplied to 34 owners represent an increase of more than 1,000 doses over the previous year. Twelve bleeders were despatched—twice as many as were sent out in 1946-47.

Thirty-six stud animals passed through the station for immunisation.

Tick Control Experiments.—A series of spraying tests with stalled animals using benzene hexachloride was completed, the efficiency of kill following single and double treatments of ·01 per cent., ·025 per cent. and ·05 per cent. strengths as well as the residual effects of those strengths being determined. These trials indicated that BHC gave a very satisfactory kill, particularly with the higher concentrations. Its action was quite different from that of DDT. The latter kills slowly, adults continuing to engorge for some days after treatment; BHC kills quickly—within 12 hours—and is particularly severe with adults. Engorging females are shrunken, grooved and assume a characteristic comma shape. They evidently withdraw their mouth parts and fall off readily when touched.

Complete protection for seven days was obtained with the ·05 per cent. strength when animals were subjected to moderate reinfestations.

With fresh preparations BHC compares very favourably with DDT for tick control.

Peg-leg Disease and Associated Botulism.—Following reports that peg-leg disease was prevalent in the Charters Towers area an investigation was made. The disease appears to be confined to the watersheds of the Cape and Campaspe Rivers south of the railway line and to Lolworth Creek on the north, though it is known that sporadic cases occur outside of this region.

Summarised, the present position appears to be that each year there is a deficiency at least of phosphorus as judged by the condition of the animals in the area generally. During dry years the condition becomes serious and affects mainly breeding cows, though younger dry females and up to 10 per cent. of the young steers also show clinical effects.

Generally speaking, mineral mixtures are used freely only when the trouble is occurring and too late to be of immediate value. Where licks containing calcium, phosphorus and a small percentage of limonite are used regularly the disease is not important. The significance of the limonite fraction of the lick is not known.

Sickness and deaths in cattle from the same area clinically resembling botulism have been observed.

Diseases of Poultry.

Two diseases were encountered for the first time, viz., perosis and "crazy chick" disease.

The former was noted in heavy breeds 4-9 weeks of age. They were in excellent condition but all showed displacement of one or both hock joints. The gastrocnemeus tendon had slipped outwards in each case. Up to 25 per cent. of the birds in certain pens were affected and recovery of badly affected birds did not occur. No further cases occurred when manganese sulphate was added to the diet at the rate of 50 p.p.m.

The encephalomalacia also occurred in a commercial flock. Forty deaths occurred and a similar number were affected but subsequently recovered. Chickens affected were from 4-8 weeks old. The condition has been described as follows:

"Staggering gait, the chickens walking or running with a lean to one side as if deprived of their power of balance. They would maintain balance by leaning on troughs, &c., walk to the end and then topple over on their sides. They then lay on their backs and kicked with their legs in the air. They were later paralysed and lay on one side."

Specimens submitted in some instances lay on their backs with the legs extended and the head was drawn back to the body, the bird later falling to one side and kicking vigorously.

Report of the Sheep and Wool Branch (Mr. G. R. Moule, Officer-in-Charge).

GENERAL.

The outstanding features of the year from the point of view of the sheep industry have been the drought in central and north-western Queensland and the extremely buoyant condition of the Merino wool market. The sheep population has not recovered from the heavy losses experienced in 1946, though good general rains in August and September of 1947 resulted in a high percentage of lambs being marked to ewes mated. However, no effective summer rains fell in the Mitchell grass downs country of the greater part of the central and north-west, resulting in drought conditions which extend from McKinlay to Isisford and on the central highlands. At the present time the State's sheep population, computed on the basis of growers' returns, is approximately 17,000,000.

During the year 404,649 bales of wool were sold by public auction, and returned approximately £A29 million, the greatest amount that has ever been obtained in one year from the sale of wool. It is also the largest income ever earned by one industry. English and continental buyers purchased the greater part of the clip, though American, Russian and Japanese interests were also represented. At the last sales held during the year, American buyers were more active and ruling rates were still high for good quality spinners' wools free from vegetable fault, but there was a more noticeable price differentation against inferior types. This had been apparent during the 1946-7 season, but was not so obvious during the sales held in the earlier part of the 1947-8 year.

The Department, through its Farmers' Wool Scheme, continued to assist small growers in the marketing of their wool. The year's operations were not as extensive as the previous year's though 662 bales were handled for 210 growers. The rate of intake has latterly declined following the institution of a similar scheme by two established wool firms.

Ruling rates for lambs at the Cannon Hill saleyards have been high, but despite favourable seasonal conditions there has not been an increase in the quantity or quality of lambs produced. The phenomenal prices being paid for Merino wool have influenced lamb-raisers against using crossbred ewes as lamb mothers; owing to the shortage of lambs for the local trade there has been no exportable surplus and growers have been able to sell on a less discriminating market than is likely to be met in the future.

Realising that the present conditions are unlikely to be maintained indefinitely, the Sheep and Wool Branch has expanded its activities to assist the industry to meet the changed conditions which must inevitably come. The high price of wool has been of great assistance to many growers, who have been able to recoup drought losses and replace and repair improvements which were neglected during the war. However, their ultimate effect must be increased competition from other fibres, and this will call for increased efficiency in production methods and the assiduous prevention of economic loss due to doubtful methods of animal husbandry.

Another important development has been the establishment of closer co-operation between the Department and the Commonwealth Council for Scientific and Industrial Research. Following negotiations commenced in 1947, the Sheep and Wool Branch has benefited from a grant under the Wool Research Trust Fund to permit certain investigatory work to be undertaken. Two projects being financed from this grant, and which are dealt with later in this report, are investigations into summer sterility of rams and the continuation of the studies on the climatology of Queensland.

Following suggestions made by this Department to the Council for Scientific and Industrial Research, a symposium, which was attended by the majority of workers actually engaged in sheep and wool research in Australia and New Zealand and to which the State Departments of Agriculture were invited to send representatives, was held in Sydney. The officer in charge of the Branch, who assisted in the organisation, attended and plans are now in hand to convey methods with immediate practical application to field officers for extension to the industry.

EXTENSION WORK.

Staff Schools.

Two staff schools, each of three weeks' duration, were conducted at the Animal Health Station, Yeerongpilly, for newly appointed extension officers. The subjects centred mainly around applied animal husbandry in relation to sheep and wool production and preventable economic loss.

Field Days.

A number of field days, organised by the advisory staff working in conjunction with the appropriate branches of the United Graziers and/or Selectors' Association, were held during the year. Subjects included fat-lamb production, property management in relation to sheep breeding, drought amelioration, the control of internal and external parasites of sheep, the prevention of fluorosis, overcoming copper deficiency of sheep, and the control of infectious labial dermatitis.

Field officers arranged and conducted 235 demonstration days within their own districts, an increase of 167 on the previous year. A large number of subjects was discussed and practical demonstrations given.

Sheep Breeding.

A general survey had been made of factors obviously influencing the low reproductive rates of Merino flocks in the north and central-west in conjunction with the research into Queensland's climatology, which has been in progress since 1946. These observations were extended in the field and extension work was carried out amongst sheep-raisers to acquaint them with the nutritional and climatic factors which influence the fertility of rams and with the periodicity of oestrus in ewes. These subjects, together with demonstrations on the clinical manifestations of diseases common to the reproductive organs of rams, were dealt with in considerable detail at field days held at Richmond, Tangorin, McKinlay, and Winton. In addition, extension work has been carried out on these subjects on a number of properties.

Particular stress was laid by all officers on flock management in the prevention of the diseases of breeding ewes, and the treatment of ewes suffering from hypocalcaemia was demonstrated on many occasions.

Sheep Classing and Ram Selection.

As part of their advisory work, field officers have given practical instruction to owners in the classing of flock sheep and the selection of rams. In addition, their advice on breeding plans has been sought by a number of studmasters.

Fat Lamb Production.

With the appointment of an adviser to Warwick, two officers are working in the lamb-producing areas. A field day devoted entirely to fat lamb production was conducted at Yandilla. Officers are co-operating with the Australian Meat Board in the conducting of its Queensland Lamb Carcass competition.

Following a survey of general problems facing the lamb industry in Queensland, it became apparent that one of its greatest handicaps was the shortage of crossbred ewes as lamb mothers. Following a conference in Melbourne, which was convened by the Australian Meat Board and at which the adoption of a uniform system of grading of export lamb carcasses was discussed, it became clear that assistance would have to be given to improve the quality of lamb produced in this State. Accordingly, a long-wool ram subsidy scheme was developed by this Department with the intention of fostering cross-breeding of sheep in the marginal lamb raising areas. The subsidy is paid to men with the requisite knowledge and experience in sheep raising, who purchase good quality Romney Marsh, Border Leicester, or Corriedale rams for mating with Merino ewes, provided the surplus female offspring are offered for sale, in the first instance, in recognised lamb-raising areas. It was considered that the subsidy might be paid on not more than 250 rams per annum; during the first six months the scheme has been in operation seven owners have availed themselves of assistance and the purchase of 89 rams has been subsidised.

Drought Management.

With the development of severe drought conditions in the central and north-west, field officers have been consulted about the measures which might be taken to ameliorate its effects. Unfortunately, it is difficult to make helpful suggestions. Agistment is hard to obtain and many of the stock routes are untrafficable; partly as a result of the strike the railways are overtaxed; and the shortage of labour, high prices, and uncertainty about the supply of stock food make hand-feeding hazardous. However, supplementary feeding of sheep has been supervised by field officers on several properties.

Property Improvement.

With the establishment on the land of more ex-servicemen and the general implementation by the pastoral industry of a strenuous campaign of property improvement, the field advisory staff has been consulted a good deal on all aspects of property improvement.

Hand Feeding Stud Sheep.

With the resumption of Sheep Shows in the country centres, many requests have been received for assistance in planning rations for stud sheep. A comprehensive pamphlet has been prepared on this subject and has been distributed amongst studmasters.

Sheep Blowfly.

The spring fly wave was very severe, particularly in the Maranoa and Warrego pastoral districts, and extended in a milder form to the central-west. The most rapid increase in the fly population appeared to occur in the Maranoa, after the August rains, and by September the fly wave was at its peak in the southern part of the State.

In October there was a noticeable decrease in fly activity and with the advent of warmer weather there was an almost complete cessation

of strike, except for a short, sharp wave in the Dalby and Goondiwindi districts in the first week of November. In autumn, fly activity was slight in the Maranoa, but a sharp wave of body strike occurred on the Darling Downs, particularly the Inglewood area, in late May.

Interesting aspects of the spring wave were the rapidity with which it developed, its severity, and the occurrence of a high incidence of body strike, despite the lack of weather conditions conducive to fleece rot.

The outstanding feature of the whole fly wave was the high degree of protection afforded by the Mules operation in conjunction with careful lamb-marking. It is becoming increasingly clear that crutch strike is virtually controllable in Queensland by the application of the Mules operation. The "tail strip" operation, combined with the turning of the ventral flap at marking time, can practically eliminate tail strike.

During the year an active policy of extension work on blowfly control measures was followed. Field officers carried out 141 demonstrations on properties, training owners and/or managers in the correct techniques to follow in applying the tail strip and Mules operation.

Miscellaneous Extension Work.

Pediculosis.—Field officers have been constantly drawing attention to the serious economic loss caused by infestation of sheep with body lice (*D. ovis*), and during the year dipping operations were supervised on several properties where sheep were being dipped for the first time.

The occurrence of foot lice (*L. pedalis*) amongst stud rams was diagnosed and treatment advised.

The Sheep Nasal Fly.—A heavy infestation of sheep nasal fly (*Oestrus ovis*) was observed amongst rams on one stud property and treatment of the sheep was supervised by a field officer.

Endo-parasites.—The control of internal parasites of sheep was dealt with at three field days by the officer in charge, and field officers conducted 28 demonstrations on properties in order to acquaint owners and/or managers with the most effective methods of combating endo-parasites. Generally speaking, the dry weather has reduced worm populations in central and northern areas, but severe outbreaks have occurred on the Darling Downs.

Infectious Labial Dermatitis.—Field officers demonstrated and supervised the initial use of the labial dermatitis vaccine on 30 properties. Woolgrowers report excellent results from its use.

Wound Infections.—General information was given on preventive measures to be adopted against infection of shearing and/or marking wounds.

Fluorosis.—Field officers have given advice on property management in relation to the prevention of fluorosis.

Copper Deficiency.—Advice has been given to owners on the methods which might be used to overcome copper deficiency of sheep. This subject was featured at three field days, and lambs suffering from enzootic ataxia, and wool showing evidence of copper deficiency were displayed.

RESEARCH WORK.

Climatological Survey.

The climatological survey has been extended to investigations on the occurrence of drought. All seasons for which records exist have been studied and classified as being good to fair, mediocre or bad, on criteria suggested by woolgrowers. The sequence of these seasons has been studied and it has become increasingly clear that three consecutive mediocre seasons can produce drought conditions in the central and north-west. The percentage occurrence of the various types of seasons has been calculated and mapped. This mapping has revealed a high incidence of bad seasons in the more westerly pastoral areas and an interesting closed area, extending over the Mitchell grass downs, where there is a high percentage of mediocre seasons. Winton and Isisford experience more bad and mediocre seasons than any other centres. As these districts are beyond the limits of practical agriculture and as they have comparatively no top feed and little opportunity of getting surplus sheep away, they are urgently in need of a policy of drought amelioration.

Summer Sterility Trials.

Research work, which has been financed from the Wool Research Trust, has been carried out in north-western Queensland into summer sterility of rams. In keeping with the findings of Dr. Gunn, rams subjected to the high summer temperatures which occur in the north-west were found to suffer from seminal degeneration, and it was decided to investigate the effects of thyroid administration on spermatogenesis during the summer. After preliminary trials in the hot-room at the School of Physiology at the University of Queensland, one grain of thyroid extract, containing ·96 mgm. of thyroxine, was administered per day to each of 20 rams. Ten of these animals were fed a vitamin A rich supplement, which provided approximately 1 lb. digestible crude protein and 4 lb. starch equivalent per week and both were allowed to graze on Mitchell grass pastures. Two other groups, each of 10 rams, were depastured in the same paddock; one was fed supplement and the other kept as a control—*i.e.*, it received neither supplement nor thyroid. The prefeeding and thyroid administration were continued for three weeks and all the rams were then turned out to graze.

Semen samples were obtained at the end of the first and second weeks after feeding and medication had ceased and were evaluated by studying volume, density, motility, pH, acid drift, and morphology. Unfortunately, dry conditions precluded a breeding trial. The most noticeable effect of thyroid administration was upon the morphology of the sperm; the semen of the rams receiving the thyroid contained fewer abnormal types than those which were untreated. The semen from rams which received the supplement was also adjudged to be better than that of the control group, but

this improvement was not maintained as well as that produced by the administration of thyroid.

In the course of this work it became clear that rams in the north-west suffer from a high incidence of sexual ill-health and surveys carried out in a number of flocks showed that about 30 per cent. of rams were suffering from one or more conditions likely to render them infertile. About 70 per cent. of the affected animals had epididymitis and work has been commenced to examine the causal factor. From clinical and post-mortem findings it would appear that a large proportion of the affected animals are suffering from metastatic caseous lymphadenitis abscesses in the epididymi. As a large number of the sheep examined were stud animals, some of which had only recently been purchased, an examination was made of rams offered at the leading sheep sales, including Sydney. Many of the animals (some of which were sold for high prices) were suffering from diseased conditions of their genital organs which were likely to render them comparatively or completely infertile.

Copper Deficiency of Sheep.

Work has been undertaken in conjunction with the Chemical Laboratory on methods which might be employed to overcome copper deficiency of sheep. A satisfactory way of maintaining an even concentration of about 10 mgm. of copper per gallon in water which has a low carbonate content has been evolved. Provided the distribution of the water is through concrete troughs this method is practicable under field conditions. Investigations have been commenced into the effects of topdressing of natural pastures in north-western Queensland with copper sulphate applied at the rate of 4 lb. per acre. An initial rise in the copper content of some grass samples examined has been observed.

Epidemiology Trials.

Field officers have continued to assist in the conduct of the epidemiology trials to study the seasonal incidence of the parasitic worms of sheep. These observations have been extended to include the "desert" country east of Hughenden. This work is being carried out in co-operation with the officer in charge of the Animal Health Station, Oonoonba.

Flourosis.

Field officers have assisted officers of the Chemical Laboratory in field investigation into fluorosis. They have also carried out a number of surveys for the Fluoride in Ground Water Committee to determine the economic importance of fluoride in drinking water used by stock.

Report of the Pig Branch (Mr. F. Bostock, Officer-in-Charge).

GENERAL.

The increased services made available to the industry by the stationing of advisers in the main districts has been welcomed by pig producers, as is evidenced by the increased demand for the services of these officers.

The following will serve to give some indication of the work carried out by the Pig Branch during the year:—farms visited, 1271; pig sales attended, 48; meetings attended, 26; field days attended, 11; bacon factories visited, 46; shows attended, 13; lectures given, 20; and demonstrations given, 30.

In addition to the above there were 61 students enrolled in the Correspondence Course at the beginning of the year and during the year 97 entered the course. Of these, 71 completed the course and 42 have either discontinued or are being held in abeyance, leaving 45 students active at the end of the year.

SEASONAL CONDITIONS AND PRODUCTION.

Weather conditions experienced on the Northern Tablelands were generally favourable to pig production in that area, but the industry has not recovered to any appreciable extent from the low level reached in 1946. The favourable price for whole milk, together with shortages of labour and building materials, caused many who previously bred pigs to transfer to the milk trade; also, the high price for maize has diverted large quantities to the silos and less to stock feeding.

In the Burnett area seasonal conditions were abnormal, 45·74 inches of rain being registered at Murgon compared with an average of approximately 30 inches, and distribution of this fall was somewhat irregular. June and July were dry months. December was abnormally wet (14 inches fell as compared with an average of 330 points). January and February were fairly dry, but falls in March, April and May were above the average. The excessive rains in December prevented the planting of summer crops and much land that had been prepared for sowing ran to weeds. When this land was again prepared insufficient rain fell to ensure germination of seed. This excessive wet weather in December and dry weather in January and February spoilt most of the earlier planted maize crops and substantially reduced the yield of grain sorghums. A heavy frost in April and a series of heavy frosts during the latter half of May also affected the yields of a number of crops.

In the Moreton area good falls of rain were experienced in the spring and summer months, with heavy falls in the autumn. However, reasonably good conditions prevailed throughout the area and green feed was plentiful.

On the Downs dry conditions were experienced. However, rain at the latter part of April relieved the position a little, but frosts during May were frequent and most grazing areas were browned off and rain was again needed.

Production figures for the year reveal a decline, which is largely attributable to the high price of feed grains and short supply of protein foods. The lack of fencing wire and building materials is no doubt preventing many farmers from carrying out programmes for increasing pig production. Further, losses and enforced slaughterings of breeding stock during the 1946 drought have not been fully replaced.

In spite of the above limiting factors there is a decided interest in pig raising, as evidenced by the response to carcass competitions conducted during the year. An early announcement of a substantial increase in the price of pig meats would encourage a return to pig-raising and a general increase in production.

PRICES.

No plan has been agreed upon to take the place of the Pig Meats Acquisition Plan and pig prices are no longer controlled. However, a contract still exists with the United Kingdom which has an influence on local prices and to some extent tends to give a measure of stability to the industry.

It was announced by the Minister for Commerce and Agriculture in the third week of May that the British Ministry for Food had agreed to an increase for pig meats from 9d. to 10d. per lb., but the industry claims that present-day cost of production is 1s. 4d. per lb. At a meeting in Melbourne industry representatives pointed out that if increased production of pig meats was to be secured a price of 1s. 6d. per lb. would have to be paid to the producer. However, to date no announcement has been made regarding the new contract price to be paid.

STUD PIG RAISING.

Reports indicate that there has been a keen demand for stud stock, breeders being unable to supply the demand. During the year over 100 animals were introduced to the Northern Tablelands from Central Queensland.

This shortage of pigs has resulted in purchases being made at top prices regardless of quality and some breeders are selling animals not suitable for the production of good type stock. Such conditions will, no doubt, have an adverse influence on our markets, both local and export.

CARCASS COMPETITIONS.

Early in May judging of a new-type Carcass Competition was carried out at Murarrie bacon factory. Pigs were forwarded by farmers and cured in the usual way and then judged for carcass conformation. Sides cured as bacon were then exhibited at the Beaudesert Show, together with a score card indicating where each entry fell short of the ideal. This competition attracted 59 entries. Such competitions should increase in popularity because country Show Societies are enabled to include Carcass Competitions in their schedule when refrigeration is not available and provide valuable information to district farmers.

The Australian Meat Board's carcass competition was also judged during the month. This competition created great interest throughout the State and from discussions in each district it would appear that greatly increased entries may be expected for next year's competition. The competition attracted 45 entries, but information regarding the conditions was not available for publication until early in the year and time available for farmers to select suitable stock was short. However, the carcasses judged were representative of the class of stock production in each area.

EXTENSION WORK.

Much work has been carried out in an endeavour to raise the standard of feeding, with good results in numerous cases. Many farmers now realise the value of improved methods of feeding and have a better understanding of food values.

Field days have been attended and lectures and demonstrations given in many districts. However, work of this nature will be more conveniently carried out when projectors are more readily available, since it appears that night lectures are popular in many areas.

Co-operation has been maintained with all organisations interested in pig production and with the Commonwealth Reconstruction Training Scheme by making available the services of an officer for the purpose of giving lectures on pig raising to members of each School. The first Junior Farmers' School was given a lantern lecture. The Junior Farmer movement is rapidly expanding and will provide a means of contacting the farming community not available previously.

Report of the Poultry Branch (Mr. P. Rumball, Officer-in-Charge).

PRODUCTION.

An improvement in the feed supply position encouraged farmers to increase hatchings and obviated the slaughter of laying birds that occurred in the previous year, with the result that there has been a slight increase in the output of eggs.

There is no measure available for correctly judging the increase in production that may have occurred in central and northern Queensland, but the increase in production in the southern portion of the State can be assessed by the intake of eggs by the South Queensland Egg Board, as shown in the accompanying table. It is estimated that in northern Queensland the increase has been proportionately greater than in southern Queensland, but in central Queensland many farmers who were engaged in poultry raising and had to reduce their flocks because of food shortages have not attempted to build up their flocks to previous levels.

INTAKE OF EGGS BY SOUTH QUEENSLAND EGG BOARD.

Month.	No. Weeks.	1945–46.	1946–47.	1947–48.
		Dozen.	Dozen.	Dozen.
July ..	4	797,268	494,385	635,488
August ..	5	1,612,757	1,258,151	1,206,288
September	4	1,436,753	1,190,062	1,114,162
October ..	4	1,399 144	1,206,665	1,085,566
November	5	1,490,198	1,265,849	1,096,473
December..	4	870,720	675,580	627,424
January ..	4	764,274	*606,106	834,028
February ..	4	686,698	454,957	630,749
March ..	5	757,703	†484,013	543,855
April ..	4	448,389	306,825	453,080
May ..	5	478,648	436,025	480,245
June ..	4	343,147	398,630	497,831
	..	11,085,699	8,777,248	9,205,189

* 5 weeks. † 4 weeks.

During the war years there was a big lift in production throughout the State, and the intake of eggs by the South Queensland Egg Board in the year 1945-46 was more than 50 per cent. higher than in any previous year. In order to meet contracts made with Great Britain for eggs and egg products, the 1945-46 level of production must be not only reached but expanded by 30 per cent. if Queensland is to produce its proportionate share. This will be difficult of achievement with the present material and feed supplies. Enquiries from hatchery owners reveal a lower demand for chickens during the present season than last season. Feeding costs have always been higher in Queensland than in southern States, and egg values lower than in New South Wales. The expansion of the industry under these conditions has been due to a higher production per bird, which was made possible by more favourable climatic conditions and a higher standard of nutrition. It is felt, however, that present-day feeding costs are responsible for the apparent reduced demand for chickens, and that the recovery of the industry will not be as rapid as the intake of eggs by the Egg Board during the first six months of 1948 indicates.

POULTRY FOODS.

There was an adequate bulk of grain available throughout the year, but much of it was of very poor quality and entirely unsuited for the feeding of poultry for economical production. Supplies of mill offals and protein-rich foods of both animal and vegetable origin have been very much short of the industry's needs. This has resulted in the slowing up of the development of growing birds, a loss in quality of male birds reared for table purposes, a reduction in output from laying flocks, and some nutritional disorders.

For many years poultry raisers have made extensive use of mill offals in the rations of their poultry flocks. The increased needs due to expansion of flocks and the requirements of other classes of livestock without a corresponding increase in the output of mill offals has forced most farmers to depart from long-established feeding formulae and increased the need for instruction on nutrition.

It is not likely that mill offal produced in this State will ever overtake the requirements of the poultry industry and the needs of other classes of live stock; consequently a permanent departure from old-established feeding practices is necessary.

The advantages of mill offals over grains include (1) their general lower cost, (2) their higher protein, mineral and vitamin content, and, (3) the improvement their use imparts to the texture of poultry mashes. Experiments conducted some years ago suggested that lucerne chaff of choicest quality could be used to replace to some extent mill offals for the layer. Most of the chaff coming on to the Brisbane market is unsuitable for poultry feeding, the cost has been high, and consequently the industry has not had the opportunity of taking advantage of this research work. The poultry industry could be developed into a big consumer of lucerne-chaff of the right quality and at the right price. Lucerne of the correct quality would also make a material contribution to the protein needs of the industry.

The insufficiency of protein supply previously referred to is one of the most serious problems the industry has to face. The extensive use of cereals low in protein increases the need for protein from other sources; in this State the only source is meatworks by-products, and this is not inexhaustible.

SLAUGHTER OF POULTRY.

Poultry are being slaughtered for local requirements in many establishments adjacent to Brisbane as well as in country areas, but only three slaughtering establishments, all in the Greater Brisbane area, slaughter for both local and overseas trade. No accurate measure exists for gauging the total number of poultry killed for table purposes throughout the State, but it is possible to make a comparison of the

slaughterings in two of the larger Brisbane establishments for the years 1946-47 and 1947-48. The following table gives the monthly slaughterings for these years:—

TOTAL SLAUGHTERINGS.

1946.		1947.		
July	37,145	July ..	17,362	
August ..	44,272	August ..	16,215	
September ..	61,727	September ..	23,499	
October ..	47,651	October ..	34,223	
November ..	59,334	November ..	53,720	
December ..	65,073	December ..	66,518	
1947.		1948.		
January ..	75,714	January ..	76,978	
February ..	71,788	February ..	83,567	
March ..	70,360	March ..	75,000	
April	46,425	April ..	77,527	
May	37,271	May ..	71,769	
June ..	24,431	June ..	44,078	
	641,011		640,456	

There is little numerical difference between the two years, but it is pleasing to be able to report that the improvement in the poultry feed position enabled a greater number of male birds to be raised for table purposes than in the previous year, and that farmers were not forced to make undue sales of laying hens owing to the shortage of feed. The percentage of cockerels slaughtered for the year 1946-47 was 19 per cent., whereas for 1947-48 it had increased to 40 per cent.

There was an upward trend also in the export trade of dressed poultry. The following table shows the weight and value of the various classes of dressed poultry exported. The increase of exports for the year over 1946-47 is approximately 50 tons, equivalent to 20,000 fowls.

DRESSED POULTRY EXPORTED.

	Lb.	£	s.	d.
Boilers (hens)	687,483	68,032	3	5
Chickens (young males)	457,840	61,999	3	4
Ducks	134,473	13,307	4	5
Turkeys	53,731	7,835	15	5
	1,333,527	151,174	6	7

There is a ready sale in Great Britain for the choicest quality of table poultry that is now being produced in Queensland, but it is considered that if this trade is to be retained when the poultry flocks of the war-ravaged countries of Europe are again built up, an improvement in the general appearance of the birds exported will be necessary.

Values for table poultry have been maintained throughout the year and premiums paid for export quality. The ruling price for good hens has been 1s. 1d. per lb. liveweight, and for cockerels of similar quality 1s. 6d. per lb. liveweight.

SEX DETERMINATION OF CHICKENS.

During the year eight candidates as sexers were examined, three for a license first class, and five for a license second class. No candidates obtained a license first class, and only two qualified for a license second class.

Since the introduction of legislation to license persons competent to determine the sex of day-old chickens 37 have qualified by examination, but during the past year only 23 engaged in this work. The following table gives the approximate number of chickens whose sex was determined for the years 1946-47 and 1947-48, in the several districts. It will be noted that there has been a big increase in this work in the Bundaberg area. This is due to the residence in that area of an additional qualified sexer, who, by the use of air services, was also able to do some sex determination in Rockhampton.

District.	1946–47.	1947–48.
Darling Downs ..	283,450	425,210
Ipswich	88,985	128,495
Brisbane	1,321,829	1,461,062
Nambour	125,800	173,515
Gympie	..	..
Maryborough	950	5,908
Bundaberg	63,700	122,297
Rockhampton	..	23,170
Mackay	..	..
Townsville	..	..
Cairns	..	..
Atherton	..	..
Totals	1,884,784	2,339,657

From the above table there appears to be some evidence of an increased output of chickens during the last half of 1947, and that such was the case is borne out by the increase in egg production during the first half of 1948 as compared with the same period in the previous year.

REGISTRATION OF POULTRY STOCK SUPPLIES.

From the subjoined table giving the registrations for 1947-48, it will be noted that a considerable increase in registrations has taken place during the period under review. Of those registered for 1947, a total of 22 have been struck off the register due to the sale or closure of businesses, and 2 because of deaths. Consequently, there has been a larger increase in personnel than the table indicates. Entailed in the registration of stock suppliers is the blood-testing of flocks and general inspection, and at times culling and advisory work in connection with selection and mating.

REGISTERED STOCK SUPPLIERS.

	1947.	1948.
Hatcheries with associated flock ..	140	163
Hatcheries without flock	7	6
Suppliers of fowl eggs for hatching ..	55	90
Poultry dealers	..	3

DISEASE AND PEST CONTROL.

General.—Officers of the Poultry Branch work in the closest co-operation with the Animal Health Station at Yeerongpilly and take every opportunity of visiting farms to advise as to methods of control, and submit or arrange to submit cases which they are unable to definitely determine in the field to that institution. Many farmers are familiar with the methods of control of some of the more common diseases, but unfortunately many more are under the impression that disease is inevitable and that losses

must be expected. In numerous cases, diseases are only reported to this Department by farmers when the particular disease has been in evidence for some considerable time and has caused heavy mortality. It is considered, however, that the services of the Department are progressively being more freely availed of by the farmer.

Avian Leucosis.—This disease is widespread throughout the State, and upon many farms is still responsible for heavy losses. As there is no method of treatment or detection of the latent carrier, and control is only possible by breeding, culling and sanitation, every opportunity is taken to impress upon farmers the importance of breeding from older birds which have resisted the disease, with the object of developing strains that may have greater resistance. Upon farms where the farmer is not familiar with the varying symptoms, officers have spent some time in culling out infected birds in order to demonstrate to the farmer the practices that he should follow.

Botulism.—Several outbreaks of botulism have occurred in northern Queensland, but the disease has not been recorded during the year in central or southern Queensland.

Coccidiosis.—Caecal and intestinal types of coccidiosis have been prevalent. Old-established farmers are familiar with this disease and they freely avail themselves of the sulpha drugs that are now available for treatment and which have proved very efficient in controlling outbreaks.

Cholera.—Chronic cases of cholera have been reported upon farms adjacent to Brisbane, but a material reduction in the incidence of this disease on one farm has followed better husbandry and sanitation practices.

Coryza.—Coryza has not been uncommon in young birds and the disease has been frequently aggravated by a shortage of vitamin A, by overcrowding, and by unsanitary conditions.

"Crazy Chick" Disease.—During the latter portion of 1947, nine cases of "crazy chick" disease were brought under the notice of the branch. The trouble occured in chicks 4-6 weeks of age and the mortality rate was 2·5 per cent. The actual cause of the complaint has not as yet been definitely determined.

Deficiency Diseases.—Deficiency diseases during the year due to lack of vitamins A, B_2, and D, have been recorded. These deficiencies have been most pronounced in young birds, but there have been several cases of deficiencies of both A and B_2 in hatchery flocks, despite the fact that the importance of these two vitamins has been brought to the notice of hatchery owners over a long period of years.

Fowl Pox.—Inoculation for fowl pox is becoming more popular, but on many occasions birds have been infected with coccidiosis at the age when inoculation for fowl pox is usually carried out, thus preventing inoculation. The result of this is that fowl pox has been responsible for a reduction in the output of birds coming into production early in the year.

Pullorum.—During the year officers of the Branch tested 261,215 head of poultry for pullorum disease, and 25,107 were tested by other authorised persons, making a total of 286,322. During the previous year 232,648 were tested. The positive reactors were 4·69 per cent. as compared with 4·84 per cent. for 1946-47. These figures do not indicate any marked improvement in the reduction of the incidence of infection in breeding birds; but there were 50,000 more birds tested this year than last, some from flocks that had never previously been tested, and this may account for the fact that no marked improvement is shown. It is evident, however, that pullorum disease in chickens has now been brought under definite control and a material reduction in losses in chicks has been achieved.

Salmonellosis.—Salmonellosis in chickens appears to be becoming more prevalent and has been responsible for particularly heavy losses in a few cases, mortality being as high as 90 per cent. in batches of chickens of from 300 to 500.

Spirochaetosis.—This disease is not uncommon in areas where poultry tick is present, but the Branch had to deal with two cases in which neither of the carriers of spirochaetosis—i.e., the tick or the red mite—could be found. In collaboration with officers of the Animal Health Station preliminary investigations were conducted as to the possibility of another type of vector being responsible for the outbreak on a farm adjacent to Brisbane, but with negative results. The farm, however, is being kept under close observation.

Stickfast Flea.—As previously reported, the flea spread from the Boonah area to the Normanby Poultry District. The properties that have been quarantined have increased from 63 to 85 during the period under review. Fourteen of these properties have been cleaned and released from quarantine and the number of apparently clean properties is 51; consequently, infested properties in this area now number only 20. In the Boonah area, 298 farms have been quarantined; 83 of these have been released from quarantine and there are another 79 properties apparently clean.

In the earlier days of control there was no fully efficient treatment, but the efficiency of DDT for the control of the flea has now been definitely demonstrated and should enable farmers to clean up their properties if their attempt is sufficiently determined.

EXTENSION WORK.

Every opportunity has been taken to conduct Field Days and give talks to gatherings of farmers. The most successful Field Day was held in the Bundaberg district, where there was an attendance of approximately 80 farmers and poultry raisers. Talks have been given to every poultry organisation throughout the State. Functions for the commercial poultry raiser and inspections have been made upon over 2,000 farms.

Egg quality being of particular importance, especially the keeping quality of eggs for export, the Branch has kept in close contact with the Egg Board and many cases of eggs not being up to export standard have been followed up.

DIVISION OF DAIRYING.

Report of the Director of Dairying (Mr. E. B. Rice).

STAFF.

A number of appointments was made to both the Field Branch and the Dairy Research Laboratories during the year, facilitating field survey work, herd recording and investigations in connection with both the liquid milk and cheese industries.

Whenever conditions have permitted during the year, field officers have been given schools of special training in various aspects of their work. In some cases this included a training period in a Dairy Research Laboratory.

The granting of scholarships by the Government to enable cadetships to be taken out at the University of New Zealand, with the scholars taking up duty with the Department on graduation, is a forward step in the provision of adequately trained staff for the dairy research laboratories.

SEASONAL CONDITIONS.

Seasonal conditions during 1947-48 were the best experienced in the dairying districts for several years, in some districts being favourable almost continuously throughout the year. In the first quarter of the year there was an abundance of rough grazing, supplementary to which were large acreages of green forage crops. Good soaking rains during the spring enabled cows freshening for the new lactation to start producing in good condition and with ample fodder. Calvings were generally rather later than usual because of the very hard conditions under which dairy cattle had been kept in the adverse seasonal conditions of the previous year. Summer production was maintained at a higher level than for some years previously. Though there was a dry spell in January and February it did not affect production; indeed, it prevented pastures in some districts from growing rank and sour, as normally happens at that time of the year. Favourable conditions continued through the autumn and early winter to the end of the report year. Some flooding occurred in June due to an unseasonable cyclonic disturbance.

DAIRY PRODUCTION TRENDS.

The following table gives information on dairy cow population and dairy production for the 10 years 1937-38 to 1947-48:—

Year	Dairy Cows and Heifers.	Total Milk Production.	Butter Production.	Cheese Production.
		1,000 gal.	1,000 lb.	1,000 lb.
1937–38	985,858	274,043	118,244	11,963
1938–39	1,050,569	347,336	157,626	15,769
1939–40	1,080,430	325,344	142,846	13,849
1940–41	1,058,009	279,267	119 940	11,733
1941–42	1,115,760	237,635	97,623	16,360
1942–43	1,308,780	289,808	113,211	28,541
1943–44	1,290,398	260,996	103,032	24,051
1944–45	1,267,829	247,253	96,334	22,635
1945–46	1,413,389	269,390	101,242	26,943
1946–47	1,258,926	204,863	74,068	17,292
1947–48	..	277,000 (estimated)	104,058	21,596

The effect of the serious drought of 1946-47 is clearly shown by the decline in production for that year.

The estimated total value of butter, cheese, and milk produced in 1946-47 was £11,636,000 and in 1947-48 £16,170,000. The value of separated milk used on farms and by-products of dairy manufactures—buttermilk and whey—is excluded from this assessment.

COMMONWEALTH GOVERNMENT SUBSIDIES.

An Australian-wide survey of over 1,000 random-selected dairy farms was carried out by a Production Costs Committee, representative of dairy industry organisations and the Commonwealth Government. The data collected by the Committee, which covered a period of five years to 30th June, 1946, were used by the Commonwealth Government to determine the guaranteed price to be paid producers for milk and cream supplied for the manufacture of butter, cheese, and processed milk products.

After excluding farms with very low or very high costs, 692 farms were included in the group which was taken for assessing the cost of production. This cost, estimated to be 2s. 1½d. per lb. commercial butter, was accounted for as follows:—

—	Pence.	Percentage of Total Costs.
Cash costs—		
Direct farm costs such as materials	6·86	22·0
Hired labour	1·92	6·2
Interest on borrowed capital	1·01	3·2
Rent	0·62	2·0
Total	10·41	33·4
Non-cash costs:—		
Depreciation	1·78	5·7
Family labour	12·9	41·4
Interest on farmer's equity	4·49	14·4
Managerial allowance ..	1·58	5·1
Total	20·75	66·6
Total, all costs	31·16	100·0
Less income from sidelines	5·57	
Net total costs of butter ..	25·59 (approx. 2s. 1½d.)	

An interesting disclosure of the survey was that the average Australian dairy farm supports 50 cows, uses 2.1 male adults (or equivalent labour), produces 9,781 lb. commercial butter yearly (196 lb. per cow), and has a capital investment of £73 per cow in land and improvements.

Following the receipt of the Committee's report, the Commonwealth Government decided to increase by subsidy the overall return to dairy farmers from 1s. 7½d. lb. commercial butter to 2s. per lb. Payment of the altered price was made retrospective to 1st April, 1947.

The Commonwealth Government also announced a guaranteed price for dairy produce for five years from 1st April, 1947. The price is subject to review yearly in the light of any factors which cause costs either to increase or to recede.

IMPERIAL CONTRACT.

The Imperial contract for the purchase of the exportable surplus of butter and cheese from Australia expired on 30th June, 1948. Representatives of the Commonwealth and British Governments are at the present time negotiating for the renewal of the contract.

SOME FARM ASPECTS OF DAIRYING.

Recovery of the Industry.

In some districts where grain growing is extensively carried on there has been a noticeable reduction in the size of dairy herds because of the high prices received for grains and the less exacting demands on the farmer. However, in districts where dairying is the primary form of production, and particularly in areas where farm acreages are not large, the indications are that farmers are concentrating on dairy production and, given favourable seasons, dairy production should now tend to regain ground lost during the war and immediate post-war years.

Quality.

Since the reorganisation of the Department in 1945 the factory has been the focal point from which milk and cream quality work has radiated. Dairy officers constantly visit the factories in the areas under their supervision to check the quality of milk and cream supplies in order to assist them in their advisory duties among producers. The officer's approach is that of an advisory officer anxious to assist farmers in their problems and it is generally found that the goodwill of the farmer is obtained.

Owing to the scarcity of rural labour, milking machines have been installed on dairy farms in rapidly increasing numbers in recent years. It is evident that the milking machine must continue to play a leading role in mechanisation of dairy farming. However, careful methods are necessary if quality of milk and cream is not to be adversely affected by machine milking. With a view to assisting producers to secure satisfactory results with milking machines, all field officers of the Division have been specially trained in all aspects of efficient machine milking, mechanical check-up of milking plants, and milking machine hygiene. It is pleasing to report that, as a result of the practical service now afforded by field officers, the quantity of machine-tainted milk and cream is declining and dairy farmers are showing a keener appreciation of correct mechanical and hygienic care of milking machines.

The special training which field officers now receive also enables them to afford useful instruction to producers on aspects of the mechanical care of cream separators.

Farmers are attempting to improve the standard of dairy buildings and milking-shed equipment since the prices received for dairy produce have improved, and if materials were more readily available further improvement would rapidly take place. There is still considerable room for improvement in the cleansing and sterilizing facilities on dairy farms; and the cooling of milk and cream, one of the most important phases of quality control, is not effected on the majority of farms. Farm refrigeration units supplied to farmers by the Queensland Butter Board at cost price have been installed on a number of farms throughout all dairying districts. Very satisfactory results have been secured with these units and their widespread use is worthy of the fullest encouragement.

Fodder Conservation and Feeding.

As better feeding (which must depend primarily on growing and conserving fodder on the farm) can substantially raise the average productivity of dairy cows, fodder production and conservation and planned dairy production go hand in hand. This is, unfortunately, not sufficiently appreciated, as is evidenced by the wide fluctuations in dairy production from year to year. In some areas where portion of the farmers' milk is accepted for the market milk trade, producers are becoming more interested in supplementary feeding during times when pastures are inadequate. Elsewhere, despite an active campaign conducted jointly by officers of the Agriculture Branch and Division of Dairying in the past couple of years, interest in fodder conservation is unfortunately still not being shown to the extent justified by its importance to the economic well-being of the industry.

In the recently-formed grade-herd recording units there is also evidence of development of a keener appreciation of the necessity for supplementary feeding. The marked higher production, during periods of the year when pastures are of low feeding value, in the herds of farmers who have consistently adopted supplementary feeding is stimulating the interest of other producers.

Shortage of Stock.

A shortage of good-quality dairy stock was evident during the year; at one stage heifers near to freshening were fetching prices up to £18 per head at saleyards.

BUTTER PRODUCTION AND QUALITY.

Production and Value.

The production of factory-made butter was 104,057,796 lb., of an estimated value of £11,402,000. Owing to the much improved seasonal conditions this output was higher than recorded in any year since 1942-43. The aggregate value is a record for the State, the previous highest value of £9,500,000 being recorded in the record production year of 1938-39. The trend in butter values (per cwt.) is shown in the accompanying table taken from a report of the Commonwealth Dairy Produce Equalisation Committee Ltd.—

Year Ended 30th June.	Equalisation Rate.	Subsidy Rate.	Over-all Return to Manufacturers.
	s. *d.*	*s.* *d.*	*s.* *d.*
1937	123 2	..	123 2
1938	136 6	..	136 6
1939	136 3·5	..	136 3·5
1940	141 10·25	..	141 10·25
1941	143 1·2	..	143 1·2
1942	145 5·42	..	145 5·42
1943	151 11·85	11 11·25	163 11·1
1944	152 11·87	37 5·07	190 4·94
1945	154 4·03	40 6·85	194 10·88
1946	172 3·52	31 2·41	203 5·93
1947	185 2·93	20 0	205 2·93
1948	215 0	30 6	245 6

The average price (including subsidy) received by producers for cream supplied to butter factories in recent years has shown the following upward trend:—

Year.	Price per lb. Commercial Butter.
	s. *d.*
1943	1 3
1944	1 6
1945	1 7·3
1946	1 7·5
1947	1 8
1948	2 0

Grading.

A high proportion of Queensland butter production is graded officially by Commonwealth and State grading officers working in co-operation. In the year under review 86 per cent. of the output was graded, the results being as follows:—

Grade.	Boxes.	Per cent.
Choice	814,790	50·99
First	703,003	43·99
Second	72,711	4·55
Pastry	7,502	·47

The better seasonal conditions were reflected in the improved grading figures compared with those for the previous year, which were:—Choice 32·46 per cent., First 59·75 per cent., Second 7·08 per cent, Pastry ·71 per cent. There is, however, still a good deal of leeway to be made up before the general average quality of Queensland butter will attain that of the immediate pre-war period. It is quite appreciated that all sections of the dairying industry, and none more so than producers, have passed through a number of difficult years due to manpower shortage, scarcity of materials and equipment, and rather adverse seasons. The availability of markets for all kinds of dairy produce to the limit to which they can be produced and a less critical consuming public in the face of existing shortages are no doubt factors which could very easily be conducive to the lowering of quality standards. It is to be hoped that none interested in the welfare of the industry will take a short view and, that, despite the present seller's market, full recognition will be given to the fact that, when world trading conditions become normal, the quality of a country's produce will largely govern the price it will receive for it. In this connection, too, uniformity of quality is an objective for which the Australian dairy industry must strive. Comparisons of official and factory gradings for the past year indicate that some improvement in cream-grading standards at factories has taken place; its continuance is vital to efforts to uplift quality, as any misleading of farmers concerning the true quality of cream produced by them seriously hinders attempts to elevate quality.

Weed Taint.

Following a field survey of the incidence of weed taints in cream carried out in all districts of the State in 1946 by officers of the Division of Dairying, the C.S.I.R. arranged for laboratory investigations to be commenced last year. The investigation so far as it has gone appears to indicate that the major tainting weed is *Coronopus didymus* (cress weed). Although several other weeds commonly taint dairy produce in Queensland they are much less widespread than cress weed and, consequently, of lesser economic importance in the degrading of cream and butter. Contrary to the generally held view of producers and factory personnel, carrot weed (*Apium leptophyllum*) appears not to be a serious cause of tainting; in fact, in feeding experiments with the freshly-cut weed, a taint could not be induced in the milk of the cows consuming it. Several other weeds were incriminated as serious in the tainting of cream and butter. A method for the removal of taint due to cress weed has been worked out on the experimental scale by officers of the C.S.I.R.

Mottled Butter.

A number of factories continue to produce mottled butter, an appreciable quantity of which was degraded during the year. An officer has been engaged in carrying out laboratory and factory investigations on the body and texture of butter, with particular reference to mottles. Following on observations made at several factories which had experienced much trouble through mottles, a circular was distributed to all butter factories outlining suggestions for control of this defect.

New Butter Processes.

Several new types of machines which make butter by dispensing with the use of the conventional churn were developed in Germany, Sweden, Switzerland, and Australia during the war years. Another plant has since been developed in the United States. A Swedish machine which arrived in Australia during the year was installed in a factory in New South Wales and preliminary experiments have already been carried out. The Australian Dairy Produce Board is sponsoring certain trials with several of the new machines and a Committee, of which an officer of the Department is a member, has been set up to supervise the trials. The Swiss machine which is to be installed at

the Caboolture factory is expected to arrive in Australia about September, 1948. This machine differs from the others in its ability to churn acid cream; hence the decision to carry out trials with it in Queensland, where the supply to many factories of whole milk or fresh cream is unlikely to become economically feasible within the foreseeable future.

Butter Improvement Scheme.

This service continues to play an important role in butter quality control. As the laboratory and field staffing position improves the service can become increasingly effective. There is now available in the Dairy Research Laboratory an officer who is able to devote full-time service to the butter improvement scheme. Field officers co-operate in providing the liaison between the laboratory and the factories.

Considerable delay is being experienced by factories in obtaining replacements for worn-out equipment, especially churns, and this is obviously retarding the efforts of factories to obtain improved results, particularly in biological tests, in the Butter Improvement Scheme. Detergents for dairy factory use which have also been in short supply have caused some anxiety during the year in the maintenance of factory hygiene.

Visits were made to several factories during the year for the purpose of making complete bacteriological and chemical surveys. In these surveys there is close co-operation between the officers of the Dairy Research and Field Branches.

CHEESE PRODUCTION AND QUALITY.

Production.

Some diversion of milk from cheese manufacture to the market milk trade occurred, but there was only a slight changeover of suppliers from cheese to butter factories. The production for the year was 21,595,525 lb. as against 17,291,768 lb. in the preceding year. Seasonal conditions in the main cheese-producing area—the Darling Downs—were generally favourable, which accounted for the higher output for the year. The values for 1947-48 and 1946-47 were £1,268,386 and £887,919 respectively.

Including Commonwealth Government subsidy, the average price returned by factories to suppliers was 30·8d. per lb. butterfat.

The average payouts by cheese factories per pound butterfat for the past five years have been:—

Year.	Pence.
1943–44	25·56
1944–45	27·18
1945–46	27·75
1946–47	27·8
1947–48	30·8

Grading.

The quantity of cheese graded by Commonwealth and State graders was 14,179,360 lb., representing 65·6 per cent. of the total production. The official grade classifications were:—

Grade.	Lb.	Per cent.
Choice and First	8,916,895	62·9
Second	4,870,136	34·35
Third	345,459	2·44

The grading results have shown a marked decrease in the proportion of first-grade cheese compared with the official gradings of several years past. It is difficult to ascribe reasons for this decline, as seasonal conditions were satisfactory.

Grading Factory Milk Supplies.

Payment for milk supplies according to bacteriological quality, as indicated by the methylene blue test, was commenced at a further three factories during the year. These schemes are operated entirely on a voluntary basis. Queensland is the only State in Australia which has introduced a system of milk grading embodying differential rates of pay for milk quality, and this progressive action by some Queensland factories is deserving of commendation. The grading system has been generally well received by suppliers, whose interest in maintaining the quality of their milk supplies has been thereby stimulated.

Bacteriophage.

As in other countries, the incidence of bacteriophage is a major trouble confronting cheesemakers in this State. In dealing with this problem there has been a close association between the laboratory and the field advisory officers. Without a laboratory service efforts of factories and advisory officers would be greatly hampered. An awakening to the necessity for following new techniques in starter propagation in factories is rapidly spreading and it is pleasing to record the co-operation which now exists between factory and Departmental personnel in facing up to the problem. The stage is now fast approaching when most Queensland factories should be equipped either with an isolated starter room or with suitable alternative arrangements for enabling starters to be propagated under conditions which will greatly minimise the risk of serious breakdown of acid development during cheese manufacture. For several years the recommendations of Departmental officers have been in accordance with those advocated in New Zealand, which has led the world in studies in the control of starters under factory conditions. The visit to Queensland during the year of Dr. Whitehead of the New Zealand Dairy Research Institute, the world's foremost authority on starters, has done much to fortify the recommendations of the Departmental staff.

Milk Areas.

The milk areas for cheese factories which were gazetted in 1942 were cancelled during the year under review. Though enforcement of supply to cheese factories was lifted in 1944, owing to a change in respect of Britain's requirements of dairy produce, the milk areas were not then cancelled.

Closure of Factories.

The Aubigny cheese factory was closed in September, 1947, and two other factories, Kelvinhaugh and Rosemount, were closed on 30th June, 1948. The Pittsworth Co-operative Dairy Association closed its Brookstead branch temporarily in March.

Buildings and Equipment.

It is pleasing to note from field officer's reports that some cheese factory directorates are making special efforts to maintain their

units in a good state of repair; however, some factories which were not remodelled early in the war years are now urgently in need of major repairs and renewal of equipment.

Cheese Yields.

Field officers have carried out investigations on cheese-yielding capacity of milk in relation to actual cheese manufactured with a view to assisting factories to control the composition of cheese and to reduce avoidable losses. Samples of cheese are also taken regularly during factory visits and forwarded to the Toowoomba laboratory for chemical analysis. The results are of further assistance to factories in the control of manufacture.

Varieties other than Cheddar.

Quantities of varieties of cheese other than cheddar were made at a number of factories; the types included Gruyere, Roman, Gouda, and Cottage, and were readily saleable. There is a growing public appreciation of varieties of cheese other than cheddar.

Refrigerated Cheese Rooms.

In recent years several factories have installed refrigeration to control the temperatures in cheese-holding rooms, and the good results achieved are causing increased interest in this matter by other factories. The Pittsworth Co-operative Dairy Association has now commenced the erection of a new curing room which will be equipped for refrigeration.

MARKET MILK.

There is now a deliberate policy in many countries of expanding the consumption of whole milk, of which the annual pre-war per capita consumption in pints in various countries was:—United Kingdom 207, U.S.A. 342, Canada 381, Denmark 360, Holland 328, Australia 213.

Pasteurised Milk.

Rapid developments have also taken place in Queensland during the past few years in the pasteurisation of milk. The provision of pasteurised milk is being encouraged by the granting of franchises for pasteurisation plants to be established in specific areas. This has enabled factories equipped with the most modern plant to become established and ensured an adequate, safe, high-quality milk supply in the main cities and towns. In the past year a franchise was granted to the Maryborough Co-operative Dairy Association to establish a pasteurisation plant at Maryborough. The South Burnett Co-operative Dairy Association commenced to supply pasteurised milk from its Murgon factory in March, 1948. The North Coast Milk Supply Depot at Caloundra was closed and the business transferred to Nambour, where a new building was erected and new plant installed. Another pasteurisation factory is in the course of construction at Burleigh Heads.

The Malanda factory recently fitted out a laboratory for routine laboratory control at its milk treatment plant. Field officers of the Division also collaborate with and utilise the laboratory service for their advisory work among producers.

The laboratory and field advisory services provided by the Division for the Brisbane Milk Board were strengthened by the appointment by the Milk Board of two additional field officers, who work under the supervision of a Departmental officer.

Milk Quality.

In the spring of each year there is a high proportion of milk of low fat content received by Brisbane milk pasteurising plants. A determined attempt was made during July-November, 1947, to reduce the quantity of such milk to a much lower level than prevailed in preceding years. A pamphlet outlining suggestions for maintaining the fat percentage of milk (morning's milk is received at depots) was prepared and distributed to producers. Field officers' activities were also concentrated on this work. These efforts met with a good deal of success.

Brisbane milk-pasteurising plants have installed much equipment of the most modern type during the year, while other contemplated building and plant installations represent a noteworthy advance which must have a very beneficial effect on the treatment of milk.

Field officers co-operated in investigations on electric hot water boilers and cooling of milk by several different methods, and in the collection of samples for the study of factors affecting the composition of milk being carried out by the Dairy Research Branch.

Milk Tankers.

A progressive feature in the market milk industry is the provision of milk tankers to transport milk from the country factories to a Brisbane pasteurising factory. The unsatisfactory method of cartage in milk cans is likely to be superseded by transport in tankers in the not distant future. The advantages which would accrue from milk tankers are—

(1) Milk of a better bacteriological quality. This would result from the smaller surface area in contact with milk, and the greater ease of cleansing compared with cans.

(2) Lower losses due to spillage. Spillage during tipping at the city depot end would be eliminated; the true weights would also give greater satisfaction to producers.

DRIED MILK.

The South Coast Dairy Co., Southport, which has been concentrating milk for supply to a large ice cream manufacturer, installed a roller drying plant during the year under review and has already commenced the drying of whole milk and separated milk. Another factory which proposes to manufacture spray-dried separated milk powder has already obtained some of the necessary plant from overseas. An overseas company has also had a representative in Queensland during the year for the purpose of investigating the possibility of establishing a milk products factory.

CASEIN.

The cheese section of the Toowoomba factory of the Downs Co-operative Dairy Association was diverted to the manufacture of a lactic casein during the year.

There have been numerous inquiries in recent years as to the possibility of stepping up casein manufacture in Queensland. A difficulty has been that farm separation of milk is almost universal on farms supplying butter factories in Queensland, and to change over to supplying milk for separation at the factory for the purpose of utilising the separated milk for casein manufacture would not only disorganise farmers' methods and restrict the amount of separated milk available for the raising of pigs but would add considerably to the cost of transport; in many areas where farms are scattered and a long way from factories the transport of whole milk would be impracticable in the Queensland climate.

HERD RECORDING.

The yield per cow is the most important single factor in the efficient production of dairy produce. Farm costs are high and farm labour expensive, and the most effective way of reducing the cost of production is to milk cows with high production. There is a world-wide shortage of dairy produce and with the increasing demand for more milk for the liquid milk trade every effort should be made to increase production. This is desirable from both the individual and the national economic outlook. Increased production can only be gained on most farms which are already fully stocked by improving the production of the individual cow, not by increasing the number of cows. The main factors in improving productivity of dairy cows are (*a*) better feeding, and (*b*) better breeding methods. Neither of these can be achieved by the dairy farmer unless he bases his better feeding and better breeding on known production, and for this knowledge he must consistently record the production of all of his cows.

At the invitation of the Australian Dairy Produce Control Board, a visit was paid to Australia during the year by Dr. W. M. Hamilton, Department of Scientific and Industrial Research, New Zealand, and Mr. A. H. Ward, Director of Herd Improvement, New Zealand Dairy Board, to report on dairy cattle improvement in Australia. They visited the eastern States of Australia and later submitted a report to the Board. In the report they stressed the need for increased herd recording and making greater use of the information obtained. It was also suggested that the herd recording schemes of all the Australian States should be standardised. It is expected that the Australian Dairy Cattle Improvement Committee will discuss the report at some future date.

Herd recording in Queensland is of two types, which are discussed separately.

Purebred Advanced Register Recording.

This involves the testing of purebred cows registered by the recognised herd book societies. Cows producing prescribed standards according to age are admitted to the Advanced Register of the herd book. It is from the breeders of registered stock that the commercial dairy herd owners select their herd sires, hoping by so doing to increase the production of their future herds. Accordingly, purebred herds should be capable of producing at a higher level than the ordinary grade herds under similar conditions. In order to prove their production the onus is on the pure breeders to test their entire herds so that the information will be available to the dairying industry. Figures given later in this report show that only a small percentage of the registered breeders are recording and often only a few head each.

The present purebred recording scheme has been operating since 1921. In order to bring the scheme into line with present-day requirements consideration is being given to its amendment.

The following table shows the number of registered breeders in each herd book society and the number testing during the year:—

—	Number of Breeders in Herd Book.	Number Testing.	Percentage Testing.
Australian Illawarra Shorthorn ..	466	56	12·0
Jersey	700	60	8·6
Guernsey	30	5	16·7
Ayrshire	47	3	6·4
Friesian	20	nil	..
Total ..	1,263	124	9·8

The next table shows the number of cows in each breed which were due to complete their lactation during the year:—

—	Number of Cows Completing Lactation.			
	Total.	Passed.	Failed.	Withdrawn.
Australian Illawarra Shorthorn	338	156 (46·1%)	70 (20·7%)	112 (33·1%)
Jersey	492	242 (49·2%)	116 (23·6%)	134 (27·2%)
Guernsey	36	16 (44·4%)	8 (22·2%)	12 (33·3%)
Ayrshire	18	7 (38·9%)	6 (33·3%)	5 (27·8%)
Friesian	nil	..	..	..
Total	884	421 (47·6%)	200 (22·6%)	263 (29·7%)

TABLE 1.

PURE BRED DAIRY CATTLE PRODUCTION RECORDING SCHEME.

Breed Production Averages for Registered Herd Book Stock which completed Lactation Records of 273 days during the year ending 30th June, 1948.

—	Ages of Groups.							
	J2.	S2.	J3.	S3.	J4.	S4.	Mature	All Ages.
Jersey—								
Number of Cows ..	113	38	36	28	24	19	100	358
Average Milk lb. ..	4,988	5,767	6,066	5,904	7,150	6,965	7,112	6,068
Average Butterfat lb.	263	300	325	315	346	381	374	320
Average Test Per cent.	5·27	5·2	5·36	5·33	4·84	5·47	5·26	5·27
A.I.S.—								
Number of Cows ..	41	43	32	26	18	11	55	226
Average Milk lb. ..	6,849	7,347	8,466	9,062	9,313	10,094	9,444	8,413
Average Butterfat lb.	266	296	346	361	370	392	373	335
Average Test Per cent.	3·88	4·03	4·09	3·98	3·97	3·88	3·95	3·98
Guernsey—								
Number of Cows ..	1	5	5	..	2	1	10	24
Average Milk lb. ..	6,326	5,597	7,185	..	7,705	5,391	7,727	7,013
Average Butterfat lb.	319	274	349	..	398	283	375	344
Average Test Per cent.	5·04	4·89	4·86	..	5·16	5·25	4·85	4·9
Ayrshire—								
Number of Cows ..	2	1	2	4	..	1	3	13
Average Milk lb. ..	6,646	5,456	6,058	7,132	..	7,561	8,826	7,187
Average Butterfat lb.	307	212	243	310	..	276	401	310
Average Test Per cent.	4·62	3·88	4·01	4·34	..	3·65	4·54	4·31

All Ages and All Breeds.—Number of Cows, 621 ; Average Milk, 6,981 lb. ; Average Butterfat, 326 lb. ; Average Test, 4·67 Per cent.

Table 1 shows the average production for each age group of each breed.

It will be seen that though the year was a favourable one the number of cows tested was small. The average number of cows per breeder for each breed was:—

—	Number of Breeders Testing.	Cows Tested.	Average Number of Cows per Breeder.
Australian Illawarra Shorthorn ..	56	338	6·0
Jersey	60	492	8·2
Guernsey	5	36	7·2
Ayrshire	3	18	6·0
Totals ..	124	884	7·1

The following production records for 273 days' test were established during the year:—

A.I.S. Senior 3-year-old.—J. Phillips & Son's Sunny View Beauty 6th—16,577 lb. milk, 733 lb. fat.

Jersey Mature.—W. S. Conochie's Brookland Cunning Drop—12,800 lb. milk, 752 lb. fat.

Guernsey Junior 3-year-old.—W. A. K. Cooke's Bangalow Vale Vanity Fair 3rd—9,664 lb. milk, 465 lb. fat.

Guernsey Mature.—W. A. K. Cooke's Laureldale Vida—12,473 lb. milk, 563 lb. fat.

The following production record for 365 days' test was established during the year:—

Guernsey Junior 3-year-old.—W. A. K. Cooke's Laureldale Pamela—11,698 lb. milk, 569 lb. fat.

In connection with the scheme for the testing of purebred dairy cattle, it is hoped to introduce sire surveys and a register of merit for cows. The latter would ascertain families and strains which produce at a consistently high level over a number of years, thus showing the desirable qualities of high production, good fecundity, sound constitution, and resistance to disease.

Grade Herd Recording.

This is divided into:—

(*a*) Farmer's own-sample method.

(*b*) Group herd recording method.

The farmer's own-sample method, which is free to the farmer, has been in operation since 1923. The number of farmers availing themselves of this scheme has gradually diminished; during the year only 47 herds were under test. The main reasons for this are shortage of labour on the farms and the increased use of milking machines.

The 47 herds comprised 1,947 cows; 289 cows completed their lactations for an average production of 3,393 lb. milk and 179 lb. butter fat. Of this 289, 25 (8.6 per cent.) produced less than 100 lb. butter fat, 86 (29.7 per cent.) produced 100-149 lb., 86 (29.7 per cent) produced 150-199 lb., 51 (17.6 per cent.) produced 200-249 lb., 25 (8.6 per cent.) produced 250-299 lb. and 16 (5.5 per cent.) produced over 300 lb.

Group herd recording commenced during the year has aroused much interest in the State and appears to be filling a long-felt need. It provides for the setting up of group herd recording units each consisting of about 22 herds milking an average of about 800 cows monthly. There is appointed to each unit a herd recorder to visit each farm once monthly in rotation.

The first unit commenced operations at Beaudesert on 27th January and there are now eight others operating—viz., Beaudesert, Maleny Nos. 1 and 2, Goomeri, Oakey, Allora, Cooroy, and Kingaroy; Monto and Cedar Pocket (Gympie) units will commence operations in July, 1948.

Applications for the formation of units and inquiries about the scheme indicate that the number of units operating in Queensland during the coming year will be approximately 30. As each unit comprises approximately 800 cows, this will mean 24,000 cows under test.

The scheme has not been operating long enough to be able to supply production figures, but monthly summaries of each unit are prepared and issued to each member of the unit. This enables him to compare the production of his herd with that of others in the district. It is felt that a man with a low-producing herd, seeing the average of other herds in the district, will endeavour to improve his farming methods and so increase the average production of his herd.

The monthly averages for each unit are given hereunder:—

Unit.	Month.	Herds.	Cows.	Average Milk.	Average Test.	Average Butterfat.
				Lb.	Per cent.	Lb.
Beaudesert	February	15	926	16·69	4·05	·676
	March	14	888	14·63	4·3	·618
	April	15	882	12·08	4·48	·538
	May	16	851	10·11	4·83	·488
	June	16	802	9·34	4·52	·422
Maleny (2 units)	February-March	24	1,155	14·96	5·05	·756
	March-April	31	1,419	12·83	5·57	·715
	May	37	1,420	11·46	5·27	·604
	June	37	1,261	10·51	5·11	·536
Goomeri	May	18	581	10·09	4·58	·462
	June	19	585	11·44	4·28	·489
Allora	May	20	509	11·62	4·51	·524
	June	20	492	13·14	4·26	·560
Oakey	May	22	632	14·97	4·47	·669
	June	22	621	16·6	4·43	·735

During the coming year it is proposed to institute sire surveying in conjunction with the scheme.

The scheme is financed by the farmer, the State, and the Commonwealth. The farmers' fees are collected through the Co-operative Dairy Associations, which are assisting the work considerably. Results obtained from the recording are being utilised by field officers of the Division to advise farmers on culling, breeding, and farm management, and, in conjunction with the Division of Animal Industry, on feeding practices. Already many of the farmers are improving their methods of supplementary feeding and increased production must result.

Effect of the Month of Calving on Production.

During the year records from the grade herd recording scheme were examined to determine the effect of the month of calving on production in various districts in Queensland. The survey shows that in most districts in Queensland the production per cow could be greatly increased by calving cows in July, August, and September. Further information on this subject will be gathered from each herd recording unit so that farmers will be given reliable data as it relates to their respective districts.

Herd Wastage Survey.

During the year a survey of herd wastage was conducted with the co-operation of more than 200 farmers. The information gained, when correlated, will give basic information to Departmental advisory services and to the dairying industry in general. The co-operation of the farmers concerned is greatly appreciated. It is intended to extend this survey in conjunction with the herd recording units in operation.

Field Days and Meetings.

During the year addresses on dairy herd production and herd recording were delivered at nine field days and 20 meetings. Much of the interest displayed in herd recording can be attributed to the information given at these meetings. Two radio talks were delivered. The various schools conducted by the Commonwealth Rehabilitation Training Scheme at Lawes were visited and the students addressed on dairy cattle improvement, herd recording, dairy hygiene, and general dairying. The herd recording staff again conducted the ground milking competition at the Royal National Association's Exhibition.

REBATE OF FREIGHT.

Applications were approved in respect of the refund of freight paid on the transport by rail of 108 bulls, the progeny of female stock entered in the Advanced Register of the various Breed Societies. The expenditure amounted to £406 2s. 4d.

MILK AND CREAM TRANSPORT.

The Cream Transport Committee, which consists of two Departmental officers and an industry member, met regularly throughout the year. Many matters arising out of control of the transport of milk and cream from farms to factories were dealt with, such as overlapping in picking up supplies by carriers, alterations to routes previously gazetted, inquiries concerning applications for transfers of licences, gazettal of new routes and renewal of licences. A number of visits to country areas were made by one or more members to investigate disputes where local efforts had failed. The distribution of fuel ration tickets to licensed milk and cream carriers, which had been performed on behalf of the Liquid Fuel Control Board for several years, was allowed to revert to the Board.

The gazettal of new routes numbered 12, and 28 routes were revised, while 94 licences were issued to carriers.

The Committee was also consulted by the Directorate of Emergency Road Transport in regard to applications for the purchase of motor vehicles by milk and cream carriers.

DAIRY FACTORY ACCOUNTS.

During the year inspections were made of the books of 21 dairy companies; generally speaking, the position in regard to payments to suppliers is very satisfactory, and the provisions of the *Dairy Produce Acts* in this regard are being observed. However, a tendency towards high over-runs has been observed in the case of several factories, and it is hoped to investigate these during the coming year.

An analysis was made of the costs of individual dairy associations in manufacturing and selling butter during the year 1946-47 and the results forwarded to factory managers. The figures show a considerable increase on those of the previous year, this increase being due partly to higher costs and partly to the abnormally low production caused by drought in 1946-47. The average return to suppliers of butter factories over all grades, including deferred pay declared but not paid but excluding the retrospective subsidy paid towards the end of 1947, was 20·29d. per pound commercial butter.

Reports on cheese factories whose returns appeared to show that the quantity of butterfat paid for was abnormally low in relation to the quantity of cheese manufactured were submitted.

HANDBOOK AND CORRESPONDENCE COURSE.

On behalf of the Brisbane Technical Correspondence School officers of the Division prepared a series of instruction papers for a correspondence course in dairy manufactures. The course comprises milk and cream testing, milk and cream grading, buttermaking, cheesemaking, and market milk.

The study of the testing and grading sections, or possession of the Departmental testing and grading certificate, is a prerequisite to enrolment for the other subjects, which may be studied according to the branch of the industry in which the employee is engaged. Actual practical experience will be gained by the student at the factory at which he is employed.

The above courses of instruction fill a long-felt need of those engaged in the dairy industry, and are receiving the strong support of the Australian Society of Dairy Technology, the Institute of Dairy Factory Managers, and the Co-operative Dairy Companies Association.

EXAMINATIONS.

The usual theoretical examinations for certificates of proficiency issued to dairy factory operatives were held in July and November. Certificates were issued to the following numbers of candidates who had completed both the theoretical and the practical examinations:—Teachers' milk and cream testing 3, milk and cream testing 21, milk and cream grading 21, buttermaking 11, and cheesemaking 13.

COMPETITIONS.

Grading competitions for both butter and cheese were again conducted on behalf of the Queensland Division of the Australian Institute of Dairy Factory Managers. A considerable amount of clerical work is associated with the keeping of the necessary records for computing the points gained in the official grading of butter and cheese.

EFFICIENCY GRANT.

An announcement of major importance to the dairy industry was made by the Prime Minister in October, 1947. In connection with the increase in the rate of subsidy payable for milk and cream supplied for manufacturing purposes, it was intimated that the Commonwealth Government would make available to the States an annual grant of £250,000 for a period of five years for the purpose of promoting improved farm practices in the dairying industry and stimulating production by assisting farmers generally to secure greater output per cow and per farm. Proposals in connection with the utilisation of this grant were subsequently discussed at a conference of representatives of the appropriate Federal and State Departments.

Plans for the most effective use of Queensland's apportionment from the grant have been drawn up and submitted to the Commonwealth Department of Commerce and Agriculture for approval. It is hoped the schemes to be implemented will assist in achieving the wish of the Commonwealth Government for production per cow and per farm to be materially improved by the raising of productive standards. This objective must undoubtedly be striven for if the industry is to be placed in a position to dispose of exportable surpluses on a competitive basis when normal marketing conditions again prevail.

MARGARINE.

On account of the improved position in respect of supplies of vegetable oils, margarine manufacturers were able to pack their respective quotas of table margarine fixed in accordance with the provisions of the *Margarine Acts Amendment Act of 1939*. This was the first time for some years that manufacture up to the quota limit has been possible.

HERMITAGE REGIONAL EXPERIMENT STATION.

Plans for the layout of the dairy buildings and yards at Hermitage Regional Experiment Station were finalised. Three acres of the station have been reserved for the necessary yards and buildings. The latter will comprise hayshed, four 25-ton silos, two feed rooms, feeding stalls, combined milking shed and dairy house, and calf-feeding stalls.

The layouts of the dairy premises at Biloela Regional Experiment Station and a commercial dairy at Kairi Regional Station have also been drawn up.

Report of the Dairy Research Laboratories (Mr. L. E. Nichols, Senior Dairy Technologist).

The activities of the Dairy Research Branch have been centred at the three laboratories at Head Office, Hamilton, and Toowoomba.

A feature of the year's work under review has been the increasing specialisation of officers in chemical or bacteriological problems of the butter, cheese, and market milk industries. In addition, one technical officer is now engaged on field survey work, attending to both farm and factory problems. Besides research work, the year's programme included routine quality-control of dairy products; chemical engineering investigations; analytical work for the Department of Commerce and Agriculture, factories, and producers; testing of dairy glassware; training of field officers; and extension work and general service to the industry. Several of the research projects were successfully concluded during the year.

MILK RESEARCH.

The following are the main lines of investigations into milk quality problems which have been pursued.

Microscopic Appearance of Raw Milk.

This project was commenced with a view to rendering more accurate the microscopic diagnosis of low reduction times of raw milk supplies. At the present time smears are made of each supplier's milk from the methylene blue tubes immediately following reduction. Smears are examined daily to aid the farmer in locating the cause of low reduction times. For some time it has been felt that an investigation was necessary to discern with greater accuracy than at present where many bacterial associations originated.

The project has been extended to provide information on (*a*) the heat resistance of farm contaminating organisms; (*b*) their prevalence, origin, and identification; and (*c*) an estimation of the reducing capacity of each type.

Photomicrographs have been prepared of contamination from each source to serve as a guide to future workers, as well as providing permanent reference for publication purposes.

Pasteurisability of Raw Milk.

This project involves the efficiency of pasteurisation at milk plants. The predominating thermoduric bacteria have been isolated. Some results of this work have been extended to effect control both on farms and at factories.

Farm Contamination of Raw Milk Supplies.

Investigational work on this subject was completed during the year and a paper is in course of preparation.

The Resazurin Test.

At the request of representatives of the dairying industry this test has now been compared with existing standard tests, including the methylene blue test, plate count, and direct microscopic examination. Approximately 500 comparisons have been made; results to date indicate that the test does not possess any special advantages over the modified methylene blue test as at present applied. Similar weaknesses concerning the detection of milk quality anomalies during the winter months occur with both tests, while during the warmer months rate of reduction compared favourably. Both showed similar reactions to the effect of abnormal milks, such as those associated with mastitis, colostrum, or advanced lactation.

On the results obtained there appears to be no justification for the adoption of this test in preference to those at present in use. The investigations, however, do indicate the need for a modification of the methylene blue test as at present applied to more accurately determine winter milk quality, preferably with pre-incubation period at constant temperature prior to testing. The project is now being extended to test more fully the practicability of the suggested modification and the most suitable period and temperature of incubation under Queensland conditions. The desirability of a temperature-time compensator, particularly during the winter months, appears necessary for the more accurate determination of winter milk quality.

Variations in the Composition of Milk.

This project was commenced last year, sampling once monthly from nine farms in the Brisbane milk area. Already considerable variations in the percentages of fat, solids not fat, total protein, casein, non-casein protein, and lactose have been recorded. The decline in the percentage of these constituents would seem to be more marked during the months of July, August, and September, coinciding with an increasing number of calvings and drier winter pastures.

The variation is recognised as a nutritional problem, and as such is to some extent controllable, it is thought, by supplementary feeding. Extension of the project to individual cows on Departmental experiment stations may enable a more specific determination, particularly of the effect of protein and roughage deficiencies.

CHEESE RESEARCH.

Control of Bacteriophage by Ultra-violet Light.

Bacteriophage active against lactic-acid-producing streptococci is often present in cheese-making vats in Queensland. Its action frequently retards the rate of acid production, with at times a complete starter failure. The decline in cheese quality over the past year has been attributed in no small measure to the effects of phage activity. It has been clearly demonstrated that phage may be disseminated through the air. Methods so far applied for control, in addition to application of a high standard of factory hygiene, have aimed at isolating the starter from a phage-infected environment. It therefore seemed feasible that irradiation with ultra-violet light might prove effective in destroying bacteriophage.

Initial trials in the laboratory indicated that the power of ultra-violet radiations of definite wave length emitted from a mercury vapour lamp was effective in destroying stock cultures of bacteria as well as the lytic activity of bacteriophage. As a result, trials were extended to cheese-factory conditions. However, the results obtained were discouraging, seeming to indicate that the steam-laden atmosphere was responsible for failures by interfering with radiation, while at the same time conveying phage. However, it appears now that this was not the only possible cause of failure. Further information is needed on the following points:—

(1) The most effective working distance for bacteriophage destruction;
(2) Duration of radiation required;
(3) Absorption of ultra-violet light by various materials;
(4) Destruction of bacteriophage on various surfaces, in air, and under specific conditions; and
(5) Various factors protecting bacteriophage from the lethal effects of irradiation.

Under practical conditions modifications to receive attention include the installation of ultra-violet ray tubes in the air intake system to the bulk starter cans, and exposing the whole of the starter room to the radiations.

The Non-Acid Condition of Milk Supplies to Cheese Factories.

Several instances have occurred recently of the failure of some cheese milk to support the growth of lactic streptococci during the cheese-making process. In one such milk the condition was traced to four individual cows in the milking herd, the non-acid principle being potent enough to practically stop acid production in the vat when the dilution was slightly greater than 1 in 10. In another milk investigated antagonism increased markedly at a dilution of 1 in 10, and was still strongly evident at a dilution of 1 in 100. There is some reason to believe that the misuse of chlorine on the farm was responsible for the non-acid condition in the latter case. At present, the prevalence of the condition at cheese factories, the frequency with which such milk is supplied, and the source and cause of the condition are under investigation.

Reconstitution of Milk for Manufacture of a Non-Fat-Leaking Cheddar Cheese.

Though all experimental work on this project was finalised last year, further observations were made on the keeping quality of the product, as well as the preparation of photomicrographs for publication purposes.

Cheese Mite Control.

Cheese-mite control measures using dichlorethyl ether, which were successfully initiated last year, were extended during the year.. Treatments previously recommended were suspected of tainting cheese. A comprehensive series of trials carried out showed that when prescribed dosages, using a liquid application at the rate of 1 lb. per 1,000 cubic feet, suitably atomised at approximately 80-lb. pressure, were made, no definite ether taint occurred.

In conjunction with the Entomology Section of the Division of Plant Industry, the Branch is giving consideration to other methods for the control of mites. These include vapour treatment with dichlorethyl ether, the effect of waxing cheese as a preventive measure, and the use of benzene hexachloride. The use of dichlorethyl ether as a gas from specially devised vapourising equipment may offer some advantage, as well as considerably reducing the present quantities used.

BUTTER RESEARCH.

Texture Studies.

Microscopic testing of water dispersion in butter instituted during the year quickly detects unsatisfactory butters, and investigations have been extended to the factories concerned. The work aims at reducing the number of moisture droplets greater than 10 microns in diameter. Results to date indicate that incomplete working, and particularly the presence of salt in a partially dissolved state (already confirmed by photomicrographs), is a contributing factor to texture anomalies.

The project has also been extended to study the nature of bacterial development and subsequent deterioration in quality as a result of poor texture. These investigations, it is hoped, will assist the production of a product of improved keeping quality.

Accuracy of the Plate Count of Butter.

This investigation has been carried out in conjunction with the Butter Improvement Service to determine the accuracy of the plate count as applied to butter, so as to enable more accurate interpretations for the benefit of factories. An attempt is also being made to assess the accuracy of methods in use during the bacteriological surveys of butter factories. Although the work is only in its very early stages, analyses to date indicate a reasonable degree of accuracy from existing methods.

Titratable Acidities of Cream and pH of Butter Serum.

In recent years there has been a marked increase in the pH of butter serum in Queensland. Values range from 6·2 to as high as 8·3, with many samples exceeding 7·5, and export butter has often been commented upon as being characteristically "flat-flavoured." Researches have shown that the acidity of the cream and the resulting pH of the butter serum play an important part in keeping quality. Accordingly investigations have been commenced to ascertain—

(1) The accuracy of neutralisation procedures in factories in relation to the pH of the butter;
(2) The effect on keeping quality of varying acidity ranges in cream and varying pH from laboratory-made butter samples; and
(3) The effect of existing tentative recommendations governing churning acidities of 0·8 to 0·10 and pH of butter serum from 6·8 to 7·2.

The limited results available to date indicate inaccuracies in neutralisation procedures, as well as a tendency to over-neutralise. The ensuing year should provide further information on these three points.

FIELD SURVEY WORK.

Testing the Practicability of Modern Milking Methods.

Within recent years, principally as a result of experiments in America, milking practices have been changing. Efforts are now being directed to stimulating milk secretion by improved milking practices and to encouraging the rapid milking of cows. Application of the new methods has, it is stated, considerably increased production. In addition to testing these claims under Queensland conditions, a project has been designed to investigate further some economic aspects of the mechanical stripping of cows following machine milking, including effect on production, time for complete milk-out (using a timing device), regulating the teat cups for more effective milk withdrawal, and effect on farm economy of the recommended practices.

Testing the Efficiency of Existing Dairy Farm Practices.

Last year a method for the cleansing and sterilisation of milking machines was evolved for improved dairy produce quality. This method is now being thoroughly checked bacteriologically on farms surrounding Brisbane.

The practice of washing udders with hypochlorite, at present widely used by farmers, has been under laboratory test during the year. The bacteriological results obtained (after the use of 100 parts per million up to 1,200 parts per million available chlorine) were not considered satisfactory. A considerable modification in the technique of udder washing appears necessary. The project aims at evolving a practicable yet more efficient method than that at present applied.

Farm surveys have been carried out to ascertain the sensitivity of various tests in detecting abnormal milk direct from the udder. Comparisons have been made between the modified methylene blue test, indicator tests such as the brom thymol blue test, and the less practicable direct microscopic examination. The investigations are being carried out with a view to assisting suppliers with milk quality-production problems.

QUALITY CONTROL OF DAIRY PRODUCTS.

Market Milk.

Milk Examinations.—Laboratory and field advisory services were continued on behalf of the Brisbane Milk Board, and covered also milk supplied to Warwick, Toowoomba, Southport, Merrimac, and Ipswich depots.

Raw milk supplied to Brisbane was under the constant supervision of the laboratory, and collaborating depot testers performed 79,579 methylene blue and 30,522 fat tests. The fat content varied from 3·6 to 3·93 and averaged 3·74 per cent. A marked improvement is revealed in the fat content of milk received at depots. An appreciable reduction in the percentage of sub-standard methylene blue tests is also evident from the year's results as compared with last year. This year only 10·7 per cent. of all methylene blue tests were less than 4 hours, whereas last year 24 per cent. were less than the desired standard. In the laboratory, 4,975 low-quality milks were microscopically examined and advice notes forwarded to producers. Besides 641 methylene blue tests performed for wholesale vendors, examinations of 2,593 bulk raw milks supplied to pasteurising depots, involving 5,193 tests, were made. Only 15 consistently low-quality suppliers were suspended from supplying milk for a period of three days pending improvement in milk quality, as compared with 54 in the previous year. A total of 2,502 visits was made to dairy farms by field and laboratory officers, and 250 visits to milk depots. The improvement in milk quality is attributed to (1) an increasing appreciation by suppliers of the importance of clean milk production and cooling of milk on the farm, (2) the provision of additional Milk Board advisory staff, permitting more frequent instructional visits to farms, and (3) more favourable seasonal conditions and milder summer weather.

Bottled pasteurised milk in Brisbane has been examined daily; of 957 samples submitted to 3,314 tests for plate count, coliform organisms, phosphatase test and fat percentage, 98·1 per cent. showed a negative phosphatase test. These results indicate the high standard of pasteurisation efficiency at the various depots. The average fat content was 4 per cent., which is considerably above the prescribed minimum. Milk-quality control at pasteurised-milk depots has been stepped up, as evidenced by the increased number of factory surveys. Comparison with the previous year's results reveals an improvement in the bacteriological quality of pasteurised milk.

Including raw and pasteurised milk, a total of 85,890 samples necessitating 126,344 tests was examined by depots and in the Department's laboratories.

As a result of control measures applied in milking practices for improvement of low butter-fat content, sub-standard fat contents have been less frequent in market milk throughout the year, only 1·2 per cent. being below 3·3 per cent. butter-fat. Favourable seasonal conditions have also assisted in this improvement.

A survey of the variations in the composition of milk within the Brisbane milk area is now well under way. Trends from the first 12 months' analyses are now being investigated; these will supply information on the composition of milk from nine farms within the area and the extent of monthly variations.

Miscellaneous samples have included farm waters and individual cows' milk for the detection of mastitis. Toowoomba and Warwick milk pasteurising plants have also received service and, in addition to surveys, samples are regularly collected and examined. The work has resulted in a general improvement in the bacteriological quality of milk from these areas.

The Departmental travelling laboratory has been used for farm and milk depot investigations on milk quality problems during the year.

Detergents.—As a result of the continued shortage of alkaline detergents, a survey of available substitutes for milk-factory use has been carried out. Two non-alkaline detergent preparations—both sulphonated fatty alcohol derivatives—appear promising, though expensive.

To ensure maintenance of detergent strengths in bottle-washing machines, printed instructions for testing and maintaining concentrations were issued to all milk depots.

Farm Operations.—The importance of cooling for the improvement of milk quality has been stressed by field officers, particularly the advantages of water-cooling towers and farm refrigerators. The relative efficiencies of different types of milk coolers have been compared so that farmers may be advised as to the most suitable methods.

The increasing electrification of country areas is popularising the use of the electric hot-water units on dairy farms. The heating efficiency and capacities necessary for farm electric water-heating units are being determined by trials on farms near Brisbane.

Butter Improvement Service.

At the Hamilton laboratory 1,945 churnings of butter from 44 factories were examined bacteriologically and chemically; 11,550 bacteriological and chemical tests were made and results, together with advice, forwarded to factories and field officers.

The following figures indicate an improvement in the bacteriological quality indexes coincidental with an improvement in the percentage of choice grade butter manufactured:—

—	1946–47.	1947–48.
Bacteriological Quality Index ..	180	212
Percentage of Choice Grade Butter	31	50·9

The results, however, still leave room for improvement and the staff was increased during the year to investigate butter quality problems. Two technologists are at present assisting in butter factory survey work. However, any marked improvement will be considerably restricted because of difficulty in obtaining factory equipment, particularly churns. Shortages of detergents and chlorine sterilizers for factory cleansing and water-treatment purposes have also made it diffieult to maintain the desired standard of factory hygiene.

Texture Defects.—Texture defects were prevalent during the year and the laboratory staff gave assistance to factories experiencing such defects. The causes are principally the result of incomplete working of the butter, and failure to completely incorporate the salt and to modify churning temperatures to suit the condition of the fats affected by seasonal variations.

Over-neutralisation.—Consideration has also been given to the spoilage of butter due to over-neutralisation. In recent years there has been a tendency to add excessive amounts of neutraliser. The accuracy of the neutralisation process is now being checked at all factories, and desired ranges varying from 0·08 to 0·1 per cent. acidity at churning applied.

"Rabbito" Butter.—One "rabbito" butter outbreak occurred during the year. The condition was shown to be of bacteriological origin, chiefly wash-water contaminants, aggravated by over-neutralisation in an incompletely worked butter.

Effect of Copper on Butter Quality.—A characteristic (tallowy flavour) occurred at one factory during the year, due to contamination with copper exposed surfaces. Delayed tinning of butter equipment, particularly cream-cooling coils and vats, can cause the condition. A survey of cream samples from each section of the equipment at the factory concerned revealed a cream-cooler tray and coil as the cause of the defect. Cream samples showed up to 1·5 parts per million of copper and the resultant butter 0·7 parts per million. With the declining condition of factory equipment and delayed replacement, this type of deterioration should be guarded against.

Butter Keeping-quality Experiment.—This involved the analysis before and after cold storage of 31 factory butters. The results emphasise the importance of chemical and bacteriological factors in the deterioration of the quality of stored butter.

Timbers for Butter-box Manufacture.—In conjunction with the Division of Forest Products of the Council for Scientific and Industrial Research, plans have been made to investigate the suitability of timbers other than New Zealand white pine, North Queensland kauri pine, and Queensland hoop pine for export butter-box manufacture. The rapidly diminishing supplies of existing butter-box timbers make it imperative that the possibilities of other woods for butter-box manufacture be explored, and particularly the extended use of secondary species.

Weed Taints in Butter.—The investigations initiated last year were continued in conjunction with the Council for Scientific and Industrial Research. The laboratories at Hamilton and Toowoomba provided facilities for investigating modifications in manufacturing technique, especially lower pasteurising temperatures, with a view to ascertaining if the severity of the taint could be minimised. However, the effect of reducing pasteurising temperatures to 183 degrees F. so affected the efficiency of the pasteurising process from a bacteriological point of view as to endanger the keeping quality of the resultant butter. Weed taints still present a serious problem in the degrading of Queensland butter, and while other methods of control are being attempted, the more accurate identification of weed-tainted cream on the receiving platform by means of a steam-heated plate is advised.

A New Method of Butter Manufacture.—During the year an opportunity was afforded to see the "Alpha" continuous method of butter manufacture in operation at Lismore. The principle is essentially an inversion of phase from the fat-in-water phase of cream to the water-in-fat phase of butter by the aid of temperature and pressure with a "quick freeze." The process may present difficulties under Queensland conditions because of the fact that whole milk is not supplied for butter manufacture, the limited capacities of the machines, and the softened condition of the butter when packed.

Composition of Queensland Factory Butter.—The estimated average composition of butter received from factories during the year was:—

—	1946-47.	1947-48.
Moisture	15·56	15·56
Salt	1·33	1·31
Curd	0·83	0·81
Fat	82·28	82·32

There is still need for butter of improved and more uniform composition to ensure economic manufacture.

Seventeen butter factories were visited by laboratory officers during the year, when surveys and special examinations involving 1,200 tests were carried out for the purposes of quality improvement.

Detergent Shortage.—The acute shortage of alkaline detergents for dairy cleansing and factory purposes necessitated a survey of suitable substitutes. Three non-alkaline detergents, principally sulphonated fatty alcohols, have shown promising results for butter factory use, being comparatively non-tainting to dairy products when discreetly used and reasonably good cleansers. However, their cost is considerable as compared with the more commonly used detergents, though much smaller quantities, as low as 0·5 per cent., can be used effectively.

Cheese Quality.

Cheese Starters.—For the convenience of the cheese industry on the Downs, distribution of cultures is now being made through the Toowoomba laboratory. A total of 649 cultures of lactic-acid starters was supplied.

Eighteen strains of lactic cultures are being propagated in the laboratory. Eight new strains have been received from New Zealand and added to the five regular Departmental strains. The cultures are carried in chalk litmus milk and subcultured weekly. In addition, a separate working culture is carried for each week, being subcultured daily in sterile separated milk. Vitality tests have been carried out weekly on 10 single strains and good vitality has been maintained by plating, picking off, and selection of daughter strains. Three special lactic cultures for fancy-cheese manufacture are also maintained. These cultures, *Lactobacillus helveticus, Bacterium propionica,* and *Streptococcus thermophilus,* are propagated and forwarded to factories as required.

Samples of starter cultures from factories have frequently been received and examined for purity and results reported with necessary advice to cheese factories and field officers. An intensive drive is being carried out to raise the standard of hygiene associated with cheese-starter propagation. This has followed from a survey of starter propagation methods in all factories.

Bacteriophage.—Following recommendations made last year, 13 cheese factories are now in the course of installing equipment suitable for the control of phage. In addition to water-seal lids with special air inlets, modified equipment has been planned with air filters attached. A specialised technique of inoculation from mother cultures to bulk starters by pouring through flame is also being tried.

One isolated culture-room was completed during the year, and another room is in the course of construction at Mount Tyson.

Phage surveys have been initiated at cheese factories to detect principal causes of phage infection. From these it has been ascertained that the lip of the Erlenmeyer mother-culture flask together with use of absorbent cotton wool have proved sources of infection. Accordingly rubber bungs are now advised in the absence of non-absorbent cotton wool, together with the flaming technique of inoculation or use of pipetted inoculum.

Phage race-relationships are now being determined against all single-strain cultures at present distributed so as to enable the most suitable rotation for factory use.

Cheese Composition Survey.—The composition of each factory's cheese is examined every two months, immediately following manufacture. An analysis of the fat, moisture, and salt content, together with fat in the dry matter and moisture on a fat-free basis, is made and recorded with grade results. When sufficient samples have been analysed trends will be examined and efforts made to determine the best composition consistent with quality and effects if any of seasonal variations.

Rehabilitation of the Cheese Industry.—Within recent years, following a determined drive by officers of the Department, cheese quality has shown a marked improvement. Buildings, equipment, and methods of manufacture now compare favourably with those of other States and countries.

CHEMICAL ENGINEERING.

A technologist visited various factories and farms during the year for the purpose of giving practical instruction and assistance on problems of a chemical and/or engineering nature. Typical matters include treatment of factory and farm waters, maintenance and specialised treatments of brines, waste disposal, insulation, size and suitability of boilers for factory practice, farm refrigeration, and farm cooling.

During the year the practicability of using certain pressure-filter units in dairy factories was investigated, and the efficiency of farm electric water-heating units was determined as a first step towards finding their suitability or otherwise for extensive use in the State.

Work on cheese-room air-conditioning was advanced by recording observations over a period of 10 weeks during the summer season at the Irongate factory.

The variations in the composition of burnt and slaked limes from various Queensland sources is being studied with a view to ascertaining their significance in water treatment.

GENERAL ANALYTICAL WORK.

A feature of the chemical work has been the marked increase in the number of chemical determinations as compared with the previous year. A total of 440 samples of butter, cheddar cheese, processed cheese, egg pulp, condensed milk, and margarine was analysed for the Department of Commerce and Agriculture. An additional 387 samples of butter, cheese, brine, waters, sterilisers, and detergents were examined for factories and farmers. The total number of determinations made was 2,064.

TESTING OF DAIRY GLASSWARE.

Dairy glassware is still in rather short supply and of somewhat variable quality. There is a need for the drawing up of an Australian standard for Babcock glassware and accessories. The formation of a Dairying Standards Committee in Australia recently may prove helpful in this respect. Glassware tested comprised a total of 11,282 pieces.

DIVISION OF MARKETING.

Report of the Assistant Director of Marketing (Mr. C. H. P. Defries).*

In past years it has been customary to combine the annual report required of the Director of Marketing under *The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1946, with the report of the Division's activities included in the Departmental annual report. It is now proposed to separate these two reports. This has become necessary owing to the ever-increasing ramifications of the marketing organisations set up in this State under statutory authority and the difficulty of compiling all of the statistical and other data required for the former report in time for inclusion in the Department's annual report. Consequently, the report required under the Marketing Acts to be submitted to the Honourable the Minister, which reviews the activities of the various marketing boards (of which the Director of Marketing is *ex officio* a member) and which is usually incorporated in this report, will be published as a separate document. This report will be confined to a general reference to the activities of the Division, an account of the progress of the crop reporting and marketing prices services, and a brief review of the major marketing developments in various industries.

Marketing.

General.

During the year the Marketing Branch has been concerned with the administration of the following Acts, viz.:—

The Primary Producers' Organisation and Marketing Acts, 1926 *to* 1946.
The Wheat Pool Acts, 1920 *to* 1930.
The Fruit Marketing Organisation Acts, 1923 *to* 1945.
The Primary Producers' Co-operative Associations Acts, 1923 *to* 1934.
The Dairy Products Stabilisation Acts, 1933 *to* 1936.
The Second-hand Fruit Cases Act of 1940.

The marked tendency for primary producers to display an increasing interest in organised marketing following the wartime experience of controlled and stabilised conditions that were effected under National Security legislation has been mentioned in previous reports, and producers in the potato, navy bean, tobacco and Central Queensland egg industries, which did not, prior to the war, operate under any scheme of orderly marketing, have now taken advantage of the State's marketing legislation to set up marketing boards for their respective industries. Grain sorghum growers are also giving consideration to similar action.

The increase in the number of Boards, the transfer of controls which had operated under wartime powers to the State organisations, and the increasingly widening scope of existing organisations have thrown a heavy strain on the restricted staff resources of the Branch, many of the members of which have been able to commence their academic and administrative training only since their return from active service. However, with the easing of demands that were made on the staff as a result of wartime and post-war emergency controls, particularly in the administration of subsidy and rationing schemes for feeding grains, it has been possible to devote more time to the building up of the Division's services, and good progress has been made with the development and expansion of the services which provide production trend reports, crop forecasts, and market price reports.

Following a decision of the Australian Agricultural Council, when proposals were adopted for a Commonwealth organisation for the marketing of tobacco leaf, the Department was asked to prepare draft legislation which might form the basis of uniform legislation throughout the Commonwealth. This legislation was prepared in co-operation with the Division of Plant Industry but was not proceeded with owing to the failure of States to agree on a uniform plan. Consequently, Queensland growers proceeded with plans for the setting up of a marketing board under State legislation.

The Division has been engaged on the consideration of proposals relating to the institution of an Australia-wide system of wheat grading and is represented on the inter-State Committee set up to examine this matter.

The Director of Marketing has continued to represent the State Government on the Queensland Export Advisory Committee. This committee is comprised of representatives of Commonwealth and State Governments, Chambers of Commerce and Manufactures and shipping and exporting interests. Similar committees have been set up by the Commonwealth Government in all States to act in collaboration with the Federal Export Advisory Committee. The main objects of the committee are to assist in the reconstruction and further development of our export trade. Some attention has been given during the year to the developments of exports to dollar countries.

Coarse Grain Industries and Grain Export.

Heavy crops of maize and grain sorghum were harvested in southern Queensland during the 1946-47 season, when plantings were heavier than normal largely because of the failure from drought of the previous wheat crop; the grain sorghum harvests were also increased by an unexpectedly heavy secondary crop. The harvest of more than 22,000 tons of maize on the Atherton Tableland also provided surpluses from that quarter. Barley crops, too, were heavier than usual. This contrasts with the acute shortages that had been experienced for many years.

After considerable negotiation between growers' representatives, the Department of Agriculture and Stock, and Commonwealth authorities, when it became clear that a record wheat crop was in sight and would not only

* This report has been prepared by the Assistant Director in the absence of the Director of Marketing (Mr. H. S. Hunter) on extended leave.

safeguard the State's feed position, but also obviate further contribution by the Commonwealth Treasury to pay freight on feed grains imported to Queensland, the Commonwealth Government finally agreed to permit limited exports of the surplus available. The details are set out in the following table:—

Crop.	Amount Approved for Export.	Amount Actually Exported.	Percentage of Crop Exported.
	Bushels.	Bushels.	
Grain Sorghum ..	600,000	509,328	15
Southern Maize ..	160,000	160,360	6
Northern Maize ..	320,000	320,000	38
Barley	50,000	..	..
Oats	Queensland growers shared in the Australian Pool.		

At the request of the Commonwealth Government the Department was required to supervise the arrangements made for export in accordance with certain principles which were designed to ensure that exports should be from growers' stocks only, that speculators should not be permitted to reap the benefits of the export market at the expense of growers who had sold to them at fixed ceiling prices, that all growers who held stocks and desired to participate should be given the opportunity to do so, that these growers would be paid a return representing the equalisation between returns on the overseas market and on the local market, and that the requirements of the local market should be met.

At the suggestion of the Department, growers of sorghum and maize in southern Queensland formed co-operative associations to conduct pools to comply with the above conditions. Both for Atherton Tableland maize and for barley there were in existence commodity marketing boards which rendered further organisation unnecessary. Sorghum growers formed The Sorghum Growers Co-operative Association Limited and southern maize growers The Maize Growers Co-operative Association of Southern Queensland Limited, both organisations being formed under *The Primary Producers' Co-operative Associations Acts,* 1923 *to* 1934. These associations established voluntary pools for their respective commodities. Growers who desired to participate in the export were required to sign agreements with, and to deliver the whole of their surplus product to, these organisations, which allocated these stocks for export or the local market, all suppliers receiving a return proportionate to their deliveries irrespective of the final destination of their grain. The Sorghum Growers Co-operative Association Limited appointed The Queensland Co-operative Milling Association Limited as its agent to handle the grain sorghum, and The Maize Growers Co-operative Association of Southern Queensland Limited appointed the Brisbane Produce Merchants' and Produce Agents' Association's Trading Committee as handling agents for maize.

It will be noted that the percentage of the crop exported was quite small in the case of sorghum and southern maize, though somewhat greater in the case of Atherton maize. With Atherton maize the position was somewhat different from that of the southern grains. The growing areas on the Tableland are remote from the rest of Queensland and particularly from their major market with processors in southern States. With a heavy crop of nearly 900,000 bushels, The Atherton Tableland Maize Marketing Board found itself in difficulty owing to the scarcity of coastal shipping and the diffidence of southern buyers, who could purchase maize from other sources at a lower cost. There was a reduced demand in the north because of satisfactory seasonal conditions, and reduced requirements for horse-feeding in the cane areas owing to mechanisation. Damage to silos made it difficult for the Board to cope with the storage problem involved. As the southern Queensland market was not available to the Board because of the heavy freight charges involved and the sufficient quantities of maize available, agreement was reached on the basis of an export of 320,000 bushels.

With regard to barley, it has not been possible to date to secure shipping from interested countries and no contract has yet been finalised for its sale.

Because of the difficulties which arose in Queensland as a result of these surpluses, and the fact that the unusual position meant that there was no well-defined Commonwealth policy regarding the export of summer grains, proposals were submitted which resulted in preliminary agreement being reached by the Australian Agricultural Council for the setting up of a Miscellaneous Grain Export Control Board for the purpose of defining in future what proportion of each grain should be allotted to the local market and of ensuring that growers of coarse grains receive equitable treatment in regard to export.

Early in 1948 summer grain crops in Queensland, except Atherton maize, suffered severely from drought conditions. There has been a further drain on the supplies of these grains because of the difficulties that were experienced by the State Wheat Board in delivering feed wheat quotas consequent on the prolonged railway strike, and this was accentuated by continued drought conditions in some parts of Queensland.

The Dairying Industry.

Following the presentation of the report of The Joint Dairying Industry Advisory Committee, appointed by the Commonwealth Government to conduct a survey into the cost of production in the dairying industry, the Commonwealth Government decided to guarantee a price to dairy farmers, for a 5-year period commencing 1st April, 1947, of 224s. per cwt. for butter and 139s. 4·9d. per cwt. for cheese. To achieve this objective, the Commonwealth Government approved the retrospective adjustment of subsidy benefits to 1st April, 1947, in addition to an increase in prices to the consumer as from 1st December, 1947.

Because of further increased costs in the industry, a supplementary investigation was conducted early in 1948, which resulted in further increases of 2½d. per lb. for butter and 1d. per lb. for cheese being approved. This increase in returns to the industry will be borne solely by a price increase to the consumer.

The Commonwealth Government has also accepted the principle of a return to producers based on the rising or falling cost of production; the industry has been striving for some time for the recognition of this principle.

During the year 1947-48, 1,858,276 boxes of butter and 21,599,643 lb. of cheese were manufactured in Queensland. The output of butter was the largest in this State since the year 1942-43, and also established an all-time record in returns to factories in payments, amounting to £9,582,000, in addition to subsidies amounting to £1,820,000. The approximate return to cheese manufacturers, including subsidies amounting to £186,480, was £1,268,386.

A dissection of sales of Queensland butter in 1947-48, taken into account for equalisation purposes, is as follows:—

Quantity Manufactured.	Commonwealth Sales.		Export.			Grand Total Sales.
	Queensland.	Interstate.	Ship Stores and Countries other than Great Britain.	Great Britain.	Total.	
Boxes.	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.
1,858,276	437,623	117,129	60,605	1,271,386	1,331,991	1,886,743

A dissection of disposals of cheese for the year is:—

Local and interstate	7,416,313 lb.
Local processed	4,423,675 „
Export	8,140,756 „
Total	19,980,744 lb.

The difference between production and disposal represents shrinkage and stocks on hand at the end of the year. Of the total amount of cheese manufactured in Queensland, approximately 95 per cent. was of the cheddar variety.

The Egg and Poultry Industry.

The Commonwealth Government relinquished war-time control over the Australian egg industry as from 1st January, 1948. As from the same date the control under prices regulations of the wholesale price of eggs was also withdrawn. Retail margins were, however, still prescribed under the latter regulations. The State Egg Marketing Boards were therefore required to resume their pre-war responsibilities and status as marketing authorities.

The failure of the scheme to deal with surplus production through an Equalisation Committee, together with the agreement entered into between the Australian and the United Kingdom Governments, led to the formation of an Australian Egg Board under the Commonwealth *Egg Export Control Act*, 1947 to administer the execution of the agreement. All export of eggs or egg contents is prohibited by the Act except under license issued by the Board. In practice licenses are issued (except in rare cases) only to State Egg Marketing Boards.

The major marketing problems facing the industry in the period under review have therefore been those associated with the transition from Commonwealth to State control of distribution within Australia and the organisation for export to the United Kingdom.

As noted in last year's report, a Board has been set up to market eggs in the Central Queensland district. Operations by The Central Queensland Egg Marketing Board commenced on 1st April, 1947. As agent of the Board, the Central Queensland Meat Export Company Ltd., Lakes Creek, receives, candles, grades and distributes eggs and carries out the necessary pulping operations.

During the year representatives of the British Ministry of Food discussed with the industry the possibility of substantial increases in production to meet the needs of the United Kingdom market. However, shortage of protein concentrates and materials has remained acute and any substantial increase in the production of a high quality product has been difficult. Production for the first half of the period, in fact, was less than for the corresponding period of the previous year, though since January there has been an increase in southern Queensland sufficient to provide an overall increase for the whole year of 4·87 per cent. compared with 1946-47.

During the year, deliveries of eggs to the two Boards were as follows:—

	Dozen.
The Egg Marketing Board (South Queensland)	9,205,189
The Central Queensland Egg Marketing Board	497,151

The eggs received were disposed of as follows:—

	Central Board.	Southern Board.
	Dozen.	Dozen.
Eggs in shell (local and interstate)	207,745	5,017,893
Eggs in shell (export)	22,200	1,500,060
Eggs—Pulped	252,167	2,671,792
Broken, bad, or useless	7,991	23,059
Totals	490,103	9,212,804

Of the total pulp disposed of during the year, amounting to 2,890,090 lb., 739,280 lb. were exported to the United Kingdom.

Prices payable under the contract between the Commonwealth Government and the British Ministry of Food, as existing at 1st July, 1947, which was to be effective until 30th June, 1950, were:—

Eggs in shell—2s. 1d. (Australian currency) per doz. f.o.b. Australian ports for 15-lb. pack.

Egg pulp—1s. 6¾d. (Australian currency) per lb. f.o.b. Australian ports.

These prices represented an increase of 5d. per dozen and 1¾d. per lb. respectively on prices operating as at 30th June, 1947, under the old contract.

However, following negotiations between the contracting parties, this contract will be terminated as from 30th June, 1948, and a further new contract commenced as from 1st July, 1948, to extend up to and including the season ending 30th June, 1953.

Prices negotiated for the 1948-49, 1949-50, and 1950-51 seasons were:—

Eggs in shell—2s. 4d. (Australian currency) per dozen f.o.b. Australian ports for 15 lb. pack, with proportionate adjustments for heavier and lighter packs.

Egg pulp—1s. 8.9d. (Australian currency) f.o.b. Australian ports.

The prices which will apply for 1951-52 and 1952-53 will be determined by further negotiations not later than 16 months before the season to which they will apply.

During the year, wholesale prices of eggs charged by The Egg Marketing Board (South Queensland) ranged from 2s. to 2s. 10d. per dozen for first quality hen eggs. The prices operating under the jurisdiction of The Central Queensland Egg Marketing Board for eggs of the same quality ranged from 2s. to 3s. per dozen wholesale. Appropriate prices operated for eggs of other grades.

The Fruit Industry.

Factors of major importance in the development of marketing facilities for the Queensland fruit industry have concerned the expansion of retail and wholesale distribution facilities by the Committee of Direction of Fruit Marketing, the operation of the Pineapple Cannery at Northgate, and the illustration afforded during the year of the value of organisation by fruitgrowers when the C.O.D. was able to set up an effective road distribution service during the railway strike.

Wholesale distribution facilities in New South Wales, the biggest market for Queensland tropical fruits, included the opening by the C.O.D. of an additional sales floor at Newcastle and the extension of its selling space at Sydney. Further substantial expansion is urgently required at Sydney particularly to cope with the increasing banana sales and the need for additional ripening facilities.

Retail Distribution.—During the past year the C.O.D. has concentrated attention on consolidating its first efforts in retail selling through its four shops established at Nambour, Charleville, Gympie, and Roma. Profits were shown at all places except Gympie.

The railway strike gave the branches full opportunity to demonstrate the value of their service to the community. With the whole of the resources of the C.O.D. organisation behind the supply position, each branch was regularly served by road transport. Further expansion in the retail trade, particularly at Longreach and Charters Towers, is proposed. Retail shops established at Innisfail, Mackay and Bowen gave good service throughout the year.

Road Transport During the Strike.—With the rail strike the fruitgrowers faced a major test when their organisation, the C.O.D., was given control of road transport of fruit and vegetables. Big quantities from Stanthorpe had to be moved to Brisbane and a record crop of pineapples transported to canneries and the New South Wales wagons at South Brisbane. Transport outwards from Brisbane was essential to avoid glutted markets and to feed the people.

The whole problem was handled successfully. Transport was secured at points of production, The Brisbane markets were kept open for receiving at night and 9,540 tons were unloaded and stacked on agents' sections at night by unloading gangs employed to ensure expeditious delivery. Peak loading from Stanthorpe in a single day was 486 tons. A night and day market service was given by the C.O.D. in issuing petrol tickets and supplying petrol.

Pineapples transported by road amounted to 360,000 cases to canneries and 81,500 cases to South Brisbane for interstate markets, a total of 14,725 tons gross weight. The C.O.D. Cannery was kept open day and night for receiving, issue of petrol tickets, and supply of petrol.

When a ban was placed on goods outwards from Queensland a road transport service was instituted to Newcastle, Sydney, and Melbourne.

All Queensland towns with C.O.D. branches were kept supplied, but with heavy rains some periods of shortages were inevitable. Regular runs were made to Townsville, with Bowen, Innisfail, and Cairns branches picking up their requirements at Townsville. Later deliveries were made direct to Innisfail and Cairns. The maximum quantity moved by C.O.D. in a single day from Brisbane to country centres was 78 tons.

C.O.D. Cannery, Northgate.—The construction of the cannery was commenced in August, 1946. It was sufficiently advanced by June 1947, to enable processing to commence, but the main building programme was not completed until October, 1947. As additional space was required a further building is now in the course of erection. Altogether buildings, including the new construction, cover 162,000 square feet.

The installation of the plant and equipment was commenced in December, 1946, and, though seriously hampered by the shortage of materials and current industrial difficulties, sufficient progress was made with the installation to enable processing during the latter half of 1947. By January, 1948, installation had progressed sufficiently to enable the cannery to process at 80 per cent. of designed capacity. It is anticipated that work will be completed in 1948.

The plant has a designed daily capacity of 160 tons of pineapples and a high-speed can-making plant should be installed by the end of 1948. The cannery is also equipped to handle other canned fruits, including papaws, and all jams. In pursuance of the policy to develop new and existing products, an extensive laboratory has been installed to enable the necessary research to be carried out.

During the period 9th June, 1947, to 30th June, 1948, the cannery processed the following quantities of fresh fruit:—

	Tons.
Pineapples	13,202
Papaws	207
Citrus	192
Strawberries	18
Sundry Fruits	749

The output of the cannery during this period was:—

	Dozen Cans
Canned Pineapple ..	470,506 (30 oz. equivalent)
Pineapple juice ..	221,643 (30 oz. equivalent)
Jams	229,865 (24 oz.)
Sundry fruits ..	21,207 (30 oz. equivalent)

Sales during the year were as follows:—

	£	s.	d.
Overseas sales	485,889	12	11
Australian sales	165,782	2	0
	651,671	14	11

The export pack was distributed to the following countries:—

	Dozen Cans (various sizes)
United Kingdom	198,000
Canada	259,790
New Zealand	6,000
Other Markets	63,553

Other markets include Eire, the Continent, Middle East, Pacific Islands and Hong Kong.

The bulk of the undistributed stocks on hand at the 30th June was under contract for delivery to the United Kingdom and Canada. Particular attention is being paid to the Canadian market with a view to taking full advantage of the present Canadian restrictions upon the importation of canned fruit from dollar areas, which is also affording the industry an opportunity of consolidating its claims to the retention of preferential duties should these again come up for discussion. Some anxiety was caused when the Canadian Government placed a total embargo on the importation of canned fruits irrespective of source late in 1947, but this was rectified as a result of representations by the C.O.D. through the Minister for Agriculture and Stock to the Commonwealth Government. The Canadian Government then lifted the embargo upon the importation of Australian canned fruits and placed quotas on the importation of canned fruits from dollar areas. In view of the present currency difficulties, the export of Queensland canned pineapple to Canada in exchange for dollars is becoming increasingly important to Australa.

During the year under review, difficulties included material shortages, the dislocation arising from the Queensland railway strike, and labour problems. The diversion of fresh fruit from the southern markets during the strike and the failure of the other major canner to handle normal intake threw an added burden on the cannery. The summer crop of 1948 provided a record 582,823 cases (''tops on'') of pineapples for canning, of which the C.O.D. cannery handled 320,000 cases (''tops on''). Under all the circumstances the pineapple industry was fortunate that the cannery was operating.

Fruit Cases.—The supply of cases to the fruit and vegetable industry proved as severe a problem in the period under review as during recent years. However, case shortages which were deemed possible, particularly with respect to the Stanthorpe district and for factory pineapples, were obviated, partly by obtaining fairly substantial quantities from North Queensland.

A conference at which Mr. P. J. R. Hilton, M.L.A., presided on behalf of the Minister, and which was representative of the Department of Agriculture and Stock, Forestry Department, Timber Control, Committee of Direction of Fruit Marketing, Second-hand Fruit Cases Committee, Stanthorpe sawmillers and case distributors, and the Prices Branch, was held in November, 1947, to discuss the question of fruit case supplies for the Stanthorpe district. The conference favoured the suggestion of an equalisation scheme designed to provide Stanthorpe growers with cases at a uniform cost, irrespective of whether the cases are manufactured locally or imported from other districts. This scheme did not receive the full support of Stanthorpe growers and has not been implemented.

Prices for case shooks, controlled by the Commonwealth Prices Commissioner, were increased a number of times during the financial year 1947-48. With the heavy demand for building timber perhaps some incentive to cut cases was necessary, especially to North Queensland millers. National Security (Prices) Regulations published in the *Commonwealth Government Gazette* of 31st May, 1948, defined ''Grading Rules for Timber for Fruit Case Shooks'' and ''Specifications for Fruit Case Shooks.''

Sales of second-hand fruit cases by dealers licensed by the Second-hand Fruit Cases Committee totalled 1,335,153 cases, for the financial year 1947-48. This figure has only been exceeded on one occasion—viz., 1943-44, when 1,448,000 cases were handled. Requests have been received from all other States for information regarding the Queensland Second-hand Fruit Cases Act and its administration with a view to studying the possibility of introducing similar legislation in those States.

The Peanut Industry.

A feature of the development of the industry is its widening geographical distribution throughout the State. Originally localised in the South Burnett district, it is now well developed in the Proston-Gayndah area, has spread to Central Queensland and the Atherton Tableland, and its possibilities are being investigated at Cooktown.

Increasing production has necessitated increased storage facilities and The Peanut Marketing Board is at present considering the provision of additional storage at Maryborough, Rockhampton, and Cairns. At Kingaroy, the work on the construction of new silos, begun in August, 1946, continued throughout the year. No. 3 silo (5,200 tons capacity) is nearing completion, but progress has been slow because of delays in building supplies. Work on No. 4 silo (2,300 tons capacity) was begun early in 1948.

Selling prices for the 1947 season's crop are the same as last year: 8d. per lb. for edible kernels and 4d. per lb. for those used for oil. The undertaking to divert at least 25 per cent. of the total crop for oil production operated throughout the year.

The Potato Industry.

Commonwealth control of potato marketing in Queensland will cease in 1948 with the disposal of the North Queensland crop which is normally harvested in August and September, and thereafter the responsibility for potato marketing in this State will be assumed by The Potato Marketing Board. This board, which was constituted on 1st January, 1948, will

operate under the *Primary Producers' Organisation and Marketing Acts*, and is comprised of five representatives of the growers and the Director of Marketing. Although the Board has not yet been called upon to undertake the marketing of potatoes, a great deal of preparatory work has been put into train, including an arrangement with the present agents of the Australian Potato Committee in Queensland to act as the Board's agents for the handling and distribution of all Queensland-grown potatoes. The board expects to commence marketing operations with the distribution of the southern Queensland spring potato crop, the harvesting of which should begin in early October.

The following table gives some indication of the development of the potato industry in Queensland during the period of Commonwealth control. An interesting feature is the tremendous expansion of the industry in North Queensland at the time when large numbers of troops were stationed there and the subsequent contraction of acreage with the declining demand.

POTATOES.

NUMBER OF GROWERS, AREA PLANTED, AND PRODUCTION, 1943 TO 1947.

(Source: Deputy Potato Controller.)

Southern Queensland.

Season.	Number of Growers.	Area Planted.	Production.
		Acres.	Tons.
1943 Autumn ..	834	3,001	10,765
1943 Spring	3,431	7,616	14,801
1944 Autumn ..	2,386	8,160	11,870
1944 Spring	3,238	10,336	13,600
1945 Autumn ..	2,542	8,401	13,428
1945 Spring	3,078	9,061	17,681
1946 Autumn ..	2,266	7,461	12,424
1946 Spring	1,918	6,386	10,592
1947 Autumn ..	1,453	5,654	8,305
1947 Spring	2,366	7,579	18,741

North Queensland.

Season.	Number of Growers.	Area Planted.	Production.
		Acres.	Tons.
1943	324	805	2,485
1944	591	1,687	6,090
1945	648	2,649	6,310
1946	283	1,160	2,515
1947	284	1,064	3,754

The Tobacco Industry.

Since 1941 all tobacco leaf produced in Australia has been marketed under a Commonwealth-wide scheme operating under The National Security (Australian Tobacco Leaf) Regulations. Under this plan the marketing of tobacco leaf is controlled by the Australian Tobacco Board, consisting of representatives of the Commonwealth Government, growers of tobacco leaf, tobacco manufacturers, brokers, and employees in the tobacco-manufacturing industry.

All tobacco leaf is appraised by an Appraisal Committee, appointed under the above Regulations, the Committee being required to appraise and determine the appraisal price for each parcel of tobacco leaf in accordance with the Table of Limits prepared by the Australian Tobacco Board. The Table of Limits, in effect, is the instruction to the Appraisal Committee, from the Board, as to the range of prices which cover each grade and quality of tobacco leaf. Tobacco leaf, after appraisal, is allocated by the Board amongst the various buyers, who are required to purchase the leaf at the appraised prices.

The Commonwealth Government has intimated that the control of marketing of tobacco leaf under The National Security Regulations will be relinquished after 31st December, 1948, and growers in Queensland desiring to retain some orderly system of marketing their product have taken steps to request the setting up of a Tobacco Leaf Marketing Board for Queensland, under the *Primary Producers' Organisation and Marketing Acts*. The Board will be constituted upon the election of growers' representatives in July, 1948, but will not assume control of the marketing of tobacco leaf produced in Queensland until the termination of Commonwealth control at the end of 1948. The Tobacco Leaf Marketing Board of Queensland will consist of four industry representatives and a Government representative in the person of the Director of Marketing.

The Wheat Industry.

In marked contrast to the severe drought conditions which prevailed throughout the wheat areas during the 1946-47 season, conditions during the 1947-48 season were exceptionally good up to the time of harvest. Suitable rains were recorded during the period of land preparation and continued throughout the planting period, with the result that an area of approximately 496,000 acres was planted to wheat for grain—a record for this State. Frost damage to growing wheat was only slight. From the commencement of ripening to the time of harvest mild conditions prevailed, and in the early part of the harvest, which began in late October, yields were exceptionally high, up to 60 bushels per acre being harvested from some farms.

The first setback was received towards the end of November and during December when harvesting was well under way. Heavy rains were recorded over an area extending throughout the Pittsworth, Millmerran, Cecil Plains, Dalby, and Warra districts. Damage resulted to both standing and bagged wheat, and harvesting was delayed. Though the loss to individual farmers was high, the loss to the industry as a whole is estimated to have been not greater than 10 per cent. of the crop. Rust was widespread in most districts, but damage resulting therefrom was not heavy.

To the end of June, 9,992,233 bushels of wheat had been delivered to the State Wheat Board, and it is estimated that approximately 500,000 bushels have been retained on farms for seed and feeding purposes, thus making the total production in Queensland approximately 10,500,000 bushels.

During the year, payments to Queensland growers who delivered to the No. 9 Pool were completed, and further advances were made on wheat delivered to Nos. 10 and 11 Pools. To 30th June, four advances totalling 8s. 1d. per bushel had been declared by the Australian Wheat Board for deliveries to No. 10 (1946-47) Pool, and two advances totalling 7s. per bushel for deliveries to No. 11 (1947-48) Pool. These advances were subject to average deductions of 4.5d. and 5d. per bushel respectively for railage.

Little progress was made during the year in establishing a peace-time system of stabilisation to replace the war-time plan carried on under Defence powers. It was noted in the last report that proposals for the post-war marketing of wheat on a Commonwealth-wide basis were in abeyance following the failure of States other than Queensland and Tasmania to pass the complementary legislation necessary to meet constitutional limitations on Commonwealth powers. Further interstate conferences have been held but no finality reached. However, a Premiers' Conference reaffirmed the need for wheat stabilisation and recommended that war-time wheat marketing powers be continued for the 1947-48 crop.

The Wheat Acquisition Regulations under the National Security Act, as extended by the *Defence (Transitional Provisions) Act,* 1946, were further extended by the *Defence (Transitional Provisions) Act,* 1947, to cover the 1947-48 season, and the Commonwealth Government has, under these regulations, continued to acquire all wheat produced in Australia. The marketing of the wheat thus acquired has remained the responsibility of the Australian Wheat Board. The State Wheat Board, constituted under *The Wheat Pool Acts,* 1920 *to* 1930 has continued to act as the sole receiver and agent in Queensland for the Australian Wheat Board.

Owing to the continued shortage of grain in world markets, all bushelage and acreage restrictions were again suspended in relation to the 1947-48 crop, and no acreage restrictions will apply to the 1948 plantings.

Two further factors were introduced during the year into the formulation of plans for stabilisation—namely, the International Wheat Agreement and the pending reversion of price control powers to State Governments. Following the ratification of the International Wheat Agreement by the Commonwealth, further plans for stabilisation were submitted to States in June, 1948. These proposed a marketing plan based on guaranteed prices of 6s. 3d. per bushel (bulk basis) f.o.r. ports for both export and home consumption wheat to vary with an index based on costs of production, the guarantee to apply until the 1952-53 season, and an export tax of a maximum of 1s. per bushel with a limit to the fund of £15,000,000. These proposals were conditional on the States enacting appropriate legislation to fix home consumption prices based on the above guarantees and on the ratification of the Wheat Agreement by the U.S.A. Late in June it appeared that this scheme would become void as a result of the non-ratification of the International Wheat Agreement by the U.S.A., and a further meeting of Ministers for Agriculture was proposed early in July to discuss the position.

(NOTE.—A conference of Agriculture Ministers held on 12th July, 1948, agreed to recommend to their respective Governments the adoption of a stabilisation plan submitted by the Commonwealth Minister for Commerce and Agriculture which provided for a guaranteed price of 6s. 3d. per bushel bulk basis, f.o.r. ports, to vary in accordance with a cost index, and to apply for the period up to the end of the 1952-53 season. A stabilisation fund is to be established by means of a maximum tax of 2s. 2d. per bushel on wheat exported. The guarantee will not apply to a quantity of export in excess of 100,000,000 bushels.

This plan will be conditional upon State Governments enacting legislation to ensure a home consumption price equal to the guarantee and upon authority existing for the direction of wheat by an Australian Wheat Board to an approved organisation. It was agreed that States could constitute State marketing boards which could act in either an advisory or an administrative capacity.)

Feed Wheat Distribution.—The plan whereby the Commonwealth Government established feed wheat quotas for each State was continued during the year. Considerable difficulty was experienced early in the period in obtaining supplies which had to be shipped from southern States, but the difficulties that feeders might otherwise have encountered were offset to some extent by the excellent crops of summer grains available. However, in view of the acute shortage of mill offals and protein concentrates that has continued to embarrass stock feeders, summer grains could not completely replace wheat.

Owing to the very wet conditions experienced during harvesting, the quality of a proportion of the wheat delivered from the 1947-48 harvest was adversely affected, and consequently an abnormally large quantity (934,501 bushels) of the wheat delivered had to be graded as feed. Much of this feed was of very inferior quality, and numerous complaints resulted from producers in the consuming industries. As a result of representations by the Minister the State Wheat Board introduced a system of dockages whereby such wheat was to be sold by the Board at prices below the 6s. 3¾d. per bushel (bulk basis) which is the price charged for average quality feed wheat.

Crop Reporting and Forecasting.

Considerable expansion has occurred during the year in the work of the Crop Reporting and Forecasting Service. At the time of the presentation of the last annual report a commencement had been made and two reports had been issued in connection with the 1947 autumn potato crop. During the last 12 months the service has been expanded to embrace wheat,

maize, grain sorghum, and barley. Eleven comprehensive reports have been published, as under:—

10th September, 1947	—1947 Southern Queensland spring potato crop
15th October, 1947	—1947 Southern Queensland spring potato crop
28th October, 1947	—1947–48 wheat crop
18th November, 1947	—1947–48 wheat crop
24th February, 1948	—1947–48 maize crop
27th February, 1948	—1947–48 grain sorghum crop
21st April, 1948	—1947–48 grain sorghum crop
21st April, 1948	—1948 Southern Queensland autumn potato crop
28th May, 1948	—1948 Southern Queensland autumn potato crop
24th June, 1948	—1947–48 maize crop
30th June, 1948	—1948–49 wheat crop

A report on the 1948-49 barley crop was in progress of compilation at the close of the year.

The objective of this service is to provide, during the growing period of a crop, detailed information as to its condition in the more important localities, a general summing up of prospects, and an estimate, either preliminary or final, of total production. The information on which these reports are based is obtained primarily from farmers known as honorary crop correspondents who are situated in key localities and who furnish reports as required as to the condition of the crops in their districts.

The information supplied includes in the early stages of the growing period an estimate by the crop correspondents of the proportion which plantings bear to plantings for the previous season, and information as to the prevailing growing conditions. Later in the season, estimates of yield per acre, and the proportion which the area to be harvested bears in the opinion of the crop correspondent to that harvested in the previous season, are reported, from which are calculated estimates of production. Before publication, the localised information on which the reports are based is carefully checked with field officers of the Department, and other sources, such as commodity marketing boards, which may be expected to have an expert knowledge of the crop.

The information contained in these reports is widely disseminated by medium of radio stations, newspapers, and other periodicals. In addition, copies of the reports are eagerly sought by farmers, produce merchants, machinery and fertilizer firms, transport and storage agencies, banks, Government Departments, &c. The present circulation for each type of report is—Potatoes 234, wheat 282, maize 233, grain sorghum 266, barley 196.

These reports are of value to farmers in organising their production programme. If growers know the situation throughout the State, they tend to increase their efforts in the cultivation of the crop when production is likely to be low, and *vice versa*. Wide distribution of these reports to farmers would tend to operate as a stabilising influence. With crops such as maize and grain sorghum, where planting is extended over a fairly long period, progressive reports as to the acreage planted and the progress of the crop would have a direct relation to a farmer's planting programme and also his decisions as to how the crop is to be utilised—*i.e.*, whether the crop is to be harvested for grain, used for current feeding, or stored as conserved fodder. Machinery and fertiliser firms, transport agencies, banks, and sales departments of firms which handle farmers' requirements all find forecasts of this nature of value in planning their activities. Under present conditions forecasts of the production of various grains are also of value in assessing the feed prospects for the pig, poultry, and dairying industries, and in the consideration of applications for export permits for supplies of surplus grain.

Experience during the year, when there was a lack of detailed and reliable knowledge of crop prospects and grain stocks such as would be required to permit an accurate assessment of the feed position in relation to export surpluses of grain, emphasised the need for these reports.

At the present time, 222 farmers are co-operating with the Department in the role of honorary crop correspondents. Of this total, 55 report on the potato crop and 167 on one or more of the various grain crops. Of the latter total, 2 are reporting on the four grain crops handled, 18 on three crops, 60 on two crops, while the balance of 87 are reporting on one crop only. The number of correspondents for each crop is as under:—

Wheat	108
Grain sorghum	89
Potatoes	55
Maize	50
Barley	23
	325

As their title implies, honorary crop correspondents receive no monetary reward for their work, and their loyal co-operation is gratefully acknowledged. Without their assistance, this service could not function. To recompense them in some measure they are kept informed, as far as is possible, of the progress in other States of the crop on which they are reporting, and, naturally, are supplied with a copy of every report on their crop issued by the Division of Marketing. By arrangement with the Queensland Council of Agriculture, they have also been placed on the free distribution list of *The Queensland Producer*.

The organisation is still in the formative stages, and experience over a number of seasons will be necessary before the organisation of the corps of honorary crop correspondents is completed. However, forecasts made by the service, and which it has been possible to check with actual production figures, have been, considering the largely experimental nature of the work, near enough to actual production to be very encouraging.

The institution of a forecasting system requires much detailed statistical analysis of previous years' crops in order not only to obtain the necessary basic data but also to provide checks to the acceptance of an unduly optimistic or pessimistic estimate of acreage or yield per acre. Work of this nature has continued throughout the year and has proved of great assistance in the forecasting work and in other directions. It is expected that the continuation

of this aspect of the work, and its extension to commodities which it is not proposed immediately to include in the forecasting service, will crystallise and define certain trends in production which are now taking place.

Production Trend Reports.

Publication of the monthly "Report on Production Trends" has continued during the year and is meeting an ever-increasing demand. The present distribution list includes 249 addresses. This report contains a general review of prospects for the major rural products and is compiled to a large extent from data supplied by the various Divisions of the Department, based upon information secured from field officers. Prior to the institution of this report there was little information of this nature available in this State which was both authoritative and timely. Every effort is made to effect distribution within a fortnight of the monthly period covered by each report, and the up-to-date nature of the contents largely explains the eagerness with which the publication is sought by the business and farming communities.

Market Reporting Service.

Commencing in April, 1947, with the issuing of daily official market quotations covering transactions at the Brisbane wholesale fruit and vegetable markets the Market Reporting Service is now well established as an essential factor in the general economy of the fruit and vegetable industries.

The primary purpose of this service is the collection and dissemination of accurate and representative wholesale prices realised each day. In addition to prices the daily reports include constructive comment on the quantity and quality of produce on offer and the ruling demand for various varieties,

Market prices information is disseminated daily by medium of the radio and press, and in addition some 60 copies are posted each day to interested parties in all parts of Queensland, as well as in New South Wales, Victoria, and the Australian Capital Territory.

Prices information is of the utmost importance to the producer, and with reliable information being broadcast daily he has up-to-the-minute information to guide him in his marketing operations. To the grower who sells to local wholesale or retail distributors the official market quotations are a basis for transactions.

Apart from the daily official quotations a special report is furnished each day to the Australian Broadcasting Commission for inclusion in its daily broadcast of interstate market reports. These broadcasts are for the benefit of Queensland growers as well as growers in other States who have consigned or who may wish to consign their produce to interstate markets.

The daily official market quotations provide a most valuable service to the buyer as well as to the grower. To that vast number of buyers who do not or are unable to attend the markets and make their own purchases, market reports form a reliable guide to ruling prices and market conditions. Substantial quantities of fruit and vegetables are sold in this way from the Brisbane market each day, particularly in the summer months when prevailing weather conditions in many parts of the State exclude local production.

Requests by Government Departments, firms supplying various farming requisites, and banks, are proof of further value of the Market Prices Service.

In February, 1948, the service was extended to cover the wholesale farm produce sales held at the Roma Street railway goods sheds. Produce submitted at these sales includes grains, chaff, hay, straw, pumpkins and various heavy root vegetables. Since that month the daily official market quotations have included a special section for farm produce and the service is of the same exhaustive nature as that for fruit and vegetables.

The collection of market information and the preparation of daily reports is carried out by officers only after undergoing an intensive period of training. These officers are on duty at the markets each day from the commencement of trading.

Since the inception of market reporting complete and detailed daily records of wholesale prices have been kept and already calls are being made for this valuable information which previously was unobtainable in Queensland.

As an adjunct to daily official market quotations a weekly summary of trading in the Brisbane wholesale fruit and vegetable and farm produce markets is prepared and published. Requests have been received from 35 bodies for the supply of regular copies.

In June, 1948, a commencement was made on the collecting and recording of ruling wholesale prices for butter, cheese, eggs, honey, beeswax, hams, bacon, lard, wheat, flour, bran and pollard

Co-operative Associations.

The Registrar of Primary Producers' Co-operative Associations (Mr. A. J. Everist) reports that during the year the following new associations were registered under the *Primary Producers' Co-operative Associations Acts*:—

The Yarrol Road Co-operative Dip Association Limited;
The Sorghum Growers Co-operative Association Limited;
The Maize Growers Co-operative Association of Southern Queensland Limited;
The Charters Towers Growers' Co-operative Association Limited;
Cecil Plains and District Co-operative Dairy Association Limited;
Southport Co-operative Dairy Association Limited.

The number of licensed auditors increased from 256 to 263.

Report of the Standards Branch (Mr. F. B. Coleman, Standards Officer).

Summary of Operations.

The following table summarises the work of the Standards Branch for the year 1947-48; comparative totals of samples, &c., for the two previous years are included:—

—	1947–48.					Total.		
	Seeds.	Fertilizers.	Pest Destroyers.	Veterinary Medicines.	Stock Foods.	1945–46.	1946–47.	1947–48.
Samples received from—								
Inspectors of the Branch—								
(*a*) Local sale	1,150	41	20	15	69	951	3,135	1,295
(*b*) For export	4	..	..	..	44	..	..	48
(*c*) Imports	375	..	..	..	1	..	..	376
Dealers	3,258	9	2	..	7	1,798	2,155	3,276
Buyers	62	..	..	..	..	28	41	62
Government Departments ..	988	..	..	..	1	1,534	643	989
For experimental tests	793	..	..	..	..	838	261	793
Total samples dealt with ..	6,630*	50	22	15	122	5,149	6,235	6,839
Licenses issued	..	268	..	411	..	629	665	679
Registrations effected	..	232	60	223	280	901	839	795
Registrations refused	..	..	1	17	..	25	16	18
Board meetings and/or Committee meetings	26	..	19	18	..	10	33	63
Number of inspectional visits made to localities other than Brisbane	..	..	..	..	..	..	82	105
Analyses carried out for this Branch in the Chemical Laboratory ..	..	38	37†	..	115	29	167	190

* The 6,630 samples of seed involved 8,602 tests.
† Including 15 carried over from 1946–47.

Inspections were carried out covering the following territory:—North of Townsville, South Coast Line, Brisbane Valley, Brisbane to Toowoomba, Brisbane to Kilcoy, Kingaroy Line, North Coast Line to Cooroy, and several other places.

Seeds for Sowing.

During the year, 6,630 samples were examined at the Seed Testing Station. Of these, 1,529 were samples taken by inspectors of the Branch, 3,258 were from seed dealers, 62 from farmers, and 988 from other Government Departments, including 297 from the Commonwealth Vegetable Seed Committee and 793 samples for experimental work. An additional 1,143 tests were carried out on Rhodes grass, *Paspalum dilatatum* and prairie grass on account of the seed suffering from lack of maturation, and so requiring follow-up tests. A total of 829 retests was also made.

Of the 6,630 samples examined, 1,534 samples did not comply with the Regulations, the reasons being:—1 contained *Asphodelus fistulosus,* 3 *Convolvulus arvensis,* 11 *Cuscuta* spp., 63 *Datura* spp., 119 *Ipomoea* spp., 9 *Melilotus indica,* 5 *Raphanus raphanistrum,* 24 *Rapistrum rugosum,* 162 *Salvia reflexa,* 1 *Silybum marianum,* 16 *Sorghum halepense,* 3 *Verbesina encelioides;* 55 were infested with live insects; 53 contained an excess amount of inert matter plus weed seeds; 21 contained excess weed seeds; 16 samples of Sudan grass contained *Sorghum vulgare;* and 972 samples, of which 771 were from lots of seed being offered for sale, failed to germinate up to the prescribed standard.

Action taken under supervision included destruction when warranted, or cleaning, or crushing, or diversion to stock foods (including bird seed) in respect of seeds offered for sale as seed for sowing and which did not comply with the standards prescribed because of low germination, weevil and other insect infestation, excess of inert matter or weed seeds or presence of prohibited seeds.

The following summary shows a five-yearly comparison of the seeds seized and sealed (awaiting further action); cleaned under supervision of an Inspector, destroyed or otherwise disposed of.

—	1942–43.	1944–45.	1945–46.	1946–47.	1947–48.
Seized and sealed—					
Vegetable seeds	720 lb.	..	360 lb.	..	1,440 lb.
Farm seeds	4 bags	..	305 bags	218 bags	45 bags
Cleaned under supervision of an Inspector—					
Vegetable seeds	..	..	..	..	..
Farm seeds	134 bags	..	..	331 bags	345 bags
Destroyed—					
Vegetable seeds	1,142 lb.	457 lb.	1,662 lb.	1,004 lb.	2,468 lb.
Farm seeds	..	..	30 lb.	17 bags	36 bags
Diverted for stock food purposes—					
Vegetable seeds	..	..	..	23 lb.	..
Farm seeds	107 bags	..	..	230 bags	225 bags
Packet seeds (3d. and 6d.) destroyed	..	..	..	6,697 packets	619 packets

On 1st December, 1947, a storage experiment was initiated with the objective of ascertaining if vegetable seeds can be held in store under the hot, humid conditions that are met with in North Queensland. In the past the usual method of storage in tins, bottles, or paper containers has resulted in large quantities of seeds being rendered non-germinable, and during the height of the summer months this has occurred in the space of a month or so.

These experiments have been designed to ascertain if it is feasible to provide a suitable storage medium that will to a certain extent overcome this grave disability. With the co-operation of the officers of the Horticulture Branch and a Brisbane seedsman, samples of seed are being stored in different containers under varying conditions at Stanthorpe, Brisbane and Cairns. The containers include airtight tins, paper containers, cellophane, and pliofilm. Some of these containers are being held under refrigerated conditions and in one case they are being stored in a florist's shop having a humidity higher than normal. The experiment is designed to cover a period of two years with three-monthly examinations of the seeds. To date 680 germination tests have been carried out.

Seed Certification.

During February, 1948, a school for seed certification officers drawn from districts where hybrid maize is or will be grown was held at the Queensland Agricultural High School and College through the courtesy of the Department of Public Instruction. The time spent at the school was taken up by field demonstrations and work, supported by lectures, which covered the production of hybrid maize. Full advantage was taken of the opportunity for a free interchange of ideas between the 18 officers who attended.

During the year 16 growers commenced a probationary period for growing hybrid maize, embracing a total area of approximately 4 acres, and two commercial producers planted 13 acres of hybrid maize. Five producers are growing approximately 88 acres of Hegari and Wheatland grain sorghum, and one producer is growing 8 acres of Brown Beauty beans. Seasonal conditions were not in general favourable for the production of seed.

A considerable amount of organisation has to be done before the number of growers engaged in this work can be enlarged; the progress made to date, being on sound grounds, can be considered as satisfactory and as rapid as is possible under the prevailing conditions.

Fertilizers.

During the year 232 fertilizers were registered and 268 licenses issued to fertilizer dealers. Samples analysed for the Branch totalled 38.

The fertilizer supply position during the year under consideration showed considerable improvement. Nevertheless, less sulphate of ammonia than is considered necessary was received. Further, the supplies that were available were very late in arriving; this was due to many difficulties, the principal of which was lack of transport facilities. Action has been taken during the last six months in an endeavour to obtain earlier delivery of this nitrogenous fertilizer.

While small quantities of potash in the form of sulphate have been obtained from Western Australia, Queensland has to depend mainly upon Palestine and France for supplies of potash salts, and it is hoped that the international situation will not disrupt continuity of supply of this important fertilizer. This matter is of great importance to Queensland, which for many years has used 50 per cent. or more of the total potash consumed in Australia.

The following table sets out the price per ton (2,240 lb.) for which straight fertilizer could be purchased f.o.r. Brisbane for the last 10 years.

Name.	1938.	1940.	1943.	1945.	1947.	1948.
	1st February.	March.	1st January.	14th September.	January.	May.
	£ 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*	18 10 0*c*	18 10 0*c*
Sulphate of Ammonia 21% Nitrogen	12 0 0*a*	14 15 6*b*	18 10 0*b*	18 17 6*b*	18 17 6*b*	18 17 6*b*
Superphosphate—						
22% P_2O_5	5 6 6	5 18 6	7 19 6	..	7 4 0*c*	7 4 0*c*
18% P_2O_5	..	..	..	6 19 6	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	7 15 0	8 10 0
Bone 3½ : 23 : 0	7 10 0	7 10 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	30 18 0

a Discount if paid within 30 days, 2½ per cent. *b* Less 7s. 6d. for cash *c* Less 5s. for cash.

When comparing any of the above prices with those quoted overseas, it is necessary to take into consideration exchange, freights, insurance, and the grade of fertilizer, &c.

An increase in the transportation cost of fertilizer by rail in Queensland became effective from 10th May, 1948. Though goods rates on fertilizers were increased to the extent of 50 per cent., these materials nevertheless remain in a comparatively low freight class.

Pest Destroyers.

In the course of the year 60 pest destroyers were registered and 37 samples were analysed for the Branch. The year being the last year of the current 3-year registration period, the low number of registrations represents mainly new preparations coming on to the market.

In the report for last year it was stated that the registration of chemical sterilisers was

being considered at length. This matter has not yet been completed but finality should be reached in the near future.

The supply position with regard to arsenical dipping preparations and arsenical weed killers has been seriously affected during the period under review as a result of an acute shortage of caustic soda. This can only be overcome by increased production and/or importation of this important ingredient.

Veterinary Medicines.

This year sees the commencement of the 1948-1950 registration period and so far 223 registrations have been effected, claims and formulae of which have been reviewed by the Veterinary Medicines Board. The Board refused to register 17 preparations. The gradual tightening up of claims allowed is having effect and applications for registrations of new preparations containing extravagant claims are becoming rare.

The number of licenses issued to sell veterinary medicines amounted to 411.

The introduction of preparations manufactured by reputable drug houses both here in Australia and overseas should be welcomed by farmers. Penicillin preparations for the treatment of mastitis have already been registered this year, while sulphanilamide and its associated compounds have also been accepted for registration and are playing their part in the control of stock diseases.

Under supervision of Inspectors, 986 packages of veterinary medicines being offered for sale were destroyed owing to their not being registered or registration being refused. A total of 403 packages was re-labelled under supervision; 42 were seized due to non-compliance with the Acts and await further action.

Stock Foods.

The number of stock foods registered for the year amounted to 280. This is an increase of 92 over last year's figure of 188. The total number of samples received was 121, of which 115 were analysed in the Chemical Laboratory.

While supplies of protein concentrates of animal origin are maintained at a level commensurate with the number of animals slaughtered for human consumption, there is still a very serious deficiency of crude protein for feeding purposes due to greatly reduced supplies of linseed meal, copra cake, and cottonseed meal. There is no prospect of improvement until the growing of linseed, cotton, soybean, or other suitable crop is established on a large enough scale to provide a large quantity of meals for stock-feeding purposes.

Because of the shortage of these concentrates, some manufacturers of poultry mashes are sacrificing quality for quantity. Analyses have revealed that in some cases the crude protein content of the mashes has been deficient. In such instances suitable action has been taken and the manufacturers warned that guarantee figures must be maintained.

The Branch was called upon to classify the grain sorghum received at Brisbane by the Grain Sorghum Pool and intended for export. The following table summarises the results of the examination:—

Classification.	Number of Bags.	Percentage.	
Accepted on first inspection ..	99,636	36·0	
Accepted after grading ..	27,561	10·0	25·3
Accepted after fumigation ..	34,960	12·6	
Accepted after fumigation and grading	7,619	2·7	
Rejected for export because of the presence of Datura, burr or excess weed seeds; badly weathered, and insect-damaged grain ..	107,325	38·7	
Total number of bags examined	277,101	100·0	

That only 36 per cent. of the sorghum transported to Brisbane could be accepted on first inspection is an unsatisfactory state of affairs.

While there is a tendency on the part of some organisations to install cleaning machines, and recently this has been augmented by mobile cleaning plants, stress must be laid upon the fact that much greater efforts are required by all concerned to place on the market a reasonably clean article. The present seller's market will not always exist, and selling inferior quality grain jeopardises the prospects of this State establishing a substantial trade outside Queensland. Queensland trade with other States has already suffered in this respect, and it is known that some southern merchants have ceased buying Queensland-grown seeds and are endeavouring to secure their requirements in other parts of the Commonwealth where a greater appreciation of the use of cleaning machinery prevails.

Consideration will have to be given in the near future to the formulation of some standards setting out grades of the various grains, hay, and chaff that are being sold, as repeated instances occur where purchasers have stipulated prime or first-grade material and have received low-quality material. Unfortunately at present, due to the absence of definite grades, little can be done to assist these unfortunate people.

Imports and Exports.

The following goods were examined at the Port of Brisbane for purposes of the Quarantine Act and/or Commerce (Trade Description) Act:—

Kind.	Quantity.
Imports—	
Vegetable seeds	4,973 lb.
Garden peas	63 bags
Farm seeds	343 bags
Bird seed	10 bags
Parcel post	91 parcels
Exports—	
Seeds for sowing	448 bags
Grain for stock feeding—	
Sorghum	13,165 tons
Bird seed	14,206 bags

By Authority: A. H. Tucker, Government Printer, Brisbane.