QUEENSLAND

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

AND STOCK

FOR

THE YEAR 1948 - 49

1949.

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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.
Assistant Under Secretary (Administrative) .. .. W. T. Gettons, A.I.C.A.
Special Administration Officer .. .. H. Barnes.
Officer in Charge, Information Services .. .. C. W. Winders, B.Sc.Agr., A.C.I.S.
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Senior Soil Conservationist .. .. J. E. Ladewig, Q.D.A., B.Sc.Agr.

Agriculture Branch—

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

Regional Experiment Stations—

Director, Regional Experiment Stations .. .. W. G. Wells.

Horticulture Branch—

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

Bureau of Sugar Experiment Stations—

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

Science Branch—

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

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Assistant Director .. .. A. L. Clay, B.V.Sc.

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Sheep and Wool Branch—

Officer in Charge .. .. G. R. Moule, B.V.Sc.

Pig Branch—

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

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

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Assistant Director of Dairying and Senior Dairy Technologist .. .. L. E. Nichols, B.Sc.Agr., A.A.C.I.

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

Standards Branch—

Standards Officer .. .. F. B. Coleman.

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REPORT OF THE DEPARTMENT OF AGRICULTURE AND STOCK FOR THE YEAR 1948-49.

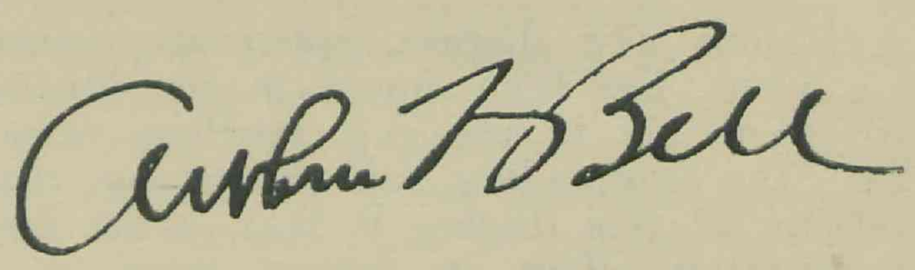
TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

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, 1949.

In the first part of the report I have reviewed the condition of the more important primary industries and commented upon the various phases of the Department's work. This section is followed by reports of the Directors of the Divisions of Plant Industry, Animal Industry, Dairying, and Marketing, and the heads of their constituent Branches, and a report is furnished by the Assistant Under Secretary (Administrative), Mr. W. T. Gettons, on general administrative activities.

The Assistant Under Secretary (Technical), Mr. Robert Veitch, has assisted in co-ordinating the work of the various production Divisions and has handled many matters concerned with individual technical sections.

Yours faithfully,



Under Secretary.

SUMMARY OF AGRICULTURAL PRODUCTION AND DEPARTMENTAL ACTIVITIES DURING THE YEAR 1948-49.

The Sugar Industry.

Sugar-cane remains pre-eminently the leading agricultural crop of the State. The 1948 season's crushing of nearly 6½ million tons of cane constituted a record, while the 910,039 tons of raw sugar (94 net titre) manufactured was better by 18,000 tons than the previous best, recorded in 1939. Because of the greatly increased Australian demand for sugar for domestic and industrial use, the exportable surplus will be about 70,000 tons less than the record 1939 export of 531,000 tons. Prospects for the 1949 crop are good, but production will be materially less than in 1948.

The overall average price received for the 1948 crop was £25 9s. 11d., compared with £24 18s. in 1947; export sugar returned £28 2s. per ton. Due mainly to the increased crop the total proceeds of the sale of 1948 raw sugar will be over £23 million, or nearly £9 million above the previous year's return. However, rising costs of production, and particularly costs of marketing, have reduced the net return per ton of sugar and so offset much of the value of the increased crop to the producers.

Acting upon the advice of the Central Sugar Cane Prices Board the Government has approved and gazetted increases in mill peaks aggregating 137,000 tons of sugar over the peaks determined in 1939. The Board has announced that completely new assignments will be granted in certain mill areas in order to enable those mills to attain their new peaks. Increases will also be made in farm peaks, and where necessary in assignments, with particular reference to the needs of small farmers.

The Board, in making its recommendations, took cognizance of greater production potential due to increased efficiency in the industry, the

expansion of irrigation, and the improvement of cane varieties. The work of the Bureau of Sugar Experiment Stations has undoubtedly contributed in large measure to the development of these new circumstances.

Variety testing during the past year has given further evidence of the superiority of new canes over many of the standard older varieties. The variety Q.50, bred by the Bureau, has been very extensively planted in the central district over the past few years and it is now finding favour in more southern and northern areas. Emphasis in current breeding work is on earliness of maturity, as a substantial proportion of early maturing cane varieties would enable the extension of the economic milling period and would also reduce losses from frost.

The pronounced success which attended experiments in the control of grub and wireworm pests with benzene hexachloride has led to a marked commercial use of this pest destroyer, and many thousands of acres are expected to be treated by canegrowers during the coming season. The residual effect of this insecticide in the soil is not the least of its attributes.

A serious new disease, apparently caused by a virus, has been found in the Mackay district, mainly in the new seedling variety Q.28. The outstanding, and disturbing, characteristic of this disease is that, apart from the stunting effect in ratoon crops, it is symptomless. It cannot be detected in the plant crop either visually, microscopically, or by laboratory test, and if the stunting of the ratoons were less severe it would escape detection. Fortunately, the local disease control organisation may be trusted to institute the necessary safeguards, but the occurrence of this type of disease is disturbing; one wonders how widespread symptomless diseases may be.

A considerable amount of attention has been devoted to improving methods of weed control and it appears fairly evident that chemical weed control will become an accepted practice in Queensland canefields.

The sugar industry has been particularly well served in relation to soils and fertilizer advice. During the past year many additional fertilizer and liming trials have been conducted and hundreds of recommendations made to individual farmers. Considerable assistance has been given to the Bureau by various sugar-mill directorates in conducting soil fertility survey work. The fertilizer supply position has not been satisfactory for some years past; the Department is constantly endeavouring to have the highest possible allocation of essential fertilizers made to the State and latest advices indicate the probability of a distinct improvement this year.

A good deal of attention has been devoted to problems of mill technology during the year and 24 mills participated in the Mutual Control Scheme. The decision of sugar-milling interests to establish a milling research institute has not yet been implemented, and it is expected that it will be some time before the question of delineation of responsibilities as between the Bureau and the new organisation will need to be faced.

The Wheat Industry.

Wheat growing in Queensland has been stimulated within recent years by current and prospective prices and by the successful testing of new areas. Records were again created during the 1948 season, with 630,000 acres sown and the harvest yielding over 14 million bushels. The sale of wheat for local consumption amounted to somewhat less than 7½ million bushels in the 1947-48 cereal year.

No ballot of Queensland growers was taken on the question of approval of the wheat industry stabilisation plan drawn up by the Commonwealth and States in collaboration, but State legislation was enacted to enable Queensland participation in the scheme following a favourable vote by growers in the main producing States. A gratifying feature of the scheme is the degree of autonomy retained by the Queensland State Wheat Board, which for nearly 30 years has efficiently controlled the marketing of the Queensland crop, either directly or as agent under Commonwealth wartime legislation.

As Queensland growers will probably be dependent in future years to a large extent on the export trade, it is hoped that the International Wheat Agreement will be ratified by the requisite number of countries, as only by agreement between major exporting and importing countries can the market be stabilised.

Attention has been given by the Department to the feasibility of employing bulk-handling methods for the increasing wheat crop in this State, and inquiries in this connection are proceeding in southern States.

Analysis of planting figures for the 1948 crop shows that varietal improvement is continuing to play a big part in the progress of the industry, with Department-bred varieties figuring very prominently. The wheat-breeding programme was advanced during the year, and a very comprehensive series of variety trials was conducted.

The high level of natural fertility of the Darling Downs soils has lulled growers into a sense of security, but obviously crops cannot continue to be garnered indefinitely without some replenishment of plant foods. Experimental work at Hermitage Regional Experiment Station (near Warwick) has indicated that responses may be obtained to certain fertilizers, and farm fertilizer trials have accordingly been laid down on Darling Downs properties in the new season's crop. These trials will be of great interest, as they are expected to throw light on the capacity of the soils to continue to produce good crops without the use of fertilizers.

Mottling of wheat grain, which has been a source of concern to millers over the past few years because of the associated lowered protein content of the grain, is probably due to plant food deficiency, and is now being investigated.

Attractive though current prices may be, the expansion of the wheat industry in Queensland is not an unmixed blessing. In current practice, land intended for wheat is left as a bare fallow through the summer wet season and thus the soil erosion hazard is greatly increased. Some modification of present practices, by the adoption of stubble mulching, contour farming, or other soil-conservation measures, must rapidly be adopted if this expansion is to be permanent or desirable.

Maize Growing.

If the estimated yield of 3,000,000 bushels of maize be achieved, the 1948-49 crop will be about normal. The Commonwealth Government has indicated its willingness to grant export permits for a quantity up to 14,000 tons.

Excessively wet conditions on the Atherton Tableland dimmed early prospects of a heavy harvest there and the estimate is now about 16,000 tons. A lively interest is being shown by Atherton Tableland growers in rotation crops for maize, as it is realised that single cropping with maize (or any other row crop) cannot be carried on for much longer without serious effects on soil fertility.

Progress has been made in the production of commercial hybrid maize seed, and 306 bushels of Government certified seed were produced in 1948-49. It is not generally realised that the first experiments in hybrid maize production in Australia were commenced at the Queensland Agricultural High School and College in 1926 and that the eight varieties eligible for certification are a direct result of this work. By mutual arrangement hybridisation and selection are carried on by the College, with this Department now assisting in the field supervision of commercial seed production for certification.

The establishment of hybrid maize as a farm crop in Queensland has necessitated many years of painstaking self-pollination, hybridisation, and field testing work, and great credit is due to the plant-breeding staff of the College for evolving hybrids which outyield the standard varieties in the areas for which the hybrids have been developed. The supervision of commercial seed production of maize hybrids to ensure that the seed measures up to the standards laid down by the Seed Certification Committee of this Department will require an increased amount of attention by Departmental officers. The production of hybrid maze varieties is time-consuming and expensive and, in general, special hybrids are required for the varying conditions of different districts. It therefore cannot be expected that the College will be able to provide at short notice hybrids suited to all districts. Moreover, it should be borne in mind that in the United States the increased yield of hybrid varieties has often been associated with lower protein content, thus reducing the effective yield.

While hybrid maize may in time supersede the standard open-pollinated varieties in Queensland as it has done in parts of the United States, to-day's popular varieties will no doubt continue to be used for a number of years and the Department accordingly is proceeding with the restoration of type characters which to some extent were lost from the major varieties during the war years.

The increase of mechanical harvesting of maize on the Atherton Tableland, with its enforced accelerated intake at the silos, has posed a number of storage and handling problems. The solution of some of these has proved relatively easy, but it is expected that some difficulties will take a little time to overcome.

The Tobacco Industry.

A great deal of attention has been given to the problem of developing the tobacco industry in Queensland. The Experiment Station at Mareeba and the Sub-station on the Lower Burdekin at Clare are now operating actively and the latter has served as a training centre for the first group of ex-servicemen taking up tobacco lands in that district. The industry is only now emerging from its wartime decline and a good deal of improvement in production facilities and development of new areas will be required before the peak yields of the 1930's are again attained. However, the 1948 season's crop is expected to yield over 2 million pounds of cured leaf from 2,154 acres.

There is every indication that the upward trend will be maintained. On the cultural side, it may be said that pest and disease hazards can now be mostly overcome, irrigation practices are being improved, and seed supplies purified. Expansion of growing areas is assured as irrigation facilities become available. Ten new farms of 40 being developed as an ex-servicemen's land settlement scheme on the Lower Burdekin are almost ready for their first crop.

Dissatisfaction of growers with the marketing system operating under emergency Commonwealth legislation culminated in the abandonment of the system in September, 1948, whereupon a State Tobacco Leaf Marketing Board set up by the growers assumed control of leaf sales in Queensland. An immediate improvement in prices attended reversion to sale by auction, but it remains to be seen whether manufacturers will continue to pay prices considered satisfactory by growers. Manufacturing by a North Queensland grower co-operative has been undertaken and may be expected to exercise a stabilising effect on tobacco-leaf values.

The Future of Cotton.

The continued serious decline of the cotton-growing industry in Queensland must be regarded as a very significant loss to the nation. Here is a primary industry which, assured of a monetary return comparable with that of other farming enterprises, could greatly relieve the dollar situation, contribute a great quantity of by-products for stock feeding and industrial purposes, and provide a crop with some special qualities in a pasture-crop rotation. A case for a guaranteed average net return to growers of 9½d. per lb. seed cotton for a period of five years was presented to a sitting of the Tariff Board by the State Government and also by the Cotton Marketing Board. The report of the Tariff Board is eagerly awaited, for even very favourable action by the Commonwealth Government on the recommendations of the Board, if long delayed, might fail to arrest the decline in the industry.

Mechanical harvesters have been operating in cotton crops during the current harvesting season under Departmental supervision and have given very satisfactory results when variety, uniformity of maturity, and other factors have been favourable.

Irrigation trials have been intensified, as it is considered that irrigation could prove a potent factor in the development of the industry.

Fruit and Vegetables.

Weather conditions at some critical periods were extremely unfavourable for horticultural crops and many serious losses were experienced. With most fruit crops, however, the coming into bearing of recent plantings more than compensated for losses due to the weather. Production of pineapples, papaws, and apples was much higher than normal and can be expected to increase, but banana plantings showed a decrease.

Processing plants are playing an important part in overcoming the problem of gluts in certain fruits. Depression of prices during periods of over-supply is sharply accentuated by a considerable quantity of small or low-quality fruit offered on the fresh fruit market. Diversion of such fruit, in addition to the normal intake of surplus high-grade fruit, to juice extractors and canners has had a stabilising effect on prices. The operation of the growers' cannery at Northgate has been of particular benefit in the economic disposal of the heavy pineapple crop. The efforts of the cannery to devise a satisfactory canned banana pack have met with success and may provide a useful outlet for surplus fruit.

Improvement of plantation and orchard planting material continues to be one of the main Departmental services to the fruit industry. Pedigreed planting material of pineapples is expected to be available to growers on a large scale within the next year or so, following several years of selection of improved types by Horticulture Branch officers. Citrus growers are using the Department's citrus budwood scheme to a greater extent than ever.

Pedigreed seed of two new varieties of papaw is likely to be released to growers in the near future. Certified seed of four new tomatoes developed by the Department for the Stanthorpe district has met with a ready sale, and it is expected that the widespread use of these varieties in areas to which they are suited will result in a marked increase in production, as on occasion they have shown themselves capable of outyielding standard varieties as much as fivefold.

Pest and disease control services have been given to fruit and vegetable growers throughout the year, and progress has been made in the investigation of various plant protection problems and of transport and storage disorders. In order to keep pest control practice abreast of the release of new insecticides in rapid sequence during the past few years, a great deal of testing work by Departmental officers has been necessary.

New and Promising Crops.

Some of the 1948 linseed crop was crushed for oil and meal, but much of the seed was reserved for 1949 planting and sufficient to sow about 14,000 acres was distributed. The rise in the area planted to this crop has been accelerated by favourable seasons, but the interest shown by farmers is encouraging for the ultimate firm establishment of linseed growing. The announced intention of a large processing firm to commence crushing in Queensland improves the prospect of a larger supply of linseed meal for stock feeding in this State.

Mechanised methods of pest destruction in linseed, including aerial dusting, were closely observed last season, but while it is recognised that such measures must be developed, emphasis is being placed by the Department on early planting as a pest-control measure.

Sunflower growing for oil seed purposes has shown an increase, and canning bean production was double that of 1947-48. The soybean, however, has not yet gained a firm foothold in Queensland agriculture, due to the limited and uncertain market for the oil. The soybean industry achieved its success in the United States as a result of the great demand for oil for the manufacture of margarine and pastry shortenings; the industrial usage of the oil is relatively not great.

Testing of tea, rice, and miscellaneous tropical crops proceeded during the year. It is evident that both upland and swamp rice can be successfully grown in the State, but average yields obtained do not promise an attractive monetary return. Tea has assumed great importance in Australia's trade budget, the f.o.b. import value of this commodity exceeding £10 million in 1947-48. Good quality tea has been grown at the tropical agriculture experiment station, but the commercial culture of this crop in Queensland probably depends on the elaboration of a suitable mechanical harvesting technique; this is being investigated.

The Sheep and Wool Industry.

The wool market has fluctuated during the past year, but the disposal of the 472,000 bales offered, for a return of £32½ million, was very satisfying. The passing of drought conditions in badly affected areas is expected to bring about an increase of the order of 50,000 bales in next season's offerings.

Accentuation of drought conditions in the central-west and north-west during the latter half of 1948 resulted in the continued removal of sheep to agistment areas until December. Many of the flocks, which remained were fed on purchased foodstuffs for varying periods, and Departmental advice to sheep raisers on the choice of rations and the mechanics of feeding in many cases saved owners very considerable sums of money.

A large proportion of the sheep removed from drought areas did not return after the drought broke, and as sheep for restocking have been very difficult to obtain graziers are faced with a relatively slow restoration of flock numbers. In order to proffer advice on methods of achieving the greatest possible natural increase, officers of the Department conducted field days at several centres in the areas concerned.

Demonstration work has again featured very largely in the operations of the Sheep and Wool Branch, and the virtues of the Mules operation in blowfly control, and improved husbandry practices in general, are being brought home to an increasing number of sheep raisers in their own districts. The staff of the Branch has been further increased and field officers are now stationed in 11 pastoral centres, in contrast to one a few years ago.

Research work financed from trust funds has again been concerned with climatological studies

and an investigation of the factors influencing the fertility of sheep.

As the time is bound to come when the market for wool will depend upon the merits of the fibre for textile manufacture, fleece quality is assuming added significance. In the past no really adequate measure of the effect of sheep breeding methods on wool quality has been readily available in Queensland. The Department is now planning to provide a fleece-testing unit which will enable breeders to secure information on fleece characteristics and their transmission to offspring, and which will be particularly useful in assessing the value of progeny testing in sheep breeding.

The concerted approach made by various Branches of the Department to the solution of the cause of Georgina River disease has brought a native plant under very strong suspicion. If this tentative determination be confirmed by feeding tests and further field investigations in the coming year, it may then be possible to devise some means of protecting stock from poisoning by the plant concerned.

Scabby mouth still constitutes a cause of ill-health in sheep and a source of disturbance to owners and shearers. Preventive vaccine is being fairly widely used and over half a million doses were supplied by the Department during the year.

Studies in the utilisation and regeneration of mulga have considerable significance for sheep raisers in the south-west, where this plant constitutes a valuable drought reserve. Lopping and other utilisation practices have been under observation with the object of determining methods which will yield the maximum amount of fodder without adverse effect on the permanency of the trees. Pasture studies in the west are yielding useful information on the botanical composition of the various pasture types, and it is becoming increasingly apparent that the grasses do not entirely overshadow the less conspicuous associated miscellaneous plants in importance, as is commonly supposed. The Department's long-range plan provides for the formation of a small select "western team" to study the special problems of inland pastures.

A large market for lamb meat in Queensland lies almost undeveloped; moreover, increased production would release greater quantities of beef for export to the United Kingdom. To encourage the production of fat lambs suitable for both local and export needs, the Department during the year subsidised the purchase by sheep raisers of 400 long-wool rams suitable for siring a useful type of lamb mother. Arrangements have also been made to send two officers to the south to study the latest developments in fat lamb production.

The Beef Industry.

Plans for large-scale development of the beef industry on a long-term basis have been the subject of consultation between interested Governmental and other bodies. Negotiations will shortly commence on the formulation of conditions for a 15-year agreement between the Commonwealth and United Kingdom Governments, but details—including the important one of price to be paid for beef—have yet to be finalised. Beef is essentially a long-term "crop" and general efficiency in production is not likely to be achieved without the stability engendered by assured markets at remunerative prices. The expansion and intensification of the beef-cattle industry is in a large meausre dependent upon increasing carrying capacity of holdings by ringbarking, subdivision of paddocks, and improved water facilities. Confidence in marketing prospects is necessary before such work will be undertaken on a large scale.

Departmental officers are maintaining close contact with road-train movement of fat cattle. It is recognised that this may well become an important factor in building up the beef industry in remote areas, as an earlier turn-off means greater production. Wastage and bruising in transit are being carefully checked on each consignment.

The Gulf and Peninsula areas appear to be capable of a much increased turn-off if fluctuations in food supply can be minimised. An exploratory farm is about to be opened on a property on the lower Peninsula in order to examine the possibility of growing fodder to top off cattle for market or to keep them in condition during the periods when natural pasturage is inadequate for the purpose. Supplementary feeding trials are at present being conducted in other areas, and the fattening of stores on grain sorghum stubble is receiving particular attention.

Plans for the establishment of two Beef Cattle Research Stations, jointly with the Commonwealth Scientific and Industrial Research Organisation and the Australian Meat Board, are well advanced. It is proposed that one Station will concentrate on problems of animal husbandry and pasture establishment and maintenance, while the other will study problems of breeding and breed adaptability.

The continued success of recently developed insecticides used against cattle tick and buffalo fly augurs well for an ultimate substantial reduction in the ravages of these pests. The judicious use of D.D.T. has already initiated the retreat of buffalo fly from southern infested areas and has greatly simplified the problem of tick control on individual holdings. In view of the trend away from dipping in favour of spraying in other tick-infested countries, particular attention is being paid to the suitability of various materials for spraying.

Steps have been taken towards implementing recent legislation providing for the central killing of livestock for local meat consumption. Centres which will receive first consideration are Rockhampton, Townsville, Ipswich and Toowoomba. During the year the Under Secretary and the Works Manager of the Queensland Meat Industry Board visited New Zealand for the purpose of observing the operation of centralised slaughtering and other aspects of the meat industry.

The initiation of a Cattle Husbandry Branch within the Division of Animal Industry was reported last year and the technical staff of the Branch now numbers five. At present emphasis is being placed on the development of advisory services to the dairy industry on account of the greater fund of technical knowledge available and in accordance with the cur-

rent drive for increased dairy production. However, efforts are now being made to recruit officers for beef-cattle husbandry and the first of these is now obtaining practical cattle station management experience before embarking on advisory duties. The Branch will work in close association with the projected beef cattle research stations.

Dairying.

Dairy cattle numbers have shown a substantial increase to 1,423,000, and as a result of this and of generally favourable seasonal conditions the total yield of dairy products is in the vicinity of £17 million, of which butter and fresh milk contribute 90 per cent.

A pleasing feature of the market milk trade is the increase in pasteurisation. In 1948, 24,000 gallons of milk were bottled daily in Brisbane alone, and the proportion of milk pasteurised and bottled is higher in Brisbane than in any other State capital.

The Commonwealth grant for the promotion of greater efficiency in the dairying industry, which became effective early in the financial year, necessitated the recruitment of temporary staff and the diversion of some permanent officers to the special work involved. Herd-recording activities have been greatly increased, and many farm demonstrations commenced. The formation of the Department's Cattle Husbandry Branch, coincident with the announcement of the grant, greatly facilitated the initiation of the field work.

Farm advisory and inspectional services, and services to distributors, processors and manufacturers of milk and/or dairy products were continued, and a number of technical problems were investigated by the research staff.

Many dairy farmers have been given technical assistance in conserving fodder. It is unfortunate that materials for silo and hayshed construction have been scarce at a time when silage and hay crops could have been readily grown by farmers who had not done so previously but as far as possible the Department has facilitated the procurement of such materials and has also supervised or given advice on the actual construction of silos.

Pasture improvement trials have been conducted in most dairying districts, and useful results have been obtained in many instances. A total of 55 such trials is now being carried out in addition to the demonstrations arranged under the Commonwealth grant for improved efficiency in dairying.

Testing of milk-producing herds for tuberculosis has been continued, particularly in the districts supplyling Brisbane and on the Darling Downs, and a total of 71,079 animals in 1,243 herds was tested during the year. The figure of 2·6 for the percentage of affected cattle indicates a much lower incidence of the disease in tested herds in the second year of testing. The arrangement whereby private veterinary practitioners conduct tuberculin testing on behalf of the Department has enabled the scheme to function satisfactorily despite the unavoidable withdrawal of some Departmental staff. Under this scheme fully qualified private practitioners are given "block" testing, thus assuring them of some steady income. The provision that such practitioners may be required to reside within a stipulated area will gradually provide a resident highly qualified veterinary service for dairying districts. Amending legislation has enabled compulsory T.B. testing to be extended to areas producing cream for butter factories.

Pig Raising.

The extent of Departmental advisory services to pig raisers may be gauged by the fact that advisory officers visited 1,659 farms during the past year. A wider geographical coverage was facilitated by the decentralisation of field officers; advisers are now stationed in Brisbane, Toowoomba, Murgon and Atherton, while young officers in training will later be stationed in other centres.

Bacon carcass competitions are being assisted in every way, as they are regarded as a potentially strong factor in the improvement of carcass quality. The matter of establishing pig-testing stations throughout the Commonwealth has also been under discussion by the several States.

With the establishment of a Tamworth Stud at Kairi Regional Experiment Station, the Department has recommenced stud breeding operations. Departmental studs in the past played an important part in the improvement of district herds, and it is confidently expected that farmers on the northern tablelands will benefit from the new stud at Kairi.

Considerable expansion has taken place in the testing of stud-pig herds for brucellosis and many studs are now free of the disease.

Pig raisers are still dissatisfied with contract prices for export pigmeats. As in the case of the dairying industry, of which it is to a considerable extent a subsidiary, pig raising must be very efficiently conducted if the margin between cost of production and price is to be on the side of the producer. Feeding and management trials now being conducted by the Department should lead to increased efficiency of production; many producers are finding that greater attention to feeding, accommodation and sanitation yields an increase in net returns.

The initiation of the Queensland-British Food Corporation's sorghum-growing and pig raising project in Central Queensland is seen as the forerunner of a big change in pig husbandry methods in Queensland. It has to be recognised that the inevitable decrease in farm milk residues, and the increasing use of maize for food processing, must be compensated by large-scale production of fodder grains, and the development of other protein supplies.

Experiment Station Development.

The experiment station activities of the Department range from single-crop experiment farms to regional stations on which facilities are being provided not only for research on individual crops and breeds of stock but for the integration of crop and livestock investigations.

The Regional Experiment Station, as its name implies, is designed to serve the basic needs, in experimentation, of the primary industries of a particular region. No region is homo-

geneous in soil type, weather conditions, and class of farming; hence at no regional station can all conditions obtaining in the region be duplicated. Precisely the same may be said of district stations and only in exceptional circumstance—e.g., very local development of irrigation farming—do stations serving a small district have any virtues not possessed in a greater degree by a regional station.

While a certain number of experiment stations are essential for plant introduction and breeding, and the investigation of basic problems of plant and animal production, there is no necessity for a large number of local stations—as so many primary producers seem to think. The ultimate test of the value of all new varieties or methods must be made on the farms with the assistance of the local Departmental advisory officers. Farm experimentation is the basis of progress and, while a certain number of experiment stations are a necessary adjunct, they are not a substitute, and resources should not be dissipated in maintaining an excessive number.

Developmental work on regional and other stations proceeded slowly during the year because of shortage of materials and equipment, and it will be some time before all stations are functioning as planned, and longer still before their full impact on the primary industries is felt. It is pleasing to report that the new regional station at Ayr has been developed to the extent that irrigated pasture and crop trials will shortly be commenced. The Kairi regional station has begun to assemble its livestock units; a poultry flock and a Tamworth pig stud were established during the year, and a dairy herd will soon be procured.

All regional and Branch stations are performing useful work, particularly in the fields of agriculture and horticulture, and with the projected development of cattle research stations on a co-operative basis with other bodies the primary industries of the State will be receiving a comprehensive field and laboratory research service. No plans have as yet been formulated for the establishment of a sheep research station, although this must receive attention at some future time; the State assisted, of course, in the establishment of the C.S.I.R.O. field station at Gilruth Plains, where research on sheep breeding and selection is receiving particular attention.

Conserving Soil Fertility.

With an increase in technical staff from three to nine, the Soil Conservation Service of the Department has been able to expand its activities, but growing interest in soil conservation is such that this staff cannot handle applications for assistance as expeditiously as could be desired. It must, however, be appreciated that Queensland, with its low population density, cannot hope to provide services approaching those of the United States of America, which are often held up as an example of what might be aimed at. Nor can it be expected that Queensland will be able to work on the same intensive scale as may be done in Victoria or New South Wales, where population densities are respectively fifteen and six times that of Queensland.

The Department will continue to display approved conservation methods on demonstration farms (at present there are 15 such co-operating farms), and as far as practicable will assist in the incorporation of appropriate measures in ordinary farm practice. But it obviously cannot undertake to survey and re-design, carry out works, and completely plan farming operations, on all farms in affected areas.

Current soil conservation practices in the United States and other countries advanced in the preservation of the soil are based on a great amount of observation and research. It would be most unwise to attempt to impose overseas practices, without prior testing, on the markedly different pattern of Queensland agriculture. Only observation and research under local conditions of soil and climate will determine which practices can be recommended as "foolproof," and appropriate investigations to that end are in fact proceeding. Fortunately, the judgment of Departmental officers, who were obliged to commence operations in this State with few basic data to guide them, has been particularly good. On the Regional Experiment Station on the Atherton Tableland, for example, areas contour banked with only slight knowledge of local erodibility factors lost little soil during an 8-day period yielding 21¾ inches of rain, whereas farms not so protected lost great quantities of soil per acre as a result of both sheet and gully erosion.

While most farmers realise that incorrect farming methods must lead to a decline in soil fertility, there are many on the Darling Downs, in the Lockyer, and in other fertile areas who would dispute the view that their land will soon require, if it does not already do so, the application of fertilizers. The long-sustained productivity of these soils under cropping has lulled many into the belief that their fertility is virtually inexhaustible. There is proof in some areas, however, and there are strong indications in others, that the amount of some essential plant foods is not sufficient for maximum production. It is not suggested that a rapid decline in productivity has begun, but at the same time it must be borne in mind that a truly permanent agriculture demands the restoration of certain mineral elements removed in the form of crops and livestock products. It demands, further, that soil structure be maintained, and in many cases this is most effectively ensured by linking the grazing of animals with the production of crops.

Market and Crop Reports.

Recently inaugurated Departmental services which have grown rapidly in popularity are market and crop reporting. Reports on prices and quality of fruit, vegetables, and farm produce submitted to the metropolitan markets are compiled and issued before noon daily. These reports are given wide publicity by press and radio and have come to be accepted as the standard quotations.

The monthly reports on production recordings and trends compiled from information furnished by field officers and other sources have an increasing mailing list and are much in demand by banks, the transport industries, and other commercial interests.

Advance knowledge of crop prospects in major agricultural crops is of great assistance and importance and the "Honorary Crop Cor-

respondent'' Scheme, instituted to provide such information, has proved very successful. Reliable correspondents from selected areas furnish periodic reports on the extent of plantings and crop prospects, and from this information it has proved possible to provide reliable forecasts of crop yields. The system is being extended.

Co-operative Work.

The agricultural and pastoral investigations of the Commonwealth Scientific and Industrial Research Organisation continue to be assisted by the provision of land or facilities by the Queensland Government. This co-operation commenced some years ago and includes the provision of the land occupied by the field station at Gilruth Plains, near Cunnamulla, which was leased to C.S.I.R.O. at a nominal rental, and land for a horticulture station at Stanthorpe. Buildings and other facilities have been provided for pasture research at the Cooper Laboratory, Gatton, and at the University. Land has also been allocated to the Organisation on the new University site at St. Lucia and the cost will be shared in the erection of a building thereon to house permanently its staff engaged on pasture, soils and other studies. The old Animal Health Station buildings at Yeerongpilly have been made available to it by the Department of Agriculture and Stock for parasitological investigations, while the Queensland Meat Industry Board has provided a laboratory and cold storage facilities for the study of meat storage and transport problems. This Department has also provided land and facilities for co-operative studies with C.S.I.R.O. on tobacco and pastures in the Burdekin area.

Joint committees have been set up to ensure the co-ordination and avoidance of overlapping of investigations carried out by C.S.I.R.O. and the Department of Agriculture and Stock in this State.

A large amount of technical work has been carried out by this Department on behalf of the Department of Public Lands in connection with soil surveys and in determining suitability of land for soldier settlement, and also chemical analyses and other work for the Bureau of Investigation of Land and Water Resources by way of assisting its potentiality surveys.

Courses of lectures have been given by the professional staff to University and Technical College students, while assistance is also being rendered the Physiology School in its researches on the reaction of sheep to temperature.

Staff.

Though staff numbers improved during the year, the retirement or resignation of several senior technical officers has created staffing difficulties that cannot be readily overcome. Deficiencies in the technical staff of the production Divisions are mainly in the intermediate categories and it is likely to be some time before progression of officers in the more junior grades and recruitment of replacements will have corrected the deficiencies. This position arises largely as a result of reduced numbers of students graduating from the Universities both during the war years and the depression of the early nineteen thirties. Of the technical officers who have resigned, the majority have entered private industry, which has thereby been relieved of the expense of training each technologist over a number of years.

Staffing difficulties were increased by the need to secure temporary staff in connection with projects financed from the Commonwealth Government's grant for increasing the efficiency of the dairying industry. Many permanent officers are also engaged on grant projects.

The letting of tuberculin-testing contracts to private practitioners relieved the staffing position in the field veterinary services branch. The Department will shortly begin to reap the benefit of the Government's scholarship scheme for the training of veterinarians for service in the Department, as some of the scholarship holders are in the advanced years of their University course. Twenty-two students are attending Queensland or Sydney Universities as holders of Division of Animal Industry scholarships.

Refresher courses of instruction for veterinary officers, stock inspectors, dairy officers and advisers, and agriculture field officers were held during the year, and efficiency tests were conducted within certain grades of horticulture officers. Selected officers of various Branches were enabled to secure specialist training outside the State.

Departmental branches in country centres were expanded during the year, and the status of some district officers was raised.

The clerical staff, including stenographers, and the accounting staff, have, despite numerous retirements and changes in personnel, performed a tremendous amount of essential work during the year. Staff difficulties here are perhaps even more acute than on the technical side.

The Australian Agricultural Council.

National policies on agriculture and the activities of the Departments of Agriculture in Australia are co-ordinated through the Australian Agricultural Council, which consists of the Federal Minister for Commerce and Agriculture (as Chairman) and the State Ministers for Agriculture. The Council is assisted by a Standing Committee, which is composed of the permanent heads of the Commonwealth Department of Commerce and Agriculture, the Treasury, and Post-War Reconstruction, State Departments of Agriculture, and C.S.I.R.O.; the Under Secretary of this Department is the present Chairman of the Standing Committee.

Three meetings of the Standing Committee and two of the Council were held during the year. Among the major items considered were the Australian Wheat Stabilisation Plan, the encouragement of linseed growing by attention to cultural and economic problems, the allocation between States of available supplies of sulphate of ammonia, the importation of agricultural machinery from dollar areas, beef-cattle research in northern Australia, the importation of stud animals, veterinary training, and grasshopper control trials.

DIVISION OF PLANT INDUSTRY.

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

The activities of the Division have covered the same wide field as last year with some intensification in each of the spheres of investigation, extension, and inspection. In the investigation field, at the end of the period now under review, a total of 28 crop plants and 220 species of pasture plants was actually under field investigation, and the number of large-scale experiments in progress exceeded 300. These 300 field trials, together with laboratory work, represent a very comprehensive investigational programme, and, with the improved technique now available, the number of experiments which give positive evidence has reached a pleasing proportion. The duration of these trials varies from a few months to as long as seven years.

There has been a marked development of co-ordination between Branches of the Division in the matter of experimental work, and consequently experiments in the field are now yielding a wider variety of results. Apart from inter-branch co-operation, the amount of inter-divisional co-ordination has also increased; in addition, the Division is closely associated in several instances with the Forestry Sub-Department, the Lands Administration Board, the Bureau of Investigation of Land and Water Resources, the Department of Irrigation and Water Supply, C.S.I.R.O. and the Bureau of Agricultural Economics, the last two being, of course, Federal Government instrumentalities.

The call on advisory services continues to increase, particularly from new settlers, whose numbers have grown markedly by the settling of ex-servicemen on the land. The advisory work has been furthered very considerably by the holding of 24 field days and in this connection the Agriculture Branch, the Horticulture Branch, the Bureau of Sugar Experiment Stations and the Soil Conservation section have been prominent, whilst in all practicable instances the Science Branch and the Chemical Laboratory have provided specialist officers to address growers on these occasions.

The work of the inspectional staff, whose duty is to maintain standards of quality of agricultural products, normally makes little appeal to the primary producer but it is noteworthy that producers' organisations are showing an increasing appreciation of the importance of the work of these men, which is nonetheless valuable because virtually the only publicity it receives is occasional adverse criticism.

The detailed work of the individual Branches is dealt with by the heads of Branches, whose reports are submitted herewith. From these it will be seen that some noteworthy advances have been made with many crops. Particular attention might be directed to the work of plant breeders in connection with wheat, grain sorghum, tomatoes and papaws; of soils officers in connection with the settlement of ex-servicemen; of entomologists in connection with fruit fly investigations and cane grub control; and of soil conservationists in the wide service now being rendered in several important agricultural areas.

The Post-war Refresher Course for field officers was again held last winter and, with a further school proposed for the coming spring, the great bulk of the Division's field officers will shortly have been given much valuable instruction in their more important fields of endeavour.

STAFF.

Whilst there have been a number of changes in staff during the period under review, these have been hardly no more numerous than would be expected in quite normal times, and it seems evident that the unrest which inevitably followed the abnormal years of war is passing. Altogether, seven resignations were received from technical officers but against this 11 new men were appointed to the higher grade technical positions. A further loss was sustained by the retirement of five officers under age limit regulations. Of these, special mention may be made of Mr. H. St. J. Pratt (Senior Adviser in Horticulture) and Mr. H. Jarvis (Entomologist), both of whom served the Department for many years and gave meritorious service to primary producers and the Department. In addition to the 11 new appointees mentioned above, two officers formerly employed in the Department in other categories completed their University courses under post-war educational schemes and returned to the Division. Further, six cadets were appointed and four scholarships granted to enable the holders to complete University courses; each of these, on successful completion of his course, will join the staff during the coming financial year. With respect to the actual staffing in each of the several Branches, the position may be summarised as under.

The Agriculture Branch position remains much as it was during the last financial year, with the Director of Agriculture (Mr. C. J. McKeon) still seconded to the Queensland-British Food Corporation. Pasture work has now been placed within this Branch and Mr. S. Marriott has been appointed Agrostologist in place of Mr. C. W. Winders, who has assumed full time duties in the Information Branch. Three new appointments have been made to strengthen the agronomic team and two scholarships at the University have ben awarded in this field.

The Horticulture Branch suffered a loss by the resignation of Mr. N. E. H. Caldwell, the Assistant Director. His place was filled by the appointment of Mr. J. Harold Smith. This Branch also lost two field officers. Compensation has, however, been afforded by the appointment of two new officers, one for general horticultural work and one for special soil studies. Inspection services have ben strengthened by the appointment of seven new officers.

The Bureau of Sugar Experiment Stations lost one senior officer during the year, when Dr. W. A. McDougall left the post of Senior Entomologist with that Branch upon his appointment as Senior Entomologist, Science Branch.

There has been no change in the senior staff of Regional Experiment Stations. There have, however, been some changes in the actual personnel of cadets training at these institutions.

An adjustment was necessary in the Science Branch when Mr. J. H. Smith was appointed Assistant Director of Horticulture, his place being taken by Dr. McDougall, and in a re-allocation of work the new position of Assistant Senior Entomologist was filled by the appointment of Mr. J. A. Weddell. Mr. W. Pont resumed duties after the completion of his University course, and one scholarship has been awarded in the Pathology Section. Mr. J. E. C. Aberdeen resigned to take up an appointment with the University of Queensland, whilst Dr. H. E. Young resigned to accept an oversea appointment. The loss of Dr. Young is partly compensated for by the appointment of a new officer for certain aspects of weed control investigations.

The one resignation from the staff of the Chemical Laboratory was compensated by three new appointments. There is one scholarship holder within this Branch, who is expected to assume full-time duties after graduation towards the end of 1949.

The numerical strength of the Soil Conservation Section has been increased during the period under review by the recruitment of one graduate and two agricultural college diploma holders, whilst the position with respect to office work, particularly mapping, will be improved by a recent transfer from another Branch.

Biometrical and illustration services have been maintained as for some years past.

Whilst there are still certain major staff deficiencies, particularly in the Agriculture Branch, Regional Experiment Stations and Soil Conservation Section, these will be made good as quickly as trained men become available. The loss of 10 typistes from the Division in 12 months has militated seriously against the expeditious handling of much routine work. At the present time, a total of 22 cadets is receiving instruction and this, whilst it is recognised as representing an investment, does call for a good deal of time and effort on the part of the more senior officers. It is, however, firmly considered that this represents a particularly good way of ensuring continuity in the work of the Division.

SEASONAL CONDITIONS.

Generally speaking, the climatic conditions during the past 12 months have been favourable for agricultural production. Good winter rains provided ample subsoil moisture in most districts, and, though the spring and early summer were dry, this was advantageous for wheat and cane harvesting operations and in both of these important crops the much-desired continuity of operations was achieved. Horticultural industries were probably the most adversely affected by the weather in the early part of the period under review; firstly, by the late spring frosts which caused devastation to deciduous fruit and grape crops in the Stanthorpe district, and, secondly, by the retardation of vegetable growth owing to lack of moisture in the soil zone of shallow-rooting, short-season crops. Partial relief in the agricultural areas was afforded by December storms which benefited both cane and cereals. In the late summer, devastating cyclones swept parts of the North, adversely affecting fruit crops and, owing to the prevalence of waterlogged conditions, retarding land preparation for sowing sugar cane in some of the more northerly areas. Where damage was not sustained during the cyclones, the February-March period was wholly satisfactory, planting rains, particularly on the Darling Downs, having given most crops an excellent start for the coming season. Perhaps the best effects of the heavy rains will be manifest in the Channel country, where a very high flood has ensured a fine body of grass for months to come.

SOIL CONSERVATION.

The past year has seen a very considerable advance by the Soil Conservation Service, and the volume of work being handled is increasing at a highly gratifying, if somewhat embarrassing, rate. The awakening of farmers and others to the urgency and the importance of soil conservation, which was reported last year, undoubtedly continues, though there is an important minority who are somewhat averse to adopting modern methods. This minority owes its importance to the fact that at times the topographical distribution of farms makes it essential for all farmers in one local unit to be conservation minded and, even if they are not prepared to do something themselves, at least to avoid handicapping others who wish to take adequate steps for the protection of their farms. Whilst any form of compulsion is repugnant, it does seem that in this matter, for the safeguarding of a national asset, a measure of direction may be fully justified.

In connection with soil conservation work, possibly the most important development is the practice of stubble mulching. There seems no doubt that this practice will prove extremely desirable, and therefore work on this aspect is considered to be of outstanding importance At present, priority in this matter is given to the testing of available machinery for the purpose.

REGIONAL EXPERIMENT STATIONS.

The development of Regional Experiment Stations has continued despite the inescapable difficulties arising out of shortages of materials and manpower. As reported last year, the basic problem of these Stations is to establish the correct economic relationships of crops and animals. Development of the Kairi Station has now reached the stage where animals can be introduced and the correlation work will therefore be commenced forthwith at that centre.

Although lack of buildings has delayed similar development at other Stations, the facilities provided have enabled much crop work to be carried out by several Branches of the Division, and in this way the Stations have contributed largely to the advancement of many important investigations. Special mention might be made in this respect of the comprehensive investigations relating to cereal and fodder crops and pacture species, from which is being obtained much needed basic information.

On these Stations virtually every major and many minor field crops are now under investigation.

AGRICULTURE BRANCH.

The favourable seasonal conditions for field crops have allowed appreciable progress in much of the work of the Agriculture Branch and advancement has been made in the breeding of wheat, grain sorghum and maize, whilst the work on the nutritional requirements of several crops, notably potatoes, is also worthy of special mention. During the year, too, it has been possible to increase considerably the amount of work on pastures and at the end of the year, apart from Experiment Station work and small observational trials, a total of 54 dairy farm experiments dealing with pasture improvement was in progress.

Particular attention has also been given to tobacco work and at the Mareeba Experiment Station much information was obtained on cultural requirements of the crop, particularly in respect of nitrogen requirements. At the Clare Tobacco Experiment Station, where experiments are being conducted in association with C.S.I.R.O., the emphasis has been on irrigation requirements. As much fundamental work has to be done before any spectacular results can be achieved, little that is definite can be said at this stage beyond stating that it has been shown by experiments to be beyond doubt that commercial production of tobacco can be successfully carried out in the Clare area. The yields of the experiments on both the Burdekin and the Herbert Rivers average 1,600 lb. of cured leaf per acre; this is highly satisfactory and enables the settlement of ex-servicemen to proceed with every confidence.

The work being carried out at Utchee Creek by the Bureau of Tropical Agriculture has been retarded by unavailability of wire for subdivisional purposes. This is most disappointing, but until wire can be obtained the amount of progress which can be made in these pasture investigations is very limited.

HORTICULTURE BRANCH.

The investigational programme of the Horticulture Branch has been continued, stress being laid on problems concerned with plant nutrition, soil management, and plant improvement, and the Maroochy, Redlands and Kamerunga Experiment Stations are playing an increasingly important part in the activities of the Branch in each of these aspects of the work.

Maroochy Experiment Station is the most developed of the three and it is obvious from the interest growers are taking that this institution will exert an important influence on the production of tropical and sub-tropical fruit crops in south-eastern Queensland. The emphasis at this Station at present is on pine-apple work, and the value of selection of planting material and sound cultural methods is demonstrated with the utmost clarity in the plantings which have been made there.

Redlands Experiment Station commenced operations during the period under review as soon as it was possible to erect a temporary residence for the Manager. Already there is evidence that a Station in this district can help to solve problems of vegetable growers, not only of the metropolitan area but of remote parts also, this latter being brought about chiefly through the production by breeding of superior varieties.

Kamerunga Station is operating on a small scale, but here again work on both fruit and vegetables is proceeding.

In the production field perhaps the outstanding achievements are to be found in the work on tomatoes and papaws. During the past season the first releases were made of certified seed of superior tomato varieties and insofar as sales of seed are criteria, tomato growers intend to take every advantage of the results of this plant breeding activity. Papaw breeding has now reached a stage where commercial production of seed of superior papaw types can be undertaken and negotiations are in hand to have this work well under way during the coming planting season.

Problems of handling, transport and storage of horticultural products arising out of distant marketing have been given further attention. Whilst progress can be reported along several lines, there is still too large a body of growers who, in spite of rather intensive extension work, fail to realise the absolute necessity of handling products with the greatest possible care. Until there is a better realisation of this, both the individual grower and the State will continue to lose heavily each year through avoidable waste.

BUREAU OF SUGAR EXPERIMENT STATIONS.

As reported by the Director, cane crushed during the 1948 season reached the record figure of 6,433,501 tons, thus attaining the forecasted increase over the previous year of more than two million tons. It can be justly claimed that the work of the Bureau of Sugar Experiment Stations is an important factor in this gratifying state of affairs in the sugar industry. The soil fertility work which enables sound recommendations of fertiliser requirements to be given, the outstanding success in combating the ravages of cane grubs by the use of benzene hexachloride, and the influence of varieties which have been bred by officers of the Bureau, are potent factors. As has been pointed out in connection with Regional Experiment Stations, the opening up of a new Station offers very many difficulties and this accounts for the comparatively small amount of progress which can be reported in connection with the new Experiment Station in the Burdekin Delta.

CHEMICAL LABORATORY.

The Chemical Laboratory has perhaps been the most fortunate of the Branches in the matter of numerical strength of staff and this is reflected in the increased amount of work which it has been possible to handle. As will be seen from Dr. White's report, this laboratory serves not only several Branches of the Division of Plant Industry but also works in close association with the Division of Animal Industry. Work to which special attention might be directed concerns that dealing with minor elements in animal diets, the nutritional value of certain fodder crops, and soils work. In connection with soils, the increase in both detailed and reconnaissance soil surveys is particularly pleasing because it has both assisted in the matter of settlement of ex-servicemen and furthered plant nutritional investigations by the Agriculture and Horticulture Branches.

SCIENCE BRANCH.

Horticultural and agricultural crops during the year have been subject to the ravages of the usual pests and diseases, and the Entomology and Plant Pathology Sections have been kept extremely busy. The biological testing of new fungicides and insecticides continues to be an important feature of the work of these Sections. Whilst the development of this almost bewildering array of new tools is most welcome to the scientist, nevertheless the work entailed in checking their efficacy and limitations causes embarrassment inasmuch as it is necessary to get results in the quickest possible time, both because growers have every right to expect to have the best means of control placed at their disposal, and also because they have an equal right to expect some protection against exploitation through extravagant claims sometimes attending the marketing of new preparations.

The Botany Section continued work largely on the advisory side and in this connection has worked in close co-operation with the Sub-Department of Forestry. At the same time, this Sectoin has developed its research programme appreciably and important work is in hand on mulga regeneration studies and on western pasture problems.

Report on Soil Conservation Services.

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

The year under review has been an exceptionally busy one for all soil conservation officers. Requests for technical assistance are being received at an increasing rate, and despite the fact that the technical staff has been increased from three to nine attention to applications has often to be deferred for periods of up to six months.

It is gratifying to know that there is a widespread and increasing realisation of the dangers of erosion. In the Darling Downs and South Burnett districts alone, applications for assistance have been received from 210 farmers and cover a total area of approximately 50,000 acres of arable land. It is anticipated that in the coming year there will be a material increase in the number of applications for assistance, and to meet this call for service officers are now stationed at Brisbane, Toowoomba, Kingaroy, and Atherton.

SOIL EROSION CONTROL.

The devastation which has followed the practice of exploitative farming in many of our agricultural areas has focussed attention on the urgent need for the adoption of reclamation measures. Whilst this represents the major problem of the immediate future, over-all permanent control is dependent upon the adoption of wise land use practices. Mechanical control works, such as contour banks, diversion banks, prepared waterways, &c., are required primarily to ensure successful reclamation where erosion has been severe and to ensure the control of run-off in less severely eroded areas.

"Farm planning" techniques, so successful in the United States of America, have now been adopted as standard practice, and soil conservation officers prepare complete farm plans as a necessary pre-requisite to the implementation of soil conservation procedures. In the short time this system has been in operation, 20 farm plans have been completed and issued to farmers as their "blue print" for conservation farming.

In order to ensure that all farming practices are established on a sound soil conservation basis, field officers of the Agriculture and Horticulture Branches have been given special instruction in modern soil conservation procedures which they can advocate as part of their normal extension activities.

Contour banks have been constructed on 3,050 acres of arable land, and though this is only a modest beginning the success of these works has resulted in enquiries for assistance in respect of the contouring of many more thousands of acres of land.

An aggregate length of 700 chains of artificial waterways was constructed during the year, and on the Darling Downs, where most of this work has been done, a number of observational trials have been initiated to determine the most satisfactory and economical means of vegetating these waterways. The establishment of vegetation on waterways is proving to be the most difficult technical problem confronting the soil conservationist. Since the natural waterways on most farms are now deep gullies, it is necessary to construct and vegetate artificial waterways (Plate 1). On the black soils of the Darling Downs this is an expensive undertaking, and not infrequently it takes 12 months or more to establish a satisfactory vegetative cover.

The existence of unstable drainage lines from catchment to watercourse on most of the Darling Downs areas is preventing the implementation of soil conservation programmes on a catchment basis. Two large-scale projects have been investigated, one of 28,000 acres and the other of 3,000 acres. Tentative plans have been prepared and action may be initiated in the coming year.

EFFICIENCY OF EROSION CONTROL PROCEDURES.

In some areas of the State the rainfall intensity was less than is normally experienced during the summer months, and all soil conservation works performed satisfactorily. In the Monto and Atherton areas, falls of rain exceeding 20 inches in 10 days were received. In both districts soil conservation works were completely satisfactory, erosion was controlled and surplus run-off transferred safely from the land. This was in direct contrast to surrounding "uncontrolled" areas, where severe erosion and soil loss occurred. These tests are a satisfactory check

Plate 1.—A prepared waterway on a Darling Downs Soil Conservation Demonstration Farm. Special waterways must be constructed and vegetated, as natural waterways have gullied.

Plate 2.—Portion of a Wheat Varietal Trial at Hermitage Regional Experiment Station.

against design techniques, and provide encouragement to the technician who is forced to design control works on very meagre basic data on erodibility of many soils in this State.

STUBBLE MULCHING.

It is obvious that the basic approach to the erosion problem in this State is the provision of an adequate protective blanket over the soil surface during the heavy rainfall period of the summer. Cover cropping meets this need, but is not practicable with clean tilled summer growing row crops, nor will available machinery enable this practice to be followed with land in fallow for winter cereal crops. Stubble mulching with crop residues will afford the necessary protection, but existing machines, with few exceptions, are usually incapable of working through any appreciable volume of trash.

A specially designed stubble mulching machine was purchased in June, 1948, for the purpose of conducting experiments relative to stubble mulching. This machine has worked very satisfactorily in all types of crop residue and weeds, and sufficient information has been obtained to enable a complete experimental programme to be initiated in the coming year.

In recent months reports have been received from three farmers practising soil conservation farming, and including stubble mulching, stating that they have been very impressed with the additional rainfall stored for crop growth as a result of the adoption of these practices.

SOIL CONSERVATION RESEARCH.

Two experiments have been established at Kairi Regional Experiment Station, one dealing with the spacing and gradient of contour banks, the other with the determination of the effect of various land use procedures on run-off and soil loss. Such experiments are a pre-requisite to extensive district work since Atherton Tableland conditions are not duplicated in countries where soil conservation research has been carried out.

At Hermitage Regional Experiment Station the initial work has been carried out for the conduct of two experiments, and these will be established in the coming year. One experiment will be devoted to the determination of the effect of land use procedures, including stubble mulching, on run-off and soil loss. The other experiment, more complicated, and the first of its kind in Australia, is intended to enable the testing of various waterway vegetative covers under pressure of various water velocities.

The experimental programmes at both stations have been hampered by the unavailability of suitable measuring equipment. The design of this is receiving consideration at present, and trial equipment will be installed in the coming year.

Control programmes have been designed for both Kairi and Hermitage Stations, and much of the work has been completed; in the past year, a 3,600 cubic yard dam, a waterway and several contour banks were constructed at Hermitage and an additional area contour banked at Kairi.

At Maroochy Experiment Station an area has been selected for the purpose of conducting soil conservation experiments. Construction work has been initiated, and since it embraces bench terracing and other procedures not previously utilised in Australia, any results obtained should be valuable to this State.

SOIL CONSERVATION DEMONSTRATION AREAS.

Because of the scepticism in many country districts concerning soil conservation, the establishment of demonstration areas has been the spearhead of the extension activities. These demonstrations are established for the purpose of publicly demonstrating methods of soil conservation, taking into account local conditions of soil type, slope, climate and agricultural practice. Eleven such areas have already been established on the Darling Downs, four in the Monto district and one on the Atherton Tableland. Work proceeded satisfactorily on all demonstration areas during the year. Each has served as a focal point of local interest, and there has been a marked increase in the applications for assistance from farmers in the vicinity of these demonstration areas.

Demonstration areas on the Darling Downs are being extensively used by the Department for various experimental purposes, including determining the most satisfactory method of vegetating waterways, land use procedures, stubble mulching investigations, and the relative merits of many standard conservation practices and modification of such practices.

EXTENSION WORK.

Five public soil conservation field days were conducted, 12 public lectures given to primary producers' organisations and others, and two film evenings for farmers held. Three groups of Commonwealth Rural Training Scheme students, one party of Primary School Project Club members, and one party of agricultural and horticultural field advisory officers (Refresher Course) have been conducted on organised tours of inspection of Downs conservation works.

The demonstrations are now approaching the stage where field days can be held with maximum benefit to the public, and the first such day was held in May. In the coming year it is proposed that field days will be held on every one of the demonstration areas.

Report on Regional Experiment Stations.

MR. W. G. WELLS, DIRECTOR OF REGIONAL EXPERIMENT STATIONS.

A very comprehensive programme of experiments relating to activities of the Division of Plant Industry was carried out satisfactorily at all of the Regional Experiment Stations. The more important results are reported in the following summaries of the investigations conducted at each centre, except where experiments were carried out either for other Branches or in conjunction with them, in which instances references to the results obtained appear in the appropriate Branch reports. The monthly rainfalls are presented in Table 1 to indicate the climatic conditions under which the experiments were conducted. Facilities were also made available at Kairi for the Poultry and Pig Branches of the Division of Animal Industry.

TABLE 1.

RAINFALL, 1948–49 SEASON (IN INCHES).

—	Hermitage.	Biloela.	Ayr.	Kairi.
July	1·36	1·62	·78	1·61
August	·54	Nil	Nil	·37
September ..	1·46	·41	Nil	Nil
October	·06	·07	Nil	Nil
November ..	2·33	2·45	1·24	·26
December	4·34	2·36	5·10	4·27
January	3·69	1·29	10·20	12·03
February	3·64	8·87	12·04	21·58
March	4·10	5·61	24·51	34·99
April	·05	1·81	1·77	7·42
May	·90	·57	Nil	1·06
June	3·29	1·01	Nil	·90
Total	25·76	26·07	55·64	84·49

HERMITAGE.

The climatic conditions experienced at this centre were suitable for demonstrating the value of having a good supply of subsoil moisture at planting time for both winter and summer grown crops.

Oats.

Mid-season conditions were adverse for establishing a repetition of the oat grazing trials of the previous season, so investigations in oats were confined to testing the seed-yielding ability of the main commercial varieties and the newer rust-resisting Klein, Victoria x Richland, and Fulghum x Victoria. Fulghum significantly outyielded all other varieties with 51.8 bushels of grain per acre. The dry late winter and spring reduced the incidence of rust so much that no advantage was obtained by the newer rust-resistant varieties. Their grain yields indicate, however, that in conjunction with their ability to produce good yields of either pasturage or hay, as was demonstrated in the previous season at Hermitage, these varieties should be very useful on the eastern Darling Downs.

Wheat.

The standard varietal trial mentioned in the last Annual Report was expanded last season to embrace testing of the varieties on both highly fertile alluvial black soil (see Plate 2, facing page 12) and a sandstone slope of only fair fertility. Table 2 presents the yields and also the data relating to the Pelshenke test for the gluten content of the grain of each variety. Mottling, which is associated with reduction of protein in the grain, was not noticeably present in any grain produced on the more fertile soil, though Puglu and Seafoam contained a high percentage of starchy grains. On the less fertile soil, Puora and Puno contained from 20-30 per cent. mottled grain, while Puglu, Warput, and Seafoam were characterised by largely starchy grains.

TABLE 2.

WHEAT VARIETAL TRIAL DATA.

Variety.	Hermitage.				Biloela.	
	Fertile Soil.		Fair Soil.		Fertile Soil.	
	Yield.	P. Test.	Yield.	P. Test.	Yield.	P. Test.
	Bus.	Min.	Bus.	Min.	Bus.	Min.
Gabo ..	39·0	242	33·4	118	37·4	123
Puno ..	35·6	201	30·5	133	42·1	162
Fedweb 5 ..	34·9	197	32·9	122	37·4	123
Flora ..	34·7	180	30·6	98	35·2	176
Pusa 4 ..	34·1	302	29·1	173	38·8	120
Puora ..	33·3	268	33·0	157	38·1	131
Puglu ..	33·0	56	29·4	43	33·6	34
Seafoam ..	32·2	176	24·9	139	34·2	122
Kendee ..	31·8	252	29·9	185	..	..
Charter ..	31·6	287	32·3	170	39·7	88
Warput ..	28·9	173	28·3	110	34·6	91
Yalta ..	24·1	198	30·6	164	..	..
Mean ..	32·8	211	30·4	134	37·1	117

Sorghums.

The standard grain sorghum varietal trial was continued on fertile alluvial soil similar to that used for the previous season's trial. Once more, Wheatland 11s outyielded all other varieties. Although the climatic conditions of the district are reasonably favourable for the production of pasturage from both grasses and crops, there is a definite need for ensilage for feeding the dairy herd during stress conditions. Accordingly, a trial of saccharine sorghums, embracing nine of the main varieties grown in the State, was conducted last season. The good growing conditions promoted excellent development of all varieties, with Saccaline S21, Jones J1, and Sugardrip S11 leading with 33 tons each. Further testing under less favourable conditions is required, however, to ascertain the relative merits of some of the quicker maturing varieties.

Miscellaneous Crops.

A trial of several maize double hybrids and the standard commercial variety of the district, which was conducted for the Plant Breeding Section of the Queensland Agricultural High School and College, grew satisfactorily but had not been harvested at the time of writing this report. Facilities were made available to the Agriculture Branch to conduct a linseed varietal trial, a canning bean varietal trial, and a sunflower varietal trial.

Pastures.

The testing of legumes and grasses from countries with conditions comparable to those of the eastern Darling Downs was expanded this season to embrace a total of 115 strains and species. Seed multiplication plots of the strains giving the most promise during the first two seasons of the trials were established and seed of a considerable number of strains was supplied to other centres.

The brome grasses continued to show promise, particularly *Bromus carinatus*, which not only performed satisfactorily far into the summer but also matured a heavy crop of seed from which a good stand of self-established seedlings resulted during the autumn. The wheat grasses continued in a fairly healthy condition but again failed to get much seed. The Auburn woolly-pod vetch repeated its performance of the previous season.

Several of the summer growing grasses performed well, but with the exception of Rhodes grass dried off early in the autumn. The Kenya and Kafue strains of Rhodes grass remained in an attractive green state well into May.

Hunter River continued to eclipse the other strains of lucerne established in previous seasons. The results to date appear to indicate that row spacings of this strain not only maintain growth to better advantage during dry periods but also increase the longevity of a planting compared with normally spaced stands.

Soil Fertility.

The green manure—superphosphate experiment of the previous season was repeated on the same area this season and once again the wheat crop benefited from the residual phosphate, in some treatments the gain amounting to as much as 6.8 bushels per acre. In contrast to the previous season, the wheat yields following bare fallow tended to be lower than following any of the green manures, especially in the plots not receiving phosphate. The results would appear to indicate that several years of ploughing under green manure crops may build up the organic matter content of this soil enough to promote sufficient increased production of nitrogen to improve wheat yields. The experiment is accordingly being repeated on the same area in the 1949-50 season.

The results obtained in the previous season's green manure experiment having indicated a lack of response by the wheat crop to the preceding green manures, a complex fertilizer trial was conducted on an adjacent area that had been under wheat in the previous season. An over-all significant response to both nitrogen and phosphate was obtained; the experiment will be repeated in the 1949-50 season to test for the effect of seasonal conditions.

An experiment was conducted on the alluvial soils of the Station to study the merits of turning under cereal stubble compared with burning it, and the value of either cowpea as a green manure crop or sulphate of ammonia applied just prior to turning under the stubble for supplying sufficient nitrogen to decompose the straw and to make ample nitrogen available for the following wheat crop. An over-all increase in yield of 1.7 bushels per acre was obtained following the turning under of the stubble, with the plots receiving sulphate of ammonia outyielding the fallowed and green manured plots in both the turned-under and the burned stubble areas. The experiment is being repeated on the same site to test for possible residual effects as well as reaction to the new season's conditions.

Soil Conservation.

The development of facilities for studying the merits of various soil conservation measures was continued during the season. A dam was constructed to provide a supply of water for testing the suitability of a range of cover crops for protecting constructed waterways. An area of some 25 acres was brought under cultivation preparatory to establishing a series of plots from which water and soil losses will be measured while under various croppings. The purpose of this is to determine the best crops and cultural practices to use on the cultivated slopes of the eastern Darling Downs. The areas already equipped with either contour or absorption banks yielded further evidence that soil losses can be largely eliminated by the use of such measures combined with suitable cultural operations and croppings.

BILOELA.

The climatic conditions experienced at this centre were even more suitable than those at Hermitage for demonstrating the value of a good supply of subsoil moisture at the planting period of both winter and summer grown crops.

Oats.

Over the years, oats planted in March have provided good late winter and spring grazing at the Experiment Station. To obtain further evidence as to the best grazing oat for the district a trial of the varieties Belar, Fulghum, Mulga and Sunrise, which had all performed well in past seasons, was planted in March on soil wet to a depth of 4 feet. As in previous wet autumns, Belar and Mulga yielded more pasturage which, judged by the results obtained from periodic sampling of the crops during the season, contained more crude protein per acre than the other two varieties.

Wheat.

A varietal trial of 10 standard wheats was planted in June following a total of 16.33 inches of rain experienced in February, March, May and June, which wet the subsoil to a depth of 4 feet. Although a total of only 48 points fell during the rest of the growing season after 1.68 inches in July established the experiment, an average yield of 37 bushels of grain of good quality was produced. The varietal yields are presented in Table 2 to allow of ready comparison of the performance of each variety at both Hermitage and Biloela. Soil moisture determinations throughout the growth of the crop indicated that approximately 25 per cent. of the moisture used by the plants was taken up after the grain had reached the dough stage and that the moisture to the full original depth of wet soil was exhausted by the time the crops reached the harvesting period. The results show clearly the value of practising a cropping rotation that will ensure all possible storage of subsoil moisture prior to planting wheat.

Linseed.

A varietal trial of the leading commercial varieties available in this State was carried out. The results are reported by the Acting Director of Agriculture.

Cotton.

The final results of the 1947-48 experiments may be summarised as follows:—

1. Cotton planted at mid-October following good rainfall and receiving a total of 10.3 inches of irrigation in January and February produced 1,600 lb. seed cotton per acre. Where an additional irrigation of 3 inches per acre was applied before planting, a yield of 1,820 lb. was obtained.

2. Irrigated cotton following both irrigated grain sorghum and irrigated cotton yielded respectively 1,561 and 1,476 lb. seed cotton per acre compared with only 530 lb. seed cotton per acre where rain-grown cotton followed rain-grown grain sorghum.

3. In an irrigated trial of some of the newer cottons bred at this centre, four out of 13 strains in the trial yielded between 2,300 and 2.361 lb. seed cotton per acre.

4. These same strains grown without supplementary irrigation reacted severely to the very adverse conditions experienced at mid-season, 573 lb. seed cotton per acre being the highest yield obtained.

5. Cotton grown without supplementary irrigation in the first or second year after the ploughing out of Rhodes grass of three years establishment outyielded cotton on areas which had been cropped annually, the gains being up to 140 lb. seed cotton per acre.

In 1948-49 investigations relating to cotton growing, as usual, were an important part of the season's programme at this centre, which is in the largest cotton growing district. Owing to the very dry spring, the rain-grown cotton was not planted until early December. Growth of these plantings was slow until the early February rains stimulated the formation of a light crop borne on a bushy type of plant. The cold weather of late April retarded the development of the top bolls so that only light yields, as a whole, were obtained from the rain-grown cotton.

The results obtained with the McCormick-Deering cotton picking machine in the trials conducted at the Experiment Station last season were so impressive that arrangements were made this season to test it in sufficient commercial plantings of irrigated cotton in the Theodore irrigation area to allow of representative costs of operation being obtained. The mechanical harvesting trials at the Experiment Station were perforce continued this season with the Rust cotton picker. The trials have not yet been completed, but the results obtained to date confirm previous findings that the Rust picker operates efficiently in clean cultivated cotton with plants of an open habit of growth. Both of these factors are important for, although the test areas were clean, the machine picked only 77.7 per cent. of the cotton in the Triumph variety and 87.3 per cent. in Miller compared with 97.4 per cent. in New Mexico Acala, which has a much more open habit of growth than the other two varieties. As a whole, the machine picked so efficiently that, wherever possible, it was used to harvest the Station's crop of both irrigated and rain-grown cotton.

Grain Sorghum.

A standard varietal trial planted at mid-December on soil which was wet to a depth of 54 inches grew satisfactorily through very dry conditions until early February, when the onset of the wet season ensured ample moisture to complete the development of the crop. The value of a quick maturing strain under such conditions was demonstrated by the Early Kalo E.K.1 which produced 38 bushels per acre and outyielded all of the main varieties. This strain was developed at Biloela by the Senior Plant Breeder to provide farmers with a quick-maturing type for growing either under conditions of late planting or where a season of only limited rainfall is normally experienced during the main growing period.

Pasture Investigations.

The need to grow Rhodes grass in a short term ley on forest soils instead of establishing it for long periods was well demonstrated by the yields obtained in areas of two and three years establishment, which were respectively 2.36 and 1.36 tons of air-dried hay of good quality per acre.

A comparison was conducted of Poona and C.P.I.9432, a strain of cowpea which the Commonwealth Scientific and Industrial Research Organization had supplied to the Agriculture Branch as being worthy of trial in Central Queensland. The introduction made outstandingly more growth, but Poona set a much heavier and earlier crop of seed. The trials will need to be repeated sufficiently to subject the strains to a range of seasons.

The testing of row cultivated areas of *Paspalum scrobiculatum* (scrobic), blue panic, green panic and Rhodes grass, mentioned in the last Annual Report, was continued. All species performed well under both dry and wet conditions during the summer. After being closely grazed early in April, however, all grew very slowly during the following rather abnormally cool weather, confirming previous findings that correct grazing management of these summer growing species is necessary to obtain the best results.

The nursery of grassland legumes was increased during the year, and some 73 strains and species are now under observation.

AYR.

Owing to the bulk of the experiments dealing with annual crops at this centre being grown in the winter and spring, it will always be necessary to report on the planting of such experiments in one Annual Report and to discuss the results obtained from them in the following one. The findings of the experiments referred to in the last Annual Report for this centre will therefore be discussed in this Annual Report by the appropriate Branches.

The excessively wet conditions experienced during February and March, 1949, retarded seed-bed preparations to such an extent that the autumn plantings could not be completed until late May. Rather cool conditions in June checked growth of some crops but at the end

of that month the following investigations were being implemented:—Potatoes—varietal, plant spacing and fertilizer trials; cotton—varietal, fertilizer, time of planting, time of irrigation, insect control, plant spacing and mechanical harvesting trials, as well as investigations into the merits of flame eradication of weeds and grasses in the row; maize—double-hybrid varietal and fertilizer trials and hybrid seed multiplication plots; sunflowers—varietal trials and seed multiplication plots; linseed—varietal trials and seed multiplication plots; grain sorghum—varietal trial; and also the testing and seed multiplication of a range of exploratory crops and legumes.

Considerable progress has been achieved in the development of this new Station. Some 20 acres were cleared of timber in preparation for establishing in the coming spring the cattle grazing irrigated pasture experiments to be conducted in conjunction with C.S.I.R.O. A new well was equipped to provide water for 35 acres on which investigations of irrigation and cultural practices relating to agricultural crops will be conducted. An area commanded by irrigation is in the course of preparation for the preliminary testing by grazing bullocks of a comprehensive range of pasture mixtures complementary to the main irrigation grazing experiment. An introductory nursery of grasses and legumes will also be estabished.

KAIRI.

The implementation of the plan of development of this centre was furthered this season in regard to both the establishment of animals to consume the crops produced on it and the expansion of the cropping programme. Feeding trials of chickens, capons, and pullets were conducted by the Poultry Branch. Facilities are being provided for the Pig Branch to conduct a comprehensive programme of pig feeding and grazing trials. To ensure that pigs yielding a carcase of high quality may be produced, a stud of the Tamworth breed was started. The development of the main cropping rotation under examination at this centre has now reached the stage where grazing and feeding trials can be conducted and a grade dairy herd will soon be established for these purposes. Calf feeding trials will also be embraced in these operations, which will be under the direction of the Division of Animal Industry.

The seasonal conditions experienced at this centre were suitable for testing crops for drought resistance from August until December and for ability to withstand exceptional rainfall during the wet season, a total of 76 inches falling from 1st January to the end of April. All farming operations were severely handicapped under such conditions but some very informative results were obtained under this wide range of weather conditions, these being presented in the following summaries.

Oats.

The plantings of Fulghum x Victoria and Victoria x Richland varieties of oats in comparison with Klein, which were mentioned in the last Annual Report, yielded very satisfactorily. Victoria x Richland planted on 20th April, 1948, had produced 9 tons 16 cwt. of green feed by 30th June, 1948, and an average yield of 2 tons 7 cwt. of hay of good quality and free of rust by 20th September, 1948; Fulghum x Victoria yielded only 6 tons of green feed and 2 tons of hay. The latter variety was equally as rust resistant as Victoria x Richland under the prolonged showery conditions of June and July, but with its slower early growth appears to be more suited for hay production. The performance of Klein confirmed previous impressions that this is an excellent variety for grazing but not for haying. It recovers well after grazing, and stands up to long dry periods late in the season, thereby supplying grazing during the transitional period between the spring and early summer crops, when green feed is usually so badly required on this section of the Tableland.

Wheat.

The good performance of the Warput variety as a hay wheat in the previous winter was repeated in 1948 although under much less late winter rainfall, only .37 inches of rain occurring in August. A growth of an average height of 3.5 feet was obtained, which made chaff of excellent quality.

Maize.

Following the planting period of the maize areas, prolonged wet conditions prevailed during most of the early growth of the maize and made control of the excessive weed growth impossible by normal economical cultural methods. Trials of a hormone-type weedicide having yielded promising results in the 1947-48 season, the main croppings of maize on the Station were sprayed, with beneficial results. Facilities were provided for further tests of this type of weedicide by the Agriculture Branch. This Branch also carried out a fertilizer trial and the second phase of the long-term maize-green manure experiment mentioned in the last Annual Report and grew a seed improvement area of a strain of the Durum type of maize.

Pasture Investigations.

The tropical legumes *Centrosema pubescens*, *Clitoria ternatea* and *Glycine javanica*, reported upon favourably last year, were completely killed back by a severe frost experienced on 26th August, 1948. It will be necessary, therefore, to subject these legumes to further investigation before combining them with grasses in field trials. Lucerne, on the other hand, grew well during the winter and evidence was again obtained that during dry periods this plant, when grown in cultivated row plantings, will continue to perform well after growth has ceased in the normal 7-inch drilled plantings. The results obtained in the investigation in which giant setaria is sown between the row-spaced lucerne at the start of the wet season confirmed previous findings that this practice will eliminate the need to cultivate to control weed growth during this period. The promising results obtained in 1947-48 with scrobic grass when grown in cultivated rows led to similar establishment of green panic, blue panic and the local Tableland strain of Guinea grass. The trial of all these species will be continued in the coming season, combined with inter-row planting of a suitable legume to eliminate inter-row cultivation during the wet season as well as providing a more protein-rich pasture.

Soil Conservation.

The plan for providing facilities at this centre to investigate soil conservation problems was developed further by the establishment of a comprehensive series of plots to study the efficiency of various croppings to prevent loss of soil and run-off waters.

The season's rainfall provided excellent conditions to test the merits of the soil conservation installations of the previous season. A rain group totalling 21.58 inches in 8 days with 5.72 inches in one day was experienced in February when the row crops were all too small to provide much protection for the soil. Maize areas on slopes of adjacent commercial farms lost tons of soil per acre through both sheet and gully erosion. Maize areas on the Experiment Station presented a pleasing contrast where grown either on fields in which contour banks had been constructed or on fields which had been subdivided into alternate blocks of maize and cover crops of some 250 feet width on the contour across the slope of the field. Soil loss in these areas with slopes from 5 to 8 per cent. gradients was confined to localised slight sheet erosion and small scale rilling. Adjacent unprotected cultivated areas awaiting planting were gullied to a depth of 6-10 inches and 1 to 8 feet wide in several places. The results of this severe testing encourage the belief that with the use of proper cultural and cropping methods, supported where necessary by mechanical measures, soil conservation can be economically and efficiently effected in this district.

Report of the Agriculture Branch.

MR. D. O. ATHERTON, ACTING DIRECTOR OF AGRICULTURE.

During the year under review the weather was generally favourable for farming activities. Advisory services to farmers comprised a considerable portion of the work handled at Head Office and the several country centres, but a good deal of attention was devoted to experimental work in the fields of plant breeding, crop varieties, pastures, soils and soil amendments. Progress in tropical pasture investigations continued at the Bureau of Tropical Agriculture at South Johnstone, and during the year pasture investigation work generally, and particularly in dairying districts, came under the control of the Branch. A successful experimental programme was initiated on the tobacco experiment farms and some progress was made with arrangements for summer fodder crop trials in the beef cattle country of the Gulf region.

CROP PRODUCTION.

Wheat.

The main sowing, begun in May, was completed in July, and heavy winter rains favoured good germination and early growth. Subsoil moisture reserves were ample, and aided by September rains the crop matured under favourable conditions and was harvested during November. Ideal harvesting weather was conducive to high quality and rapid handling, and the bulk of the crop was delivered to the State Wheat Board in record time. Both the area sown, 630,000 acres, and the yield obtained, 14,100,000 bushels, were records for the State.

Maize.

Early sowings were light, but the increased area planted after December rains brought the total up to average. Prospects were poor, until heavy February and March rains provided excellent growing conditions and raised the estimated harvest to three million bushels. Losses on the Atherton Tableland due to prolonged wet weather extending to April reduced the prospective yield there to 640,000 bushels. The acreage was lower than usual on the southern Darling Downs, but in the South Burnett the yield is expected to be three times that of the previous season. Fair to good crops were harvested in the Fassifern, Brisbane and Lockyer Valleys.

Grain Sorghum.

On the Queensland-British Food Corporation's land at Peak Downs some 30,000 acres are expected to be harvested. For the rest of Queensland, the area sown was less than that of the previous season, mainly owing to a reduction of several thousand acres on the Darling Downs. Areas sown in the South, Central and Upper Burnett and the Callide and Dawson Valley districts showed some increase and will provide increased quantities of grain for local stock feeding purposes. Early seasonal conditions in the Darling Downs and South Burnett districts were adverse and early crops returned only fair yields. Following improved growing conditions later, the main crop developed well and general average yields are expected to be high, despite some sorghum midge damage in late crops.

Sunflower Seed.

The area sown to sunflowers for seed showed an increase over that of the previous season in the Darling Downs and South Burnett districts. Harvesting extended from January to April, with heavier returns coming from early sown crops. Burnett district crops have returned approximately 8–9 cwt. per acre and Downs crops somewhat more, though some crop failures were reported from the latter area due to dry conditions during late December and January. Crops in other districts included 75 acres grown by the Queensland-British Food Corporation at Peak Downs.

Linseed.

The area planted to linseed was expanded to approximately 6,000 acres. Seasonal conditions were generally favourable, and growers received an average return of £15 per acre at contract prices. Favourable harvesting weather was responsible for good quality linseed. On the Darling Downs, yields were reduced by corn ear worm attack, particularly in late sown crops, but in the South Burnett crops on red soils

around Kingaroy showed little such damage and yielded about 7–8 bushels per acre. Sowing for the current season commenced early in April and sufficient seed was distributed to plant 14,000 acres on the Downs alone.

Lucerne.

Growth during the 1948 winter was excellent and prime hay was conserved. The mild season and favourable soil moisture also permitted heavier grazing than usual. During the spring large quantities of hay were available for central and north-western drought areas. In the summer, lucerne continued to provide heavy cuttings and allowed farmers to supply the market and replenish reserves.

Canning Beans.

The area established showed a considerable increase over the previous season, particularly in the South Burnett, where production was approximately doubled. Seasonal conditions were favourable, and some record yields were obtained. In the Warwick district crops generally returned satisfactory yields. The season's production is estimated at 30,000 bushels from 4,000 acres (about 2,500 acres in the Burnett and 1,500 acres on the Darling Downs).

Soybeans.

There is no development to report in the local soybean industry, and it is doubtful if the total area planted reached 50 acres. The 1947-48 statistics give the area for seed as 6 acres and yield 70 bushels.

Peanuts.

Following a December planting of the main crop in the South Burnett district, faulty seed due to adverse weather conditions at the end of the previous season reduced the effective area of Virginia Bunch until it was about equal to that of Red Spanish. The estimated planting of 27,000 acres in the South Burnett was lower than that of the previous year, but there was a small increase in the Atherton-Mareeba district.

Seasonal conditions have been favourable and average yields per acre are expected to equal those obtained last year, despite the generally low germination from Virginia Bunch seed. Peanuts were also planted in the Upper and Central Burnett districts and in the Central district. The total yield is expected to exceed 17,000 tons, including South Burnett 15,000 tons, Mareeba-Atherton 1,250 tons, and Central Burnett 750 tons.

Potatoes.

The spring crop, established with ample supplies of good seed, gave an excellent strike in the main southern districts. Highest yields of about 5 tons per acre were obtained in the Fassifern Valley; elsewhere yields of 2 to 3 tons per acre were common. At Mackay, from spring harvested crops, 475 tons of excellent quality potatoes were delivered, mainly for local consumption. In the autumn planting, heavy rains and high temperatures caused some rotting of seed, reducing the area planted by 10 per cent. compared with last year. State yields are expected to be about average—last year 29,230 tons were harvested from 10,660 acres.

Tobacco.

Irrigated crops occupied 678 of 1,188 acres of tobacco planted in the Mareeba-Dimbulah area and the district production was over 1,000,000 pounds of cured leaf. On irrigated farms harvesting was completed before the heavy cyclonic weather of February and March. The development of tobacco growing continued in the Burdekin and Herbert River areas, where early irrigated crops returned an average of 1,200 lb. of leaf per acre from 82 acres, leaf quality being exceptionally good. Inglewood-Texas crops harvested during February and March were satisfactory and the yield was generally high. The State harvest is expected to be over 2,000,000 pounds of cured leaf from 2,154 acres.

AGROSTOLOGY.

Pasture improvement investigations conducted by the Branch on dairy farms are financed from a grant made by the Pasture Improvement Committee of the Australian Dairy Produce Board. The Branch is also concerned in pasture investigations at the Bureau of Tropical Agriculture and on the Regional Experiment Stations, which are discussed elsewhere.

A total of 54 dairy farm experiments is in progress, the majority being long-term projects of which many have already been in operation for more than one year. Many experiments combine different types of treatment, e.g. where fertilizer trials are superimposed on plots containing several sown pasture species.

District Pastures Surveys.

During the year a farm to farm pasture survey of the East Palmerston district was made and arrangements were completed for a similar investigation of the Daintree River area. Inspections were also made of the grasslands of the Burnett River basin with special reference to the behaviour and value of three grasses now rapidly assuming prominence in that area, namely, green panic, buffel grass and blue panic.

Pasture Introductions.

While the introduction of pasture species is more efficiently carried out at the Branch and Regional Experiment Stations, a number of new species were maintained in plots at Mackay and Rockhampton. The Agrostologist maintained close contact with the introduction work carried on at the Experiment Stations and acted as consultant and adviser in that work.

Exploratory Plots.

Small plots consisting of summer and winter pasture species, including grasses and legumes, were planted out on farms for observation over a range of soil and climatic conditions. Such plots have been started in the following districts:—Atherton, East Palmerston, Mackay. Rockhampton, Bundaberg, Gayndah, Kingaroy, Gympie, and the South Coast. Similar types of plots have been arranged with the Department of Public Instruction as part of the School Project Club work.

Grazing and Persistence Studies.

Eight experiments ranging in area from one to five acres have been established on farms, each consisting of large plots of certain promising grasses which have been sown in combination with legumes. These plots are being grazed and tested for persistence and palatability in comparison with the local common grasses. Grasses which are being tested in this way include green panic, buffel grass, Guinea grass, blue panic and scrobic.

Fertilizer Trials.

Thirteen topdressing trials have been laid down and maintained in the main dairying districts. There have been no marked responses, except in trials at Conondale and Peachester. At Conondale on a sown paspalum and legume pasture, lime and superphosphate, with and without sulphate of ammonia, are giving good response. At Peachester, potash in combination with the fertilizers mentioned above is producing increased yield in sown paspalum and clovers, while the stock exhibit a marked preference for the treated areas. No data on the economics of the treatments are yet available, nor can the results be correlated with soil types until soil surveys are made.

Renovation Trials.

Renovation trials combined with topdressing on paspalum, Kikuyu, and blue couch grass pastures are in progress, and two additional experiments have been started. The plots are restricted to mat grass and blady grass infested areas and include trials at Gympie, Cooroy, Maleny, Kenilworth, Caboolture, Oxley, and Worongary.

Contour Furrows.

Pasture furrow experiments have been continued and fresh ones commenced, there now being six in operation. Close co-operation is maintained with the Soil Conservation Service in this work, and special attention has been focussed on the regrassing of the pasture furrows with improved grasses and legumes. Seed-bed formation in single pasture furrows drawn on shallow soils overlying heavy clays on hillsides is an important aspect of this type of work. None of these experiments has been in progress long enough to enable any conclusions to be drawn.

Pasture Irrigation.

Irrigated pasture trials are being conducted in co-operation with a farmer at Homebush, Mackay, where Para grass has been giving interesting results with spray irrigation. Plans have been drawn up for the early establishment of a flood irrigation trial with the same farmer. The Branch has also been closely associated with the irrigated pasture experiments being conducted at the Irrigation Research Station at Gatton.

Pasture Weed Control.

Experiments carried out at Ravensbourne on pasture weed control indicate that, when bracken fern and blady grass are absent, hormone weed-killers economically control inkweed and other important associated weeds. Trials with other pasture weeds are in progress.

PLANT BREEDING.

Plant breeding was concerned principally with wheat, sorghums, cotton, and maize in continuation of established projects. During the year, additional projects were commenced with pumpkins, sunflowers, and linseed, and minor programmes were maintained in oats, soybeans, cowpeas, and tobacco.

Wheat.

The main breeding programme aimed at combining high yielding ability, rust resistance, drought resistance, and milling quality, was successfully continued at Hermitage Regional Experiment Station, with subsidiary plots at Yarrala, Lawes, and Biloela. The season was favourable for wheat, and satisfactory seed yields were obtained from single plant selections and rod-rows . As rust did not occur this season as a field disease on the Darling Downs, no progress could be made in selecting for rust resistance in segregating generations. Useful rust readings were, however, secured from 181 varieties and strains in the observation plot at Lawes, where again many hybrid selections proved highly resistant in comparison with check varieties. In the nursery strain trial, Gabo (48 bushels per acre) set a high standard for yield, not reached by any of the hybrid selections tested. Strains from three crosses, however, yielded particularly well (notably Kenya 6042 x Pusa 4) and have given prior indications of good gluten quality. The back-crossing programme for the introduction of stem-rust resistance into standard Queensland varieties has been advanced by two generations in certain crosses, the back-crossing of Pusa 4 having been carried to the fourth generation.

Sorghums.

A Departmental selection from the variety Wheatland, which has been extensively tested under the name Wheatland 11s, again performed very well and will be increased for general release to farmers as the variety Alpha. Improvement of crops of the nature of sorghums requires much painstaking and tedious work, but one improved variety alone could within a short time repay the amount of work put into a sorghum breeding programme during a decade.

Breeding work was transferred from Biloela to Kingaroy, where a convenient area of land was leased for the purpose. Previously developed selections from the major grain varieties were grown in progeny rows for comparison and bulk seed production. In addition, progeny selection was commenced within the newer American introductions—Martin, Plainsman, and Caprock. A limited number of hybrid families was included within this initial Kingaroy planting, and many of the most promising progenies arose from the cross X.8 (Day Milo x Dwarf Kalo). Some F4 rows of this material, including both dense and relatively open head types, are at a stage at which they can be bulked for replicate plot testing. Progeny selections of promising sweet sorghum varieties were maintained, and two Sudan grass varieties, Roma and Sweet, were subjected to pedigree selection for purification of seed supplies. Mother-seed plots of a number of grain sorghum and sweet sorghum strains required for seed certification were successfully established and harvested.

Maize.

Both field and barn selections were maintained within the varieties Improved Yellow Dent, Star Leaming, Golden Beauty and Funk's Ninety Day. While main attention was devoted to the maintenance and improvement of seed stocks which suffered from inattention during the war years, an appreciable quantity of Improved Yellow Dent was made available for sale to farmers. Of the other varieties, Star Leaming has been restored to a very satisfactory varietal status and some improvement has been recorded in Funk's Ninety Day and Golden Beauty. A replicated ear-to-row test of Star Leaming at Hermitage Regional Experiment Station, designed to test the efficacy of this method of breeding in an established variety, progressed well, but yields are not yet available.

Cotton.

Several jassid-resistant hybrids and selections are available for increase as required and breeding for jassid resistance has been discontinued. Progeny work was continued in the varieties Miller, Triumph and Lone Star, with stress on the replicated testing of the plant breeder's strains. Considerable attention is being devoted to suitability for mechanical harvesting. New varieties being subjected to testing and seed increase include Miller 610, Locket, Empire Deltapine and a group of Acalas.

Pumpkins.

A pumpkin breeding project commenced in the Lockyer Valley is intended to purify a strain or strains within the Beaudesert or Queensland Blue varietal complex. Plots were established from a number of seed sources, and controlled pollinations were made on selected plants within the better plots. Fruits resulting from these pollinations were harvested and described prior to collecting the seed and submitting the flesh to culinary tests. Seed from the final selections will be planted in progeny rows under irrigation next season.

Sunflowers.

Recent expansion in sunflower cropping has directed attention to the necessity for purer seed supplies. While no comprehensive breeding programme is at present warranted, new seed stocks of both Sunrise and Mennonite have been introduced from Canada, and some head-to-row selection was carried out within local stocks of these varieties. Increase of these improved seed stocks will result in greater crop uniformity for purposes of mechanical harvesting. Small seed stocks of the two parent lines of Advance Hybrid were increased during the winter months in North Queensland, and small crossing plots were established in southern districts for determination of crossing plot technique. Hybrid seed resulting from these plots will be available for further testing.

Oats.

Breeding was restricted to further progeny selection within material from the cross (Bond x Victoria) x Hajira, but little progress was made because of the absence of rust.

Soybeans.

Varieties and selections were tested further at Kingaroy; the majority of varieties under test can be now discarded because of unsuitability for mechanical harvesting. Some of the best prospects for direct header-harvesting are selections from Rose Non-pop and Clemson Non-shatter.

Cowpeas.

A large range of hybrid selections was tested at Kingaroy, and a few of the best green manure types were retained for increase and regional testing. Pedigree selection was commenced within the wilt resistant variety, Reeves, as a prerequisite to increase for seed certification purposes.

Linseed.

A small programme of varietal purification has been commenced on the Darling Downs, as seed stocks used in varietal trials had proved to be very unsatisfactory.

Tobacco.

Careful control is being exercised over foundation seed stocks and new varieties are now being made available to growers based on performances in varietal trials.

SOILS TECHNOLOGY.

Potatoes.

The mean yields for three levels of nitrogen in trials are shown in Table 1. At Ayr there was a highly significant yield increase from an application of 2 cwt. sulphate of ammonia per acre and an additional 2 cwt. application caused a further significant increase.

TABLE 1.

RESULTS OF NITROGEN FERTILIZER TRIALS ON POTATOES.

Treatment.	Ayr.	Laidley Creek.	Tent Hill Creek.
	Tons of First Grade per Acre.		Tubers
No nitrogen	4·33	2·79	4·82
46 lb. N. (2 cwt. S/A) per acre	5·76	3·67	5·33
92 lb. N. (4 cwt. S/A) per acre	6·57	3·60	5·41
Minimum difference for significance	1·09 (1%) 0·80 (5%)	0·74 (1%) ..	0·35 (1%) ..

Further indications that a deficiency of nitrogen is fairly general in Lockyer Valley potato growing areas were obtained from two widely separated trials at Laidley Creek and Tent Hill Creek respectively. The interaction between nitrogen and phosphate, noted previously in a Fassifern Valley trial, was evident in the two Lockyer Valley trials, responses to nitrogen being lowered progressively by increasing applications of phosphate. Under practical conditions this means that better responses would be obtained from applications of straight sulphate of ammonia than from the same amounts of this fertilizer applied with phosphate.

In a Gatton trial, response to nitrogen was not obtained, probably because green manure crops turned under supplemented nitrogen supplies in the soil sufficiently to satisfy the requirements of the potato crop.

Yield was significantly depressed by 1 cwt. sulphate of potash per acre in an Ayr trial, while in a Lockyer Valley trial potash appeared to check Fusarium wilt incidence. In the latter trial, counts of wilted plants at an early stage of infection showed a significant difference in favour of high potash; a month later the difference had disappeared. Yields significantly favoured high potash, but this difference probably reflected delayed wilt infection rather than a soil potash deficiency.

In a green manurial trial at Gatton, in which potatoes followed a winter fallow and certain green manure crops (viz. wheat, field peas, wheat and field peas, blue lupins, and skinless barley), the mean yield from fallow plots (3.22 tons of first grade potatoes per acre) was lowest, but yield differences between treatments were slight and none was significant. The highest yield (3.66 tons) was from plots following a pure wheat stand.

Maize.

The peanut-maize rotation trial on forest soil on the Atherton Tableland entered its third year. In the second year there was a highly significant increase in yield of maize following peanuts, compared with maize following maize, of over 10 bushels per acre (40 per cent. increase approximately). Two maize green manurial trials on the Atherton Tableland, on forest and scrub soil respectively, entered their second year.

A fertilizer trial on forest soil at Atherton gave very significant responses to nitrogen, a significant response to phosphate, and no response to potash. The data (Table 2) indicate that an application of 2 cwt. sulphate of ammonia and 2 cwt. superphosphate per acre gave double the yield obtained from the unfertilized soil. Residual effects of the fertilizer are being examined in a second trial which has been set out on the area.

TABLE 2.

RESULTS OF MAIZE FERTILIZER TRIAL AT ATHERTON.

No nitrogen	26·63	No P_2O_5	32·31
23 lb. N. (1 cwt. S/A) per acre	37·27	49 lb. P_2O_5 (2 cwt. super) per acre	39·02
46 lb. N. (2 cwt. S/A) per acre	47·80	98 lb. P_2O_5 (4 cwt. super) per acre	39·37
Minimum difference for significance ..	9·37 (1%); 6·77 (5%)		

A fertilizer trial at Kingaroy which appeared to be giving very definite responses to phosphate was so damaged by erosion that no yield data were collected. No response to nitrogen, phosphate, or potash was obtained in a Boonah trial.

Peanuts.

Red volcanic soils have a high fixation capacity for phosphate and to compare the value of rock phosphate, serpentine superphosphate, and basic superphosphate with that of superphosphate, trials were set out on this soil type at Kingaroy. No significant response was obtained, although there were indications of responses to superphosphate and basic superphosphate on forest soil.

A significant response to potash was obtained in a trial on forest soil, whereas on scrub soil with a good potash status there was no response.

Lucerne.

Investigations continued with various soil amendments on lucerne in the Lockyer Valley, Fassifern Valley, and Beaudesert districts. Further evidence was obtained showing that response to superphosphate in these places is due to sulphur supplied as an ingredient of superphosphate in the form of calcium sulphate. Sulphates such as sulphate of potash and gypsum, and elemental sulphur, give good responses, whereas non-sulphur-bearing soil amendments such as muriate of potash appear to give none. Some trace elements tried have so far not been found useful, although a response to zinc was indicated in one cutting only in a trial at Gatton.

Though the accumulated evidence tends to show that the response of lucerne is to sulphur rather than to phosphates, it must not be inferred that the major plant nutrients—phosphate, nitrogen and potash—are not required in the agriculture of the Lockyer. Rather is it becoming more evident that many of the Lockyer soils, long regarded as of virtually inexhaustible fertility, do need a variety of fertilizer materials for efficient crop production.

Tobacco.

At the Mareeba Experiment Station no significant differences in yields were obtained from nitrogen at levels of 20 lb., 30 lb., and 40 lb. per acre, or from phosphate at levels of 60 lb. and 100 lb. P_2O_5 per acre. At Ayr and Ingham, trials involving levels of nitrogen of 6 lb., 15 lb., and 24 lb. per acre, and levels of phosphate of 45 lb. and 90 lb. P_2O_5 per acre, were established. No significant differences were obtained at Ayr, but at Ingham there was a significant response to nitrogen (Table 3). Data by which the qualities of the leaf from the various treatments in these trials can be compared are not complete, so that the significance of the various treatments cannot yet be fully assessed.

TABLE 3.

RESULTS OF TOBACCO FERTILIZER TRIAL AT INGHAM.

Rate per acre.	Nitrogen half blood, half nitrate of soda.		
	6 lb. N.	15 lb. N.	24 lb. N.
	Lb. of cured leaf per acre.		
45 lb. P_2O_5 as super ..	1,449	1,543	1,666
90 lb. P_2O_5 as super ..	1,470	1,569	1,629
Minimum difference for significance ..	180 (1%); 130 (5%)		

Nitrate of soda and sulphate of ammonia as sources of nitrogen were compared in trials at Ayr and Mareeba. No significant difference in yield was obtained, but as quality of leaf is the important factor in this investigation final analysis will depend on appraisal values.

The effect of D.D.T. on the chlorine content of the leaf was studied in trials at Mareeba and Ayr. Treatments involved different spraying schedules with the insecticide. The cured leaf taken from different parts of the plant has not yet been chemically analysed. The uptake of chlorine by the tobacco plant as a result of applying muriate of potash to the soil in place of sulphate of potash is being investigated at Ayr and Mareeba.

Long-term crop rotation trials were established at Mareeba and Ayr, involving one, two, and three-year rotations of tobacco with various cover and cash crops. At Mareeba the cover crops are Gambia pea and Rhodes grass, and the cash crops peanuts, sunflowers and maize. At Ayr the cover crops are native weeds and grasses, Gambia pea and Rhodes grass, and the cash crops peanuts, maize and potatoes. In each trial there are eight treatments, designed to vary from a deliberate exploitation of the soil to a rotation in which the maintenance of soil productivity is the primary object. These trials have made satisfactory progress to date.

Wheat.

Following responses to nitrogen and phosphate obtained last year at Hermitage Regional Experiment Station, fertilizer trials with wheat have been set out on farms in the eastern Darling Downs.

Canning Beans.

A fertilizer trial to determine the influence of superphosphate applications on canning beans was established on the Darling Downs. Complete data are not yet available, but there are no indications of beneficial effects. Residual effect of the fertilizer on wheat will be examined in a 1949 planting.

Linseed.

The effect of superphosphate at levels of 63 lb. and 122 lb. per acre on linseed in being investigated in a trial which was set out on the Darling Downs.

Miscellaneous.

Visits were made during the year to the Dirranbandi district to investigate the problem of "scalded" areas of country which occur extensively in parts of western Queensland. It is planned in co-operation with other Branches to carry out investigations aimed at reclaiming these areas on some holdings of the Australian Pastoral Co. Ltd.

Several soil profile samples have been collected from the Peak Downs property of the Queensland-British Food Corporation. The sampling sites have been plotted on a map, and it is proposed to sample again from these sites after a number of years. By comparing analytical data for the two series of soil samples it is hoped to follow any changes in fertility level of the soils resulting from continuous cultivation.

GENERAL AGRONOMY.

Wheat.

The most comprehensive series of varietal trials yet conducted on the Darling Downs was carried through successfully. Yield summaries are presented in Tables 4 and 5.

TABLE 4.

RESULTS OF VARIETAL TRIALS WITH EARLY, MID-EARLY AND MID-SEASON WHEATS.

Variety.	Mt. Tyson.	Brookstead.	Hermitage.
	Bus.	Bus.	Bus.
Gabo	35·0	37·6	49·1
Puno	35·0	36·6	45·7
Puora	32·0	31·4	43·3
Kendee	32·0	39·6	38·1
Puseas	30·1	36·3	39·9
T_5 F1.K	29·2	24·9	32·2
Charter	26·7	32·7	39·0
$K_{41}PF_2$–4473 ..	26·4	31·4	43·5
KGPF	26·1	31·9	42·8
$KGPF_2$–4521 ..	..	..	43·8
$KGPF_2$–4613 ..	..	..	43·7
$K_{54}P_4$–4608	..	..	38·3
Minimum difference for significance	3·79 (1%) 2·75 (5%)	3·79 (1%) 2·75 (5%)	2·69 (1%) 2·00 (5%)

TABLE 5.

RESULTS OF A VARIETY TRIAL WITH MID-SEASON, MID-LATE AND LATE WHEATS AT HERMITAGE.

Variety.	Yield.
	Bus.
Ford	44·6
Fedweb 5	44·4
Fl. Col. 3813 ..	44·1
Warput	41·9
Yalta	40·2

Differences not significant.

The main feature of the trials with the group of early wheats was the uniformly high yields of both Gabo (bred at Sydney University) and Puno (bred in Queensland). While Gabo grain finishes poorly under Queensland conditions, being of somewhat dull colour, pinched or wrinkled in appearance and with a low test weight, it appears to be very satisfactory in respect of its milling and baking qualities. It is not as well suited as some Queensland wheats or as Charter to the hotter, drier conditions normally experienced north of the Darling Downs. The grain of Puno is of high gluten strength, high test weight and good appearance. Puora, the most widely grown wheat in Queensland, gave a fair performance comparable with Puseas, Kendee and Charter. The unnamed Queensland crossbred wheats were less impressive than the other varieties.

Of the slow maturing wheats, the stem-rust resistant varieties Fedweb, Yalta and Florence x College 3813, in a year free from rust, gave performances comparable to Ford and Warput, both of which are susceptible to stem rust. Florence x College 3813, an unnamed Queensland bred wheat, showed the greatest promise of the stem-rust resistant varieties, since it is much more resistant to leaf rust than the other two and has also given evidence of frost resistance.

Wheat grain mottling has caused increasing concern to millers during recent years because of the lowered quality of the flour it yields, and investigation of factors which may influence the development of this condition was begun during the year. Preliminary work included a survey of areas where mottling occurred and a classification of varieties according to susceptibility.

Sorghums.

In a yield-observation trial at Emerald, where only 182 points of rain were received after planting, yields from Kalo, Plainsman, Early Kalo (E.K.7), Martin, Wheatland 11s, and

Wheatland were 14.4, 11.4, 10.8, 10.2, 9.3 and 9.0 bushels per acre respectively. Early Kalo was ready to harvest at least three weeks ahead of the other varieties and there was a grain loss before harvesting.

Varietal trials were planted on the Darling Downs, at Kingaroy and at Gayndah. Harvest data are available only from the two trials on the Darling Downs. The purpose of these trials was to compare the U.S.A. introductions—Martin, Plainsman and Caprock—and the Queensland developed strains Wheatland 11s, and EK7 with standard varieties. Results are summarized in Table 6.

TABLE 6.

RESULTS OF GRAIN SORGHUM VARIETY TRIALS.

Variety.	Brookstead.	Pittsworth.
	Bus.	Bus.
Wheatland 11s.	79·2	35·6
Wheatland	75·4	44·3
Plainsman	75·4	40·4
Martin	67·2	39·0
Caprock	64·6	38·0
Kalo	53·2	33·8
Early Kalo (E.K. 7)	48·2	33·5
Hegari	44·6	31·4
Mean	63·5	37·0
Minimum difference for significance	13·8 (1%) 9·3 (5%)	9·0 (1%) 6·1 (5%)

Two trials with fodder sorghums were carried out at Mackay; the results are shown in Table 7.

TABLE 7.

RESULTS FOR FODDER SORGHUM TRIALS.

Variety.	Tons of Green Matter per Acre.		% Protein.	
	Sarina.	Eton North.	Sarina.	Eton North.
Honey	15·75	21·62	5·4	2·4
Sugardrip ..	14·68	13·95	7·4	3·2
Italian	12·32	9·70	6·0	3·8
White African ..	11·82	14·70	5·6	2·6
Minimum difference for significance ..	1·70 (1%) 1·12 (5%)	3·25 (1%) 2·15 (5%)	..	..

In both trials the variety Honey was outstanding. The analyses of air dried material were interesting in that the protein percentage was much higher in the Sarina trial than in the Eton North trial. The former was planted in October and the latter in January, after the soil had been subject to leaching by rains.

Potatoes.

Bismarck again performed well in the varietal trials in the Lower Burdekin and so far, on a yield basis, has been the most promising variety used. However, bad shape and a tendency to make second growth are sometimes disadvantages of this variety. Factor has also performed well but germination is occasionally faulty. Of the other varieties, Early Manhattan has been more satisfactory than Katahdin, Brownell and Carman.

Closer spacing of setts than the 13-inch spacing normally used in the Lower Burdekin did not improve yields to the extent which was evident in previous trials.

In a variety-type of irrigation trial at Gatton the standard variety for the district, Factor, was compared with Sequoia and Sebago. The results are summarised in Table 8.

TABLE 8.

RESULTS OF A TYPE OF IRRIGATION TRIAL WITH FOUR VARIETIES OF POTATOES AT GATTON.

—	Sequoia.	Sebago.	Factor.	Means.
	Tons of First Grade Tubers, per acre.			
Spray	6·43	6·33	5·58	6·11
Furrow	5·90	5·00	4·64	5·18
Means	6·16	5·66	5·11	5·65

Spray significantly exceeded furrow at 1% level.
Sequoia significantly exceeded Factor at 1% level.

A hormone preparation, "Tubertone," dusted on the seed before planting, was tested in a spacing trial at Gatton where the normal spacing is 15 inches. The results are shown in Table 9.

Mean yields were low because of widespread wilt infection.

TABLE 9.

RESULTS OF A HORMONE TREATMENT TRIAL OF SEED POTATOES AT GATTON.

—	12″ Spacing.	15″ Spacing.	18″ Spacing.	Means.
	Tons of First and Second Tubers per Acre.			Grade
No hormone ..	3·97	3·67	3·68	3·77
Hormone	4·64	4·13	4·03	4·27
	4·31	3·90	3·85	4·02

Hormone significantly exceeds no hormone at 1% level.
12″ significantly exceeds 18″ at 1% level.
12″ significantly exceeds 15″ at 5% level.

Linseed.

Replicated trials were carried out at Hermitage and Biloela and two yield-observational trials using one acre plots for each variety were placed on farms on the Darling Downs. The yield data are summarised in Table 10, and the oil analyses data of linseed samples from the

TABLE 10.

RESULTS OF LINSEED VARIETAL TRIALS.

Variety.	Hermitage.	Biloela.	Pittsworth.	Brookstead.
	Bus.	Bus.	Bus.	Bus.
Bolley Golden ..	8·58	9·61	..	..
Morocco	8·30	11·04	14·64	14·75
Walsh commercial seed	6·08	..	11·86	15·06
Walsh strain D. ..	5·62	10·04	..	..
Malabrigo	5·14	5·54	9·50	9·21
Rio	5·06	5·70	8·18	8·77
Ghahreh	4·58	..	10·16	10·80
Ameliore	..	..	9·96	9·30
Minimum difference for significance	1·94 (1%) 1·41 (5%)	1·74 (1%) 1·24 (5%)	..	..

TABLE 11.

OIL CONTENT OF LINSEED VARIETIES IN TRIAL PLOTS.

Variety.	Percentage Oil.		
	Pittsworth.	Brookstead.	Biloela.
Morocco	38·5	39·2	34·1
Walsh	39·4	36·6	36·0
Ghahreh	38·2	40·8	..
Ameliore	42·5	37·3	..
Malabrigo	38·6	38·3	27·4
Rio	40·1	43·3	26·0
Bolley Golden ..	..	..	31·1

trials in Table 11. The general trend of yields indicated that late planted crops yielded less, the Hermitage trial being the latest planted of this series. As length of the growing season is believed to have an important effect on linseed yields, and as it is necessary to avoid peak flowering when the risk of pest attack is high, planting in April and May appears desirable. It is noteworthy that, with the exception of the variety Walsh, the oil content of linseed from Biloela was lower than elsewhere. Preliminary investigation indicates that superphosphate may also reduce oil content.

In a yield-observation spray-irrigated trial at Gatton, Morocco, Bolley Golden and Rio yielded 29.6, 21.3, and 16.6 bushels per acre respectively.

Experience this season has shown that none of the varieties is pure but results have indicated the potentialities of Morocco, Walsh and Bolley Golden. Purification of these varieties is being undertaken prior to further extensive varietal testing.

Tobacco.

Two varietal trials were carried out on experimental areas at Ayr and Ingham respectively. The total plot yields are shown in Table 12. As data for grading and appraisal values of leaf are not yet complete a final analysis to determine the most profitable varieties cannot be made here.

TABLE 12.

RESULTS OF TOBACCO VARIETAL TRIALS.

Variety.	Ingham.	Ayr.
	Lb. cured le	af per acre.
Yellow Special	1,624	2,056
402	1,597	1,735
Kelly	1,579	1,939
Yellow Mammoth	1,567	1,818
401	1,506	1,918
Mammoth Gold	1,492	1,936
Hicks	1,466	1,830
Gold Dollar	1,354	1,711
Virginia Bright Leaf ..	1,299	1,702
Cash	1,207	1,739
Minimum difference for significance	312 (1%) 231 (5%)	No significant differences

Sunflower.

Varietal trials were continued, and data from the main trial at Toowoomba are given in Table 13. A new hybrid variety (Advance), Sunrise and Mennonite (all three introduced in 1948 from Canada) were compared with the Darling Downs standard Giant Russian and locally grown seed of Sunrise and Mennonite. Giant Russian was outstanding, but it is a tall-growing variety and less suitable for mechanical harvesting than the others. The oil content of Giant Russian is usually higher than that shown in Table 13.

TABLE 13.

RESULTS OF SUNFLOWER VARIETAL TRIAL AT TOOWOOMBA.

Variety.	Lb. Seed per Acre.	% Oil.	Lb. Oil Per Acre.
Giant Russian ..	1,630	21·0	342
Advance (hybrid) ..	1,315	27·0	355
Sunrise (ex Canada)	1,008	27·0	272
Mennonite (ex Canada)	940	21·7	204
Mennonite	940	22·9	215
Sunrise	855	28·0	239
Minimum difference for significance	293 (1%) 212 (5%)	..	70 (1%) 50 (5%)

Maize.

In a spacing trial at Atherton there were no significant differences in yield from sowing rates varying between 22 and 66 plants per chain of row. Three trials in the same district designed to compare Durum types with a good type of local Dent will be harvested soon.

Three hybrid strains are being compared with the local standard variety in a trial near Warwick, but yields are not yet available.

Cotton.

Trials in the Lower Burdekin were unsatisfactory, chiefly because of delayed planting and prolific weed growth developing following heavy rains and before harvesting could be carried out. A comprehensive series of trials was planted again in April–May, 1949, with better prospects of success.

The results of a furrow-irrigated varietal trial at Gatton incorporating plantings in October and November and spacings of 12 inches and 18 inches showed that two selections from Triumph with 1,276 and 1,246 lb. of seed cotton per acre, respectively, were the most promising varieties. There were no significant differences for spacing. Yields, in general, were better from the later planting. Harvesting of varietal trials planted at Mackay, Bundaberg, Eidsvold, Gatton and Boonah is in progress.

The McCormick-Deering cotton picking machine imported by the Queensland Cotton Marketing Board in co-operation with the State and Commonwealth Governments was operated under the control of the Department of Agriculture and Stock. A trial in the Lower Burdekin (see Plate 3, facing page 26) and later trials on a more extensive scale at Theodore have indicated that this machine will pick cotton efficiently in suitable fields. This performance offers encouragement in solving the problem of labour for cotton picking.

Onions.

In a varietal trial at Rockhampton strains of Brown Globe, White Globe and Brown Flat secured from onion seed growers in the Lockyer Valley, with 11.5, 10.8 and 10.8 tons per acre respectively of commercial onions, were significantly better than Hunter River Early Brown (7.9 tons). Brown Spanish and Early Golden Globe were complete failures. Plots of several varieties on two different soil types have been planted at Gatton to investigate storage quality.

Canning Beans.

In a trial near Warwick of six new introductions from the U.S.A., Standard Pink, Red Kidney and Sutter Pink (all coloured beans) gave best results, but they were not promising compared with locally grown Small White and Michelite (both white beans). The local trade does not favour coloured beans and further work with the introduced varieties is not contemplated for the present.

The data from two varietal trials planted at Warwick to observe the relative merits of the local varieties Small White and Michelite and two recent introductions from the U.S.A., Pinto and Small White 38, are shown in Table 14. Pinto is a heavy yielding coloured bean and although of no immediate value for local consumption would be useful if different market requirements developed.

TABLE 14.

RESULTS OF CANNING BEAN VARIETAL TRIALS.

Variety.	Danderoo.	Hermitage.
	Bus.	Bus.
Pinto	29·14	20·2
Small White	27·40	12·1
Michelite	27·00	16·5
Small White 38	22·30	10·8
Minimum difference for significance	6·08 (1%) 4·34 (5%)	4·2 (1%) 3·0 (5%)

Sweet Potatoes.

The varieties White Maltese and Porto Rico, with over 15 tons of good tubers per acre, were outstanding in trials in the Rockhampton and Boyne Valley districts. Both are suitable for the table and for grazing by pigs. Further varietal trials to compare the yield of other promising varieties with these standards have been planted in the Boyne Valley and at Mackay.

Velvet Beans.

Because of the demand from sugar growers on the coast, interest has been shown by Tolga-Mareeba legume seed growers in the production of velvet bean seed. Two trials with six varieties introduced some years ago have been established in the area to determine which is the most profitable to seed producers. Harvesting is not yet complete.

Oats.

In order to test out on a wider scale three promising oat varieties—Fulghum x Victoria, Richland x Victoria, and Klein—several series of observation grazing plots were planted on the Atherton Tableland, in Central Queensland, in the Central Burnett, in the Beaudesert area and on the Darling Downs. In each case local standard oat varieties have been included for comparison.

Miscellaneous.

A trial to investigate control of black tea-tree (*Melaleuca pubescens*) was carried out at Kingaroy but no treatment was completely successful. A 10 per cent. solution of sodium chlorate at 200 gallons per acre was significantly better than all other treatments, with 20 per cent. arsenic pentoxide at 50 gallons per acre next in order of merit.

Control of sucker regrowth of bloodwood, gum-topped box, oak and wattle was investigated on the Evelyn Tableland, using arsenic pentoxide and sodium chlorate treatments. No significant control was established, gum-topped box particularly being very resistant.

Field Officers supervised numerous plots of maize, grain sorghum and Sudan grass for seed certification purposes.

TOBACCO EXPERIMENT FARMS.

Despite many difficulties in obtaining building materials and equipment, a comprehensive programme of tobacco experiments was carried out at Mareeba, Ingham and Ayr. The main lines of investigation covered fertilizer, varietal and crop rotational studies. Considerable information on spray and furrow irrigation methods of tobacco growing was obtained (see Plate 4). A summary of trial progress is included in the sections on Soils Technology and General Agronomy.

Officers of the Commonwealth Scientific and Industrial Research Organisation also carried out work at Ayr on the water requirements of the tobacco plant and plant breeding research.

BUREAU OF TROPICAL AGRICULTURE.

The main work has been the continuation and extension of grassland investigations commenced in 1946. Three years of pasture trials, using grazing animals, have been completed, while at Utchee Creek 60 acres are now under pasture. Plots of various tropical crops were maintained and some trials with rice, tea and fibre plants were conducted.

Pastures.

The long dry spell from September to December was unfavourable for pastures. However, the 20 acres of the rotational grazing trial carried 16 beasts for the 12 months and the animals made an average gain of over three-quarters of a pound per day. Despite the heavy stocking, 13 additional animals had to be introduced into the 20 acres to prevent excessive growth in February and March and Guinea grass pastures had to be mown.

Observations on pasture components confirmed those reported last year. The mixture of molasses grass and puero (*Pueraria phaseoloides*) was impressive.

Although the various pasture areas were well established at Utchee Creek, the initiation of grazing trials was delayed because of the unavailability of fencing materials.

Rice.

Yields from a varietal trial at Tully, referred to last year, were low—average 17.1 bushels per acre. Q.2309 (24.5 bushels per acre), Q.2308 (23.0 bushels per acre), and Q.2297 (21.2 bushels per acre) were the highest yielding varieties.

Further trials with 15 varieties were carried out on the South Johnstone Station and at Tully. Growing conditions were ideal but some plots at Tully were submerged and later overgrown with weeds. Harvest results are not yet available.

Plate 3.—A mechanical cotton harvester operating under Departmental supervision.

Plate 4.—Irrigating tobacco at the Mareeba Tobacco Experiment Farm.

Tea.

The tea plants were pruned in August and in February a harvesting experiment was commenced to obtain preliminary information on costs of production under Queensland conditions of hand harvesting. Appearance and quality of the tea manufactured with improvised equipment were surprisingly good and indicate that tea of sufficiently high quality for blending can be produced. An additional area of plants has been established for further investigation.

If mechanical methods can be adapted to harvest tea and so reduce production costs to economic levels, tea-growing may have a future in North Queensland. Demands for harvesting labour would be at a maximum when the demands of the sugar industry were at a minimum.

GULF EXPLORATORY FARMS.

Shortages of materials continue to hinder the development of these farms. In co-operation with a pastoral company on the upper watershed of the Flinders River, exploratory plantings of summer growing fodder crops such as sorghum, Sudan grass and cowpeas have shown some promise. Equipment is being assembled for operations at a selected site near Wrotham Park, north-west of Chillagoe, and the first ploughing will commence soon.

FODDER CONSERVATION.

The need for some form of fodder conservation is widely appreciated by graziers and dairy farmers, but, in general, primary producers are slow to implement positive action in this direction. Shortage of materials and suitable machinery has, however, remained a serious handicap.

The encouragement of fodder conservation is a basic principle of advisory services and the Department has continued to provide free of charge moulds, jacks, and engine-operated concrete mixers on loan to farmers who wish to build silos. The services of a Silo Construction Officer are also available free of charge. Reinforcement and roofing iron are sold to the farmer for silo building from Departmental stocks at cost price, while cement supplies are also sponsored. Sponsorship of roofing iron for sheds in which baled hay is stored is another service provided for farmers. A number of pit and tower silos were built during the year under the auspices of the Department, but unfortunately inability to replenish supplies of reinforcement steel has curtailed assistance for the building of tower silos. Interest has been shown in the construction of tower silos for grain storage and several were built with Departmental assistance. More will be constructed when reinforcement steel is readily available.

Interest in pick-up hay balers has increased and it is expected that, when these machines are freely available, many more will be in operation on Queensland farmlands.

The formation of machinery pools has made little progress, though financial and advisory services are available through Government agencies.

Report of the Horticulture Branch.

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

PRODUCTION INVESTIGATIONS.

Pineapples.

Plantings during the last few years have been heavy and approximately 850,000 tropical cases were harvested from the 1948-49 summer crop.

The industry urgently needs good planting material. The pineapple plant sports rather freely and unless field selection is rigorously practised uniform crops cannot be expected and the crops harvested fall below the desired standard. A plant selection programme has now been under way for some years and pedigreed planting material is available in limited quantities. This pedigreed material must first be propagated under supervision before mass distribution can be made to the industry. It is hoped to make the necessary arrangement for large-scale propagation during the coming year.

The pineapple scale, which was formerly confined to the Rochedale area, was discovered further afield during the year. Quarantines were instituted to deal with the situation and the measures prescribed should improve the position.

At present the cropping habits of the pineapple plant are controlled commercially to some extent by the use of acetylene gas to induce flowering. The practice simplifies crop management and lessens the risk of losses from black heart and other physiological troubles during the winter months. Synthetic plant-growth-substances have now appeared on the market and some affect the plant in much the same way as acetylene. Depending on the concentration used, they induce flowering, delay maturity and increase fruit dimensions. Their use in the pineapple crop has been explored and it seems that alpha napthalene-acetic acid will take the place of acetylene gas for controlling flower induction.

Bananas.

Approximately 470,000 cases of bananas were harvested in 1948 but plantings during the past season were low. This implied decline in production is probably temporary, as the area under bananas is apt to fluctuate violently from year to year and plantings can be quickly increased to cope with any obvious demand for good quality fruit. The trend from the dwarf Cavendish to the semi-dwarf Mons Marie and the tall Lady Finger varieties continues. Both have characteristics which make them profitable in marginal soils when plantations are well protected from severe winds.

The shortage of rich virgin scrub soil is focussing attention on management methods which conserve the soil, prolong the commercial life of the plantation, and regenerate the soil for a further planting when the initial crop has ceased to be profitable. In the South Coast areas, green manuring within the plantation may become a standard practice. Cowpeas planted across the slope in every alternate row during October usually germinate well and within a short period give a good ground cover which persists during the wet summer months. There is, however, a risk that the legume may compete with the banana plants for moisture in a dry spring but this risk is not important in the district concerned.

The regeneration of old banana land through the medium of the perennial pigeon pea also shows some promise. A light sowing of 8 lb. per acre made shortly before the plantation is abandoned has, in practice, given an excellent cover within a few months and maintained itself against competition for two years. The ground cover is complete, the litter increment to the soil is considerable and many of the theoretical requirements of soil rejuvenation are satisfied.

A number of trials was established recently to check the rate of growth in suckers appearing above ground at different periods of the year. The project is expected to supply information which should lead to more effective control of bunching in ratoon crops.

Citrus.

Heavy plantings of citrus have taken place during recent years and in 1948 approximately 480,000 cases were harvested, including 133,000 cases of mandarins. However, price levels are easing and this places a premium on efficient orchard management designed to ensure consistently high yields of good quality fruit. There is consequently a demand for irrigated properties. The advantages of irrigation were well illustrated in 1948-49, for most of the really payable crops have been grown in irrigated districts. The fruit harvested was, on the whole, good, although rind blemishes were rather common. Hot weather during spring and early summer hampered pest and disease control measures and heavy rainfall subsequently made such measures as were applied less effective than usual.

The main departmental service to the citrus grower is still the citrus budwood scheme, whereby selected budwood is supplied to nurserymen together with seed required for propagation purposes.

The demand for budwood last year reached a peak, with orders for well over 200,000 buds. A virus disease of citrus, psorosis, is apparently more common in Queensland than has hitherto been thought to be the case. Psorosis is transmissible through budwood and great care has to be taken by the cutters to ensure that trees from which the wood is cut are free from the disease. A survey of the psorosis position, in collaboration with Science Branch officers, has now been completed and the budwood scheme will shortly be reviewed in the light of the conclusions reached as a result of the survey.

Deciduous Fruits.

Both area and production of apples in the Granite Belt steadily increased over the last three years and reached a record in 1948. The figures are as follows:—

—	1945–46.	1946–47.	1947–48.
Acres ..	4,339	4,742	4,911
Bushels ..	413,537	445,187	455,254

There has been an increase of 1,586 acres in area and an increase of 189,087 bushels in production over the pre-war average based on the mean of the seasons 1937-38, 1938-39, and 1939-40. The increase in production is to some extent due to more satisfactory control of codling moth and fruit fly and the wider use of hormone sprays to prevent pre-harvest dropping.

Grapes.

An experimental vineyard has been established at Severnlea, near Stanthorpe, to study the behaviour of the more important grape varieties when worked on to eight phylloxera resistant vines and to investigate various pruning methods.

One four-year project terminated in the past season. It has been thought for some time that Waltham Cross and Purple Cornichon grapes respond better to long pruning than short pruning, which has been the general practice in the past. In this experiment, yields have been consistently increased by long pruning methods and the vines show no signs of reduced vigour at the end of the four-year period. No change is required in pruning methods for the Muscat-Hamburg variety, which is a consistent and heavy bearer when the vines are short pruned.

Papaws.

In 1948 approximately 358,000 cases of papaws were harvested, representing an increase of 50 per cent. on production in 1946 and 1947. Work in the papaw crop continues to make satisfactory progress. Two varieties, Bettina and Improved Petersen, have been fixed and pedigreed seed should be available for distribution to growers in the near future. Both varieties are far superior to the types grown commercially and their release to growers should permit the establishment of uniform groves bearing high quality fruit. Consideration is being given to the production of certified seed in both cases. The expansion of the papaw industry depends, however, on a remedy for the wastage caused by transport rots. These rots prohibit the shipment of large quantities of good quality papaws to distant markets. There seems little prospect of controlling the diseases by orthodox plant protection methods, and a breeding programme recently begun is designed to confer disease resistance on the more palatable types of fruit.

Miscellaneous Fruits.

Many of the economically less important but still valuable fruits have yielded good crops during the year. Strawberries bore well in 1948 and approximately 387,000 pounds of fruit were harvested, representing an increase of 50 per cent. on production in 1946 and 1947. Attention is being given to selection of good planting

material and to the nutritional requirements of the plant. A good yield seems to be assured again this year in the Redlands district, where the bulk of the crop is grown.

The avocado industry expands slowly but soundly and growers are becoming variety-conscious in their desire to supply the markets with uniform packs of well shaped, mature fruit; the varieties recommended at present are Fuerte and Nabal. Instruction is being given to growers in the working of these varieties.

Custard apples habitually flower profusely but yield only fair crops. Investigations therefore are in progress on the flowering habits of the tree with a view to determining whether yields can be increased.

The production of Queensland nuts has increased by 30 per cent. since 1946 and there is considerable interest in its value as a processed article. Yields from tree to tree are extremely variable and research work is in progress to determine whether planting material from trees of high yielding capacity can be propagated asexually.

Dates.

Most of the seven varieties of dates originally obtained from the United States of America and established at Chinchilla have now reached the bearing stage and show differences in their growth habits and the type of fruit borne. Four —Zahdi, Thoory, Deglet Noor and Barhee— are very desirable types, the most attractive being Deglet Noor, which has fruit of the semi-dry type that appears suitable for artificial ripening and preservation. Limited numbers of seedlings of these varieties have been propagated at Toowoomba and are available for restricted distribution.

VEGETABLE INVESTIGATIONS.

In southern Queensland, work on vegetable crops will automatically be expanded as the Redlands Experimental Station is developed. The current season's work has been restricted to a comparison of varieties which are already grown in the district and others which show possibilities for future use.

In the most widely grown French bean variety, Brown Beauty, there is a very considerable variation in growth habit, pod type and yield potentialities. Selections from a crop grown for seed certification have now been established at Redlands. Most French beans have to be strung before cooking. Some types not grown here commercially at present, though well known overseas, are free from this defect. One variety of these stringless beans, Florida Belle, gave good results during the year in North Queensland and may find a place in commercial production here.

SEED CERTIFICATION.

During the past few years varietal standards in tomatoes and beans have been greatly improved. This improvement is due primarily to the study of varietal characteristics and systematic selection within the types most suited to Queensland conditions. The work has been followed by the routine production of certified seed.

Four very high yielding varieties of tomatoes are available for sale through commercial channels. They are Q1, which is derived from Sioux; Q2, which is derived from Grosse Lisse; Q3, which is derived from Valiant; and Q4, which is derived from Rutgers. The seed has been produced by approved growers in the Stanthorpe district and is designed primarily for the use of growers in that district. Some will, however, be grown in other parts of the State.

Bean seed certification is less satisfactory, mainly because the risk of field infection by bacterial blights is high in the coastal districts where the crop is mainly grown. The main seed producing areas must, therefore, lie in a drier climate where the risk of infection is less. In these districts, the crop will only attract growers if and when methods of mechanical harvesting are available. Steps are being taken to speed up this development.

EXPERIMENT STATION ACTIVITIES.

Experiment stations are being developed to study horticultural problems of various tropical fruits and vegetables. As the progress results have already been discussed under each particular crop, the activities of each station are dealt with below in a general way.

Maroochy Experiment Station.

This station has now been established for three years. Its two main functions are to improve the plant type in the most important commercial crops grown on the North Coast, and to solve soil management problems associated with crop production on steep slopes in heavy rainfall areas.

Plant improvement work is well up to schedule in pineapples, citrus and papaws. Before long the Station should be able to feed into the industries concerned considerable amounts of pedigreed planting material, without which little real or permanent progress can be expected. An additional area has now been set aside for the study of soil and cultural problems associated with the banana industry. This project follows naturally from the results of pre-war investigations on the physiology of the banana plant.

New methods of managing cultivated crops grown on steep slopes are being investigated on the area assigned to pineapple selection work. This investigation may provide an answer to problems of permanent horticulture in this type of country, problems which at present appear insoluble. The outlook for the fruit industry on some parts of the near North Coast will largely depend on the results obtained.

Redlands Experiment Station. (See Plate 5).

Developmental work is in its early stages at Redlands Experiment Station. Four acres are now under crop and another four should be broken up during the coming year. Limited irrigation facilities have been installed but the creek supply source will be tapped when piping and other essential materials come to hand. The Station will very largely serve the Redlands district but the fundamental work which is to be initiated should assist truck crop producers, particularly, in all parts of the State. It is planned to initiate work on papaws and strawberries during the coming year and existing plans are designed to correlate the cropping programmes of the Station with various methods of soil management which may be applicable to the district.

Kamerunga Station.

Kamerunga Station is still in the developmental stage and attention has been given mainly to mangoes, papaws, beans and tomatoes. Though the last two are important, the main function of the Station will be to develop horticultural crops which are primarily tropical in habit. The requirements of some of these plants are not well known and there is a large field open for investigation.

PREPARATION AND TRANSPORT.

Refrigerated Transport.

A cool store at Thulimbah erected by the Committee of Direction of Fruit Marketing was used last summer for pre-cooling consignments of fruit and vegetables transported in iced wagons to northern Queensland. The amount of produce available from the Granite Belt was reduced because a considerable proportion of the crop was destroyed by frost.

Greater quantities of fruit and vegetables were railed in iced wagons from Brisbane and an additional eight-wheeled insulated wagon was made available during the summer to provide a weekly service to Mount Isa. Cool storage facilities for holding consignments after arrival are now available at Charleville, Longreach and Blackall, and the Committee of Direction of Fruit Marketing will commence a regular service to these towns next summer. The main western and coastal towns will then be well served by refrigerated transport, but the volume of traffic by this means will still be small compared with that consigned in louvred wagons. Technical difficulties have been overcome, but the multiplicity of wagons used for different foodstuffs is still a factor of considerable economic importance. Consideration has therefore been given to the construction of a fan wagon of a general purpose type which can be used for a number of perishable commodities and which will obviate the necessity for pre-cooling. In conjunction with the C.S.I.R.O., further measurements have been made of the thermal conductance of the C.M.I.F. wagon used for carrying fruit and vegetables. The larger ice carrying capacity of this type of wagon makes it more suitable than the C.M.I. type which is being used for carrying other produce over long distances.

Unrefrigerated Transport.

Better quality summer lettuce can be produced in the cooler Toowoomba districts than in the metropolitan area and the possibility of marketing this lettuce in Brisbane has been explored. Good results were obtained by washing the lettuce and packing it in cases lined with waxed or heavy brown paper. Preliminary transport trials with mangoes consigned from Cairns to Brisbane have indicated that further field work is necessary in order to evolve fruit of good eating quality and carrying capacity.

STORAGE.

Apples.

There is a good market for apples in Malaya and Hong Kong, and Queensland, through its favourable geographical position, is able to obtain the advantages of an early market. The trade now prefers the Granny Smith variety as a dessert apple and tests were therefore carried out in the Stanthorpe district to determine the earliest time at which these apples could be picked for desert purposes. The results indicate that Granny Smith apples from the 1948-49 crop picked during the second week in March subsequently ripened satisfactorily.

Citrus.

Preliminary cool storage trials with citrus fruits have indicated that considerable experimental work is necessary to determine the inherent keeping qualities of Queensland-grown fruits under various storage conditions. Overseas trade involving approximately 14 days' transit from Brisbane has increased considerably since the war. Some consignments are being carried at cool storage temperatures, while others are being carried at atmospheric temperatures. Therefore, until accurate data are available on the storage behaviour of fruit under various conditions, all commercial consignments for the present will have to be regarded as experimental.

Pineapples.

A record consignment of 90,000 cases of pineapples was forwarded to the Northgate cannery during the peak week of the summer season and cool storage facilities were used for holding the surplus until it could be handled. Satisfactory results were obtained by using storage methods recommended as a result of previous small-scale trials.

WASTAGE IN PINEAPPLES.

Water Blister.

The extremely humid conditions experienced last summer were very favourable for the development of the water blister fungus, which caused considerable losses in consignments forwarded to the cannery and to distant markets. Surveys of growers' harvesting and packing procedure indicated that careful handling and strict hygiene in the packing shed and environs are essential to prevent the development of the disease. Some growers are unable to adopt the necessary measures because of labour difficulties, while in other cases the topography of the plantation is not conducive to careful handling. The majority of growers, however, still fail to realise that expansion of an export trade can only be accomplished by strict adherence to recommended methods. Some control over packing establishments is now being exercised under the Commerce Export (Fresh-Fruit) Regulations.

Black Heart.

Black heart, which is an internal discolouration of the flesh associated with cool conditions at a critical stage in the maturation of the pineapple, causes an over-all loss of approximately 5 per cent. in the winter crop. At present, no satisfactory method of controlling its incidence can be recommended and further investigations are proceeding. In 1948, the maximum incidence of black heart developed 8-14 days after a period of low maximum temperatures. Black heart was also induced by severing the fruit from the plant and allowing it to ripen in the field. Further work is in progress to determine whether black heart is associated with any nutrient or water deficiency in the soil.

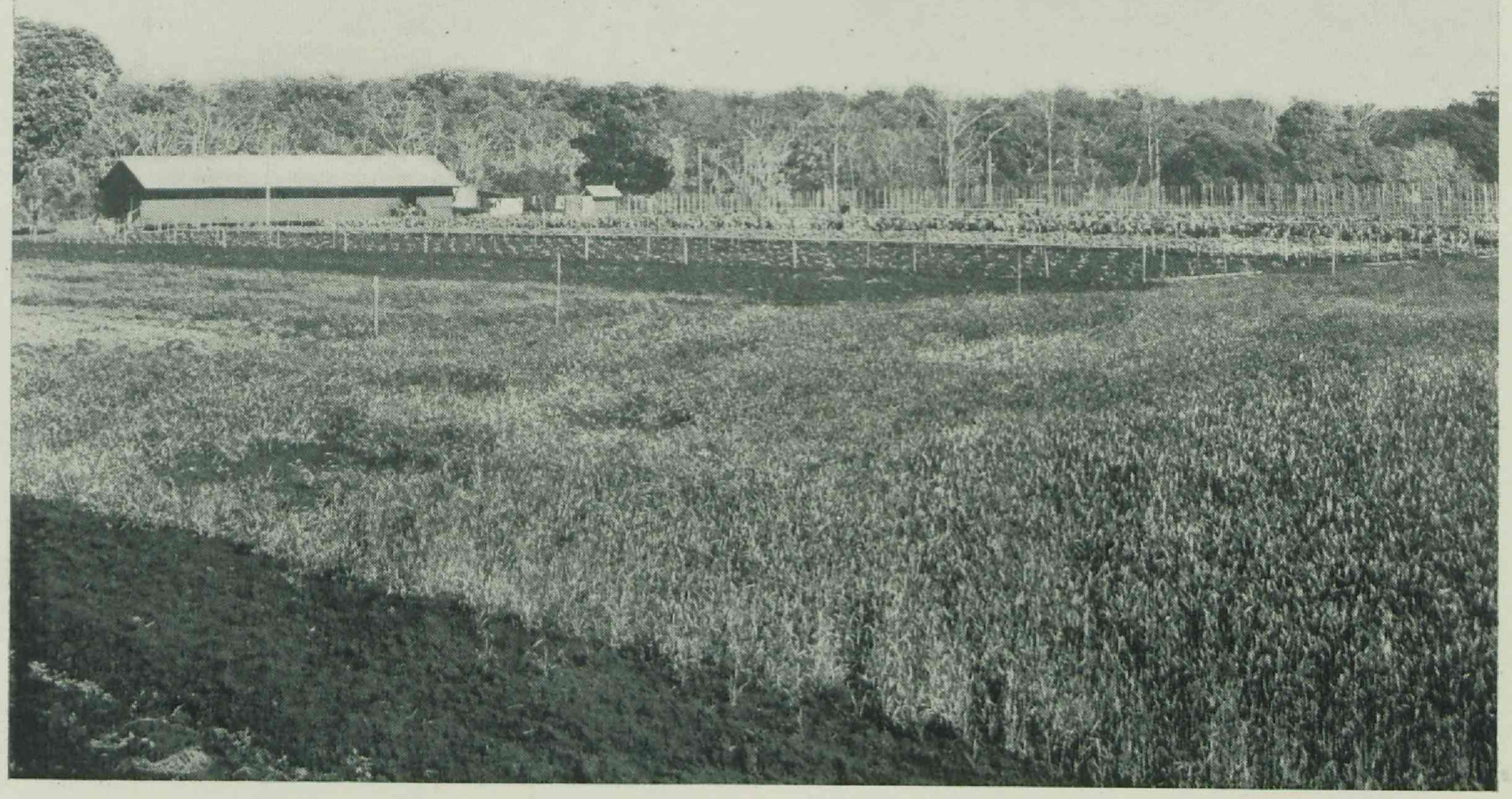


Plate 5.—Redlands Experimental Station—Ormiston. This property contains 26 acres of which about 18 are cultivable. It provides facilities for experimental work on fruit and vegetable crops grown in the Redlands district.

Plate 6.—Benzene hexachloride treatment for cane grub control. Plot on right treated at the rate of 84 lb. of 10 per cent. dust per acre. Untreated on left. Estimated difference 9 tons per acre. (Note.—Recommended treatment is now 150 lb. per acre to ensure control to the second ratoon crop.)

WASTAGE IN APPLES.

Considerable wastage through the development of superficial scald occurred in Granny Smith apples stored in the Stanthorpe district. Technical advice has been given to cool store proprietors regarding factors associated with the development of this disease, but considerable investigational work is necessary to determine the effect of both pre-storage and storage factors on fruit grown in the Stanthorpe district. A determination of the oil content of the wraps used for preventing the development of superficial scald has indicated a content considerably lower than that recommended for long storage of apples. As the wraps are imported from overseas and adequate supplies are difficult to obtain, no minimum oil content can be prescribed. The possibility of purifying the storage atmosphere is therefore being considered, as fairly satisfactory control of superficial scald by this method has been obtained overseas. Very good control of the trouble was obtained last season by dipping the fruit in an alcoholic solution of oil. This treatment also retarded ripening but in some cases slight injury was caused at the calyx end of the fruit.

RIPENING.

Bananas.

A survey of methods used in the commercial ripening of bananas has been completed. While the technique is fairly well standardised there is still a considerable range in temperature, humidity, and gas concentration in the various ripening rooms. This is largely due to the variable condition of the fruit at the time of ripening and to its treatment following discharge from the ripening rooms. The phenomenon of abnormal ripening in bananas harvested in the winter, known as "rubberiness," is being further investigated by determination of the various pectin fractions.

Tomatoes.

The length of time to ripen and the storage qualities of several varieties of tomatoes were assessed in conjunction with a number of field trials. In such investigations, however, maturity at the time of picking is a predisposing factor, and the storage behaviour of varieties cannot be compared on the basis of one picking maturity alone.

Maturity Investigations on Various Fruits.

Maturity investigations on grapes, apples, citrus, and pineapples were continued to determine whether any chemical or physical measurement of maturity could be correlated with palatability. The number of days from full blossom to maturity was again determined for apples. The average sugar content of 180 different samples of pineapples from the summer crop was approximately 12 per cent., which corresponds with the prescribed standard. A significant correlation was found between the sugar content, brix, and refractometer readings. These investigations are incomplete and will be continued.

PACKING.

Packing Instruction.

Instruction in packing was given to school pupils in the Stanthorpe and Maroochy districts in conjunction with the Department of Public Instruction. In the former district, 111 pupils were instructed in packing apples while in the latter district 85 completed the course in the packing of citrus fruits. Instruction was also given to commercial growers in many major horticultural districts.

Special Pack for Pineapples.

A special pack scheme for pineapples approved by the Committee of Direction of Fruit Marketing and this Department has now been initiated and a special and attractive label has been distributed to approved growers. It is hoped that the implementation of this scheme will eventually result in a marked improvement in harvesting and packing methods.

Experiments with Various Sized Cases.

Because the present apple dump case of 8 2/3 inches in width does not hold a sufficient weight of certain varieties of apples, experiments were conducted to determine to what extent the case should be increased in width. The case of 9 inch width was found to be satisfactory and will be used for overseas export next season. Experiments were also carried out with various sized cases with the object of finding a satisfactory container for the overseas export of pineapples. The tropical case of dimensions $24\frac{3}{4}$ x 12 x 12 inches is satisfactory provided fruit is carefully graded and packed with a liberal amount of woodwool. It has been found, however, that a smaller case ($24\frac{3}{4}$ x 12 x 10 inches) allows more latitude in grading and this case has given perfectly satisfactory results in trial shipments to New Zealand.

EXPORT.

During 1948-49 Queensland exported through the port of Brisbane approximately 35,000 cases of apples, 8,000 cases of citrus, 24,000 bags of onions and 400 bags of swede turnips. Through the port of Sydney approximately 19,500 cases of pineapples were sent to New Zealand. Export trade to places within a reasonable distance of the Queensland coast has increased considerably during the post-war period and the installation of mechanical ventilation and better stowage conditions in unrefrigerated holds should enable the consignments to be landed in a more satisfactory condition. A regular and fast service from Sydney to New Zealand is now operating and pineapples can be landed in New Zealand within 10 to 14 days after being harvested in Queensland. Results of commercial consignments are very unsatisfactory, however, the overall wastage in the summer crop being 25 per cent. on arrival of the fruit in New Zealand. Further distribution in New Zealand to towns other than the port of arrival would probably result in additional wastage. However, Departmental officers have demonstrated that by cutting the fruit from the plant and by careful handling and packing methods, consignments can be landed in New Zealand in excellent condition. Steps are now being taken to gazette standards of quality for export and to restrict export to growers who practice correct methods.

MARKET INSPECTION.

Except for temporary periods of glut, conditions in the market have been satisfactory and condemnations have been mainly for fruit and vegetables which had to be held over-long because no immediate outlet was available. Wastage was heavy in over-stored apples from southern States, in late harvested Queensland citrus, and

in pineapples marketed during February and March. The provisions of the Fruit and Vegetables Act dealing with topping and sales of produce on display have resulted in considerable improvement in trading practices, while the introduction of quality standards for all fruits and vegetables of commercial importance in Queensland should be welcomed by the consumer.

QUARANTINE.

The first conference of State and Commonwealth Quarantine Officers since 1941 was held in Melbourne in October, 1948, and as a result many of the present quarantine conditions are being revised. Consideration was also given to adequate publicity measures for educating the travelling public in regard to the dangers of importing foreign pests and diseases. Approximately 1,000 certificates have been issued covering the importation of agricultural products into Queensland. During the year approximately 7,000 logs, 290,000 pieces of sawn timber and 300 bales of cotton were imported. Additional provisions are being incorporated in the new quarantine regulations for these products, to provide adequate safeguards against the introduction of foreign insect pests into Queensland.

EXPORTS AND IMPORTS.

The following quantities of fruit and vegetables were exported to and imported from other States from 1st July, 1948, to 30th June, 1949:—

EXPORTS.

Crop.	Quantity.
Apples	26,150 cases
Avocadoes	5,578 cases
Bananas	205,358 cases
Custard Apples	16,052 cases
Grapes	14,149 cases
Grape Fruit	3,506 cases
Lemons	4,446 cases
Mandarins	5,517 cases
Mangoes	32,796 cases

EXPORTS—*continued.*

Crop	Quantity
Melons (Miscellaneous)	24,815 cases
Oranges	6,218 cases
Papaws	59,334 cases
Passion Fruit	8,081 cases
Pears	3,006 cases
Pineapples	62,272 cases
Strawberries	8,668 cartons
Fruit (Miscellaneous)	30,310 cases
Citrus (Miscellaneous)	51,000 cases
Beans	134,704 cases and bags
Beetroot	9,447 bags
Cabbage	2,157 bags
Carrots	904 bags
Chokos	2,180 cases
Cucumbers	84,748 cases
Marrows	22,486 bags
Onions	159,695 bags
Peas	1,534 bags
Potatoes	27,791 bags
Pumpkins	198,287 bags
Sweet Potatoes	30,052 bags
Swede Turnips	3,301 bags
Tomatoes	439,451 cases
Vegetables (Miscellaneous)	16,664 bags

IMPORTS.

Crop.	Quantity.
Apples	422,357 cases
Apricots	35,325 cases
Cherries	18,323 cases
Grapes	33,249 cases
Lemons	8,367 cases
Nectarines	1,589 cases
Oranges	213,723 cases
Passion Fruit	4,287 cases
Peaches	13,421 cases
Pears	118,046 cases
Plums	28,191 cases
Fruit (Miscellaneous)	154,796 cases
Citrus (Miscellaneous)	11,361 cases
Beans	12,675 bags and cases
Beetroot	122 bags
Celery	3,376 cases
Carrots	12,132 bags
Onions	94,659 bags
Parsnips	807 bags
Potatoes	285,278 bags
Swede Turnips	12,102 bags
Tomatoes	4,375 cases
Vegetables (Miscellaneous)	17,606 bags

Report of the Bureau of Sugar Experiment Stations.

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

CROP YIELDS.

The amount of cane crushed during the 1948 season was a record for the State and totalled 5,433,501 tons. This figure was in marked contrast to the 4,150,987 tons harvested in the previous year and demonstrated the productive capacity of the sugar lands in a favourable year with the existing cane varieties. Twenty-six of the States 32 mills exceeded their peak allocations and some extended crushings were experienced; 12 mills crushed into the new year, the last cane being crushed on 28th January, 1949.

The proportion of Queensland-bred canes showed an increase during the year. For the first time they reached over 50 per cent. of the total harvest and this was due mainly to an increase in the crops of Comus, Q.28, Q.44, Q.49, Q.50 and Trojan; the last indeed topped the one million ton mark. The percentage of varieties of Queensland origin is expected to increase still further in 1949 with the further propagation of Pindar and Q.50. Trojan will figure largely in future crushings of the Burdekin district whilst Q.50, in addition to its popularity in Mackay, is expected to extend rapidly in the Bundaberg district and parts of the Far North.

TABLE 1.

Composition of 1948 Crop on Basis of Countries of Origin.

Country of Origin.	Tonnage Harvested.	Percentage of Crop.
Queensland	3,438,833	53·5
New Guinea	1,200,841	18·7
U.S.A.	821,928	12·8
Java	625,111	9·7
India	189,179	2·9
Mauritius	98,096	1·5
West Indies	36,662	·6
Fiji	22,851	·3
	6,433,501	100·0

With the decline in plantings of Badila, New Guinea representation fell to 18.7 per cent. of the total whilst U.S.A. varieties, represented by C.P.29/116, displaced Javanese varieties, comprising mainly P.O.J.2878 and E.K.28, for third place. The Indian varieties Co.290 and Co.301 provided 2.9 per cent. of the crop whilst Mauritius, West Indies and Fiji varieties together accounted for less than three per cent. of the total crop.

The preliminary estimate of the 1949 crop made in May suggested that approximately 6,600,000 tons of cane would be available for crushing. This was later amended to 6,352,000 tons of cane and it is calculated that this amount will yield 882,000 tons of 94 n.t. sugar. If attained, this production will fall short of that of 1948 by some 28,000 tons in terms of 94 n.t. The area available for harvest was estimated at 282,865 acres. Much depends on late winter and early spring conditions in the sugar belt; should these be unfavourable to late growth it is unlikely that the estimated production will be realised. The incidence of frost in the south or the development of heavy arrowing in all districts could have a marked effect on the figures.

VARIETAL TRIALS.

Q.44 and Eros were the outstanding varieties in trials in the Mossman area, where P.O.J. 2878, Trojan and Badila were outyielded. In the Gordonvale district, Trojan was superior to other trial canes in 12 field experiments, though in several of them Eros produced more sugar per acre. Trojan and S.J.4 were the best varieties in the Innisfail-Tully districts, the latter variety producing 22 per cent. more sugar than Badila in four trials, while the former produced 17 per cent. more sugar than Eros.

In the Lower Burdekin, Q.45, in four trials, exceeded E.K.28 by 10 tons per acre, while on four other farms Trojan was superior to E.K.28 and Badila by margins of 5.6 and 9.0 tons per acre respectively. The Central district, as was to be expected, confirmed the superiority of Q.50, which succeeded in outyielding Q.28, P.O.J. 2878, Trojan, Q.44 and M.1900.

At Bundaberg, C.P.29/116 was the outstanding cane, though opposed to such good performers as Co.290, Q.28, Q.50 and Q.52. A similar result was obtained at Nambour against Q.28, Q.47, Co.290 and P.O.J. 2878. On the irrigated Bingera lands, Q.47 at 16 months produced 10.32 tons of sugar per acre, exceeding the yield of Trojan, Q.49, Atlas and P.O.J. 2878, which were placed in that order. At Nambour, Vesta performed well in other trials as a standover crop.

WEEDICIDES.

The investigations into the efficacy of hormone-type weedicides reported last year were advanced a stage further. The limited field in the sugar industry for weedicides which control only certain broad-leaved weeds necessitated investigation into the use of these substances as pre-emergence sprays whereby the germination of all seeds, including grasses, is inhibited. The preparation and application of a general purpose herbicide consisting of a diesel oil emulsion plus sodium pentachlorphenate and 2,4-D was also studied.

Considerable success was attained in preliminary field trials with both pre-emergence spraying and with the general purpose herbicide, and a tractor boom spray has been built for larger scale applications. Developmental work may be delayed somewhat by the present shortage of sodium pentachlorphenate in Australia, but pre-emergence control work will continue at an increased tempo and should within a short period become a commercial method. It is considered that present-day prices will make chemical weed control an economic proposition, particularly when labour costs for mechanical or manual weed control are so high. The field trials were limited to the period from February to June and experience has not yet been gained as to the efficacy of pre-emergence control during the midsummer period of maximum grass growth.

EXPERIMENT STATION ACTIVITIES.

Seedling Propagation.

In addition to the normal seedling activities on the three experiment stations, the propagation of seedlings and the subsequent planting of selections were carried out at the Bartle Frere (Babinda) and Foulden (Mackay) sub-stations. Arrangements have also been made for a small scale planting at Beerwah for the Moreton district; this project aims at overcoming the difficulty of selecting seedlings at Bundaberg for the much different conditions of the Maroochy River lands. Setts from some hundreds of desirable types will be transferred from Bundaberg to isolation at Beerwah and will later be planted in the Moreton area. It is hoped that this mass introduction will also provide a proportion of canes resistant to red rot and chlorotic streak diseases.

The usual field days were held at the three stations during April and May and very large attendances were recorded. At Mackay the field day was arranged to coincide with the annual Conference of the Queensland Society of Sugar Cane Technologists. The Station experiments which attracted most interest on the part of visiting growers were the ratoon stunting disease (Q.28 disease) plots at Mackay, the diesel oil emulsion and pre-emergence weedicide trials at Bundaberg, and the "Gammexane" work at Meringa.

Meringa Sugar Experiment Station.

This station retains its importance in Bureau field activity because of the centralising of cane breeding and entomological work in that area. The pronounced accent now being placed on (*a*) wild blood lines and (*b*) early maturing varieties has increased the number of combinations being made as well as the quality determinations in progeny. The necessity for more space has resulted in negotiations being put in train for the purchase of a further acreage of land adjacent to the Station. Although not eminently suitable for trial work, this land will be satisfactory for parent canes and for crossing procedure and will relieve the congestion now existing on the present acreage.

The pronounced success of benzene hexachloride in greyback grub control has made a further call on the services of the entomologist at Meringa in the way of increased trials. Work still proceeds on optimum dosages, residual toxicity effects and the application of 20 per cent. dust as against 10 per cent. dust for best

economic use. The control of frenchi grubs by BHC also calls for much further research work along similar lines.

Mackay Sugar Experiment Station.

The usual number of 7,000 seedlings were raised and planted out at this Station and selections were made on the previous year's seedling canes. The "trial marriage" Trojan x Eros produced canes of excellent type but the promise was not maintained in sett plantings. In advanced seedling trials E.129 significantly exceeded Q.28 while E.135 and E.119 were apparently as good as the standard. In another replicated trial Q.50 gave 9.92 tons of sugar per acre over the plant and first ratoon crops as compared with 6.36 tons for P.O.J.2878 and 3.72 for Trojan. Q.50 is now the unchallenged favourite of the Mackay district and has brought about a new conception of the district's productive capacity.

The ratoons of the filter mud trial showed that, although a 40-ton dressing increased the crop by 4.5 tons per acre, there was no corresponding increase in sugar. The value of this by-product therefore cannot be calculated simply, but must be measured over several crops.

Bundaberg Sugar Experiment Station.

Apart from the progressive seedling trials on the station which are subsequent upon the annual raising of 6,000 seedling canes, several investigational trials are carried out each year. During 1948-49 crops were harvested from (1) the permanent trash trial, which again gave no significant differences in yield; (2) a filter mud plus fertilizer trial, which although producing some 70 tons of cane per acre gave no indication of reaction to the treatments; (3) a long range rotational trial wherein 6-month fallows and 18-month fallows are included in the rotation; and (4) a plant residue and fertilizer trial which has not reacted to plant residue conservation since the inauguration of the trial in 1938. The trash trial and the plant residue trial (which includes both trash and legume treatments) have been carried on for 16 years and 10 years respectively and it can be assumed at this date that, on this soil type, no crop increases accrue from organic plant materials.

Further work with velvet beans was continued during the year and due publicity given to the advantages of these legumes in areas where bean fly or drought are likely to affect cowpea growth.

SOILS INVESTIGATIONS.

A brief summary of the year's results not only indicates the value of fertilizer applications but stresses the necessity for using the correct type of fertilizer. In assessing the results, emphasis has been placed on the amount of sugar per acre rather than the increase in tons of cane grown. An incorrectly balanced mixture may cause an appreciable increase in cane tonnage without the necessary increased production of sugar.

It is also interesting to note the number of areas which are now responding to an application of lime. The beneficial effect of lime is maintained over a number of years, so it is not necessary to recoup the outlay in one or two crops.

Once again the Bureau's thanks are due to the many growers who co-operated in the laying out and harvesting of the season's series of soil fertility trials. These trials were set down on a large number of farms and it is very pleasing to record that more than 80 were successfully completed.

Fertilizer Trials.

Standard factorial fertilizer trials were harvested on farmers' properties in the Gordonvale, Ayr, Mackay and Maroochy River districts. The results of the trial at Ayr are of particular interest in view of a recent soil fertility survey carried out in the Lower Burdekin. This survey showed that, in spite of fertilizer shortages and many years of cultivation to sugar cane, these soils are still, in general, well supplied with phosphate and potash. This was reflected in the yield figures of the trial, which indicated that the application of nitrogen only was necessary.

The third and final ratoon crop of a combined lime plus fertilizer trial was harvested at Gordonvale. The figures show that a single dressing of lime plus the annual fertilizer application resulted in a total increase of practically five tons of sugar per acre over the three ratoon crops. This is a profitable return for the purchase of 18 cwt. of fertilizer and two tons of agricultural lime.

Based on experimental work and observations over many years, Bureau fertilizer recommendations have always made a point of the fact that less nitrogen is required in the fertilizer mixture used at planting than in the one used at ratooning. However, since most sugar soils have now been cultivated continuously to cane for a large number of years, and because there have been many recent changes to more vigorously growing varieties, it was thought advisable to determine whether there had been any change in the nitrogen requirements of the plant crop as far as early application was concerned.

A series of trials was therefore laid down in all the main districts, in which the normal planting mixture containing 1.25 per cent. nitrogen was compared with a special mixture containing 6 per cent. nitrogen. Phosphate and potash applications were maintained at a constant level. The normal topdressing of ammonium sulphate was given. The harvest figures of the 39 trials completed, ranging from Mossman to Bundaberg, showed clearly that no advantage was obtained by using the higher nitrogen and more costly mixture at planting. It could almost be accepted that the reasons which prompted the use of approximately 1¼ per cent. nitrogen in the Sugar Bureau Planting Mixtures are still valid.

Lime Trials.

The first ratoon crops of 42 lime trials were harvested during the year. As in the case of the plant crops, there was again a response to the application of lime in the majority of cases. A beneficial effect was obtained on 37 farms (distributed throughout the main cane areas) either in the plant or ratoon crop, and of these 25 showed a response in both crops. The increase in the ratoon crop (average increase = 3.2 tons cane per acre) was greater than the average increase in the plant crop (2.2 tons cane per acre).

Fertility Surveys.

The soil fertility survey work was continued and 68 farms in the following districts were surveyed:—Fishery Falls, Mourilyan, Proserpine, North Isis, and Mount Bauple. Soil samples were taken from plant cane blocks on each property. These have been analysed and the growers concerned have been advised of the results, together with the requisite fertilizer and liming recommendations. In addition, 511 similar recommendations were forwarded to farmers in the Tully area as a result of the soil analytical work carried out in the Tully mill laboratory. Table 2 indicates the general fertility trend in the surveyed areas.

TABLE 2.

Soil Fertility Trend in Surveyed Cane Areas, showing Percentage of Soil Samples at each Fertility Level.

District.	Phosphate.			Potash.			No. Samples.
	Low.	Fair.	Good.	Low.	Fair.	Good.	
	%	%	%	%	%	%	
Fishery Falls	7	16	77	64	22	47	31
Mourilyan ..	7	14	79	72	26	2	43
Proserpine ..	18	19	63	88	10	2	51
North Isis ..	5	36	59	15	41	44	39
Mt. Bauple ..	..	25	75	62	38	..	16
Tully.. ..	31	22	47	65	26	9	511
Total ..	25	22	53	64	26	10	691

The figures are interesting in view of the indication that potash appears to be replacing phosphate as the major plant food requirement. Possibly this is a reflection of the use of high phosphatic fertilizers over many years.

Laboratory Work.

During the year, 1,067 soil samples were analysed, of which 334 represented those done at farmers' requests. Some 50 other samples, consisting of irrigation waters, mill by-products, &c., were analysed.

ENTOMOLOGY.

Apart from a marked increase infestation by the greyback grub pest, to which further reference is subsequently made, most of the other more common cane pests remained at normal population levels, and with the good growing conditions that prevailed throughout the wet season they were responsible for nothing untoward in the way of crop losses. The anticipated record crop production for the coming season reflects in some measure the general freedom from severe and widespread pest damage. Details in connection with some of the more serious pests are as follows:—

The Greyback Cane Beetle (Dermolepida albohirtum Water.).

In most of the northern cane areas flights of the greyback beetle occurred during the last week of December, 1948, following the first really substantial falls of rain for the summer period round about Christmas. These flights generally were heavier than those of the previous year, and the ensuing weather favoured a high survival ratio in the egg and young grub stages. Particularly was this so in the Mulgrave area, where damage and uprooting subsequently became visible as early as April, 1949. But for the continued showery weather losses would have been heavier; however, the rains proved to be a not unmixed blessing, since the wet soft ground lent little in the way of support to the sticks once their roots had been completely destroyed and whole fields of cane collapsed earlier than might otherwise have been the case.

Despite these instances of damage the overall losses in the 1948 crop did not compare with those sustained in previous outbreak years when large tracts of cane were devastated. This was because most of the areas normally subject to heavy infestation had previously been treated with benzene hexachloride as "Gammexane" and it is estimated that not less than 7,000 acres received this protective dressing during the past year. A larger acreage would undoubtedly have been treated had sufficient supplies of this insecticide been available.

The efficacy of "Gammexane" treatment (see Plate 6, facing page 30) is now unquestioned, and results have been so clear-cut that the demand has risen steeply. In one mill area alone, an original order for 80 tons of 10 per cent. dust to cover the growers' 1949 requirements was recently increased to 140 tons. The supply position during the coming season is expected to show a marked improvement, since in addition to the fairly substantial amount now being manufactured in Australia some firms propose to import benzene hexachloride from "soft" currency countries in Europe.

Consequent on the heavy grub infestations that were experienced this year, many of the experimental plots showed marked differences, and though these plots have not yet been harvested differences clearly indicate the persistence of "Gammexane" in the soil and its high residual toxicity. Original dressings at the rate of 150 lb. of 10 per cent. dust (1.3 per cent. gamma isomer) per acre made to plant crops in October, 1946, remained sufficiently toxic to kill all grubs in the subsequent second ratoon crops during February to April, 1949. Below this level some damage was apparent.

Other "White Grub" Pests.

Grubs of "frenchi" (*L. frenchi*) and similar two-year cycle beetles were responsible for some damage on a few farms in the mill areas from Mulgrave to Mossman, and also at Mackay. Flights of these beetles during December, 1948, were for the most part fairly dense. Although all experimental work was hampered through lack of heavy infestations in the treated areas, experiences with these grubs in the Cairns area gave indications that they might prove amenable to control if concentrated drill dressings of "Gammexane" were made at rates of 100-200 lb. of 10 per cent. dust, or the equivalent, per acre. Since there has been an appreciable price reduction in quotations for the 20 per cent. product, equivalent dressing of this at the heavier rate would still be well within the economic limit. Trials with the southern cane grub (*P. furfuracea*) revealed nothing definite, mainly because of light infestations and an extraordinarily good growing season.

Wireworms (Lacon variabilis).

Trials harvested in the Mackay district gave evidence that "Gammexane"-fertilizer mixtures placed at planting time in partial contact with

the setts provided complete protection against wireworms if the "Gammexane" was used at the rate of 20 lb. of 10 per cent. dust per acre and mixed in with 3 cwt. of the appropriate fertilizer; moreover, the insecticide had no depressing effect on ultimate crop yields. This rate is now the standard recommended for wireworm control in Central districts, and some 3,000 acres were treated last season. Wireworm infestations during the winter plantings were extensive but not heavy, and even under these conditions the use of the "Gammexane"-fertilizer mixtures produced some outstanding successes.

ANIMAL PESTS.

Losses due to rats were greater than for the corresponding period of the previous year and these pests were present in small concentrations in widely dispersed areas. These populations were not in any way indicative of a build-up to plague proportions, but nevertheless baiting was continued in most areas. Investigational work with two new poisons—"1080" (sodium fluoracetate) and "Castrix"—were completed and both were proved to be efficient rat poisons. "Castrix," however, is not considered suitable for use in canefields. "1080" is not as satisfactory as yellow phosphorous paste on bread for use as a snap bait. On the other hand, it could replace the more expensive thallous sulphate in packeted baits without loss of efficiency or safety, but because of the extremely dangerous nature of this poison and the fact that there is no known antitode no Cane Pest and Disease Control Board has yet used it in any general baiting campaign.

Little permanent relief from the inroads of pigs and wallabies has been possible because of the continued shortage of pig wire and wire netting. Orders in many instances are two years in arrears. Attempts are being made to keep these pests under control by increasing the amout of bonus paid per scalp, and in some cases these increases have been made on a temporary basis. Wallaby scalps paid for in the Mackay area receded from over nine thousand in 1947 to under four thousand in 1948. Beagle hounds continued to do good work in the destruction of wallabies in the Burdekin area, and as more pups were bred they were distributed to growers in the outlying parts of the district.

CONFERENCE OF CANE PEST AND DISEASE CONTROL BOARDS.

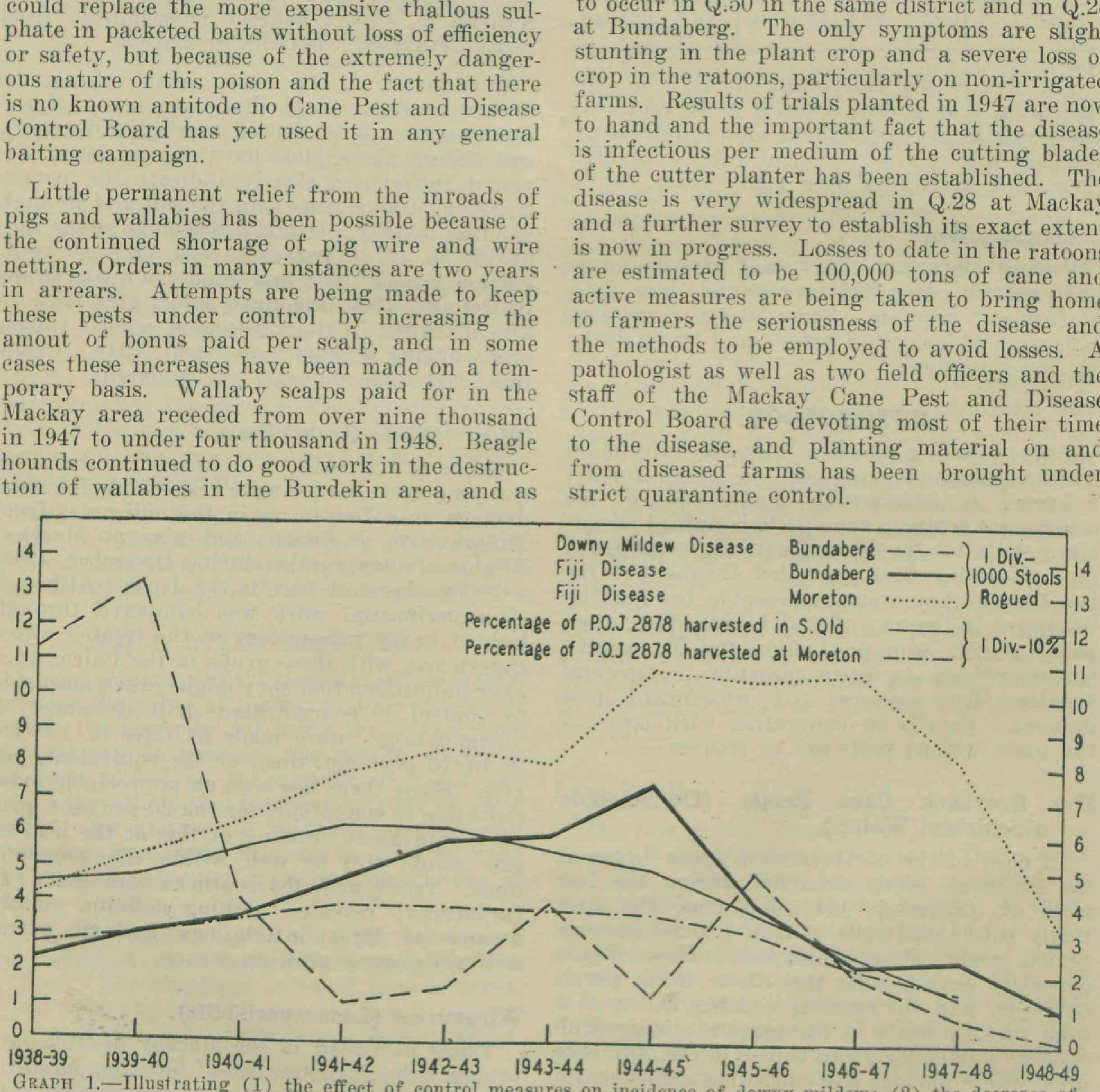
The usual annual conference of Cane Pest and Disease Control Boards was held in Mackay and the delegates who attended represented centres as far distant as Mossman and Moreton. It was decided to amend the constitution to permit discussion of all matters coming within the ambit of the "Powers and Duties of Cane Pest and Disease Control Boards," whereas previously discussion had been limited to pests and allied subjects.

The latest information on "Gammexane" experiments against grubs and wireworms was made available, as well as details of the newer rodenticides. Arrangements were also made to collect and record pest and disease data on a simplified basis.

PATHOLOGY.

Ratoon Stunting Disease.

The severe stunting in ratoon crops which initially came to notice as a disease of the variety Q.28 in the Mackay district has now been found to occur in Q.50 in the same district and in Q.28 at Bundaberg. The only symptoms are slight stunting in the plant crop and a severe loss of crop in the ratoons, particularly on non-irrigated farms. Results of trials planted in 1947 are now to hand and the important fact that the disease is infectious per medium of the cutting blades of the cutter planter has been established. The disease is very widespread in Q.28 at Mackay and a further survey to establish its exact extent is now in progress. Losses to date in the ratoons are estimated to be 100,000 tons of cane and active measures are being taken to bring home to farmers the seriousness of the disease and the methods to be employed to avoid losses. A pathologist as well as two field officers and the staff of the Mackay Cane Pest and Disease Control Board are devoting most of their time to the disease, and planting material on and from diseased farms has been brought under strict quarantine control.



GRAPH 1.—Illustrating (1) the effect of control measures on incidence of downy mildew; (2) the decrease of Fiji disease with the decreasing area of P.O.J.2878.

Downy Mildew and Fiji Diseases.

Downy mildew disease broke out again in the Hambledon Mill area near Cairns in January, 1949. The last previous record of it in this locality was in 1943 and the source of the new outbreak is not known. A total of 53 acres on two farms was found to be affected. The experience of previous outbreaks in the North indicate the necessity for the adoption of a vigorous roguing programme if the threat to the major varieties, Trojan and Eros (both of which are very susceptible to the disease), was to be removed. Diseased blocks were inspected every working day and it is gratifying to record that from a peak of 19 diseased stools on one day the number fell until in autumn only one stool was found in six weeks.

The respective Cane Pest and Disease Control Boards operating under the general direction of the Bureau have maintained continuous systematic inspections for downy mildew and Fiji diseases in the Bundaberg district and for Fiji disease at Moreton over a period of 11 seasons; the figures of diseased stools rogued are recorded in Graph 1, together with the percentage of the South Queensland crop represented by the variety P.O.J. 2878. This cane is, of course, susceptible to both diseases and accounted for the majority of diseased stools found. A study of the figure shows that downy mildew was the more serious of the two diseases in Bundaberg when roguing operations commenced, but two season's roguings together with control of the sources of plants for individual farms considerably reduced its incidence and thereafter the disease was, in general, being kept under control, though its virtual elimination awaited the abandoning of the variety. The important point is that the roguing campaign and measures associated with it allowed the growing of this valuable cane until a suitable substitute—C.P. 29/116—was available; without it direct losses would have been severe and plantings of P.O.J. 2878 would certainly have been curtailed before there was any other suitable cane to take its place. The Fiji disease in the Bundaberg district was kept within reasonable limits by the control measures adopted, despite the fact that the 1944-45 peak represented a 25 per cent. increase on the figure for the previous year; the reason for this was the discovery of a concentrated outbreak which had obviously been getting worse for some time before its presence was realised. Thereafter, the decrease in Fiji disease followed closely the decline in P.O.J. 2878. In the Moreton area, where heavier crops and higher rainfall have always given more infection with Fiji disease than at Bundaberg, the number of diseased stools increased steadily when P.O.J.2878 plantings remained stationary and there was an alarming upward leap in 1944-45 when P.O.J.2878 was actually decreasing in popularity. The indications were that the roguing scheme was not holding the disease in check. However, the newer varieties were rapidly displacing P.O.J.2878 and as this cane is eliminated from the badly diseased areas the number of stools rogued has dropped.

Chlorotic Streak Disease.

Chlorotic streak disease yield trials showed again that the variety P.O.J.2878 suffers severe losses and indicated that the newer varieties—Q.47 and Q.49 may also be reduced in yield when diseased. A ratoon trial in North Queensland showed no significant loss in yield due to the disease, in marked contrast to previous trials in that region.

CANE BREEDING.

In consequence of the dry spring of 1948 all cane was relatively retarded in growth and though good rains were recorded during January, February and March, 1949, the general backwardness of the crops appeared to have some influence in the arrowing. The flagging which occurred during mid-May pointed to an excellent flowering season but this promise was not maintained and some favoured parents failed to arrow. One of the principal of these was Oramboo. On the other hand, Korpi arrowed rather earlier than usual and Badila arrows were plentiful at Freshwater by the middle of June. The cross pollination period during June, 1949, was dry and only a few points of rain occurred.

In making the crosses particular emphasis was placed on the production of early maturing varieties and every possible combination was made which might produce progeny having a good sugar content early in the season. Only a very few purely noble crosses were made, as seedlings from these now seem to lack the hardiness demanded in modern varieties.

The volume of work being handled by the Plant Breeding Section may be gauged from the fact that at Meringa almost 8,500 seedlings and 9,300 first ratoon plants are available for selection, while many thousands more are being propagated at Babinda, Mackay and Bundaberg.

Selections from the previous year's original seedlings at Meringa yielded 86 varieties, which were planted in 40-sett plots. These included 12 selections made purely for use as parents. At Babinda, 27 selections were made whilst at Mackay the Experiment Station seedling selection yielded 76 varieties and the Lansdowne Road selection a further 24 varieties. The number of varieties selected from original seedlings at Bundaberg was 80. At each station the selections were planted out in 40-sett plots as at Meringa.

MILL TECHNOLOGY.

Seasonal Activities.

During the 1948 season tests were conducted at Inkerman and Pleystowe mills on two vacuum pans of novel design, and the work of the Werkspoor crystallizer at Moreton Mill was studied. Both series of tests were designed to provide information to assist mills in choosing new equipment for handling low grade massecuite. In addition, at the request of Isis Mill, the method used there for storing juice in subsiders over week-ends was investigated. The Senior Mill Technologist visited all mills during the season, and at Ayr, Innisfail and Mackay addressed meetings of mill officers on his visit to Hawaii. Advice was given to South Johnstone mill on a proposed programme of expansion.

The Mutual Control Scheme continued to operate, with 24 mills participating. Several mills consulted with the Senior Technologist Engineer on steam and power requirements.

Laboratory Work.

Wax Plant.—It was not convenient to operate the pilot plant during the crushing season; but later preliminary work was carried out. Several alterations and adjustments were found necessary but it has not been possible to have these effected quickly. The plant is now in order and work on it will be resumed shortly.

Molasses.—The programme of research on molasses had to be abandoned owing to the fact that the standard viscosimeter was unserviceable and considerable delay has been experienced in securing replacement parts from the United States. A viscosimeter of a different type for use on molasses was designed and fabricated. However, until the standard viscosimeter is repaired it will not be possible to standardise the new instrument.

Testing.—The technology division of the Bureau acts as a standards laboratory for the industry in many phases of its work. During the year tests were conducted on 148 brix spindles, 11 flasks, 9 polariscopes tubes, 4 thermometers, 4 sets of weights and 7 polariscopes. In addition two polariscopes were overhauled and checked. Sets of colour standards for use in pH determination were prepared and distributed to those mills requiring them.

Other Work and Work in Hand.—A proposed change in the procedure of the Mutual Control Scheme was accepted by the mills, and steps were taken to put the new arrangements into effect. Likewise, the system of recording mill plant data was altered. Instead of issuing plant capacities annually on a basis of average seasonal crushing rates, the new scheme involves the recording of actual plant sizes for the 1948 season and every five years thereafter. For each of the intervening seasons a supplement is to be prepared showing changes in plant in each mill for that season. The Plant Data Record for the 1948 season has been prepared. Also in the course of publication is a Handbook designed especially for use by sugar technologists. During the year five issues of the News Letter were published.

Activities proposed for the 1949 season include a laboratory investigation into the use of bentonite in clarification, tests on Webre vacuum pans, an investigation into the effect of low purity magma on sugar boiling, and further work on the pilot wax plant.

Report of the Chemical Laboratory.

Dr. M. White, Agricultural Chemist and Biochemist.

With the gradual change-over from war to peace time occupations, the volume of work expected of this laboratory increased. Initially the situation was met by increased staffing, but increased staffing reduced the bench and other space available for the installation of new apparatus for the additional officers. Provision has now been made to meet this situation by the transfer of two sections of the staff to Yeerongpilly. To conserve space further multi-purpose electrometric units were introduced wherever speed consonant with accuracy could be achieved. The new physical apparatus has become a most useful adjunct to previous standard methods of examination. The process will be extended to cover the continuously expanding fields of work being undertaken by the various sections. These are indicated under the sectional headings which follow.

GENERAL ANALYTICAL.

The release of newer insecticides and diverse formulations of each has come with such bewildering speed that frequently the efficiency of one group has not been tested before another becomes available. The halogenated derivatives are an example. Thus DDT, benzene hexachloride, chlordane, toxaphene and variations of each have been proposed in quick succession for control of external parasites in animals—notably the cattle tick—and plants. Phosphorus compounds promise to outrival them.

The General Analytical Section has the task of examining all these products, for many of which there is no standard method of analysis. It might be assumed that the replacement of the older insecticides would ease the analytical situation. This will no doubt take place in time, but at present there is no falling off in the submissions of any type. It is in this section that considerable expansion of photoelectric methods is called for.

The section has continued its services to other branches for which it is the chief analysing authority. Examples of work which may be cited are:—for the Horticulture Branch, estimations of oil content in wrapping papers used to cover export fruit; for the Agriculture Branch, the estimation and examination of oil content of linseed and sunflower varieties under observation; for the Science Branch, checks on commercial preparations to see how far they conformed with specifications; for the Standards Branch, analysis of preparations marketed under the different Acts administered by that Branch.

A not inconsiderable advisory service to manufacturing organisations is provided on either processes or laboratory procedure. The call for this service usually arises when the quality of products for which registration is required differs from the guarantee.

BIOCHEMISTRY.

Fluorosis.

The mitigation studies commenced over two years ago are nearing completion. Though it will be some months before the large amount of accumulated analytical work is complete, some clearcut conclusions have been reached. They are: (i) the reduction of fluorides in water to innocuous levels for stock is quite impracticable on a large scale; (ii) the addition of counteractants holds little prospect of success; (iii) alterations in the plane of nutrition of sheep continuously exposed to fluorided waters produces no commensurate improvement in condition. These conclusions indicate clearly that the only economical approach to the problem is through management. To that end, experiments designed to determine how alternation between free and affected water can reduce the severity of the disease are under way.

On the purely scientific side it is worth recording that the similarity of the bone rarification of rickets to that of fluorosis is most striking. Some of the clinical features are also comparable. Bone fractures due to imperfect calcification are not uncommon. The expected correlation of mineral imbalance with fluoride poisoning holds. The laboratory records, with appreciation, the interest shown in this work by Professor W. V. Macfarlane, of the Sir William MacGregor School of Physiology.

Renal Calculi in Sheep.

This disorder, often referred to as "gravel" or "bladder stones," is a serious one. Field observations strongly suggested that it is of dietary origin and laboratory results seemed to lend support. A combined field and laboratory plan of operation has been laid down and already encouraging results have been achieved.

It has been possible to alter in a simple manner the composition of urine from sheep so that conditions are most favourable to calculi formation. Further, it is now possible to produce this result by feeding certain known pasture species. It is a promising beginning.

Miscellaneous.

An improvement in the staffing position of this section has enabled the routine examination of biological material to be maintained while the research expanded.

The service given to the Division of Animal Industry covers a variety of determinations in blood from stock suspected of suffering from either dietary disorders or physiological disturbances following infection by disease or infestation by parasites.

Investigation of problems connected with minor element deficiencies, which form such an important feature of the work formerly confined to livestock, has, with increase of staff, been extended to cover some aspects of plant production. Here again, the need for greater facilities has become pressing.

TOXICOLOGY.

Most members of the sorghum group contain prussic acid, though the level varies widely When the plant receives a check by frost, by an abnormally dry period or by intense heat, the prussic acid content rises sharply and the plant becomes a potential hazard. A number of new varieties have been tested regularly for toxicity throughout their growth periods.

Of 10 varieties of grain sorghum tested, only three showed prussic acid in field tests. Only one showed a dangerous amount, and this quickly fell to a non-toxic level when the plant reached the flowering stage. This trial on pure varieties, in one district and for one season, indicates that, as stated in the literature, grain sorghums are fairly safe to feed to stock over all periods of growth. However, hybridisation with other sorghums may bring about a rise of prussic acid content. The period under review was a fairly good season for grain sorghums and the test results do not necessarily indicate their behaviour under conditions of drought or frost. The trials will be continued for at least five years at Biloela Regional Experiment Station, where determinations can be made on material directly from the field and possible loss due to time in transit eliminated.

Lead poisoning has been reported several times. In most instances it has been directly attributable to lead paints, but in one case it appeared likely that the poisoning was progressive and was caused by a number of lead-containing metal scraps found in the stomach. Cattle suffering from gross phosphate deficiency eat unusual foreign materials and the evidence suggested that this was a typical case.

An unusual case of deaths among cattle was almost certainly due to excessive quantities of sulphuretted hydrogen in the sole source of drinking water. Another unusual case was death from water poisoning. Molasses had been added to the drinking water and a beast drank such large quantities that water intoxication and suppression of venous return had occurred.

Damage to apples intended for export was reported. The evidence suggested that the case timber was involved. The laboratory obtained a volatile constituent from the wood and found that superficial damage similar to that found in the reject fruit could readily be induced by spraying with the ethereal oil.

The Section has spent a considerable amount of time in testing new methods of analysis for lead and other heavy metals in body tissue. The work is tedious and brings many disappointments but it has repaid the workers amply by the experience gained.

The Section has made numerous critical trials of the various methods for estimating oxalic acid in plants and is now in a position to commence the much needed survey of oxalate-bearing edible pasture plants of Queensland. The importance of this work cannot yet be accurately assessed but it is strongly suspected that many of the unexplained heavy fatalities that have occurred in travelling sheep were due to oxalate-rich pasture.

PLANT NUTRITION.

The demand for the services of soil specialists increased greatly during the year under review and shows no signs of abating. Requests for officers to carry out soil surveys of the reconnaissance type have been particularly numerous.

Soil Surveys.

Three detailed surveys were undertaken during the year. The field work is complete but much of the related analytical data has yet to

be compiled. Two of these surveys, comprising Hermitage Regional Experiment Station and Maroochy Horticultural Experiment Station, are of comparatively small areas. The other, of forest plantations at Passchendaele, is larger. Soil maps of both experiment stations will be completed shortly. The survey of the forestry reserves at Passchendaele was undertaken with the object of establishing, if possible, a relationship between soil type and tree growth under plantation conditions. It was found that no such general relationship existed, although certain soil types did possess the necessary depth and moisture-holding properties usually found to be associated with the best tree growth. As new areas of land in the district are to be planted in the near future, it is felt that the profile descriptions of the various soil types will be of great assistance in deciding the species to plant. The analytical data relating to the chemical and physical properties of these soils will also prove of assistance to orchardists and in the work of the Horticulture Branch, as some of the soil types examined in the forest plantations are identical with those devoted to horticulture in the Stanthorpe district.

An inspection of the soils of the Bunya Mountains forestry reserves was made and a report on these soils will be issued in the near future.

Reconnaissance soil surveys for the Land Administration Board were carried out in three different districts with a view to determining the suitability of certain soils for settlement of ex-servicemen. This work entails the preparation of soil profile descriptions and a report on the chemical and physical properties of the various types. It is customary in such surveys to work in conjunction with field officers of the Dairying Division or of the Horticulture or Agriculture Branches. Advice as to the best use of the land under closer settlement is contained in the joint report of the several officers engaged in the work.

Several rapid reconnaissance soil surveys by members of the staff have been made prior to the holding of farmers' field days. The talks given by the chemists at such gatherings have been well received, but commitments in other directions limit the scope of this service.

Local Field Work.

Frequently symptoms of plant failure or partial failure, as described by farmers or field officers, suggest that an examination of the soil "on the spot" may help considerably in solving a problem. Typical cases may be mentioned where this procedure has proved successful. In one, a piece of sloping land, which from superficial appearance was believed to be well drained, was found on examination of the profile to have extremely bad internal drainage due to the presence of a heavy clay about a foot from the surface. This lack of internal drainage was shown to be the cause of the poor plant growth. In the second case, peas and beans had been badly damaged by using a water of supposedly good quality. It was found, on visiting the area, that the good quality water had been pumped into an uncovered tank and allowed to remain there for some considerable time. Analysis showed that, through evaporation, the salt content of the water in the tank had increased from 40 to 176 grains per gallon —a level sufficient to cause the death of the salt-sensitive crops mentioned. Neither of these solutions would have been arrived at quickly without a visit to the actual localities and they illustrate the necessity for the soils-laboratory man to examine the field conditions whenever circumstances permit.

General Analyses.

A large number of soil analyses were carried out for the Bureau of Investigation of Land and Water Resources during the year. Reports have been compiled on chemical and physical properties. The number of samples examined for farmers has again shown an appreciable increase. It is pleasing to note that most of these samples are now taken in accordance with issued instructions and gratifying to learn that, in many instances, appreciable improvement in crop yields has followed application of the advice given.

In addition to soil samples for general analysis, fertility checks were made on samples from the control plots of all Departmental fertilizer trials. Numerous waters were analysed and reported on for their suitability for irrigation, stock and general domestic purposes.

Investigational Work.

Seven fertilizer trials were conducted for the Forestry Sub-Department at various nurseries. These included observations of the effect of certain major and minor plant nutrients on the growth and vigour of hoop pine and *Pinus caribaea* seedlings. The effects of formalin and molasses on the soil microflora were also studied. The trials with hoop pine will not be finished until June, 1950, but the data from those connected with *Pinus caribaea* were assembled and the measurements of height (which has been taken as an index of vigour) are being examined by the Divisional Biometrician. There is an indication that the balance of major plant nutrients for seedlings is a delicate one, particularly where added nitrogen exceeds a certain value.

Observational studies are also in progress on the effect of saline waters on young seedlings of hoop pine, *Pinus caribaea* and flooded gum. Hoop pine appears to be much more salt tolerant than the other species. These experiments will be continued during the coming year. An investigation into the effect of bore water (of a composition considered of borderline quality for irrigation) on a clay soil has recently been initiated. It is hoped that this experiment will provide data useful in assessing water quality.

In an attempt to accelerate the "throughput" of waters submitted, conductivity apparatus has been assembled and an attempt will be made to correlate conductivity values of waters with their suitability for irrigation as judged by chemical analysis.

Further investigational work recently initiated is an examination of the soil characteristics in areas in which "bone chewing" by cattle occurs. This programme involves co-operation with officers of the Biochemical Section and of the Division of Animal Industry.

Report of the Science Branch.

MR. J. H. SIMMONDS, OFFICER IN CHARGE.

ENTOMOLOGICAL SECTION.

Fruit Flies.

These pests have been present in their usual and well-known commercial hosts, and have been particularly prominent in normally less important hosts such as mango, avocado, capsicum, walnut, and tomato.

Outside the State, the finding of fruit fly in Queensland fruit has caused some concern to quarantine authorities and losses to Queensland growers. During last summer at Stanthorpe some preliminary investigations, under commercial conditions, on the effect of cold storage on fruit fly survival were carried out. When infested Gravenstein apples were held for 10 days at 32°–36° F., complete kill of the Queensland fruit fly (*Strumeta tryoni* Frogg.) was obtained. However, this will need confirmation by more detailed studies.

Though the Department has for a number of reasons hesitated to recommend the general use of DDT for fruit fly control, some growers have had apparent success with one spray application.

Exploratory bionomical studies with *S. tryoni* have been commenced at Toowoomba. It is hoped that this type of work can be expanded appreciably, as it is a necessary basis for sound recommendation for control.

Pests of Deciduous Fruits.

Investigations of both interrelated and specific spray schedules against codling moth (*Cydia pomonella* L.), woolly aphis (*Eriosoma lanigerum* Hausm) and mites were continued in the Stanthorpe area. The accepted concept is that the recent use of DDT for codling moth and fruit fly controls has upset the natural balance by destroying parasites and predators of the other pests without affecting the pests themselves. Evidence has been collected which supports the conclusion that a good tree coverage with HETP sprays is a satisfactory mite control, and a thorough wetting of woolly aphid colonies with this material has shown some promise. Many statistical data have yet to be considered before a clear picture of experimental results can be given.

The light-brown apple moth (*Tortrix postvittana* Walk) was prevalent in the Granite Belt during December. Though not widespread, it presented a problem where it did occur. The larval habit of sheltering in webbed tunnels on young leaves, often near the ends of tall leaders, is an added difficulty with this pest, for the eventual control of which improved and extensive spray applications will probably be needed.

Citrus Pests.

A survey has been made in the North Coast citrus districts with a view to determining the outstanding problems requiring further investigation. It appears as though over the past 10 years there have been some changes in the relative importance of the several scale species. Special attention has been given to red scale (*Aonidiella aurantii* Mask.) and to the citrus gall wasp (*Eurytoma felis* Gir.). Damage by the latter is causing concern amongst growers, and infestations have not shown signs of lessening over the past three years. Satisfactory control of the pest presents a difficult problem, but various lines of investigation are under consideration.

Fruit sucking moths are still present in appreciable numbers in many coastal districts, particularly north of Mackay, though this year there has been a definite decrease in damage caused by them. A preliminary investigation of these pests has been made at Cardwell, where entomogenous fungus trials have also been placed.

Tropical Fruit Pests

The pineapple scale (*Diaspis bromeliae* Kern) was found in areas slightly beyond the boundaries of the previously existing quarantine area in the vicinity of Rochedale. Suitable boundary adjustments were made, more rigid conditions for dealing with the pest within the new quarantine area have been imposed, and preliminary trials with chemical controls have been undertaken.

During last spring trials against nematodes with DDT at rates up to 250 lb. per acre were placed in three plant blocks and in two established stands of pineapples on the Blackall Range. So far, on observational evidence, none of the dressings has given outstanding results.

In co-operation with the Horticulture Branch, a dispersed long-term trial with DDT, BHC, and chlordane against the banana weevil borer (*Cosmopolites sordidus* Chev.) was established in the North Coast and South Coast districts. Present indications are that BHC may have some value against this pest, but chlordane at the high strength used is showing particular promise under experimental conditions.

Vegetable Pests.

In many districts excessive wet weather interrupted control programmes and necessitated repeated treatment by farmers to cope with pest problems. Bean fly (*Agromyza phaseoli* Coq.) and corn ear worm (*Heliothis armigera* Hb.) attacked beans; red spider (*Tetranychus urticae* Koch.) affected beans and tomato crops; heavy infestations of *Thrips tabaci* Lind., were investigated on beans, cucubits and potatoes during November, when damage was accentuated by the adverse farming conditions prevailing; the diamond black cabbage moth (*Plutella maculipennis* Curt.) caused some damage at Gatton.

Consignments from C.S.I.R.O. of two parasites (*Angita cerophaga* Grav. and *Diadromus collaris* Grav.) of the cabbage moth were liberated in several widely separated districts. The establishment of these parasites will be carefully watched.

Potato Pests.

Severe incidence of the potato tuber moth (*Gnorimoschema operculella* Zell.) with consequent heavy losses was experienced in the Burdekin Delta and in the Lockyer Valley, except where commercial DDT treatments had been applied. Trials in the Lockyer Valley to reduce pre-harvest damage by the special timing of DDT dusts and sprays used in conjunction with cultural operations have yielded some positive

results. Spraying proved better than dusting, and two applications of 150 gallons per acre at 10-day intervals commencing soon after the appearance of 4-5 leaves have given satisfaction. Cultural experiments including hilling schedules were also undertaken at Ayr, but the role which may be played by such operations is not yet definite. Probable variations due to varieties and seasonal conditions, and also cost, need further investigation.

In co-operation with C.S.I.R.O. three parasites of the potato moth—*Copidosoma gelechiae* How., *Microbracan gelechiae* Ash, and *Chelonus phthorimaeae Cahan.*—were liberated in southern Queensland. It is as yet too early to comment on the behaviour of the parasites.

Tobacco Pests.

Insect pests were of little importance in Mareeba tobacco fields, but attacks by mixed populations of the looper (*Plusia argentifera* Gn.) and the budworm (*Heliothis armigera* Hb.) caused some concern in the Burdekin Delta. In trial tobacco plots, 0.2 per cent. DDT emulsion gave good control in the early stages of plant growth, but later the lead arsenate-pollard dry bait was only fairly successful. Further work on the looper problem has been planned.

Dosage and application method trials with DDT against nematodes (*Heterodera marioni* Goodey) in tobacco were established at Mareeba. Dry conditions were encountered, and though results were not significant there were indications of some success with soil injections at the high rate of 400 lb. per acre.

Miscellaneous Field Crops.

A survey of the pests of linseed was made. *Aphis leguminosae* Theo. and *Tortrix divulsana* Walk. were located in trial plots, and H. *armigera* Hb. attained major importance in commercial plantings. Cultural measures for the control of *Heliothis* have been suggested, and while chemical control in itself is not difficult, the mechanical means of successfully and economically translating it to large areas subject to spasmodic attacks will need careful attention. Observations were made on the results of commercial dusting of infested crops by aeroplane.

The sorghum midge (*Contarinia sorghicola* Coq.) was responsible for damage in some of the more southern plantings of grain sorghum, and at Kingaroy dusting with 2 per cent. DDT was not satisfactory. The use of DDT against this pest needs further critical investigation.

Corn ear worm was found in moderate numbers in sunflower heads; though economic damage was negligible, this crop provides a breeding place for the pest during the midsummer months.

In commercial cotton, insect pests were not serious during the past year. Most entomological work with this crop was concerned with observation on pest populations and with routine DDT spraying associated with agronomic trials at Ayr.

The pod sucking bug (*Riptortus serripes* F.), normally occurring mostly on vegetables, proved serious in soybean plots. A 0.1 per cent. DDT spray kills this bug, but two applications are necessary for effective field treatment.

Pasture Pests.

Reports of pasture damage by moth pests were received from a number of districts. Although armyworms were also present the main pest species in natural pastures was *Psara licarsisalis* Walk. In the Toowoomba area *Cirphis unipuncta* Haw. attacked Rhodes grass, millets, Sudan grass and early planted oats. The epidemics were short lived and in most instances the damage was not observed until the caterpillars were well grown; this leaves little scope for beneficial results from control measures.

As mentioned in the last report, large-scale replicated strip trials with BHC against white grubs (*Lepidiota caudata* Blkd.) in pastures on the Atherton Tableland were established. The objective was to collect data on the value of BHC in protecting potential oviposition sites and on the use of this insecticide against actual grub infestations. From grub counts and general appearance over the first 12 months, the value of BHC as used in these trials is not promising; however, the results do help to emphasise the variations to be encountered in different white grub problems.

Exploratory trials with topdressings of DDT and BHC against the funnel ant (*Aphaenogaster ruginota* For.), which also damages pastures on the Atherton Tableland, show no differences between checks and treatments.

Forest Pests.

More than 20 borer species new to Queensland were taken or bred from imported logs, and some of these are potential forest pests. A large amount of sound critical biological data on timber borers is available, and considerable attention was given in an advisory capacity to the revising of relevant quarantine regulations. It cannot be over-emphasised that ultimate success will depend on the strict enforcement of these regulations.

Legislation.

The first year of administration of "*The Apiaries Act of* 1947" was completed on 31st March, 1949, and this Act is now functioning satisfactorily. Certificates of registration have been issued for the current year to 839 beekeepers in south-eastern Queensland. A system of indexing apiaries by parishes has been inaugurated, and this enables advice to be given to migratory beekeepers regarding unoccupied country.

Two apiaries were found to be infected by American foulbrood (*Bacillus larvae* White); both were quarantined and the affected colonies destroyed. A careful watch is being maintained. This is only the second occurrence of this disease of bees in Queensland, the first on record being in 1931.

A unique infestation of an apiary by mites (*Hypoaspis* sp.) was investigated. Though for a short period the bees were heavily infested, the mites disappeared suddenly without any apparent subsequent ill-effects on the bees.

Under "*The Fauna Protection Act of* 1937," five fauna dealers were re-registered and their premises inspected, and 69 permits to remove fauna and 9 special permits relating to protected fauna were issued. In all, 85 new

honorary fauna protectors were appointed, bringing the total to approximately 1,200 honorary appointees, all of whom were circularised regarding their responsibilities. There has been a pleasing response, manifested by an awakening interest in fauna protection matters on the part of landholders and the public generally. New sanctuary areas totalling 16,889 acres were gazetted and over 800 notices were issued for display on sanctuaries.

Under "*The Native Plants Protection Act of* 1930," a proclamation was issued extending protection to certain orchid species on Crown lands, and 27 new honorary rangers were appointed.

PLANT PATHOLOGY SECTION.

Cereals.

In the 1948 season wheat rust, which has been the cause of severe damage at times in the past, was not serious. The heavy losses in the 1947 season resulted in varieties resistant to this disease becoming increasingly popular. In the absence of an outbreak their value for this purpose was not demonstrated, but it is noteworthy that even in the absence of rust many of them compared favourably in yield with standard varieties. The Section co-operated with the plant breeding staff in assessing rust resistance in breeding material. Other diseases of wheat and winter cereals in general were not of any great consequence.

Sorghum smut (*Sphacelotheca sorghi*) has still appeared where the seed treatment has been neglected. Experimental work was undertaken to clarify anomalies in the amount of organic mercury dusts recommended for the control of this disease. It was found that with the dusts marketed in Queensland containing 1.5 per cent. of the active ingredient the full two ounces per bushel is required to deal with heavy infections of smut. It is recognised that lower doses may deal with any infection on lightly contaminated seed.

Dwarf Setaria (Panicum) crops have been fairly badly infected with leaf spot and head blight (*Piricularia oryzae*). This disease is dependent on weather conditions and when it is wet towards maturity of the crop no satisfactory means of control is available.

Miscellaneous Field Crops.

Potatoes have in general been fairly healthy. Exceptions were a rather high incidence of target spot in the Burdekin area and widespread occurrences of common scab. The latter disease can be readily controlled by seed treatment and with the increasing availability of organic mercury fungicides should soon be of little moment.

Peanut crops early in the season were very badly affected with crown rot (*Aspergillus* sp.). The high incidence of this disease was related to the wet weather which occurred during the harvest of the previous crop, leading to the development of moulds in the stooks, with consequent low germinability of the seed produced. This illustrated the necessity for good seed material in addition to seed treatment and correct cultural conditions for the control of crown rot.

Linseed crops showed many instances of the disease known as browning. With this trouble there has been some confusion between the attack of the parasite *Polyspora lini* and the effects of waterlogged soil. On the Downs there has been no evidence of the parasite and there is every reason to believe that unusually wet conditions early in the winter season were responsible for the trouble.

Deciduous Fruits.

Experimental work was carried out on brown rot in stone fruits. The disease was not as severe as has been the case in previous seasons. Sufficient developed, however, to show the value of spraying with lime sulphur during the growing period. In Queensland, spraying during the the whole period of the development of the fruit appears to be better than a few applications later in the season or at the time when the disease is first seen.

In the past, control of apple powdery mildew has been confined to the use of sulphur dust or other sulphur sprays during the spring and summer months. Powdery mildew frequently becomes very apparent on the trees after cessation of spraying towards the end of the season. This year experiments were laid down to ascertain the value of spray applications in the autumn. Results as yet have not been analysed.

Citrus Fruits.

The end of the 1948 citrus season was marked by severe losses from blue mould and other rots in fruit coming forward to the markets. Leaving the fruit hanging on the tree for an unduly long period awaiting a rise in prices is considered to have been one of the main factors in the development of this trouble.

Psorosis of citrus is causing considerable concern, particularly with respect to finding bud wood free from this trouble. An extensive survey of the citrus areas is being carried out in conjunction with Horticulture Branch officers to determine distribution and varietal susceptibility to this disease. Infection experiments are planned with a view to clearing up doubtful points in symptom expression.

The experiment on the control of brown spot in the Emperor mandarin conducted in co-operation with the Horticulture Branch has been carried through and preliminary counts made of the disease incidence in fallen fruit.

Tropical Fruits.

Control of Panama disease in the Lady Finger banana involves the use of planting material free from infection. Surveys of banana areas in the South Coast have been made with Banana Board officers in an endeavour to locate suitable plantations from which to obtain such material.

Following the high incidence of pineapple top rot in 1948 a trial was laid down on Maroochy Experiment Station to test methods of treating planting material. These methods have been used elsewhere but have not previously been successful in Queensland. Results of the experimental work have not yet been analysed; in the meantime, the old recommendations of efficient drainage and avoidance of planting directly across a slope are considered

adequate to keep the disease under reasonable control.

Wilt of pineapples has been in evidence and it is believed that in addition to incorrect soil acidity the loss of topsoil following heavy rain has some bearing on such occurrences.

A short and wet picking season for pineapples resulted in an abnormally high incidence of water blister (*Thielaviopsis paradoxa*). A survey of the main pineapple areas showed that growers who followed Departmental recommendations regarding sanitation and careful handling suffered comparatively little loss whereas the reverse was the case when these matters did not receive attention. The practice of removing basal knobs before forwarding fruit to the canneries was an important source of loss. Removal of these knobs in the plantation exposes an ideal site for the entry of the fungus causing water blister.

In contrast to the very severe losses from papaw dieback in 1948, the disease caused comparatively little damage this year. This may have been due to the short duration of the wet season compared with the extended wet periods experienced during the 1947-48 season. Among efforts to find the cause of the disease are a trace element and soil improvement trial and a soil survey commenced in co-operation with the Agricultural Chemist. Field observations and mycological investigations have been continued, but to date little can be recorded in the way of positive results.

An interesting occurrence was that of the parasitic flowering plant *Balanophora fungosa* attacking papaws in one plantation in the Gympie district. The plant was present on one of its native hosts (*Macaranga tanarius*) in the adjoining forest, whence it had evidently invaded the papaws. The attacked trees were not killed although fruit quantity and quality suffered.

Powdery mildew (*Sphaerotheca* sp.) of papaws caused a considerable loss in some instances. The majority of growers are regularly using sulphur dusts for the control of this disease.

Miscellaneous Fruits.

The strawberry runner certification scheme introduced last season resulted in the approval of 13 sources from a total of 24 applications. Both yellow edge and crinkle were less severe this season than in the previous year. Most rejections were due to cultural neglect.

Fig mosaic was responsible for a good deal of fruit shedding in the metropolitan and other areas.

Vegetables.

There has been no outstanding development to report in connection with tomatoes. Mosaic, spotted wilt and fern-leaf have been prevalent and septoria leaf spot caused severe foliage injury in the Stanthorpe district. A comprehensive and up-to-date article on tomato diseases was prepared for publication.

Experiments for the control of cucumber downy mildew have been continued. The disease was not present to any extent in the 1948-49 summer but the experiments achieved a useful purpose in showing the affects of Bordeaux mixture and sulphur on plant growth. In these trials and those of the previous season copper oxychloride was the only material which gave good control of downy mildew and no great injury to the plant. The injury due to sulphur in whatever form used was considerable and this leaves the question of the control of powdery mildew somewhat difficult to answer. However, copper oxychloride exercises some degree of control and may be adequate for practical purposes.

Many consignments of French beans sent to southern markets in the spring of 1948 were affected by "nestiness." The commonest cause of the trouble was *Sclerotinia sclerotiorum* but it was also sometimes due to *Rhizopus* sp. Careful handling has been emphasised in recommendations for the control of the disease. Care should be taken not to pick beans when the plant is at all wet and this object is easier to attain if the crops are grown on a northerly or easterly slope. Planting on low-lying areas should be avoided.

Angular leaf spot of beans (*Isariopsis griseola*) was prevalent in certain areas, where it was responsible for some damage.

Bean seed certification has been continued but the response from growers of seed beans has been disappointing.

Miscellaneous Records.

Violet root rot (*Helicobasidium purpureum*) on lucerne was recorded again after a long interval.

Leaf mould (*Cladosporium fulvum*) was prevalent in a field grown crop of tomatoes at Charters Towers in which the plants were closely spaced and furrow irrigated.

Sclerotium rolfsii was responsible for the loss of about 20 per cent. of a 2-year-old planting of apple trees from crown rot.

Spotted wilt virus was prevalent on various hosts during the year and was responsible for widespread infection in cobbler's pegs (*Bidens pilosa*).

Crown gall was recorded from crotons and dahlias.

General.

The legume inoculation services continue to be popular with farmers and during the year large numbers of cultures of the various types have been supplied.

Laboratory records and specimens have been maintained and the lag in the indexing due to staff shortage in the war years has been largely overtaken.

The advisory services of the section have been maintained at all times. These services have been given direct to farmers from the Brisbane and Toowoomba offices and on numerous field trips. Advice has also been given through other Branches of the Department and close contact has been maintained with these Branches in discussing common problems.

BOTANY SECTION.

General.

The Botany Section is primarily an advisory one and many routine determinations have been made in answer to enquiries. The number of

specimens received from schools has been particularly heavy, due to the publicity given by the Department of Public Instruction to the desirability of project clubs knowing the common grasses, herbage, herbage plants and weeds and for the trees in school grounds to be labelled with botanical and popular names and the native country.

The Section co-operated with the Superintendent of Parks and Gardens (Brisbane City Council) in labelling trees in the Sherwood Forest Park.

Forest Botany.

Many specimens have been received from Forest Officers during the year and a visit was paid to forest reserves in the Dalby–Yuleba area to check the identity of some eucalypts and cypress pines of that area.

The Forestry Sub-Department has established standardised plots in North Queensland in which trees are labelled for growth observations and for the training of forest officers. Approximately 1,000 trees were tagged and named in connection with this scheme. This work led to or necessitated a revision of several rain-forest groups in the herbarium, particularly among the Sapindaceae, berry-fruited Myrtaceae and Sapotaceae.

Ecology.

At the request of the Director of Sugar Experiment Stations, a study of the vegetation of the Bundaberg canelands was made to see if any correlation could be made between vegetation and soil types. It was found that broadly the vegetation type boundaries coincided with those of the major soil types, but in view of the flatness of much of the country rather broad transition regions (ecotones) sometimes occur. As far as could be ascertained from existing forest stands, the vegetation which originally occupied this area may be divided into two primary types, each of which is capable of further subdivision.

Mulga Research.

Further studies of Mulga (*Acacia aneura*) during the year yielded good results. A number of samples was collected from different kinds of mulga, some reported to the palatable, others unpalatable. These were hand stripped at Brisbane and sent to the Agricultural Chemist for chemical examination. All the samples represented estimated fractions of the total leaves of the trees from which they came, so it should be possible to arrive at a rough estimate of the yield of leaf from each tree.

One important new observation concerned the lopping of mulga trees. For some time, differences in the branching of these trees have been under observation and it was felt that they were related to the regrowth of trees after lopping. Mr. W. Akers, of Merrigang, near Charleville, was able to state as the result of 50 years' experience that best regrowth is obtained if the main structural branches are lopped off completely, leaving only a few thin divaricate branches growing out from the trunk or from near the base of the main branches. If these thin basal branches are left (from 3–6 feet above the ground), they put up new shoots which develop into a framework of branches bearing more leaf than the original tree. Careful examination of some hundreds of lopped trees indicated that Mr. Akers' statement was substantially correct. It will be tested by experiment and a suitable site for such work has been located at Gowrie Station, 14 miles from Charleville.

Observations were also made on the effect of two different types of "mulga breaker" on mulga in the Quilpie district. Each consists of an old wool wagon drawn by a small tractor, the difference being in the mounting of the breaking log athwart the top. The more effective of these consists of a stout log 18 feet long mounted crosswise on the wagon in such a manner as to strike the trees about 8 feet above the ground. Trees treated with this implement may be pulled over without breaking, leaving the roots partly exposed, broken off near the base, or broken off some 3 to 5 feet above the ground. Quite a number of trees were noted which had broken off fairly high, leaving the thin, low branches intact. Regrowth from such trees has been dense and rapid. A further advantage of this method of breaking is that young trees less than 8 feet high are left intact.

Most of the first phase of the mulga work is now complete and the results have been incorporated in a paper to be published in the *Queensland Journal of Agricultural Science*.

Western Pastures.

The statement has often been made, and it is the general impression, that the native pastures of western Queensland are lacking in legumes. However, evidence has been obtained that the real position is otherwise and that not only legumes but other herbage plants among the Acanthaceae, Compositae, Convolvulaceae and others contribute in no small way to the carrying capacity of the western pastures. An officer is surveying the Mitchell grass country between Augathella and Longreach in a search for promising pasture plants for trial purposes. This work is only in the preliminary stages but promises good results.

In company with the Senior Soils Technologist and Senior Soil Conservationist, a Botanist visited the south-western district to make a botanical survey of "scalded" areas. In the "scalded" areas few plants were found on the eroded surface, though a number were found on the elevated "islands" of sandy soil or in depressions where ponding of water takes place. The most conspicuous feature is the dearth of deep-rooted perennial grasses and herbs and the complete absence of legumes. In this lies the chief floristic difference between these areas and the richer clay loams and clays which are self mulching and subject to cracking.

The work is only in the preliminary stages and recommendations have been made for co-operative work over the next few years. The results should have an important bearing on the reclamation and re-vegetation of similar country in much of the south-west.

Noxious Weeds.

Following a recommendation by the Noxious Plants Sub-Committee of the Department of Public Lands the Government Botanist is conferring with the Director of Local Government with a view to revising the list of plants declared noxious throughout the State or by the by-laws of various local authorities.

Poisonous Plants.

The most important field work in this connection was a visit by a botanist in company with officers of the Division of Animal Industry to the Georgina River area, continuing investigations into the cause of Georgina River disease of sheep and cattle. As a result of these investigations it now seems fairly certain that *Eremophila latrobei* is the plant responsible. Should this be confirmed by experiments now being carried out by the Division of Animal Industry, it will clear up a mystery which has troubled graziers in the far north-west for more than 50 years.

A visit was paid to the Bollon-St. George area to ascertain the principal plants on which sheep suffering from humpy-back were feeding. Of 151 plants found in the area, 16 were found in all paddocks where affected sheep had run. Seven of these were grasses, the other nine herbage plants. Several of these belonged to the family Malvaceae. The symptoms of "humpy-back" are virtually the same as those produced in New South Wales by feeding sheep with marshmallow (*Malva parviflora*). Because of this, other Malvaceous plants are suspect, principally *Malvastrum spicatum* and species of Sida of the *S. corrugata* group. Both *S. fibulifera* and *S. trichopoda* come under suspicion and both are freely eaten by sheep. To determine if the trouble really lies with plants, exhaustive feeding tests with all suspected species will eventually have to be undertaken.

In connection with the above and other investigations, a number of rumen contents have been examined and large collections of plant material made by officers of the Division of Animal Industry identified.

Plants thought to be the cause of losses of 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.

Marsdenia microlepis:—Suspected of poisoning cattle in the Hughenden district.

Aneilema gramineum:—Reputed to cause a condition similar to "coastal staggers" in horses.

Cassinia laevis (rosemary or snuff bush):—Suspected of poisoning cattle at Inglewood.

Cnicus benedictus (blessed thistle):—Suspected of causing scouring in horses near Toowoomba.

Epaltes australis (nut heads):—Suspected to cause horse losses in Central Queensland.

Daviesis ulicina var. *angustifolia*:—A possible cause of deaths, humpy-back and scouring in a mob of sheep at Kogan. .

Solanum seaforthianum (deadly nightshade):—Reported as having caused the death of 20 head of cattle at Bundaberg. The tie bush (*Wikstroemia indica*) was also present.

Wikstroemia indica (Tie bush):—Received from Irvingbank as the possible cause of death of a young child. The berries had previously been suspected of fatally poisoning a child at Nambour and feeding tests with them on guinea pigs produced death. Feeding tests on calves with the whole plant proved negative. There is a reference to this plant under the record for *Solanum seaforthianum*.

Corchorus trilocularis:—Suspected of causing deaths of 160 sheep at Clermont. Deaths occurred in yarded sheep and in sheep being driven towards yards. Post mortem appearances were given as "blood dark in colour, tongue and gums blue as if the animals had suffocated; body took on a bluish colour shortly after death. Paunch contents were easily recognised as this plant. There appeared to be lung congestion. Death took place rapidly and the sheep went down."

Herbarium and Systematic Botany.

As far as routine duties allowed, a good deal of work on the herbarium collections has been accomplished during the year. There are still many undetermined specimens from earlier trips to incorporate in the collections, but good progress is being made with these. The study of the large collections made in the British Solomon Islands has been completed and a set of specimens prepared for incorporation in the herbarium. Duplicate sets have already been sent to the Royal Botanic Gardens, Kew (England), and to the Arnold Arboretum of Harvard University (U.S.A.).

Special work has been done on certain groups, particularly eucalypts, grasses and sedges, and some other special families including Myoporaceae, Lauraceae, and Myrtaceae.

The Queensland Herbarium is one of the richest in the world in specimens from tropical Australia and New Guinea, and visits have been paid by several botanists to consult the collections.

General exchanges were maintained with the Royal Botanic Gardens, Kew (England), Arnold Arboretum (U.S.A.), Australian Herbarium (Canberra) and the Rijks Herbarium (Leiden).

WEEDS SECTION.

A Weeds Section staffed by a Senior Weeds Officer and an assistant was established during the year and functioned within the Science Branch. Apart from giving routine advice on weed control problems, attention has mainly been directed to reviewing and cataloguing the available information on the control of the commoner Queensland weeds. An investigation of Crofton weed in the Numinbah Valley has been commenced and preparations made for experimental control work in the spring.

DIVISION OF ANIMAL INDUSTRY.

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

The year 1948-49 was notable for the breaking of the serious drought in the central and northern sections of the State towards the end of 1948 and the excellent summer and autumn rains which followed. These rains created very favourable pastoral conditions, but caused serious losses and damage in some areas, and delayed the beef killing season.

Drought conditions were so bad in some of the northern areas that the pastures failed to respond and are now in urgent need of further relief. Drought losses have been serious and repeated good seasons will be needed for stock numbers to return to normal.

There is a very real shortage of store cattle in all districts, and sheep for restocking are difficult to obtain. Many stock sent south during the drought will not return, and breeding is similarly affected. Except for isolated areas, pastoral conditions at present are good, stock routes are well grassed and watered, and conditions can be said to be very favourable.

STAFF.

In common with other State and Federal organisations, difficulty has been experienced in obtaining sufficient staff. This problem is not restricted to technical staff, but is also serious in the clerical sections. It is unfortunate that at this time, when the Department has adopted a progressive policy, sufficient trained staff is not available to implement the constructive programmes that have been arranged.

During the year under review, the Cattle Husbandry Branch has been developed, and two husbandry officers have been appointed to assist the Officer in Charge. One of these men will specialise in the husbandry of dairy cattle, and the other in beef cattle husbandry. Owing to the absence, as yet, of training facilities on regional stations, it has been thought advisable to arrange for cadets to be given tuition within the industry, and one Agricultural College graduate has been sent to a cattle station in the north to obtain the advantage of a period of experience in the field.

Two advisers resigned from the Sheep and Wool Branch but three were appointed, and an additional district was created at Roma. Specialist staff have been receiving training during the year, and with further appointments envisaged in the near future it is expected that investigations into summer sterility and genetic problems will be extended.

Mr. E. J. Shelton, a senior officer of the Pig Branch, retired, but the correspondence course for which he was responsible has been transferred to the Department of Public Instruction. The policy of recruiting cadets for this Branch is working very satisfactorily; two men, who have now received two years of preliminary training, have been sent to Toowoomba and the Atherton Tableland as field assistants and two more cadets are receiving training. The need of an adviser in the central districts has been realised for some time now, and it is expected that very shortly an officer will take up duty there.

Reclassification of staff and appointment of advisers to country districts has expanded the poultry extension services. The personnel in this Branch is still somewhat below requirements, and it is hoped that from an examination to be held in the near future additional inspectorial staff will be recruited.

The appointment of a new Divisional Veterinary Officer at Townsville has improved the disease control and extension services in the far north. Whilst resignations have weakened the branch in other areas, the prospects of increasing veterinary staff in the near future are good. Twenty scholarship holders are taking their veterinary course and the first batch of these are expected to complete their studies towards the end of 1949. With the projected re-establishment of a full-time veterinary course in Queensland, the prospects are encouraging for increase of the veterinary services in this State.

Following an examination for Inspectors of Stock a number of new appointments have been made, but unfortunately there have also been numerous resignations. It is hoped, however, to obtain further staff after an examination later in 1949.

A Senior Slaughtering Inspector was appointed during the year to supervise the meat inspection services of the Division.

DISEASE CONTROL.

Although buffalo fly has been very active, the infestation has been held north of the Burnett River. Conscientious work by the staff in the Burnett area and the efficacy of DDT have held the fly in check. All cattle moving south, either by road or rail, have been sprayed, and the fly has now receded again.

The use of the new insecticides has done much to decrease tick infestation in areas where they have been used. Some serious outbreaks of tick fever have occurred, particularly among travelling cattle, and it has become apparent that the residual effect of DDT. can be very useful, not only for general tick control, but also for cattle from clean country, possessing no immunity to tick fever, which have to pass through tick infested country.

Although there have been some temporary extensions of tick infestations into clean country, it is noteworthy that these have been due to illegal movement of cattle and not to failure of clearing dips, as was commonly the cause prior to the use of DDT.

Outbreaks of pleuro-pneumonia have occurred mainly in areas where cattle movements are common and staff not available. An outbreak in

the south-west caused serious dislocation of stock movements, and temporarily delayed the slaughter of some mobs. Additional staff and compulsory inoculation of moving cattle in some areas should do much to control this disease.

In collaboration with the Division of Plant Industry, survey work is being undertaken in connection with mineral and trace element deficiencies, and also with urinary calculi in wethers.

A progressive policy of control of tuberculosis has been adopted in this State. Following on the testing of dairy cattle in some areas during the war by Departmental officers assisted by veterinarians of the American Army, it was decided to test all cattle supplying milk to the city of Brisbane. Owing to the closing of the Veterinary School and the general shortage of trained personnel, the testing was not carried out as expeditiously as was desired, and the assistance of qualified practising veterinarians was sought.

The position is now improving: more cattle are being tested each year, additional practitioners are setting up in practice, and, with the establishment of the full course in Veterinary Science at the University of Queensland, an extension of tuberculin testing and veterinary services is expected.

Until a short time ago the scheme was restricted to areas where whole milk was marketed, but legislation was recently promulgated making it possible for the scheme to be extended to areas where cream is marketed.

ROAD TRANSPORT.

A careful watch is being kept on the transport of cattle by what has been popularly called the "road train." There have been at least 4,000 cattle moved in this fashion, all of which have been examined in the usual way by members of the staff, who have also recorded observations of the effects of this type of travel.

Most of the movements have been from the Northern Territory along the bitumen road to Mt. Isa, and thence by rail to Townsville, but some consignments have been sent to Brisbane and Rockhampton.

It is significant to note that there has been less bruising in each consecutive consignment, and that the condition of the cattle at slaughter has improved in consequence. Amongst other things it is apparent that stock should be loaded direct from the paddock and not after long droving or, particularly, after being tailed for some days before loading.

It would also appear that rest periods are essential in long journeys, both during the road train trip and during the subsequent rail journey. Observations would also indicate that road journeys of 300 miles have been undertaken without any ill effect.

INCREASED PRODUCTION.

On every hand there is a sincere desire by individuals and industries to produce more meat for export to Great Britain, where each person is now receiving less than one shilling's worth of rationed meat per week. It is reasonable, however, to expect increased production only if such production is economically sound, and it is pleasing to note that increased prices are being paid and long-term contracts promised. In a world where meat is in short supply, the less fortunate nations must look to the agricultural and stock raising countries for the supply of much of their meat requirements. The production of pig meats, lamb and mutton can be accomplished in the agricultural areas of the more closely settled countries, but it is from the countries where cattle are run under open range conditions that we must look for exportable surpluses of beef. As Australia is one of such countries, it is confidently expected that there will be a market for Australian beef surpluses for all time.

Owing to drought in 1946 and 1948 it was expected that there would be decreased production in 1949 and subsequent years, and slaughtering figures are below normal for this year. Statistics also show that cattle numbers are below average—in fact, are more than a million lower than a few years ago. Informed observers within the industry, however, feel that production could be increased in the central and coastal areas if labour for improvements were available, material for subdivisional fencing were easy to obtain, and water facilities were improved. These difficulties are not insurmountable, but will not be quickly overcome.

The growing of large areas of grain sorghum in the summer rainfall area may be of great significance to the cattle industry, for, if the feeding of grain, either in the head or by hand, or grazing of stubble, is economically sound, it should be possible not only to top up stores quickly but also to extend the present season of slaughtering for export. This and other improved nutritional practices are being examined, and, with cross-breeding, strain trials, and experiments of heat tolerance of British breeds of stock, are the plans which the Department and C.S.I.R.O. intend to adopt as a joint project to assist the beef industry.

During recent years there has been a definite swing towards grain feeding in the pig industry. This is understandable, for, owing to the greater use of whole milk for processing and milk by-products by industry, there has been a decrease in pig production in dairying districts. The pig in Australia has been forced to be the animal which depends for its existence upon surpluses, whether they be of human food refuse, surpluses on the farm, or of grain which is unexportable. It is heartening to the pig farmer, therefore, that grain is being grown especially for pigs, and, though much will be fed to pigs owned by the producers of the grain, there should be some grain available for the industry generally.

The Department is actively engaged in encouraging the increase of lamb production in Queensland. It is not thought that this will ever develop into a big export trade, but there is a local need for higher quality lamb, and increased production would indirectly make additional beef available for export. To encourage the industry the purchase of rams for the breeding of crossbreds is being subsidised.

There has been a very big increase in the production and export of poultry meat during

the last two or three years. This has not only helped to increase the total amount of meat exported, but has created a market for male day-old chicks for which there had previously been little sale.

CATTLE HUSBANDRY.

Queensland is the main cattle State of the Commonwealth. Throughout its dairying and pastoral lands are run more than 5,000,000 cattle, or approximately half the total found in the Commonwealth. The establishment of a special Cattle Husbandry Branch within the Division of Animal Industry is therefore understandable. Whilst shortage of trained staff has prevented the rapid expansion of this recently formed branch, favourable prices and the heavy demand for increased production have encouraged stock owners to seek technical advice.

Dairy production is being given practical assistance by the Commonwealth Government in the form of a large grant of money to be used for demonstrations of improved practices on the farms of suppliers in the various dairying districts of the State. With the knowledge that roughages are usually available on dairy farms in Queensland, but vary considerably in nutritive value, particularly in protein, the feeding of suitable quantities of concentrates is being demonstrated on dairy farms in selected districts of the State. These demonstrations are being measured by control farms in which supplementary feeding is not being attempted.

Selected dairy farmers are also adopting practices recommended by various Divisions of the Department in an endeavour to bring about increased production, the Cattle Husbandry Branch being responsible for advice on nutrition, breeding and stock management. Calf feeding demonstrations and dairy farm competitions will also help in the general drive for increased production by better methods.

The beef industry was subjected to serious losses due to drought in 1946 and again in 1948, and these are only now affecting supplies of stores and fats. A survey of the requirements for, and the supply of bulls in, the industry is being undertaken, and the improvement or deterioration of the quality of stock and the production capacity of properties in various districts of the State are being measured.

Supplementary feeding trials with grain sorghum, stubble grain, and other crops are being observed in the Capella area, and it is hoped that, if fencing and water improvements are completed, it will be possible to measure the results of this feeding by regular weighing of live animals, and eventually by weight at slaughter. If the results of this work prove to be economically sound it may be possible to extend the period during which fat cattle are available for export from these and similar areas.

It is obvious that, whilst natural pastures must remain the source of stock feed in most of the cattle districts in Queensland, there are areas of the State where it should be possible to improve these pastures, perhaps even to introduce new pasture plants, but at least to carry out improved methods of pasture management. Plans are being made to develop this work in association with the Division of Plant Industry of this Department and with the C.S.I.R.O. Similarly, breeding and strain trials with British breeds, and the reaction of the strains of these breeds to the tropical environment, are also to be measured on the various soils in these areas.

Much has been written in recent years concerning the use of artificial insemination in other countries. Under the husbandry conditions of those countries, artificial insemination has been sound, providing the sires used are proven. In Australia a different set of conditions is met with. Owing to the variety of breeds of cattle used, the distance between holdings, and the cost of each insemination, it is unlikely that such an operation would be economically sound on the average Queensland dairy farm. In order that staff should be trained in this procedure, and in an endeavour to test the possibility of introducing semen from overseas, an experimental insemination of a number of cows on one property was carried out with semen from America. Owing to the unsatisfactory condition of the semen upon arrival no conceptions resulted and the experiment was unsuccessful.

SHEEP AND WOOL.

As the result of drought, flock numbers have been reduced in the central-west and north-west, and such reductions have outweighed natural increases in the south, where favourable seasonal conditions have been experienced.

Wool prices remain high, and the Queensland average price compares favourably with that of other States.

Whilst it is improbable that Queensland will ever be a heavy producer of fat lambs, there has been an expansion of lamb raising in conjunction with mixed farming in the coastal and tableland areas. It is likely that, should the growing of grain sorghum expand in the central districts, there will be an increase in the production of sheep for meat. Because of the need for increased supplies for the local market, and the direct or indirect encouragement of additional meat for export, the Department has subsidised the purchase of 400 long-wool rams to encourage the breeding of cross-bred ewes to be used for fat lamb production.

Following on the closing of the Farmers' Wool Scheme, arrangements were made to use the building to house a fleece testing unit which will provide a service to the industry by permitting the application of modern methods to animal breeding.

The staff of the Sheep and Wool Branch has been increased, and has, by personal contact and field days, demonstrated applied animal husbandry in relation to animal production, and, in collaboration with the disease control staff, prevention of loss from disease and parasites through the sheep districts of the State. In addition, every effort has been made to assist in property improvement, particularly as it effects increased and more economic production, and the prevention of loss by bad husbandry or disease.

PIGS.

In common with the other animal industries, lack of material has restricted the extension of pig farming in Queensland. The shortage of

protein-rich concentrates, particularly those of animal origin, and the high price of grain have added to the difficulties of the pig raiser. Although an increase in the price of pig meats was announced late in 1948, it has been freely stated within the industry that costs of production do not allow a fair margin of profit. The survey being carried out by the Division of Agricultural Economics of the Department of Commerce and Agriculture should make it possible to clarify the position.

Production figures for the year show a slight increase, and as a keener interest is being shown in the industry it is expected that, with normal seasons and higher prices, a big increase in the production of pig meats should result.

Increased staff and decentralisation have enabled the work of the Branch to be extended to additional country areas.

Competitions judged on carcase measurement have been conducted in many areas of the State, and have been very successful. This type of measurement was evolved some years ago by Professor John Hammond of Cambridge University. The method, with some adaptations, is used to demonstrate the strength and weaknesses of a bacon carcase by length, thicknesses of fat and meat, and a comparison of their proportions. These competitions have proved to be one of the most successful means of demonstrating to pig raisers, through the dressed carcase, where their feeding methods have been successful or otherwise. Many of these competitions have been arranged and judged by the Officer in Charge of the Pig Branch and his staff, including a State-wide one in collaboration with the Australian Meat Board and local competitions arranged by Agricultural Societies and the Royal National Association.

Assistance has been given to the staff of the Queensland-British Food Corporation in the designing and selection of sites for piggeries. Experimental feeding of food yeast in comparison with meatmeal and other protein-rich concentrates has been carried out for the Corporation by the Pig Branch staff and further feeding trials are being arranged.

POULTRY.

Increased production has been general throughout the industry. It has been assessed that egg production increased during the year by 16 per cent. This is no doubt due to the increased availability of foodstuffs, but with unlimited fodder and available building material a far greater increase could be obtained.

The shortage of protein-rich concentrates is becoming very real and it is reasonable to expect that with the increased prices for butter there will be a greater demand for these concentrates by the dairy industry as also by other animal producers if other margins of profit are improved.

There has again been a phenomenal increase in the production of poultry meat, a total of 1,231,029 birds being slaughtered in abattoirs in the metropolitan area and 3,400,320 lb. of meat exported.

The registration of stock suppliers has done much to improve the efficiency of the industry and to decrease certain diseases. By controlling disease, inspecting hatcheries, and advising in husbandry and management, a general improvement in the industry must result, as between four and five million chicks are produced annually for the industry in these establishments.

Whilst a great deal of the time of the staff has been taken up with testing for pullorum disease, much extension work has been completed and poultry farmers given the benefits of modern methods of husbandry and disease control. In addition, lectures, demonstrations, field days, and radio talks have been conducted.

RESEARCH.

In view of staff shortages, the amount of research work accomplished by the staff of the Research Stations and the field staff is commendable. Owing to the extent of cattle tick infestation in Queensland and the economic loss resulting from this parasite, the testing of the newer synthetic insecticides has been given high priority. This work has been confined to three aspects:—(i.) toxicity to the animal, (ii.) effect on the parasite, and (iii.) solubility of the active principle or its power to stay in suspension if insoluble. Much preliminary work of this nature has already been accomplished and the work will be continued and extended.

In association with C.S.I.R.O., spraying trials with some of these products have been carried out to test their efficacy in preventing body strike in sheep, and work with internal parasites in cattle has also been undertaken with this organisation.

The results of investigations of certain horse diseases—viz., coastal staggers and Birdsville disease—have been very encouraging, and there is reason to believe that the cause of these diseases will be shown to be a plant poison, as is the case with humpy-back and Georgina River disease in sheep. The cause of icterohaemoglobinuria (redwater of calves) has been demonstrated for the first time in this State. Field and laboratory work with urinary calculi in sheep is progressing. Vaccination of chicks for fowl pox is proceeding and results are encouraging. Experimental feeding of pigs with yeast as a protein concentrate and poultry with maize as a grain has been completed to the first stage.

The immunisation of cattle against tick fevers and the supply of various vaccines have continued, but on a larger scale than in previous years.

Climatological studies and research into lowered reproduction rates of flocks in the north-west have been continued, and whilst the former is nearing completion the latter will receive the attention of additional staff during 1948-49.

Report on Field Veterinary Services and Acts Administration.

MR. J. C. J. MAUNDER, DIRECTOR OF VETERINARY SERVICES.

PASTORAL CONDITIONS.

Seasonal conditions throughout the State during 1948-49 varied from very bad to excellent. The south-eastern statistical divisions of Moreton, Maryborough, Downs and Roma have enjoyed an excellent year for livestock production, and prospects for the 1949-50 season are bright. Roma, in particular, records the best pasture growth for many years. The far south-west has also experienced very favourable conditions.

All other divisions of the State experienced drought conditions from June to December, being most severe in the Central Western and Far Western divisions. Relief came to all divisions in the form of excellent summer and autumn rains. Cyclones occurred, especially in the Rockhampton division, causing considerable damage. Response of pastures was not up to expectations in this division due to severe "eating out" during the drought period, and good rains are needed now to avoid drought conditions. The country around Richmond and Hughenden was also badly eaten out and has not responded well. An area of country in the Dalby-Inglewood-Texas triangle is approaching drought conditions. With these exceptions, pasture conditions throughout the State are now very favourable, stock routes are open and well watered, and the ensuing season holds much promise.

Drought Losses.

Losses have been confined to those divisions which suffered drought conditions between June and December. Heavy losses of sheep occurred in the South Western division due to blowfly. Sheep from the North Western, Central Western, and Far Western divisions were moved in great numbers to southern areas during the drought, or placed on agistment in the more favoured local areas. From the Winton district, 300,000 sheep were moved out, only 20 per cent. remaining on local areas. From the Longreach district 170,000 were moved, about 40 per cent. remaining. In the Townsville division practically all sheep were moved.

Heavy losses occurred in the Townsville and Rockhampton divisions, especially amongst breeding stock and calves, whilst many cattle were "salvaged" by slaughter. Floods in the Rockhampton area caused a reduction in carrying capacity due to the shortage of materials for repairs to fences and watering facilities. Little loss occurred in the Cairns division, but stock movements were brought to a standstill due to lack of water on stock routes, the position being aggravated by bush fires.

Availability of Fats and Stores.

Owing to the mass migration of sheep from drought-stricken areas, a serious shortage of stock exists and will probably persist for some time. Of the sheep moved from the Winton and Longreach district only about 60 per cent. returned following the break of the drought, there being at present a deficiency of about 144,000 sheep in these two areas alone. Since many of the sheep moved out were sold to New South Wales and many more sold after fattening in the Roma and Downs divisions, where conditions were extremely good, it will be some time before restocking is complete. Roma experienced a boom period under these circumstances, as evidenced by expansion of stock and station agency activities during the year.

Similarly with cattle a general shortage exists, due to loss of breeding stock and calves and heavier slaughtering during the drought period. Condition of stock following the summer-autumn rains is excellent. Again, southern divisions experiencing good seasons throughout the year benefited by a migration of store cattle from the northern drought areas. Markets have been bouyant, fats bringing 60s. to 64s. per 100 lb.

Generally it may be stated that cattle numbers in the Channel country and other parts of southern Queensland are about average, with some shortage in the central and northern portions of the State.

BUFFALO FLY.

It is again pleasing to record that, thanks to the vigorous efforts of the officers in the Burnett division and to the efficacy of DDT, buffalo fly infestation has been held to the country north of the Burnett River. Fly populations were light up till October, 1948, and then increased rapidly with the advent of favourable conditions. The spread of the fly, however, was prevented by the vigorous application of the policy of spraying with DDT, at or near the fringe of the infested area, all stock travelling on the hoof from infested to clean country. Stock travelling south by rail were treated on trucks at North Bundaberg. The systematic spraying of all stock around the fringe of the infested area retarded natural spread. The DDT dips placed strategically on stock routes have played a large part in the successful control of the fly.

During the year 2,356 horses and 152,596 cattle were sprayed.

CATTLE TICKS AND TICK FEVER.

There have been numerous outbreaks of tick fever during the year, the most serious occurring in travelling cattle in the north. Control has been exercised by the use of DDT dipping, tick fever drugs and inoculation. Greater use should be made of the residual effect of DDT by protective dipping when susceptible cattle have to travel along infested stock routes.

Tick fever outbreaks have also been common amongst paddocked cattle in the marginal country of the Central and Burnett districts, with the advent of favourable conditions following drought or near-drought conditions. These have been controlled by tick fever drugs and inoculation.

Considerable progress has been made with cattle tick control in the Burnett infested area due mainly to the use of DDT dips, which have enabled the clean-up of many holdings which had remained infested with arsenical dippings.

Outbreaks of cattle tick have occurred in the clean country of the Darling Downs and it would appear that these have been due to irregular and unauthorised movement of stock. It is pleasing that no outbreaks have been due to the failure of clearing dips, which was a big factor in these outbreaks prior to the use of DDT dips.

CONTAGIOUS PLEURO-PNEUMONIA.

Ten outbreaks of contagious pleuro-pneumonia were notified in the State during the year. Those which caused the greatest dislocation of movement to markets occurred in south-western Queensland in the unfenced areas where control is difficult. In these outback areas, quarantine is impracticable and control measures depended upon the compulsory inoculation of all stock except those for immediate slaughter prior to their travelling from or through suspected holdings and along suspected stock routes.

The proposal to station an officer in the far north to assist in control of the disease in those areas where it is enzootic could not be realised owing to the lack of suitable transport equipment.

TUBERCULOSIS.

Owing to the reduction in veterinary field staff, the amount of tuberculin testing carried out by Departmental officers declined considerably. Testing by practitioners under contract with the Department has, however, been considerably expanded. As shown in Table 1, more than 71,000 cattle were tested by Departmental and private practitioners during the year. Additional zones have been established at Ipswich and Warwick, representing two more country districts to benefit from the establishment of a veterinary practitioner.

TABLE 1.

TOTAL CATTLE TESTING IN VARIOUS DISTRICTS, 1–7–48 TO 30–6–49.

District.	Number of Herds.	Number of Cattle.	Number of Reactors.	Percentage of Reactors.
Southport ..	67	5,734	35	·61
Coomera	80	5,970	53	·88
Beenleigh ..	124	7,758	372	4·79
South Brisbane and Brookfield ..	87	4,539	36	·79
North Brisbane and Petrie	94	5,189	60	1·15
Samford	62	5,127	135	2·63
Beaudesert ..	99	8,722	324	3·7
Beaudesert to Border	31	3,255	85	2·6
Dayboro–Mt. Mee	38	2,890	69	2·38
Caboolture ..	2	326	92	28·22
Ipswich	52	2,297	51	2·22
Total for Brisbane Area	736	51,807	1,312	2·53
Darling Downs ..	205	5,058	12	0·23
Other Country Districts ..	302	14,214	583	4·1
Total ..	1,243	71,079	1,907	2·61

All tests except those conducted at Samford, Caboolture and "other country districts" were carried out by private practitioners. In the Brisbane district tests, 12·05% of reactors showed no visible lesions.

The policy of the Department on testing for shows and under the Tuberculosis-free Herd Scheme has been reviewed and a charge is now made for such testing. No charge is made for testing carried out for disease control purposes.

BOVINE BRUCELLOSIS.

Vaccination of calves with Strain 19 has almost completely replaced the test-and-slaughter method for the control of bovine brucellosis. There is an increased demand from dairy farmers for vaccination of calves, which is carried out by Departmental officers and private practitioners in co-operation with local organisations. During the year 19,400 calves were vaccinated.

A number of outbreaks of abortion have been reported amongst vaccinated calves, but in all cases investigation has shown the cause to be other than brucellosis. No undesirable sequelae have been reported as a result of vaccination.

SWINE BRUCELLOSIS.

In some districts the majority of stud herds have been tested regularly and are at present free from brucellosis. Entries in stud classes for the R.N.A. Exhibition are restricted to these herds which have been tested and found free from disease. Previously, a negative test was required for each individual entry only. It is anticipated that, in future, entries will only be accepted from herds certified free from brucellosis in accordance with the Department's brucellosis-free herd scheme.

MISCELLANEOUS DISEASES.

Mastitis.

Penicillin therapy has now practically replaced all other methods of treating mastitis, including the use of sulphonamides. Suspension in tubes has proved a most convenient and effective method of application and very good results are obtained against streptococcal infections. In most cases, the treatment is applied by dairy farmers without any form of supervision.

Sterility.

Temporary sterility continues to be a cause of considerable economic loss in the dairying industry. There is an increasing amount of evidence to suggest that aphosphorosis is an important factor in this disease, quite apart from any consideration of a general low plane of nutrition.

Ictero-haemoglobinuria.

There were several severe outbreaks of "redwater" amongst young calves in different districts and it would now appear to be quite definite that this disease in young calves is due to a leptospira.

Pneumonia of Claves.

This continues to be a common disease and is responsible for a considerable check in development. Mortality rates are not high and sulphonamide therapy appears to be worthwhile, as it hastens recovery.

Foot Rot of Bovines.

During the year, sulphapyridine soluble and sulphamezathine soluble were used for the treatment of foot rot. Indications are that either drug gives fairly good results in early acute cases, but there is a tendency to relapse, and repeat treatment at 48 hours may be advisable.

One severe outbreak occurred in a mob of cattle shortly after dipping in a vat charged with benzene hexachloride and the morbidity rate suggested that this may be analagous to foot lamenesses that occur in sheep dipped in BHC.

St. George Disease of Cattle.

No cases were reported from the enzootic areas of the St. George—Goondiwindi—Dirranbandi area, due no doubt to the advent of two consecutive good seasons, nor from the "desert" area south of Barcaldine, but a few isolated cases were reported from the Burnett. No additional information that would elucidate the etiology of this disease has been obtained.

Wallum Disease.

The provision of mineral supplement fortified with copper and cobalt has been used successfully on one coastal property where the disease had occured regularly. It is too early to assess the value of this procedure but results to date indicate a reduction in the number of cases occurring.

Plant Poisoning.

The usual mortalities have occurred due to common poison plants such as *Lantana camara*, *Trema aspera* (poison peach), *Pteridium aquilinum* (bracken fern), *Hoya australis* (wax flower), *Asclepias* sp. (cotton bush), *Alstonia constricta* (bitter bark), and *Cestrum parqui*, and some outbreaks of Paspalum ergot poisoning were reported from dairying districts during the autumn months.

Arsenical Poisoning.

Some serious mortalities have occurred following the careless use of arsenical mixtures for spraying and dipping at excessive concentrations. The most common sources of arsenical poisoning, however, are the careless use of arsenical weedicides and allowing stock access to poisoned areas.

Lead Poisoning.

An unusual number of cases of lead poisoning has occurred during the year amongst both adult cattle and calves. The source of the lead has usually been old tins, drums, &c., containing paint ingredients. In most instances, treatment has been unsuccessful.

Birdsville Disease and Walkabout.

In conjunction with Research officers, field investigations into these two diseases of horses have been continued. There is no reason to believe that whitewood is concerned in the etiology of Birdsville disease and some outbreaks of walkabout have been investigated where it has been hard to incriminate whitewood. Further enquiry is being made into the extent to which worm burden influences the course of these diseases.

Ataxia of Horses.

Several cases have occurred in the Rockhampton affected area, but the incidence at Bundaberg has been lower than usual. In all cases, there has been definite association with Gomphrena weed, which would appear to be the cause of the condition.

Georgina River Disease.

In association with research officers, field investigations and feeding trials have been carried out successfully. It would now appear that the solution of the etiology of this disease is at hand, which is most gratifying, as the disease has been known for at least 50 years but its etiology has remained obscure.

The co-ordination of the efforts of laboratory and field staff in investigations into problems such as Georgina River disease, ataxia in horses, and Birdsville disease, has been most gratifying, as it is only by such means that we can hope to achieve success in the investigation of the diseases of obscure etiology that are peculiar to this State.

INTERNAL PARASITES.

Though stock owners have long realised that worms in sheep are a great source of economic loss, it is only recently that they have come to appreciate the fact that young cattle, particularly of coastal areas, are equally susceptible to the ravages of these internal parasites. Every effort has been made to convey to stock owners, by means of extension services, the correct methods of prevention and control of worms in calves.

Similarly, the effect of heavy worm burdens on the efficiency of working horses on the large cattle runs of the far west and north has been impressed on the management of holdings concerned. Demonstrations on the drenching of practically unbroken horses by stomach tube have been most useful and the ordinary stockman has experienced little difficulty in the application of this method of treatment and control.

ROAD TRANSPORT OF STOCK.

The past year saw the beginning of a serious move to transport fat stock from holdings to railhead by road trains. The economics of this type of movement will determine its future, but there is no doubt that fat stock can be moved by road trains for considerable distances (up to 300 miles) to railhead and subsequently travel many hundreds of miles by rail and kill out at the works with a satisfactory quality grading. Its particular value lies in the fact that it permits the marketing of fat cows and two-year-old steers that could not be taken on the hoof over bare stock routes.

A close watch is being kept on this important project and observations are being recorded for all stages of the movement from the holding to the hooks.

NEW LEGISLATION.

Diseases in Stock Acts.

In anticipation of the extension of tuberculin testing, provision has now been made whereby cream supplied for consumption within the present or future gazetted areas may be subjected to assessment and levy.

Section 25B of the Act, dealing with the purchase of cattle as replacements for those condemned for tuberculosis and for which compensation is payable, has now an added provision enabling an owner to replace with heifers of his own breeding after they come into production.

That section of the Act dealing with the conditions implied on the sale of cattle whereby a buyer has remedy against a vendor of cattle found to be infected with tuberculosis within 30 days of purchase has been extended to cover cattle found to be infected with brucellosis or mastitis within seven days.

Amending legislation now provides for a permit to travel stock to be issued and remain valid subject to any conditions which may be endorsed thereon by an Inspector.

An amendment of Regulation 27 approves the use of benzine hexachloride in commercial dipping preparations.

Slaughtering Act.

To cope with the shortage of building materials, Regulation 48 has been amended to

provide for the alternative use of asbestos cement sheets or like material in the construction of the external walls of butcher shops.

A considerable amount of time and enquiry has been spent on the preparation of material for consideration in any future amendment of the Slaughtering Act and Regulations.

THE BRANDS ACT.

There has been a substantial increase in the number of registrations of cancelled horse and cattle brands, symbol brands, sheep brands and sheep earmarks, with a slight decrease in the number of transfers of horse and cattle and sheep brands and earmarks, also cattle earmarks as compared with the year 1947-48.

The fees received totalled £3,479, which is £119 in excess of those received for the year 1947-48.

It would appear that stock owners generally are observing the requirements of the Brands Acts, as few cases of irregular branding and earmarking have been reported to this Department. Two prosecutions for breaches of the Brands Acts were launched during the year, the defendants being convicted and fined in each case.

As the revised edition of the Horse and Cattle Brands Directory will contain four years' Registrations, Transfers and Alterations, it will be some considerable time before the Directory is published. It is expected that the revised edition of the Sheep Brands and Sheep Earmarks Directory will be available at an early date. Details of registrations, transfers, &c., for the year are shown in Table 8.

PROSECUTIONS.

Diseases in Stock Acts, 1915 to 1948.

During the year, there were 30 convictions for offences against the Act. The commonest offences are failure to secure permits and provide waybills. It is essential for the effective control of stock movements that the provisions of the Act be enforced strictly.

The Slaughtering Act of 1898.

Fourteen successful prosecutions were recorded during the year. Failure to dispose of offal in accordance with requirements is the commonest offence, and illegal slaughtering also figures prominently.

STATISTICS.

Statistics are recorded in Tables 1 to 8.

TABLE 2.

TRANS-BORDER STOCK CROSSINGS.

—	Cattle.	Sheep.	Pigs.
Entered from Northern Territory	69,023	..	..
Entered from New South Wales	18,203	237,002	1,434
Removed to Northern Territory	1,771	..	..
Removed to New South Wales	307,602	855,328	26,883

TABLE 3.

TOTAL NUMBERS OF STOCK SLAUGHTERED FOR LOCAL CONSUMPTION.

—	Bullocks.	Cows.	Calves.	Sheep.	Swine.
Bacon Factories	3,732	32,766	15,397	..	274,304
City of Brisbane (Abattoirs)	57,532	63,071	110,600	468,207	33,377
Larger Population Centres	68,513	64,936	26,927	218,941	38,618
Country Centres	38,480	32,127	23,546	68,931	14,226
Totals	168,257	192,900	176,470	756,079	360,525

In addition, 76,359 pigs were slaughtered in bacon factories for export. A total of 1,345 (0.45 per cent.) carcases of swine was totally condemned for tuberculosis at bacon factories, and there were 6,061 (2.21 per cent.) partial condemnations.

TABLE 4.

LIVESTOCK STATISTICS, MARCH, 1949.

Cattle	6,004,255
Sheep	16,524,742
Swine	407,531
Horses	325,283

TABLE 5.

STOCK TREATED IN DDT DIPS, YEAR ENDING 30-6-49.

Number of dips charged	27
Cattle dipped	383,500
Horses dipped	2,880
Sheep dipped	7,430

TABLE 6.

ANIMALS IMPORTED THROUGH PORT OF BRISBANE.

Dogs	23	(United Kingdom)
Cats	3	(United Kingdom)
Monkey	1	(Sumatra)
Cattle	7	(United Kingdom, 1; U.S.A., 6 Zebus).

TABLE 7.

ANIMALS EXPORTED FROM PORT OF BRISBANE.

Animals.	India.	China.	New Guinea.	U.S.A.	Philipines.	England.	Holland.	Hawaii.	Malaya.
Horses	70	91	..	..	..	..	..	..	54
Goats	..	..	3	..	..	..	..	..	..
Dogs	..	..	24	1	1	..	..	4	3
Fowls	..	..	76	..	..	..	..	..	..
Ducks	..	..	25	..	..	..	..	..	..
Chicks	..	..	166	..	..	..	..	..	..
Turkeys	..	..	6	..	..	..	..	..	..
Finches	..	..	..	..	..	100	..	..	..
Emus	..	..	..	..	..	..	2	..	..
Kangaroos	..	..	..	..	..	..	4	..	..
Wallabies	..	..	..	..	..	..	2	..	..
Cage Birds	..	..	22	..	..	..	..	..	..

TABLE 8.

DETAILS OF REGISTRATIONS, TRANSFERS, &C., OF BRANDS FOR YEAR ENDING 30TH JUNE, 1949.

—	Number.	Fees Received.	Number since Inception of Legislation.
		£ s. d.	
Three-piece ordinary horse and cattle brands registered	..	..	92,242
Cancelled horse and cattle brands registered	1,051	1,051 0 0	11,202
Horse and cattle symbol brands registered	100	750 0 0	2,322
Horse and cattle brands transferred	1,993	996 10 0	72,884
Cattle earmarks registered	510	510 0 0	33,235
Sheep brands and earmarks registered	148	107 10 0	13,353
Sheep brands and earmarks transferred	259	64 15 0	8,339
Distinctive brands registered	8	No fee	1,311
Alteration of address of brands	154	No fee	..
Brands cancelled	22	No fee	..
Earmarks cancelled	168	No fee	..
Total	..	£3,479 5 0	..

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:—

	Doses.
Contagious bovine pleuro-pneumonia	162,000
Infectious labial dermatitis of sheep	525,000
Tick fever of cattle	14,815

Nearly 13,000 specimens were received for examination, made up as follows:—

Blood samples for brucellosis agglutination tests:

Bovine	9,857
Porcine	1,107
Equine	3
Milk samples for bovine mastitis	241
Blood films for tick fevers of cattle	53
Complement fixation tests for contagious bovine pleuro-pneumonia	20
Other specimens	1,694
	12,975

During August, 1948, the staff co-operated in organising a week's school attended by 34 veterinary officers and Inspectors of Stock. Officers of the Pig Branch and the Division of Dairying were present at certain sessions. Lectures, demonstrations and discussions were designed to acquaint field officers with recent improvements in the diagnosis, prevention and treatment of important diseases of cattle and swine.

Diseases and Parasites of Cattle.

Tick Fevers.—A total of 110 steers have been prepared as reservoirs and sold to cattle owners for the inoculation of their own stock.

Two disturbing features have arisen recently in connection with the immunisation of cattle. In the first place, it has been observed that occasionally susceptible animals fail to react when inoculated with the blood of recently immunised donors even when relatively large doses have been used. Secondly, it has been noted that an appreciable percentage of animals suffer from a prolonged anaemia after the initial acute reaction has passed and the parasites have disappeared from the peripheral circulation. In a few cases death has followed.

In the field, tick fevers have been responsible for much mortality, the position being aggravated by the excellent season, which favoured the tick. The use of some of the newer synthetic insecticides may play a part, because these preparations can give a high level of tick control which may be followed after a period of time by loss of resistance on the part of the host animals. It appears to be inescapable that tick fevers will remain a serious problem until the tick is eradicated. A total of 312 cattle was received for inoculation for tick fevers.

Foot Rot.—An extensive outbreak of foot rot occurred in cattle in the Mackay district in the early winter of 1949. Of some 600 animals on the property concerned, approximately 200 were affected, all the cases occurring over a period of 10 days. The course was mild and the condition rapidly cleared up.

The trouble has also been frequently seen in cattle at the Yeerongpilly Station, especially during wet weather. These cases have been treated with sodium sulphamezathine, one dose (intravenously) usually being sufficient.

Helminth Parasites.—Studies on the seasonal fluctuations of cattle helminths have been continued in co-operation with the C.S.I.R.O. Monthly faecal samples for differential nematode egg counts have been received from dairy farms in the Pimpama, Beaudesert and Townsville areas, and the observations have been extended to include two beef cattle herds in the Gladstone district.

In the dairy herds the over-all infestation gradually builds up until the calves are 6-8 months old, then rapidly falls off and remains at a low level for the time the animals are under observation (usually 10-12 months). In general, no heavy reinfestations have occurred once this initial infestation is thrown off. It is not clear whether this represents an age or an acquired immunity. It is probably an acquired immunity, for some calves born in winter show a small peak in the spring and a second peak again during the following autumn. It is possible that the small infestations acquired in the spring did not produce an immunity sufficient to protect the calves against the heavy intake of larvae during the autumn.

Infective larvae of *Haemonchus contortus, Bunostomum phlebotomum, Bosicola radiatum* and *Cooperia* spp. are present on the pastures throughout the year, but it appears that late summer and autumn are the seasons of heaviest infestations.

Trichostrongylus spp. and *Ostertagia* spp. are only present in very small numbers and probably are not important in any potential parasitism.

These observations have been made on farms where nutrition has been fair and the calves have access to large open paddocks, generally with the adult herds. Severe parasitism in dairy calves appears to be associated with poor nutritional standards and the use of small, permanent, overcrowded calf paddocks.

The observations on the beef herds have only been running a few months but these herds appear to be following the same pattern as the dairy herds.

Coccidiosis In Young Calves.—During the course of the helminth investigations it was noted that many cases of "blood scours" occurred in calves 1-1½ months old and that large numbers of coccidia oocysts could be demonstrated from the faecal material.

Cysticercus bovis.—A portion of a bovine heart from an aged cow from the Kingaroy-Gympie area was found to contain numerous cysts which were quite viable. When decapsulated and held at 37°C. for one hour in physiological saline and 0.6 per cent. sodium taurocholate, they readily evaginated. The presence of *C. bovis* in cattle in Queensland has been suspected for some time because the adult tapeworm (*Taenia saginata*) has been recorded from children. Calcified cysts resembling this parasite have been received at Yeerongpilly, but this is the first occasion on which a definite identification could be made.

Synthetic Insecticides In The Control Of Cattle Tick.—To obtain information on the use of the several new insecticides, a small experimental tick-infested herd has been established. These animals are treated in small groups when carrying a sufficiently heavy burden and then isolated. Close and continuous inspection is then made to determine the effects of treatment on the parasite during the different stages of its parasitic life. By this means it is hoped to build up a fund of basic information on the effects of these insecticides on the parasite in its different stages. The following summary covers the essential points:—

DDT at concentrations up to 0.5 per cent. p.p. isomer does not give as good a kill as might be expected and a substantial percentage of ticks escape in both the adult and the nymphal stages.

BHC (benzene hexachloride) has been found to be effective at concentrations of 0.03 per cent. -0.04 per cent. gamma isomer, kills of up to 95 per cent. of ticks being obtained. The most resistant parasites appear to be some of the older adults and the nymphs. The concentrations mentioned are considerably lower than those recommended by the manufacturers as necessary for tick control.

Chlordane at concentrations of 0.25 per cent. as emulsion has given excellent kills of all ticks except the older adults. Nearly all nymphs and larvae have been killed. It would appear that the protective effect of chlordane is very high and this is being tested.

Toxaphene at concentrations of 0.3-0.4 per cent. gives an excellent kill, practically all ticks up to the 16th-17th day of parasitic life being destroyed. The residual or protective effect has not been tested but would appear to be less than that of chlordane.

The preparation E.605, described as diethy-p-nitrophenyl thiophosphate, has been tested at one strength only—1:10,000. In the crude form it is said to be highly toxic and must be handled with care. Recent reports indicate that the purified product when emulsified is much less toxic. The product used was one prepared for horticultural purposes. Many of the adult ticks and some of the engorged nymphs escaped destruction but nearly all the younger ticks were destroyed. Confirmation of these results is required.

In addition to laboratory tests with these insecticides, a number of field trials have been carried out. In some cases where the amount of material has been limited, and/or where the product does not lend itself to incorporation in a dipping fluid (chlordane, for instance), the medicament has been employed in the form of a spraying fluid. It is hoped to carry out more extensive trials with spraying fluids during the coming year. Some of the more modern spraying plants are very suitable for the small herd owner. The advantage of the spray plant is that the fluid can be made up fresh each time treatment is carried out; this is very important, for some of these insecticides in their present form are not stable in dilution over lengthy periods and therefore not suitable for use in a dipping vat.

Salmonellosis.—An outbreak of salmonellosis occurred in a mob of bulls received at the Station for tick-fever inoculation in March, 1949. A number of these animals, which had travelled some distance by road and rail before arrival, were scouring when received. In some cases this symptom rapidly cleared up.

In one animal the condition became aggravated and blood appeared in the faeces. *Salmonella typhi-murium* was isolated from this animal. Although treated with sulpha drugs the condition became worse and the animal eventually was destroyed.

A second animal lost condition rapidly while continuing to evacuate black fetid faeces, and subsequently died 10 days after arrival. Three species of *Salmonella* were obtained from the various organs of this animal—*S. muenchen* from the spleen, *S. anatum* and *S. typhi-murium* from the mesenteric lymph glands.

Two other animals followed a somewhat similar course and were eventually destroyed. *S. anatum* and *S. muenchen* were isolated from one and *S. muenchen* from the other. In addition *S. london* was isolated from the faeces of a fifth bull which recovered.

In those cases in which there was abrasion and bruising of the skin acquired during the train journey, acute cellulitis developed, followed by sloughing.

The most important symptoms noted apart from the skin lesions and the diarrhoea were high temperatures, increased respirations, general acute distress and rapid loss of condition.

There seems little doubt that this outbreak was greatly aggravated by the journey which these animals had made.

Ictero-haemoglobinuria of Calves.—Occasional outbreaks of this disease have been recognised for many years in southern Queensland. It usually appears suddenly in a herd and causes high morbidity and high mortality. The symptoms are fever, anaemia and reddish-brown urine, hence the common name of "red-water of calves." The cause was unknown until in the first quarter of 1949 two outbreaks at Gympie and one at Chinchilla were investigated. On each occasion a *Leptospira* was demonstrated to be the causal organism. The disease has been reproduced at the laboratory with strains of *Leptospira* isolated from these outbreaks.

Vibrionic Abortion.—Vibrio fetus was identified as the cause of abortion in a cow in a dairy herd on the North Coast. This is the second occasion that this type of infectious abortion has been identified in Queensland, the previous case having been found in 1948. The widespread use of Brucella Strain 19 vaccine in cattle has drawn attention to the causes of bovine abortion other than brucellosis. It is probable that *V. fetus* infection is not uncommon.

Lantana Poisoning.—A feeding experiment with the two common types of lantana (*Lantana camara* and *L. camara* var. *sanguinea*) showed that both types are toxic to young cattle.

Lead Poisoning.—Five outbreaks were diagnosed during the year—two in the Toowoomba district (one involved dairy cows and the other calves), two in the Maryborough district (both adult cattle) and one in Brisbane (calves). Cattle are particularly susceptible to lead and poisoning often follows their habit of freely licking such things as flaking lead paint, discarded paint tins or red lead.

Arsenic Poisoning.—The number of cattle killed each year by arsenic is apalling, particularly as fatalities usually result from careless handling of arsenical dipping fluids, weedicides, horticultural sprays, &c., and are therefore largely preventible. Eleven outbreaks were diagnosed in cattle and four in swine.

Georgina River Disease.—This is a condition involving mortality in both sheep and cattle. A special visit was made to the affected area late in 1948 by a small team of workers with a view to further investigation. A considerable number of natural cases both in cattle and sheep were examined and as a result an almost complete picture of the problem as seen in the field was obtained.

The disease is confined to definite areas in western Queensland and it is strongly suspected that it is due to a plant poison. Enquiry centred around *Eremophila latrobei,* which by feeding tests was shown to be poisonous to sheep, producing a syndrome not unlike that seen in the field. The few attempts to reproduce the disease in cattle were not quite as successful. In cattle under natural circumstances a marked feature of the disease is the manner in which the animal, without showing the least premonitory symptom, suddenly falls to the ground and dies without a struggle, suggesting respiratory collapse.

Diseases of Sheep.

Infectious Labial Dermatitis.—A total of 525,000 doses of the Commonwealth Serum Laboratories vaccine was issued through this Station. Outbreaks have been reported from only four of the many hundreds of vaccinated flocks.

Experimental observations on the immunity produced by the routine vaccination with C.S.L. vaccine were made in five flocks in the central west. Work on this subject is proceeding in the field and at Yeerongpilly.

A New Infectious Disease of Sheep.—Specimens from an outbreak of a fatal pyaemic disease of sheep on a holding in the north-west yielded cultures of a bacillus not previously recorded from sheep. This organism has been studied experimentally in sheep and guinea pigs, in which it produces a fatal infection. It closely resembles *Malleomyces pseudomallei,* the cause of melioidosis of man and rodents in south-eastern Asia. It has apparently not previously been recorded in Australia and its importance as a cause of disease in man and domestic animals in this country is as yet unknown.

Diseases of the Reproductive Organs of Rams.—In collaboration with the Sheep and Wool Branch, investigation of the bacteriology and pathology of diseases of the reproductive organs of rams was commenced late in the year.

Urinary Calculi in Wethers.—Mortality due to urinary calculi was reported in several flocks in the south-west during the latter half of 1948. In collaboration with the Agricultural Chemist and field officers of the Division of Animal Industry, studies are being made of nutritional factors which lead to the production of calculi.

"Humpy Back".—Although this disease has been known for many years in the Warrego and Maranoa and the central-west, its pathology had

not been studied until this year. The disease is similar to poisoning produced by feeding certain plants of the mallow family. For some years the plant *Malvastrum spicatum* has been suspected as the cause of "humpy back" but the evidence is not conclusive. In collaboration with the Government Botanist, observations have been made on the association of *M. spicatum* and other malvaceous plants with "humpy back," with a view to experimental testing of the toxicity of suspected species.

Diseases of Poultry.

Pullorum Disease.—As a result of the Department's blood testing programme and registration of hatcheries, this serious disease of baby chicks is now only a minor cause of mortality. Fourteen outbreaks were diagnosed.

Salmonellosis.—This disease was first diagnosed in chickens in Queensland in 1946. Since then the numbers of outbreaks diagnosed in chickens each year have been as follows:—

1946–47	2
1947–48	5
1948–49	11

The disease is of importance for several reasons:—

(*a*) All of the 160 or more species of *Salmonella* are capable of producing infections in man and many species of domestic mammals and birds.

(*b*) Although salmonellosis has been diagnosed in swine, calves and ducks at this Station for many years, the disease first came into prominence when an epidemic of gastro-enteritis of children in Brisbane in 1947 was found to be due to *Salmonella bovis-morbificans.* Six additional species of *Salmonella* found in man in Queensland have been found in domestic animals.

(*c*) In chickens the death rate from salmonellosis may be heavy. The initial source of infection in avian outbreaks is difficult or sometimes even impossible to locate, since rats, mice, domestic animals and man may act as healthy carriers of salmonella organisms. A high standard of sanitation is the most important preventive measure in poultry.

Fowl Pox.—Outbreaks of fowl pox often occur before the chickens have reached the age recommended for vaccination, namely eight weeks. Some overseas workers state that chicks may be safely vaccinated at three to eight days of age but others contend that this is a dangerous practice. During the 1948 hatching season work was commenced on the production of a chick embryo vaccine which could be safely used in baby chicks. Preliminary results were encouraging and work is proceeding.

Respiratory Diseases.—Outbreaks of infectious diseases of the respiratory tract are common at two to five months of age. Exact diagnosis often requires bacteriological examination and transmission studies in experimental chickens.

Fowl cholera of the respiratory tract was fairly common and was successfully treated with sodium sulphamezathine (0.2 per cent.) in the drinking water for several days.

Several outbreaks of infectious coryza due to *Haemophilus gallinarum* were diagnosed and in some of them the mortality was high.

Transmission experiments with material from five serious outbreaks of respiratory disease were negative for infectious laryngo-tracheitis. Thus, although this virus is prevalent in other parts of Australia, there is still no evidence that it occurs in Queensland.

Outbreaks of infectious catarrh or mucoid tracheitis of a chronic type associated with low mortality were again encountered in diagnostic work.

Many outbreaks of respiratory disease are due to concurrent infection with fowl pox virus and other bacteria or viruses. Such outbreaks could be prevented or minimized by fowl pox vaccination at the appropriate age.

Diseases of Horses.

Ataxia (Coastal Staggers).—This condition has been further investigated both at Yeerongpilly and at Oonoomba. At the former Station a feeding test with material collected at Bundaberg was inconclusive, but at Townsville, using locally obtained plants, it has been found possible to produce a typical syndrome by feeding with the plant *Gomphrena celosioides.* This plant, which is an introduced one, is known to exist now all along the coast from Townsville to Brisbane and is spreading rapidly. It was noted that it was particularly prevalent in paddocks where cases of the disease were occurring. A feature of the disease is the absence of macroscopic lesions in the carcase.

Tallebudgera Horse Disease.—It has not been possible to carry out any work on this problem. The disease has been quiescent and little has been heard of it during the last year.

Birdsville Disease.—This condition has been mentioned in previous reports. Two officers have just completed a survey in south-western Queensland, where the disease is prevalent during the winter and spring. Nothing is known concerning the cause of this complaint, which has some features not unlike the ataxia or coastal staggers mentioned above. At present all the information possible is being collected by various people interested in this disease, which is widespread throughout the whole of both northern and central Australia and causes serious disability on many station properties.

Parasites of Swine.

Control of Sarcoptic Mange in Pigs.—Three pens, each of eight young Large White pigs showing extensive lesions of sarcoptic mange, were treated with benzene hexachloride and chlordane. The pigs were crowded together in a crate and the group sprayed from above and below by means of a stirrup pump so that each pig received approximately one quart of fluid. The movement of the pigs in the crate assisted in getting a good cover and worked the spray into the skin.

The BHC was applied in the form of a suspension at concentrations of 0.25 per cent. and 0.125 per cent. gamma isomer and the chlordane as an emulsion at a concentration of 0.25 per cent. A single treatment with each of the insecticides was sufficient to eradicate the infestation. Irritation and rubbing ceased within 24 hours and in 2-3 weeks the lesions had completely disappeared.

Notoedric Mange in Koalas.

An outbreak of mange amongst koalas (*Phascolarctos cinereus*) in a sanctuary was investigated and found to be due to *Notoedres* sp. The mite found was morphologically indistinguishable from *Notoedres cati*, the form infesting the head and neck of cats.

Two pens of koalas were infested; one containing six young koalas about 12 months old, and the other containing three aged males and one aged female. The lesions took the form of dry raised asbestos-like scabs, principally on the abdomen and inside the arms. In the older koalas the lesions extended to the back and the shoulders but the head was not involved. The bears, except one aged male, did not show loss of fur but the lesions could be readily felt through the fur. The aged male showed generalised mange with raised, thickened, dry, scurfy skin and some loss of fur over the shoulders. The lesions on all the koalas examined were quite active and relatively large numbers of adult mites, together with eggs and immature forms, were found in skin scrapings.

Treatment by local application of benzene hexachloride at 0.1 per cent. gamma isomer was advised but unfortunately treatment was undertaken too late and the animals died from toxaemia which had developed before treatment was commenced.

OONOONBA STATION.

The effective working of the Station was greatly assisted by the appointment of a bacteriologist to the staff and the installation of new equipment. Accommodation was also provided for small animals.

Vaccines and Specimens.

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

VACCINES SUPPLIED.

Contagious bovine pleuro-pneumonia	105,925	doses
Tick fever of cattle ..	2,444	,,

SPECIMENS EXAMINED.

Blood samples for brucellosis agglutination tests:	
Bovine	636
Porcine	83
Milk samples	53
Dip samples	61
Other specimens	341

Diseases of Cattle.

Soley's Disease.—This disease is characterised by a persistent diarrhoea, wasting, fading and staring of the coat and depressed milk yield. Eighty deaths have occurred over a period of 13 years. The livers of more than half of the animals examined post-mortem were greatly enlarged (over 100 lb. weight in some cases) and neoplastic in appearance; in one case similar effects were seen in the lungs.

A chronic case has been kept under observation for several weeks. Biochemical tests have returned normal figures for blood calcium, phosphorus and copper. Erythrocyte counts were below average initially but have improved. Total serum protein is higher than average, but this may be the result of loss of fluid due to diarrhoea.

Aphosphorosis and Botulism.—Clinical cases of phosphorus deficiency occurred in the vicinity of Townsville in October; blood phosphate levels were parallel with those from the Charters Towers area where "peg-leg" was prevalent.

Attempts to isolate *Cl. botulinum* from bones from the Charters Towers area where osteophagia is common were not successful. However, vaccination with toxoid of 1,000 head of cattle on the same property appeared to reduce mortalities.

Tick Fever.—Smears from 10 outbreaks were examined, all being positive. A total of 2,444 doses of blood vaccine and five bleeders were despatched. Ten animals were immunised.

Mastitis.—Of 53 samples examined, *Streptococcus agalactiae* was isolated from 14 and *Staphylococcus aureus* from 6. *Aerobacter aerogenes* was isolated from the udder of an animal showing an acute painful mastitis and systemic reaction. A case of actinomycotic mastitis with sulphur granules in the secretion was encountered. Numerous branching hyphae with clubbed ends were scattered irregularly throughout the granules.

Diseases of Sheep.

Georgina River Disease.—Immediately deaths were reported, investigations were again undertaken in October. Detailed observations were made of affected sheep, both at rest and driven, and more than 20 autopsies performed.

Feeding tests corroborated past evidence that *Eremophila latrobei* is toxic to sheep. When considered collectively, the effects seen in natural cases of the disease are comparable with those produced by this plant. Feeding 4½lb. of the narrow, green-leafed form of the plant caused death of a two-year-old heifer, producing similar symptoms and lesions to those seen in sheep. Paddock trials are being designed in an endeavour to confirm the suspicion that *Eremophila latrobei* is the cause of the disease in the field.

Fleece Lifting.—In 1936, shedding of the fleece of up to 25% of sheep, accompanied by coronitis, occurring in a belt of country at Hughenden, was described. This condition was again reported in May and an investigation made. Plant poisoning is suspected and feeding trials in the area are being arranged.

Drenching Fatalities.—Nicotine sulphate poisoning followed improper drenching with this substance for worm control.

Infectious Labial Dermatitis.—Successful transmissions were obtained with scabs from two suspected cases.

Calcium Tetany.—Mortalities due to transit tetany occurred in stud rams following introduction from the south. Serum calcium estimations were slightly below normal, and sick animals responded to treatment with calcium borogluconate.

Diseases of Horses.

Coastal Staggers.—Feeding tests with *Gomphrena celosioides* produced a syndrome clinically identical with that of natural cases of this disease in two horses receiving 242 lb. and 157 lb. over a period of 42 days and 30 days respectively. A convalescing natural case was fed 192½ lb. over a period of 29 days, at the end

of which time it went down and was unable to rise. A fourth animal was fed 529½ lb. of young plant over a period of 55 days. It showed effects in keeping with previous cases but did not die. Lesions have not been demonstrated in natural or experimental cases.

Walkabout Disease.—Outbreaks were reported from several sources, extending from Reid River to Julia Creek, in the latter half of the year. Losses were not as heavy as in 1946-47. Investigations were made on two properties, the main object being to obtain further information on plants likely to be involved. A cause other than whitewood (*Atalaya hemiglauca*) must be sought as little or none of this plant was available to affected animals in certain instances.

A feeding test with whitewood from Winton has been undertaken. It has been claimed that horses having access to the plant in that area develop symptoms resembling Birdsville disease.

Salmonellosis.—In the case of deaths of three of four travelling horses, *Salmonella typhi murium* was isolated from the organs.

Ulceration of Oesophagus.—A condition causing ulceration of the oesophagus and cardiac portions of stomach has occurred in two properties in the Gulf. Material examined showed a felted mass resembling hyphae in the depths of ulcers; *Streptococcus equi* was cultured from one case.

Diseases of Pigs.

Respiratory Disease.—Investigations were made into the etiology of respiratory disease of pigs received from three sources. *Pasteurella suisceptica* was isolated from pneumonic areas of lungs of three of four animals; in one case the organism was septicaemic.

Parasites.—Very heavy infestations of internal and external parasites have been encountered in animals autopsied. Worms present included *Metastrongylus apri, Ascaris lumbricoides, Hyostrongyles rubidus, Oesophagostomum dentatum* and *Trichuris* spp.

Salmonellosis.—*Salmonella paratyphi* was isolated from the kidney of a pig from Innisfail.

Vitimin A Deficiency.—Avitaminosis A was diagnosed in pigs at Charters Towers.

Diseases of Poultry.

Coryza.—*Haemophilus gallinarum* was cultured from a flock suffering from a severe respiratory disease. There was a concomitant infection of fowl pox. Evidence obtained from transmission tests suggests that the organism may remain latent for five months and then become active when the resistance of the bird is lowered.

Botulism.—Botulism has occurred in several instances.

Turkey Pox.—A severe outbreak of turkey pox occurred at Charters Towers.

Parasites.—*Gonghyonema* spp. and stomach worms (*Acuaria spiralis*) were found in fowls from the Townsville area.

An enteric infection caused heavy mortalities in cage birds in Townsville during the wet season, and numbers of wild finches were also seen dead. There was no evidence of psittacosis, but a paracolon type organism was isolated from certain cases. A good response occurred to medication of drinking water with mezathol.

Report of the Sheep and Wool Branch.

Mr. G. R. Moule, Officer in Charge.

GENERAL.

Despite a favourable season for sheep breeding in the Warrego and Maranoa stock districts, no improvement in sheep numbers has occurred in the State. Heavy reductions in flocks in the central-west and north-west, as the result of drought conditions, have outweighed natural increase amongst flocks in the southern part of the State.

The central-west and north-west are now lightly stocked and until comparatively recently conditions were unfavourable for breeding. As reproductive rates of flocks in these areas are usually low, it seems improbable that the sheep population will increase rapidly. Because of the soundness of the southern sheep market very few sales of surplus sheep to northern buyers are being made.

The wool market has remained buoyant and the 472,389 bales of wool offered for sale during the financial year returned £A 31.5 million. Peak prices were reached in January, when an average of £77 per bale was obtained for greasy wool. An anticipated decline in prices occurred in the second sale of the May series, when the average price was £54 16s. 4d. per bale. However, a stronger demand from overseas buyers in June led to an advance in market values and prices rose to almost £60 per bale for greasy wool. A similar trend was obvious in the scoured wool market.

The average price per bale shows the Queensland clip in a favourable light when compared with those from other States. However, it must be remembered that the Queensland sheep population has a much smaller proportion of British breeds and their crosses than the flocks of other Australian States.

The main buyers were Great Britain and other European countries, Australian manufacturers, Russia and the United States of America. The activity of representatives from the U.S.A. was somewhat restricted, and buying of limited consignments was undertaken by selected trade representatives on behalf of the Japanese industry.

Ruling rates for lambs at Cannon Hill and country saleyards have been high, but the supply has been poor and quality has not been uniformly good. A noticeable feature of the mutton sheep industry, however, has been the expansion of lamb raising and crossbred sheep production in

conjunction with mixed farming in the coastal and subcoastal areas. This industry is showing considerable promise and is being tried on the Atherton Tablelands, and at Theodore, Gindie, Gympie, Maryborough, Beaudesert and Springbrook. While it is improbable that Queensland will ever develop a very large export trade in fat lambs, the supply of suitable mutton to the local markets existing in the coastal cities could make a definite contribution to the State's drive for increased food production.

In order to assist smaller producers in the preparation and marketing of their clips, the Department maintained a Farmers' Wool Scheme for over 20 years, under which growers' wool was sorted and sold in bulk lines. With the establishment of similar services by two co-operative shearing companies, and because of the necessity for a fleece testing unit which will permit the application of more modern and detailed methods in animal breeding and ecology, the Farmers' Wool Scheme was closed in August, 1948.

EXTENSION WORK.

General.

Extension officers paid visits to 1,249 properties in an advisory capacity. Advice was given on problems specific to the sheep industry in the various districts. In all, 718 actual demonstrations were carried out on properties to familiarise wool growers with techniques which might be used to improve production and to prevent economic loss due to disease and parasitic conditions. A dissection of this work is shown hereunder.

Sheep Breeding—	
Selection of flock and stud rams	48
Selection of flock and stud ewes	16
Diseases and management of breeding stock ..	58
Fat lamb production	3
Sheep Feeding—	
Drought and supplementary feeding	114
Feeding stud sheep..	20
Pests and Diseases—	
Blowfly control measures	275
Parasites	101
Nutritional disorders	46
Infectious diseases	78
Miscellaneous conditions	31

Twenty-one large scale field days were arranged in conjunction with various branches of the United Graziers' Association and were conducted by officers of the Branch, assisted on some occasions by other Departmental officers. The specific subjects, with the number of times they were featured in lectures and demonstrations, included blow fly control measures (8), infectious labial dermatitis (8), poison plants (1), worm control (2), fat lamb production (2), drought feeding (1), fertility and infertility of sheep (9), the management of breeding ewes (11), and management of mulga (6). Just over 1,000 sheep raisers attended the field days.

Two staff schools were conducted for new appointees of the Branch. The publication of extension articles in the Queensland Agricultural Journal has been continued throughout the year. In view of the need for a pastoralist's handbook, comprehensive articles, which can be used as sectional chapters, have been written. The subjects dealt with have included fat lamb production, drought feeding, preparing for shearing, copper deficiency, tail strip operation, lumpy wool and control of worm parasites.

An article entitled "The case for the Mules operation," which appeared in the February, 1948, issue of the Queensland Agricultural Journal, was reproduced by the Australian Wool Board for Commonwealth distribution.

Breeding of Merinos.

Following the breaking of one of the most severe droughts ever experienced in the central-west, demonstrations were held for pastoralists conducting properties on which Merino sheep breeding is being practised. These were at Morella, Muttaburra, Longreach (2), Blackall (2), Aramac, Emerald and Springsure, and it was considered the available information would be of valuable assistance to men rebuilding flocks which had been depleted by drought. The physiological facts relating to seasonal variations in the quality of rams' semen, together with the nutritional requirements of breeding ewes, were co-ordinated with information pertaining to the important climatic factors occurring in the pastoral environment of Queensland. The care and management of Merino rams and the causes of losses amongst breeding ewes and of neo-natal mortalities in lambs were stressed, and the diseases leading to permanent sterility of rams demonstrated.

The masters of three Merino studs consulted the Branch about animal breeding plans which might be employed to ensure more rapid progress in the rate of livestock improvement. In addition, field officers carried out a large amount of practical work amongst Merino flocks in which sheep classing has been demonstrated and they selected rams for use in 2 studs and 23 flocks.

British Breeds and their Crosses.

The long-wool ram subsidy scheme introduced in 1947-8 was continued and proved very popular. It closed (for the year) in April, when applications for assistance in the purchase of the full quota of 400 rams had been received. A survey has been made to determine the use to which these animals have been put and the benefit which has accrued to the fat lamb industry through their use.

Sheep classing has been carried out by officers of the branch amongst 10 British breed and Corriedale studs, and rams have been selected for use in nine of these. In addition, classing has been carried out in 13 Corriedale and cross-bred flocks and sires have been selected for use amongst 10 flocks.

Two stud masters have requested detailed plans of matings which would be likely to assist in the rate of livestock improvement.

Two fields days were devoted to British breeds and their crosses and to breeding methods which might be used for fat lamb production. One was arranged in conjunction with the Australian Meat Board's export lamb carcase competition.

Stud Survey.

A survey was made of the stud sheep industry in Queensland to determine the contribution which it makes to the sheep and wool industries of the State. This revealed a steady increase in the proportion of rams supplied to flock owners by local studs; during the past year about three-quarters of all the rams sold were bred in Queensland. Other trends which were

obvious were the increase in quality in southern rams as the result of the competition from the high quality animals supplied from Queensland, the time taken in establishing a stud, and the low reproductive rates amongst stud flocks depastured in the tropical and subtropical environment.

There is, however, an unfortunate deficiency in the number of studs producing "Downs" type rams used for the siring of fat lambs, and in those breeding Romney Marsh sheep, which are better adapted to coastal and subcoastal conditions.

The conclusion was reached that the stud sheep industry in Queensland is making a most worthwhile contribution to the welfare of the sheep and wool industries and that every consideration should be given to furthering the development of stud breeding in this State.

Drought Feeding.

Field Officers carried out valuable extension work on 114 properties in the central-west and north-west where drought feeding was undertaken during 1948 and the early part of 1949. In many instances, by advising on the buying of stock feeds on food-unit values, on methods of distribution and on flock management in relation to drought requirements, they were instrumental in saving flock owners considerable amounts of money. From a survey of this work it became apparent that field officers were responsible for halving the costs of drought feeding on many properties. A typical example selected from the available records reveals that, as the result of the advice of one field officer, the overall cost of maintaining 5,000 sheep was reduced from £4,614 per month to £2,322 per month.

Feeding to Overcome Specific Deficiencies.

Vitamin A and Protein Deficiency of Rams.—Widespread publicity has been given to the fact that, depending on the amounts of vitamin A and protein in the diet, there is a marked seasonal variation in the quality of the semen produced by rams. Rations suitable for the feeding of rams prior to joining have been computed at the request of a large number of wool growers and follow-up work has indicated that their appropriate use has resulted in a marked increase in semen quality.

Copper Deficiency of Sheep.—Following the mapping of the areas in which copper deficiency affects sheep in Queensland, methods of copper supplementation have been explored. Their application on 20 properties has permitted a more critical appreciation of the economic loss caused by copper deficiency. The results obtained from the sale of one small clip are given for record purposes. In 1947-8 the clip was made up of 3,973 lb. greasy wool, 496 lb. of which were considered to show signs of copper deficiency. Corrective measures were commenced in July, 1948 and the clip for this financial year was 6,159 lb. of greasy wool, 340 lb. of which were considered to show signs of copper deficiency. The normal fleece lines sold at 83½d. and 72d. per lb. respectively, while the wool affected by copper deficiency brought 46½d. per lb. on the same market.

Clinical evidence of enzootic ataxia was observed amongst lambs on two properties in the Tara district, and confirmatory evidence was obtained by analysis of samples of liver and blood.

Property Improvement.

With the continued subdivision of larger properties and the increased demand for the maintenance of improvements on established selections, a large number of requests has been received by field officers for advice on the planning and erection of property improvements. Besides supplying diagrams, visits have been paid to 31 properties to assist owners with details pertaining to the construction of sheep dips, shearing sheds, sheep yards, surface water tanks, troughing, bore drains, fences and gates.

Sheep Blowfly.

The activity of blowflies during the year has been noteworthy in two respects.

The spring wave was not of its usual proportions and was very poorly sustained. The autumn wave was extremely serious; it extended well into the winter and both breech and body strike occurred. In the central-west, north-west and the Warrego it was reported that fly activity was greater than during most previous years and the continued wet weather and shortage of shearers made the position difficult on properties where the Mules operation had not been applied.

An extremely high degree of protection against crutch strike has been reported by property owners who practice the Mules operation. An owner in the Longreach district reported that 26 sheep were struck in a flock of 6,000 young ewes carrying six months wool. The animals had been treated with Mules operation at lamb-marking time. In the older untreated ewes, carrying the same growth of wool, 28 per cent. breech strike was recorded.

The widespread application of the Mules operation has focused attention again on strike originating on the tail. A general survey of the methods which are used at marking time has revealed that tailing is probably one of the worst performed of the "farm operations" usually carried out on sheep properties. The importance of turning the flap of bare skin from the under surface of the tail back over the severed stump is still not understood by a large number of wool-growers. Even the application of the "tail strip" operation may not be sufficient in some instances to rectify damage done at marketing time.

Field officers undertook 113 demonstrations on properties in which owners were taught the correct technique to use in applying the Mules operation. In addition, 61 demonstrations of tailing methods were given on properties.

RESEARCH WORK.

Under a grant from the Wool Research Trust Fund, which is controlled by C.S.I.R.O., work on the climatology of pastoral Queensland and into lowered reproductive rates of flocks in the north-west has been continued.

Climatological Survey.

A detailed study has been made of drought in pastoral Queensland. In addition, a survey has been completed of sheep numbers and population

density within shires and petty sessions districts for the last 50 years. (See Maps 1 and 2 for illustrations of the type of information yielded).

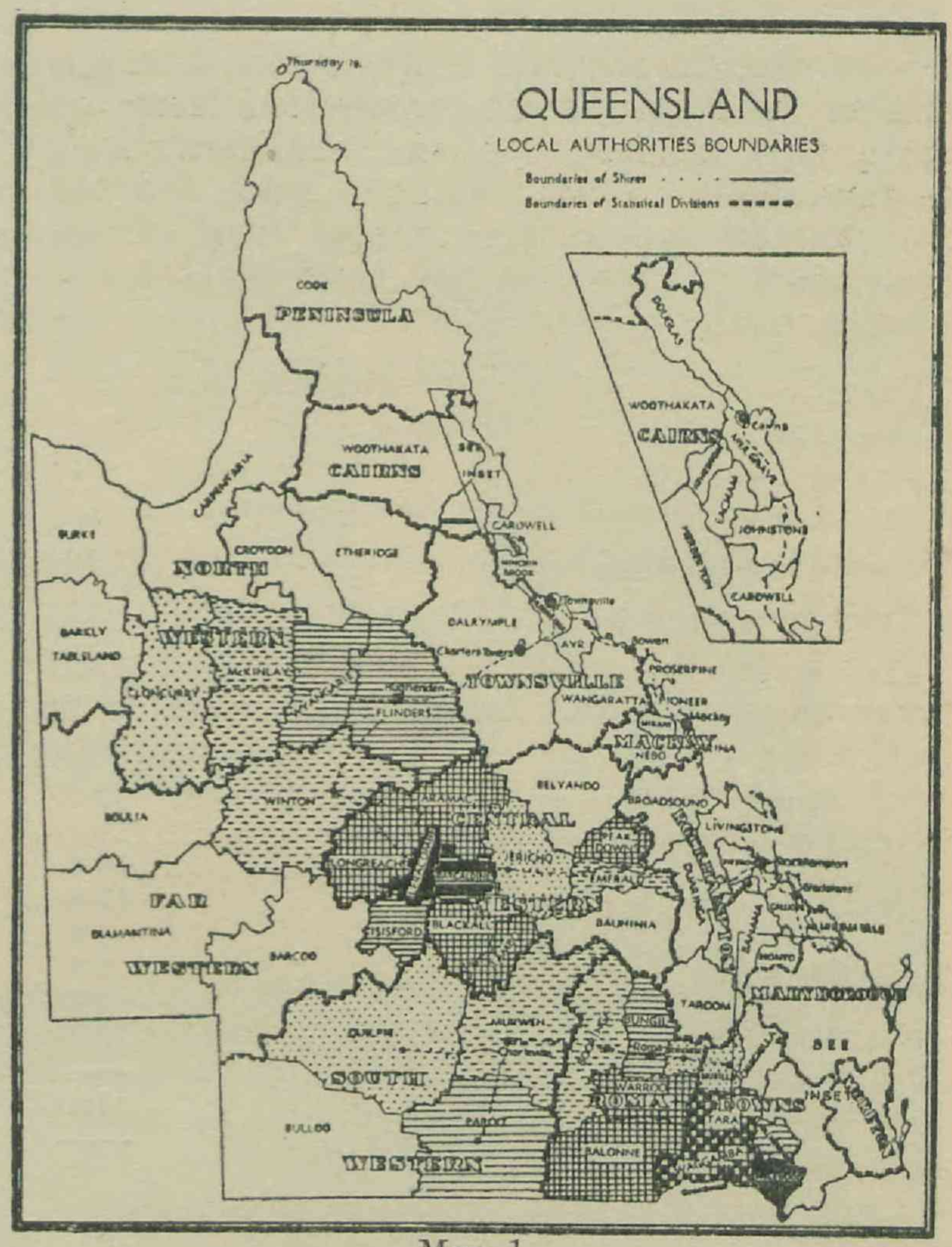
Previous climatological work had been done on a two-monthly basis, but because of the need for greater detail and a closer interpretation of available records, drought investigations have been made on a monthly basis and the reliability of effective falls was determined for a larger number of centres.

From a study of the trend of the theoretical evaporations, calculated from the formula $E = K \times S.D.$ (where E is evaporation in inches, S.D. is the saturation deficit in mm. and K is a constant varying in value from 16 to 22 depending upon the centre) a further division was made in the calculated level of effective falls. For the summer months of November, December, January and February, precipitations which gave a rainfall-evaporation ration which equalled or exceeded 0.2 were accepted as being "effective" falls. For March, April, September and October, values equal to or exceeding 0.25 for the rainfall-evaporation ratio were interpreted as signifying an effective fall, while for May, June, July and August, 0.3 was considered to be the critical level for the rainfall-evaporation ratio.

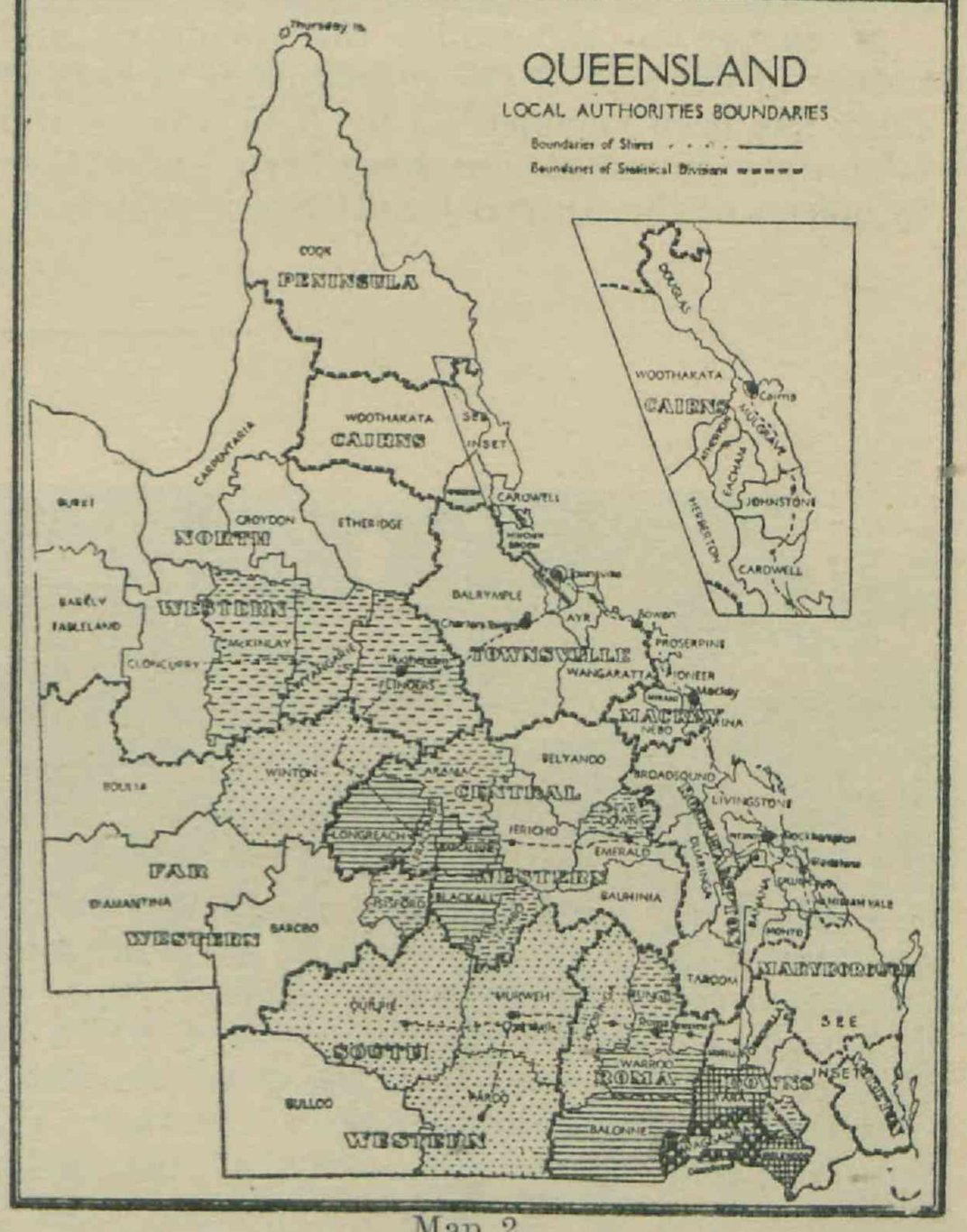
The percentage reliability of effective rain on a monthly basis was calculated for all centres for the number of years for which there were records. To compare percentage reliability of effective rain between centres a uniform period of 55 years was used. The seasons were classified as good to fair, mediocre, and bad for grass growth and for sheep raising by allotting points for the various combinations of effective falls in the different months.

It is clear from observations of the fluctuations in the sheep population that the rate at which flocks can be rebuilt after severe drought losses is limited by seasonal conditions. The average rate of increase has been estimated at two millions in the first good year after a drought and then one million in each succeeding year until checked again by unfavourable seasons.

The maximum rate of increase in Queensland was from 1903-4 to 1907-8, when sheep figures rose by two millions each year for four years.



Map 1.
Sheep Population Density at 31st March, 1942.



Map 2.
Sheep Population Density at 31st March, 1947.

DENSITY
of SHEEP per 100 ACRES

- Less than 4
- 5 — 9
- 10 — 14
- 15 — 19
- 20 — 24
- 25 — 29
- 30 — 34
- 35 — 39

Lowered Reproductive Rates of Flocks in North-western Queensland.

Large-scale breeding trials to determine the effect of thyroid administration in overcoming seminal degeneration due to high temperatures were not possible owing to adverse seasonal conditions in the north-west. About 300 stud ewes were inseminated artificially with semen obtained from treated and untreated rams in November-December, 1948. Each ewe was inseminated once, and despite the extremely hot conditions over 50 per cent. of conceptions were recorded from the use of semen from thyroid treated rams. Only 30 per cent. of conceptions occurred amongst the smaller group of ewes, which were inseminated from rams which had not received thyroid treatment. All ewes were of the same age and the difference in conceptions was statistically significant. In view of these results two large-scale field trials are in hand for next summer.

During the lambing which occurred under intensive conditions, information was collected on neo-natal mortalities of lambs in north-western Queensland. As the ewes were lambed in netted yards, no losses from foxes, pigs or crows occurred. Allowance has been made for such losses in the dissection of potential losses under paddock conditions set out hereunder.

Dissection of Lamb Losses.

Lambs lost (of total born) in survey	12·8 %
Total potential loss	22·0 %

Causes or Potential Losses (Percentage of Total Loss).

Plugged teats	30
Weak at birth and/or premature ..	20
Cold	16·6
Loss of mother	13·6
Crows, &c.	6·6
Dystokia	6·6
Died at birth	3·3
Unknown	3·3
	100

As conditions were ideal for lambing the high rate of potential loss amongst the lambs is somewhat disturbing.

A survey to determine the incidence and nature of diseases of the reproductive organs of rams has been commenced by field officers and laboratory investigations have been undertaken by officers of the Animal Health Stations Branch. Further evidence of an extremely high wastage amongst rams in the tropical environment has been secured.

Fundamental research into changes in testicular temperatures has been conducted in conjunction with the staff of the School of Physiology of the University of Queensland. Multiple thermocouples were inserted through the scrotum and testicle and temperature gradients under cool conditions, hot conditions, and when the scrotum was wrapped were observed. (See Plate 7.)

From this work it became obvious that under cool to moderate conditions—74°F. dry bulb and 64°F. wet bulb—testicular temperatures are from 6° to 8° lower than rectal temperatures and that the temperature throughout the testicle is uniform.

A marked rise in testicular temperature to within 3° of rectal temperature occurred when the rams were confined in a hot atmosphere—105°F. dry bulb and 78°F. wet bulb—for from four to six hours.

Comparable results were obtained when the external pudental arteries, which supply the scrotum, were ligated. When the scrotum was wrapped in cellophane and woollen fabric the testicular temperatures rose to within a degree of rectal temperatures.

Further work to check these results and to determine the role of the sympathetic nervous system in the control of testicular temperatures is in hand.

Report of the Cattle Husbandry Branch.

Mr. R. D. Chester, Officer in Charge.

This Branch of the Division was formed just prior to the year under review with the intention of giving more adequate service to both the beef and dairy industries.

Initially the aim is to give an efficient extension service in animal nutrition, breeding and management, but the most efficient type of extension is that backed by research which is carried on side by side with the extension work. For this reason, small short-term investigational projects concerned with aspects of the cattle industry most likely to yield immediate results in respect of increased production will be undertaken.

The year has been one in which there has been an increasing interest in ways and means of stepping up the output of beef and dairy produce. Because of this, it has at times been difficult to meet the demands of the Department for information and of the industry for increased service. However, the difficulties have been no more serious than those normally associated with any new enterprise and the organisation is already able to handle most demands with adequate speed and efficiency. Increased demands in the future are most likely to arise as a result of present services.

EXTENSION WORK.

General.

As staff was limited at the beginning of the year, consideration was given to ways and means of best using the manpower available, and it was decided that efforts should be concentrated on improving the efficiency of dairy production by better feeding methods. Abundant material was available on which to base a sound extension service.

Every effort has been made to organise field days. In this connection there has been very close liaison with the Herd Recording Section of the Division of Dairying. Emphasis has been placed on methods of limited concentrate feeding. These methods are dependent on a knowledge of a cow's production and so can only be efficiently practised where herd recording is being undertaken. The Branch is therefore keenly interested in the extension of herd recording throughout the dairy herds of the State. Towards the end of the year a series of lectures by Cattle Husbandry and Herd Recording officers were being given throughout all districts where herd recording groups had been arranged.

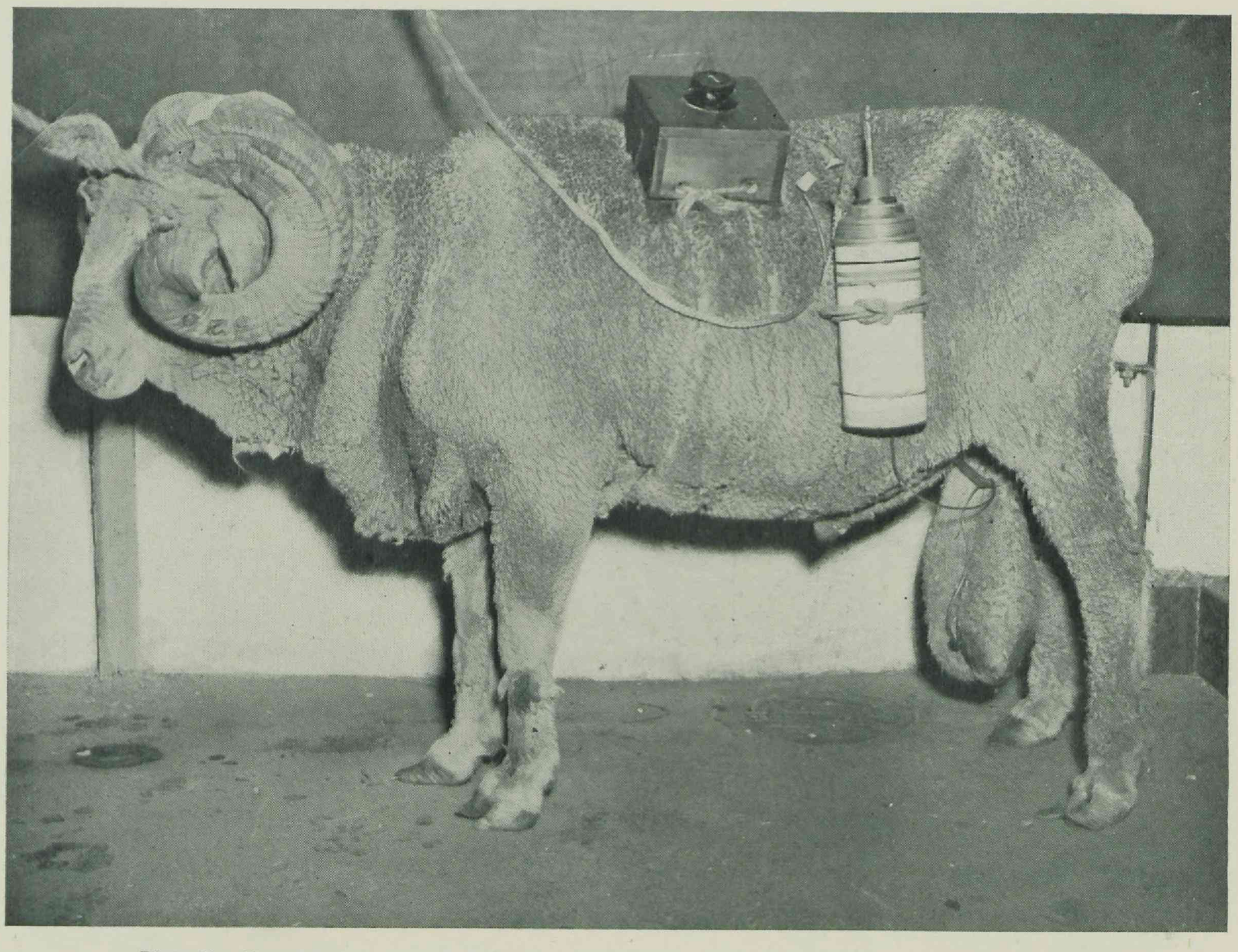


Plate 7.—Apparatus in use to determine changes in testicular temperatures of rams. This research work is connected with a study of fertility in sheep.

Plate 8.—General view of entries in the Central Queensland section of the Australian Meat Board baconer carcass competition for 1949.

At the same time, attention is being given to improved methods of calf husbandry, particularly calf nutrition.

On the beef side, extension work has been confined largely to visits to individual properties where graziers have been requiring advice on particular aspects of management or where calls were made for the purpose of gathering information on specific aspects of beef production.

To some extent extension work has been limited by the small amount of detailed information which is available concerning production problems within the beef industry. For this reason, the information which is available is being gathered and collated.

Staff School.

Early in the year, Dr. M. C. Franklin, Principal Research Officer of the Council for Scientific and Industrial Research, assisted by officers of the Divisions of Plant Industry and Dairying, conducted a five-day school in Animal Nutrition for field officers of the Department. The course was confined chiefly to crop and pasture production and animal nutrition and was attended by some 70 officers of the Divisions of Animal Industry and Dairying, most of whom would subsequently assist the Branch in its field advisory services.

Sire Survey.

There is insufficient information available from herd recording in this State to warrant special work on sire surveys, but the time is quickly approaching when a special study must be made of the available sires. For this reason, the efforts of the Herd Recording Section to establish a calf identification system are of particular interest.

Artificial Insemination.

No move has been made to set up an experimental artificial insemination centre. Because of the staff position and the limited finance available, it is felt that the interests of the cattle industry will best be served by keeping in close contact with work carried out in the southern States. The Branch, however, is in a position to undertake a small amount of experimental insemination in stud cattle when called on to do so by breed societies.

An attempt was made in February of this year to inseminate a number of Guernsey cows in a herd at Maleny with semen introduced from the State College of Agriculture of New Jersey, U.S.A. However, refrigeration arrangements for the semen in transit were unsatisfactory and only a small percentage of sluggishly motile spermotozoa were present in the semen at the time of insemination—between 72 and 86 hours after the semen was collected in New Jersey. No conceptions resulted.

COMMONWEALTH DAIRY GRANT—DEMONSTRATION WORK.

Limited Concentrate Feeding Demonstrations.

Following the work of Jensen and his associates in America on the "input-output" relationship of food to milk production and Ferguson's work in New South Wales on the effect of limited concentrate feeding, it was decided to attempt to demonstrate the value of this method of feeding in the field in Queensland. The Commonwealth grant to the dairy industry made the financing of this scheme possible.

The growth of pasture and crops in the semi-tropical and tropical environment of this State is such that the nutrients available from these sources vary very rapidly with changes in the season and generally a partial drought is experienced in late winter and spring months. Production rises slowly during late spring and early summer, gains momentum in mid-summer and reaches a zenith in February, from which point production declines gradually at first, then more rapidly, and reaches the lowest level usually in August or September. Greatest seasonal variation is shown by the crude protein level, and it is felt that frequently protein is the limiting factor in milk production during several months of the year.

For economic reasons it is not possible at all times to feed sufficient protein or other nutrients for full production. It seems clear, however, that the feeding of small amounts of concentrates of high protein value would not only increase milk output but would do so at an economic level.

Six demonstrations have been designed along these lines. Insufficient data are yet to hand on which to base an estimate of the possible results, but indications are that the response will follow along the expected line.

Farm Demonstrations.

Under the Commonwealth dairy grant the Divisions of Plant Industry and Dairying and Animal Industry are co-operating in a scheme whereby several farms will be selected in six selected districts of the State and managed by the owners as closely as possible along lines suggested by Departmental officers. This Branch will be responsible for nutrition, breeding and stock management on the farms.

Calf Feeding Demonstrations.

Work on the nutrition of calves will be financed by the Commonwealth grant. These demonstrations will include investigational work on feeding of calves through metal and rubber teats rather than directly from buckets. Dosing with rumenal flora from adult stock, rotational grazing and other husbandry methods will also be demonstrated.

Dairy Farm Competitions.

A State-wide competition will be conducted in conjunction with the Divisions of Dairying and Plant Industry. The scale of points for this competition has been drawn up by a joint sub-committee, and it is expected that the competition will run from 1st October in each year.

Miscellaneous Observations.

Six temporary Field Assistants have been appointed to supervise feeding demonstrations. These officers visit farms concerned three or four times each week. As a result they are able to keep complete records of the herds concerned. They can also contact other farms frequently enough to enable them to keep a check on the movement of cattle within herds. Accurate

observations are being made on the following matters of importance to the industry:—

(1) Duration of lactation.
(2) Frequency of calving.
(3) Effect of age of heifer at first calf on production.
(4) Percentage of calves reared.
(5) Calf mortality.
(6) Wastage of heifers and cows.
(7) Effect of "steaming up" on subsequent lactation.
(8.) Reliability of udder conformation of the heifer at four months as a guide to subsequent production of the mature animal.

THE BEEF INDUSTRY.

In an attempt to collect information not available from other sources, surveys are being made in respect of two aspects of the industry.

An attempt is being made to assess the herd bull requirements of the industry and to find out just how far these requirements are fulfilled by recognised stud breeders, firstly from Queensland and southern breeders, secondly from Queensland breeders alone, and thirdly, to what extent various districts are self-sufficient in their bull supplies.

In another survey, the Branch is endeavouring to ascertain what improvement or deterioration has taken place in cattle quality and production capacity of properties in various districts of the State.

Important information from both these surveys should become available in the ensuing year.

Supplementary Feeding Observations.

Arrangements have been made with the Queensland-British Food Corporation to carry out observations on cattle depastured on sorghum stubble and various other crops which will be grown for grazing in the Capella area.

Sorghum stubble will become available at about May or June in each year and may be fed off until all country is reploughed for the following season's crop. This will probably give a grazing period of a maximum duration of four months.

During the course of the next year it is hoped to build yards and instal a cattle weighing scale so that regular weighings may be made. This work has not been possible in the first year but general observations are being made on cattle now grazing on the available stubble. There is a considerable amount of grain in the head available to cattle this year and this is proving an excellent fodder for topping off forward store bullocks. Cattle accustomed only to pasture grazing quickly adapt themselves to the new feed and after a period of only two or three days show a marked preference for the stubble and grain diet.

As soon as a husbandry officer is available for work in Central Queensland, a fairly extensive programme of experimental work will be commenced.

Mineral Imbalance.

It is evident that one factor of importance in the economy of beef production in central and northern Queensland is that of mineral imbalance, particularly phosphate deficiency.

Arrangements are in hand for work on mineral supplements for cattle in the central district.

Zebu and Zebu-Cross Cattle.

In certain more closely settled areas of Central Queensland there has been a swing towards Zebu-cross cattle, whilst in the less well-developed country of the north the Zebu-cross has become less popular.

It is hoped that in the near future joint experimental work will be carried out with C.S.I.R.O. on a property in Central Queensland to establish the place of Zebu cattle in the beef industry of this State. A careful watch is being kept on the use of Zebu hybrids and it is felt that whilst Zebu cattle may have some place in the economy of the cattle industry of the State, indiscriminate use of various Zebu hybrids by small individual cattlemen is fraught with such grave danger that it must be condemned. The aim of the beef cattle breeder must be the production of a uniform type of carcass. Indiscriminate crossing of hybrids will lead to a multiplicity of types. Such a policy is likely to prejudice the cattleman against the introduction of Zebu strains of any type and therefore slow up progress along the lines of more enlghtened animal breeding methods.

Raising Steer Calves.

Plans are in hand to investigate the economy of raising steer dairy calves to the age of six to 12 months for the vealer trade rather than to allow their sale and slaughter as calves. This work will be carried on side by side with dairy calf rearing work.

Some calves will be raised on surplus skim milk, others on a limited milk diet.

Report of the Pig Branch.

MR. F. BOSTOCK, OFFICER IN CHARGE.

Implementation of the policy of decentralisation by the establishment of district offices at Brisbane, Toowoomba, Murgon and Atherton has been welcomed by pig producers, as is evidenced by the demand for the services of the officers stationed in those centres.

The following gives some indication of the work carried out by the Branch during the year:—

Farms visited	1,659
Meetings attended	21
Bacon factories visited	41
Lectures given	23
Pig sales attended	53
Field days attended	10
Shows attended	19
Demonstrations given	34

In addition to the above there were 45 students enrolled in the Pig Raising Correspondence Course at the beginning of the year, and during the year 36 students entered the Course. Of these, 14 completed and 18 have yet to finish. The remainder for various reasons did not continue with the Course.

It has been felt for some time past that this Course should be conducted by the Department of Public Instruction, and at a conference held early in the year it was agreed that the Course be transferred to that Department, with the proviso that all lessons be referred to this Branch, from time to time, for checking and revision when necessary.

PRICES.

On 20th September, 1948, it was announced that the British Ministry of Food had agreed to an increase in the price of pig meats, which resulted in a price of 12½d. per lb. being paid to the producer for first quality baconer pigs as from 1st October, 1948.

However, representatives of the industry expressed disappointment at this price and the announcement by the Minister for Commerce and Agriculture that he had directed that a survey of the cost of production of pig meats be carried out by the Division of Agricultural Economics of his Department has been welcomed by the industry.

PRODUCTION.

Production figures for the year reveal a small increase in the number of pigs slaughtered, which is attributed mainly to the good season experienced and the increase of milk by-products made available for pig feeding.

However, the short supply of protein foods, fencing wire, and building materials has no doubt prevented many farmers from carrying out programmes of increased production.

In spite of these limiting factors there has been a decided increase in the interest shown by farmers in the improvement of their pig raising activities by better breeding, management and feeding, and this is evidenced by the response to carcass competitions conducted during the year.

STUD PIG RAISING.

Reports indicate that there has been a keen demand for stud pigs throughout the year and breeders are making every effort to secure fresh blood lines in order to maintain and improve the quality of their stock. In this regard the Royal National Show enables breeders to compare their pigs and provides the opportunity to purchase fresh breeding stock, and the services of Pig Branch officers in the selection of such stock are readidly availed of and much appreciated.

CARCASS COMPETITIONS.

The new type of baconer carcass competition has gained in popularity. Farmers forward selected pigs to a bacon factory for curing in the usual way and the carcasses are then judged for conformation. Sides cured as bacon are exhibited at country Shows where refrigeration space is not available, thus enabling farmers to determine from the score cards displayed where each entry falls short of the ideal. Twelve country Show Societies, in addition to the Royal National Association, have included this type of competition in their schedules and have received excellent entries.

The Australian Meat Board, in association with this Department and with the co-operation of all sections of the industry, again conducted a baconer pig carcass competition on a district basis. (See Plate 8, facing page 64.)

The championship was awarded for a pig sired by a Canadian-type Berkshire boar and a dam of Large White Berkshire cross, bred in the Mareeba area, with a score of 82 per cent. The carcass was a very good type, scoring well in all points, thus presenting a nicely balanced and evenly proportioned carcass, well fleshed, with an even covering of good quality fat.

Generally speaking the competitions were a success. In all 103 carcasses were judged, showing a considerable improvement on last year's entries, indicating that farmers have benefited from experience and utilised the information and knowledge gained as a result of the 1948 competitions and field days.

Arrangements were made to announce the winners of each district competition immediately after judging and this met with approval, especially the completion of the score cards, which clearly set out the points awarded and also the standard measurements of each carcass within its weight range. It is considered that the display of these score cards added greatly to the interest of the field days and was of excellent educational value.

As in previous competitions the English method of appraisal was used in judging and to qualify dressed carcasses had to weigh 120 lb. and not more than 180 lb. The 103 entries which complied with the conditions of entry had an average score of 67·97 per cent. The average of each section of judging is given below.

—	Possible Points.	Average Points Obtained.	Percentage of Possible Points.
By Inspection—			
Hams	8	6·27	78·4
Shoulder	7	5·92	84·57
Streak	12	5·57	46·4
By Measurement—			
Eye muscle at loin	28	18·04	64·42
Backfat thickness	20	15·26	76·30
Body length ..	20	13·06	65·30
Leg length ..	5	3·02	60·14
Total	100	..	67·97

GENERAL.

The Department was represented at a conference sponsored by the Australian Meat Board and held in Melbourne early in May, 1949. The object of the conference was to discuss fully the system at present in operation for the judging of carcass competitions, and to determine, if possible, if any improvement could be effected. Several suggestions were put forward and it was agreed that additional measurements, &c., should be taken by all judges of the 1949 Meat Board Competitions in each State, and that at the conclusion of this year's series of competitions another conference be called to consider the suggested alterations of the judging system in the light of additional data collected.

At a meeting of the Technical Sub-Committee on Animal Production, the matter of the establishment of Pig Testing Stations in each State was thoroughly debated and recommendations forwarded to the Australian Committee on Animal Production for its consideration.

It was decided to establish a stud herd of Tamworth pigs at the Kairi Regional Experiment Station and accordingly three mated sows were purchased. These sows have since farrowed and in order to keep them in production an unrelated Tamworth boar, suitable for mating with the sows and their present progeny, was secured.

It is hoped that the progeny of this foundation stock will be of assistance in improving the quality of the pigs produced on the Tableland and that as a result of experiments which it is proposed to conduct the pig industry of that area will reap considerable benefit.

Early in 1949 the Queensland-British Food Corporation commenced work on the establishment of the first 200-sow unit on a site selected at Moura.

This is the first step in a project which will no doubt have a bearing on the future development of the pig industry in this State. It is being pursued along lines of feeding and management that have been advocated by this Branch for some years past in the belief that any substantial increase in pig production, in the future, must come from grain growing areas.

Climatic conditions experienced on the northern Tablelands were generally favourable to pig production in that area, but the industry is making only a slow recovery from the low level reached in 1946.

Several factors appear to be responsible for this slow recovery. Lack of fencing and building materials are preventing many farmers from carrying out programmes to increase production. The favourable price for whole milk, together with the above shortages, have caused many who previously bred pigs to transfer to the milk trade. Also the high price for maize and the relatively low price received for pigs has had a considerable influence on production.

In the Burnett area seasonal conditions were dry in the early part of the year, but good summer rains were experienced and green feed and milk by-products are in good supply.

During the early part of the year pigs were marketed at light weights and in many cases unfinished, due to the shortage of food grains, and some farmers disposed of their breeding stock, due to this fact, and on account of the unfavourable price of food grain.

Although conditions improved in the latter part of the year, no big increase in pig production was secured, mainly due to the conditions prevailing earlier and the favourable prices being received in the dairying industry, coupled with good prices for calves and the shortage of food grain.

On the Downs climatic conditions were generally favourable throughout the year, but production was not greatly increased mainly due to the high price of food grain, farmers stating that a better price could be obtained for their grain by selling direct, than by feeding it to pigs; also building materials being in short supply and the delay in the announcement of any price increase for baconer pigs retarded production.

In the Moreton area useful falls of rain were experienced, resulting in reasonably good conditions prevailing throughout the area and green feed was in fair supply.

A small increase in production was secured, but as in all other districts food grain was too expensive, protein foods difficult to obtain, while fencing wire and building materials were in short supply, all having a retarding influence on production.

As a result of the work being carried out by officers of the Branch, many farmers now realise the value of improved methods of feeding and management and have a better understanding of food values in respect to the feeding of pigs.

Field Days have been organised, lectures and demonstrations given in many districts. However, work of this nature will be more conveniently carried out when all district officers are equipped with a suitable projector and slides, as it would appear that night lectures are popular in many areas.

Close 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, &c., on pig raising to members of each school.

Report of the Poultry Branch.

Mr. P. Rumball, Officer in Charge.

EGG PRODUCTION.

The increase in egg-production in southern Queensland, as measured by the intake of eggs by the Southern Queensland Egg Board, was about 20 per cent. In Central Queensland the intake of the marketing board exceeded that of last year by approximately 19 per cent., but it is estimated that there has been a fall in production in northern Queensland.

The estimated intake of the Southern Queensland Egg Board is 11,050,150 dozen eggs. This closely approaches the 1945-46 peak year intake of 11,085,699 dozen and exceeds the intake for 1947-48 by over 1,800,000 dozen.

There is a much greater density in the poultry population in southern and central Queensland than in northern Queensland. Consequently production in these areas has a greater influence on the total production of the State. It is estimated that egg production for 1948-49 exceeded that of the previous year by at least 16 per cent.

TABLE POULTRY.

There is evidence of a marked increase in the production of poultry meat, as will be seen from the table dealing with slaughterings and the export of dressed poultry.

Replacements of flocks of the State are largely dependent upon hatcheries. The hatchery season extends from March until October, with the majority of the hatching taking place from June onwards. There has not been a keen demand for early hatched pullet chickens, but the demand for cockerel chickens, which are reared for table purposes, is greater than the supply. This suggests that egg production may not be maintained at last year's level and that a further increase in the production of poultry meat is a distinct possibility.

In the Greater Brisbane area there are now four establishments slaughtering poultry for local and overseas markets, and poultry are slaughtered in many other localities for the local trade. No accurate method is available for measuring the fluctuation in the rise or fall of the production of poultry meats. The records collected from two of the older killing establishments engaged in the export trade suggest that the expansion of this side of the industry has been considerable. This is supported by the increase in the quantity of poultry exported.

TABLE 1.

Slaughterings of Poultry at Abattoirs.

Group.	1946–47.	1947–48.	1948–49.
	Birds.	Birds.	Birds.
1	641,011	640,456	945,911
2	..	..	185,718
3	..	..	99,400
Total	..	..	1,231,029

Table 1 gives (1) the slaughterings of two establishments that have been under observation for the past three years, (2) an estimate after enquiry of the slaughterings of two establishments engaged in both local and export trade, and (3) an estimate of the slaughterings of six establishments in the Greater Brisbane area where poultry are slaughtered for local trade.

From Group 1 of the Table it will be seen that there has been an increase in killings of 47 per cent. The estimate of the killings at other establishments has been made in order to indicate that, though some of the increase may have been due to a diversion of business from one channel to another, the slaughter of poultry for local trade in smaller premises is considerable.

The expansion of the poultry meat section of the industry is due in no small measure to (*a*) the high values ruling overseas inducing farmers to raise more cockerels and ducks for this market, and (*b*) the growing practice of commercial egg-producers of retaining hens for laying purposes for one year only, the most productive year.

An examination of the killings made by the two firms under observation for the past three years indicates that the slaughter of ducks was 10½ per cent. and that of cockerels 38 per cent. of the total killings.

In addition to the interest being displayed in the breeding of ducks in this State, very large numbers are being imported as day-old from the southern States. Weight and value of poultry exported during 1948-49 are given in Table 2.

TABLE 2.

Dressed Poultry Exported.

—	Weight.	Value.
	Lb.	£ s. d.
Boilers (hens)	1,792,000	196,000 0 0
Chickens (young males)	1,169,280	158,340 0 0
Ducks	389,760	46,284 0 0
Turkeys	49,280	7,186 13 4
Total	3,400,320	407,810 13 4

The weight of poultry exported for 1947-48 was 1,333,527 lb. and the value £151,174 6s. 7d.

NUTRITION EXPERIMENTS.

Nutrition experiments were commenced at the Regional Experiment Station, Kairi, on 30th August, 1948. Poultry farmers in North Queensland are often faced by serious shortages of wheat, bran and pollard, and in any case haulage costs of these materials adds to the cost of production of eggs.

With these points in mind the nutrition experiments were designed to determine to what extent the locally-grown products, maize and lucerne, could be used.

Chicken-raising Experiment.

A total of 800 day-old Australorp chickens were divided into 5 equal groups and placed on five different rations ranging in maize content from 30 per cent. to 70 per cent. Lucerne meal ranged from 1 per cent. to 7 per cent. of the total ration. In addition, all rations were supplemented with equal amounts of oils containing vitamins A and D_3, synthetic riboflavin and manganese sulphate.

This experiment was continued for a period of eight weeks. Results obtained were encouraging and it is intended to repeat the experiment during 1949.

Cockerel and Capon Experiment.

At 10 weeks of age, 300 cockerels were divided into six groups of 50. Three groups were caponised. An experiment to determine relative growth rates of cockerels and capons for table purposes on different rations was begun. The three rations used utilised at least 65 per cent. maizemeal. The protein percentage was varied, being 17, 15 and 13, respectively. Two groups, one of cockerels and one of capons, were placed on each ration. This experiment was continued until the birds were 7½ months of age.

The results showed that the relative growth rates for cockerels and capons on each of the three rations were similar. However, the weights of both cockerels and capons on the 15 per cent. and 17 per cent. protein levels were superior to those of cockerels and capons on the 13 per cent. level. The growth rate of birds on 17 per cent. protein ration was not significantly greater than that of those on 15 per cent. level.

In all groups the table quality of the capons far surpassed that of the cockerels. The production of capons may yet have an important bearing on our overseas trade in table poultry.

Laying Experiments.

Laying experiments using increasing quantities of maize were commenced on 16th February, 1949, and will be continued for 12 months. A total of 270 pullets, in six pens of 45 birds each, are now under test; two pens are on each of three separate rations containing 55 per cent., 62.5 per cent., and 70 per cent. maize, respectively. No significant differences are yet evident.

REGISTRATION OF POULTRY STOCK SUPPLIERS.

As from 1st January, 1949, registration of poultry stock suppliers became compulsory. It will be seen from Table 3, giving the registration for the years 1948 and 1949, that there has been a slight increase in the number of registered hatcheries with associated flocks, and a fairly marked fall in the number of registered suppliers of eggs for hatching. Many of those registered for the latter purpose have disposed of their flocks and others have not been able to combine production with hatcheries. This could be due to the increase in some hatchery flocks and the lowered demand for chickens.

TABLE 3.

REGISTERED STOCK SUPPLIERS.

—	1948.	1949.
Hatcheries with an associated flock ..	163	180
Hatcheries without an associated flock	6	6
Suppliers of fowl eggs for hatching ..	90	76
Poultry dealers	3	4
	262	266

The registration of poultry stock suppliers was commenced in 1947. Since that date 353 names have been entered in the Register but of this number 90 have been struck out, a few due to death, a few to retirement, but the majority due to a change in ownership. The change in ownership has been greatest during the past year. Many whose registration has been cancelled have not had an extensive knowledge of this class of business.

Entailed in the registration of stock suppliers are blood testing of flocks, general inspection and advisory work.

Hatcheries have a marked influence upon the quality of the flocks of the State and no effort is spared to bring about improvement in the flocks associated with them. The hatchery capacity of the State, as registered, is 1,585,757 eggs per three weeks. Working to capacity, registered hatcheries could produce 1,000,000 chickens every three weeks. The output per year would probably be between four and five million. These figures indicate the important part played by hatcheries in the flocks of the State.

Although registered hatcheries supply the major portion of the chickens used for the replacement of poultry flocks, a large number of farmers breed and hatch their own requirements.

SEX DETERMINATION OF CHICKENS.

During the year three persons qualified for a second class license to engage in this work. This brings the total that have qualified in the State to 40. Only 27 renewed their license and engaged in chick sexing during the period under review. Owing to the demand for table poultry many farmers purchased chickens whose sex had not been determined, with the result that the number of chickens examined was not much greater than for the preceding year. Table 4 gives the sex determination for 1947-48 and 1948-49 for various districts.

TABLE 4.

SEXING OF CHICKENS.

District.	1947–48.	1948–49.
Darling Downs	425,210	556,928
Ipswich	128,495	131,969
Brisbane	1,461,062	1,368,167
Nambour	173,515	151,123
Gympie	..	6,355
Maryborough	5,908	5,276
Bundaberg	122,297	143,761
Rockhampton	23,170	3,200
Mackay	..	..
Townsville	..	..
Cairns..	..	..
Atherton	..	..
Total	2,339,657	2,366,779

DISEASES AND PEST CONTROL.

General.

Poultry Branch officers work in the closest co-operation with the Animal Health Stations at Yeerongpilly and Oonoonba. It is the practice of these Stations to advise the Branch of all cases of disease submitted direct by farms, and, where possible, inspections are immediately made by officers of the Branch.

Avian Leucosis.

From field observations this disease appears to be becoming a greater problem than ever. It has, at times, been responsible for a mortality

of 30 per cent. or more of the pullet section of a flock and is regarded as the most serious disease afflicting the poultry industry. The economic losses are twofold, for not only must the loss of carcase value be taken into consideration but the loss in egg production is extremely serious.

From overseas experience it appears that the only method of control is by breeding from strains of birds that have some resistance to infection.

Resistance to infection can only be determined by a very careful process of breeding and recording. This work, which entails careful collection and recording of data, appears to be beyond the capacity of the plant of most breeders. Consequently the Branch has endeavoured to encourage breeding from both aged males and females which, by reason of their age, have indicated that they themselves possess some resistance.

The demand by commercial egg-producers for early hatched chickens, with the object of avoiding some chicken-rearing troubles, prevents this practice being followed by hatchery owners to any great extent. As aged birds in the main are not in production at this period of the year, to meet the demand for early chickens hatchery owners are forced to breed from young birds, many of which may succumb during the first year of life.

Coccidiosis.

The caecal and intestinal types of coccidiosis have again been very prevalent. The intestinal type appears in birds at or near the maturity stage, and with birds of this age the mortality rate is not spectacular; consequently many farmers fail to detect the disease until it has become chronic. When this stage is reached treatment is of doubtful use, and as the bird is in an advanced stage of emaciation the carcase is of no value. It has been found necessary to destroy many birds consigned to slaughtering establishments owing to their emaciated condition.

Sulpha drugs are being used extensively for the treatment of caecal coccidiosis, in most cases with excellent results, though cases have come under notice where the drug has been misused. It is not used as freely as it might be in the treatment of intestinal type because of the increased quantities required increasing the cost of treatment and the difficulty experienced by farmers in detecting the trouble sufficiently early.

Cholera.

Chronic causes of fowl cholera have again been reported among both fowls and ducks. This disease, though a problem to some individual farmers, is not widespread.

Fowl Pox.

Vaccination as a method of control of fowl pox is practised very extensively. The general recommendation is to vaccinate birds when about eight weeks of age. They must, however, be in good health. Coccidiosis was responsible for many flocks not being treated, and a higher incidence of fowl pox resulted. In northern Queensland it was responsible for a very much reduced output of eggs during the early portion of 1949.

Pullorum Disease.

During the year officers of the Branch tested 275,283 head of poultry for this disease, compared with 261,215 during the previous year.

The percentage of positive reactors for 1947-48 was 4.84 and for the period under review 2.83.

It is considered that over-all progress in the eradication of carrier birds from the flocks of the State is satisfactory, but instances of an increase in infection in some flocks have occurred. In many cases the probable cause of the increase has been traced, but in some cases this has not been possible. Mortality in baby chickens due to pullorum disease is decreasing each year.

Stickfast Flea.

For the purpose of controlling this pest the Boonah and Normanby Poultry Districts were declared infested areas some years ago. The flea was localised for a start in the Boonah District, with the Normanby District as a "buffer" area, but the pest eventually spread to Normanby and was found upon 85 properties. All the properties in Normanby were freed of the flea by using DDT, and only one officer now remains in the area to advise farmers as to treatment and to guard against the unauthorised movement of birds and infected animals.

The indifference of many farmers to the well-being of the small farm flock is likely to lead to re-infestation of the area, and constant inspection of properties is necessary.

EXTENSION WORK.

Lectures, demonstrations and field days were conducted throughout the State. Special emphasis was placed on nutrition and breeding. Nutritional lectures laid particular stress on vitamins A and B_2 and manganese, requirements of poultry which are so often deficient because of shortages of green feed, buttermilk powders and cereal mill-offals. Details of methods for obviating these deficiencies have been disseminated through the Queensland Agricultural Journal, radio talks, lectures and contact with individual farmers.

The subject of breeding for resistance to disease, with special reference to leucosis, has been kept well to the fore.

Extension work has not been confined to the formal lecture. The time spent on individual farms in blood testing for pullorum disease offers an excellent opportunity for informal talks on culling of sub-standard birds, nutrition of all classes of poultry, housing and other general matters pertaining to the poultry flock. That this phase of extension work is bearing fruit is evidenced by the fact that only 1 per cent. of the birds submitted for testing throughout the State were rejected as culls. Since the majority of egg producers obtain their stock from these hatcheries, these informal talks have a valuable indirect bearing on the future of the poultry industry.

DIVISION OF DAIRYING.

Report of the Director of Dairying (Mr. E. B. Rice).

STAFF.

Consequent on retirements and resignations several promotions were made among the field officers of the Division in the year under review and successful candidates from an examination for Dairy Officers were appointed to positions which were either vacant or recently approved. All new appointees were given a period of training in Brisbane before being sent out to the dairying districts. A conference of Senior Advisers in Dairying was held in Brisbane, and a school of instruction for field officers at the Queensland Agricultural High School and College, Lawes. It was also necessary to appoint five temporary officers to carry out work being financed by the Commonwealth Government for the purpose of raising the general efficiency of dairying. A considerable expansion in the production recording of grade dairy herds took place during the year, the number of units operating throughout Queensland having increased from 8 in 1947-48 to 29 in 1948-49; thus, 21 additional herd recorders (who are temporary officers) were recruited, and temporary clerical staff was also appointed for carrying out the necessary computations of production records.

SEASONAL CONDITIONS.

The favourable conditions of 1947-48, which continued until October, enabled production for the first quarter of the year to be well maintained, and both butter and cheese outputs were above those of the corresponding period in the preceding year. Below average rainfall recordings in October and November caused some decline in production during the spring months, but with the onset of the usual summer seasonal rains in December pastures and fodder crops made good growth and the declining dairy production was arrested. Production for January to March, 1949, was somewhat above that of the corresponding period in 1948, and the generally favourable seasonal conditions resulted in a prolific growth of pastures and crops. Some damage to crops ensued from floods and high winds in Central Queensland. Mild weather and useful rains in the last quarter of the report year ensured a continuance of favourable conditions for dairying and production was well maintained to the 30th June, 1949.

TRENDS IN PRODUCTION AND DAIRY CATTLE POPULATION.

Though there still continues to be a scarcity of some essential farm materials and equipment, the decline in dairy production which took place during the war years has been arrested and dairy cattle numbers and production are now steadily rising. Dairy cattle numbers, which had declined in the four previous years, rose from 1,332,000 at 31st March, 1947, to 1,383,000 at 31st March, 1948, a gain of 3·8 per cent. At the latter date the dairy cattle in the main Statistical Divisions of the State were:—

Statistical Division.	Numbers.	Per Cent.
Moreton	426,793	30·9
Maryborough	358,420	25·9
Downs	297,886	21·5
Rockhampton	184,886	13·4
Other Divisions	114,579	8·3

The dairy cattle population for the years 1945-1948 is shown in Table 1.

TABLE 1.

DAIRY CATTLE STATISTICS.

—	1945.	1946.	1947.	1948.
Dairy cows in milk	742,387	714,800	653,940	694,244
Dairy cows dry	258,991	273,035	237,247	228,778
Heifers (1 year and over)	266,451	254,236	232,086	213,451
Calves (under 1 year)	210,960	171,318	135,733	171,934
Bulls (1 year and over)	30,453	29,312	28,177	27,853
Others (including calves, cows, &c., for slaughter)	..	..	44,939	46,304
Total	1,509,242	1,442,701	1,332,122	1,382,564

The most recent information from the Commonwealth Bureau of Census and Statistics shows that the estimated total production of milk for all purposes produced in Queensland for the year ended 30th June, 1948 was 272,686,000 gallons, the highest recorded since 1942-1943.

There has been a keen demand for dairy stock during the year and prices continue to be satisfactory.

The higher prices now obtaining for all forms of dairy produce have meant a marked increase in the value of the dairy industry in the economy of the State. It is estimated that the gross value of dairy produce will exceed £17,000,000 for the year; the value of butter and fresh milk make up over 90 per cent. of this amount.

IMPERIAL CONTRACT.

The contract with Britain for the purchase of the exportable surplus of dairy produce from Australia was renewed for a period of seven years from 1st July, 1948. The new contract was negotiated at increased prices, with a proviso for annual review of prices if either party requires such review on substantial grounds. Any variation is limited to 7½ per cent. of the prices ruling in the preceding year. For the year ended 30th June, 1949 the agreed sterling prices were:—

Choice butter—233s. 6d. per cwt. f.o.b. (291s. 10½d. Aust. currency).

Choice and first grade cheese—131s. 6d. per cwt. f.o.b. (164s. 4½d. Aust. currency).

For the purpose of stabilising returns from exports for the period of the contract, the Commonwealth Government has created a fund to which approximately 20s. per cwt. for butter and 4s. per cwt. for cheese will be placed during 1948-49. It is estimated this will contribute approximately £1,750,000 to the fund in the first year of the renewed contract.

BUTTER PRODUCTION AND QUALITY.

Production and Value.

Favourable seasonal conditions and some increase in the total number of dairy cows in Queensland were responsible for butter production showing a further increase on that of the preceding year, which was the highest recorded in the State since 1942-1943. The production amounted to 105,743,741 lb., estimated to be valued at £12,600,000, which was also higher than the record of £11,402,000 in the previous year. The higher value this year has been due to the increase of 2d. per lb. commercial butter which was approved by the Commonwealth Government under the guaranteed price scheme.

Quality.

The total quantity of butter officially graded by Commonwealth and State officers represented 86·2 per cent. of the total output. The actual grading results were:—

Grade.	Boxes.	Per Cent.
Choice	688,149	42·27
First	832,980	51·16
Second	95,934	5·89
Pastry	11,109	·68

The percentage of choice quality butter, although it was about the average for the past five years—which is 41.52 per cent.—was somewhat below that of the previous year. There was a profuse growth of milk and cream tainting weeds due to the good winter and early spring rains, and this, together with an abnormally hot summer, contributed largely to the decline in choice butter. Research work carried out by the Commonwealth Scientific and Industrial Research Organisation on means of overcoming weed taints has not yet reached a stage where weed taint can be removed from cream and the butter produced therefrom. This work is still continuing and if successful will materially assist the industry in this State, as degrading of weed-tainted butter is a problem of some magnitude in Queensland, particularly in seasons of good winter and early spring rainfalls.

It has been pointed out by leaders of Australian primary industries and others closely in touch with the world's marketing situation that farm products have now apparently reached peak values and some recession may be expected. The long term contract with Britain for the purchase of dairy produce gives a measure of stability to the dairy industry which allays fear of any serious threat to a ready market at remunerative prices for Australian dairy produce for some years ahead. However, world marketing trends do focus attention on the desirability of the industry facing up to, and seriously implementing, proposals for producing to the maximum dairy produce of uniform and high quality. In this regard, it is pleasing to report that in the past year the proportion of butter which has been down-graded as not true to the quality packed has been lowered. There are, however, several factories which appear to be lenient in cream grading standards.

Butter Improvement Scheme.

Useful and appreciated help in the maintenance of bacteriological standards in manufacture and the chemical composition of butter was again rendered all butter factories in Queensland under this scheme. There is still a long back-lag in the delivery of certain factory equipment, especially butter churns, and the continued use of some worn-out equipment pending the installation of new replacements which are on order has retarded the attainment of the desired improvement in the results of laboratory examinations of the produce of some factories. Nevertheless, results generally were satisfactory and showed improvement over those of the preceding year. Now that new plant and equipment are becoming available, although delays occur in fulfilling orders, quite an appreciable improvement in factory equipment is being made, and this is expected to assist factories to obtain better results in the butter improvement scheme than have been possible in recent years when obsolete equipment could not be replaced.

Butter Boxes.

During the year a change-over was made by many factories from butter boxes made of Queensland pine to boxes with wooden ends and cardboard sides. The new type of box was not entirely satisfactory, but it is expected that quite suitable fibre board boxes will be available in the coming year. These boxes have been

widely used with success in New Zealand in recent years and, because of a serious deficiency of suitable timber in Australia, the replacement of all-timber butter boxes by boxes made of substitute materials is being rapidly forced on the industry.

CHEESE PRODUCTION AND QUALITY.

Production and Value.

Cheese production was well maintained, the output for the year being 21,018,093 lb., in comparison with 21,595,525 lb. for the previous year. The estimated value of cheese production was £1,400,000, compared with £1,270,000 in 1947-48.

Quality.

The decline in the percentage of choice and first grade cheese which took place in the previous year was arrested and it is pleasing to be able to report that the percentage rose from 63 per cent. in 1947-48 to 71.47 per cent. in the year just concluded. This compares favourably with cheese quality for the past seven years. All cheese factories, except three (each of which has a very small output) are now equipped with pasteurisers. Under Queensland climatic conditions the pasteurisation of milk for cheese manufacture can be regarded as essential for the production of cheese of satisfactory quality.

Another pleasing aspect of this section of the industry is the extent to which headway is being made in providing facilities for the efficient control of the propagation of starters, particularly to prevent bacteriophage in the cultures. It is believed that Queensland factories are more advanced in this respect than factories in other Australian States.

A defect of common occurrence during the year was open texture. The use of single-strain starters can assist in overcoming this fault, but adequate facilities for control of such starters are indispensable for success.

The Kelvinhaugh and Rosemount cheese factories ceased operations during the year. It is doubtful whether several other small factories will be able to continue to operate. However, the closing of a few small factories has been expected and the industry must benefit from fewer but larger factories. Some new equipment was installed in cheese factories throughout the State and some progress made with structural alterations and repairs, but slow deliveries of equipment and building materials have impeded a more rapid attempt to catch up with the leeway caused by the war.

There is an acute shortage of skilled cheese factory operatives, which has caused some factories concern in securing adequate experienced labour. A modern cheese-holding room was opened at the head factory of the Pittsworth Co-operative Dairy Association, where all cheeses made in the various factories of this Association will be kept for storing and maturing. The room is cooled by a plant which enables automatic control of both temperature and humidity.

Experiments are in progress in the South Burnett district on the use of refrigerators for cheese factory milk supplies with a view to determining the quality of the resultant cheese.

MARKET MILK.

A feature of the year has been the number of installations of modern milk plant equipment in milk pasteurising factories. It is believed the Queensland plants now compare more than favourably with plants in any other State and, so far as Brisbane is concerned, the proportion of bottled pasteurised milk produced is considerably higher than in any other capital city in Australia. Of an average daily supply of approximately 40,000 gallons, it is estimated that 85 per cent. is heat-treated and 60 per cent. is supplied as bottled pasteurised milk. The extent to which bottled pasteurised milk has grown in Brisbane is clearly revealed by the following figures. In 1928 sales were approximately 1,000 gallons per day, in 1938 they were 4,000 gallons, and in 1948 the trade had expanded to 24,000 gallons daily. In the corresponding period milk sold by direct producer-vendors decreased from 14,000 gallons daily in 1928 to 10,000 gallons in 1938, and 6,000 gallons in 1948.

Total milk sales in Brisbane increased in the 20-year period from 18,000 gallons daily to 40,000 gallons. This increase was partly due to the greater population and partly to an increased per capita consumption of milk. The square milk bottle was used by one Brisbane plant during the year for the first time in Australia and, it is believed, in the British Empire. The Dayboro Co-operative Dairy Association commenced operations with its new pasteurisation plant and the Camford Milk Co., Brisbane, completed its new factory and plant installation.

The Milk Tribunal recommended the granting of franchises for the establishing of milk pasteurisation plants at Mackay and Bundaberg.

The four Field Officers of the Brisbane Milk Board continued their work in collaboration with Departmental officers in affording advisory services to producers. This intensive service is effecting a marked improvement in the quality of milk supplies for pasteurisation. At the request of the Brisbane Milk Board inspections are made of farms before any new producers are registered by the Board, and registration of any producer whose premises are not of the requisite standard is refused.

In July and several succeeding months in each year there is difficulty with milk of substandard fat content. Investigations have indicated practices which may be adopted on farms to overcome the trouble and, accordingly, a vigorous campaign was instituted in 1948 and succeeded in considerably reducing the proportion of low fat content milk during the season of its appearance.

A total of 2,400 visits was made to farms and 292 visits to milk factories and depots in connection with the milk quality control scheme on behalf of the Brisbane Milk Board; these are exclusive of visits made to suppliers to the Toowoomba and Warwick factories on the Darling Downs, which also supply milk to Brisbane milk pasteurisation factories.

The trend of prices paid to producers for milk supplied for the Brisbane market over the past 10 years is set out below:—

Year.	Price per Gallon (Pence) (including Subsidy).
1939	10·2
1940	11·12
1941	12·0
1942	13·5
1943	15·2
1944	18·2
1945	19·3
1946	19·3
1947	18·62
1948	20·42

INSPECTION OF FACTORY ACCOUNTS.

Inspections made of the books of dairy companies during the year have shown a considerable improvement in the relationship between payments to suppliers and official gradings of butter, but there is evidence that a few factories continue to show a discrepancy between actual payments to suppliers and the true quality of the cream received. This occurs principally in districts where two or more associations are competing for supplies.

Payment by factories of choice rates for inferior cream must be viewed in a serious light, as it removes any incentive towards quality improvement on the part of the supplier and tends to render the work of the Division's field officers ineffective. Action will be taken if the position is not rectified at offending factories.

Generally speaking, the factories are distributing overrun in accordance with the requirements of the Dairy Produce Acts.

A further analysis of factory costs was made from the published accounts of dairy companies for the year ended 30th June, 1948. As the following table indicates, costs of manufacture and distribution per pound of butter were lower for that year than for the previous year, but this was due to greater production and not to lowered costs.

—	1946–47.	1947–48.
	d.	*d.*
Manufacturing charges	1·53	1·47
Selling costs	·21	·20
Overhead costs	·48	·38
Depreciation	·23	·17
	2·45	2·22

The average pay to suppliers over all grades and including Government subsidy for 1947-1948 was 25.34d. per pound of commercial butter compared with 20.29d. the previous year.

AMENDMENTS TO REGULATIONS.

Regulations under *The Dairy Produce Acts* dealing with certificates of competency in milk and cream testing and milk and cream grading were amended to allow separate certificates to be issued for each subject.

Regulations were inserted to provide for tenders to be called before agreements could be entered into for the transport of milk or cream and to limit the duration of any agreement to three years.

MILK AND CREAM TRANSPORT.

Many matters arising out of the transport of milk and cream were dealt with by the Cream Transport Committee, and a number of visits was made by one or more members to investigate disputes.

Twenty new or revised routes were gazetted and 86 licenses were approved.

EXAMINATIONS.

The usual theoretical examinations for certificates of competency issued to dairy factory operatives were held in July and November and the numbers of candidates examined were:—Teachers' Milk and Cream Testing, 5; Milk and Cream Testing, 57; Milk and Cream Grading, 60; Butter Making, 31; Cheese Making, 20. Certificates were issued to the following numbers of candidates who passed both the theoretical and practical examinations:—Teachers' Milk and Cream Testing, 2; Milk and Cream Testing and Grading, 27; Butter Making, 22; Cheese Making, 7.

REBATES OF FREIGHT ON APPROVED BULLS.

Applications were approved in respect of the refund of freight paid on the transport by rail of 85 bulls, the progeny of female stock entered in the Advanced Register of the various Breed Societies. The expenditure amounted to £499 11s. 5d.

During the year the maximum rebate allowable was increased from £10 to £13 10s.

HERD RECORDING.

The value of herd recording appears to be appreciated to a greater degree in this State, many farmers having become recording-minded. They realise that dairy production must be placed on a sound economic basis if the industry is to prosper in the future.

The grant provided by the Commonwealth Government to assist in raising the efficiency of dairy production in Australia has greatly helped to draw the farmers' attention to the value of herd recording.

Herd recording is divided into two sections, each governed by its own rules. They are (*a*) Pure Bred Production Recording and (*b*) Grade Herd Recording.

Pure Bred Production Recording.

This scheme is open to all pure bred cows registered with the various Herd Book Societies. Should the cows produce more than a required standard production according to age, they are admitted into the Advanced Register of their respective Herd Books. Many owners of commercial herds select their herd sires by reference to the production of the cows in the Advanced Register. They also seek to improve the production of their herds by the introduction of high producing cows from pure bred herds.

During the year the rules governing this scheme were revised in order to bring it into line with present-day requirements. The revised rules come into operation on 1st July, 1949.

The chief alterations from the previous rules are:—

(*a*) Cows will be tested monthly instead of bi-monthly. This gives a more accurate assessment of a cow's production.

(*b*) The breeder is required to submit 33 per cent. of his registered cattle, including all cows in their first lactation. The submission of all cows in their first lactation will assist in the early evaluation of a bull's capabilities of transmitting production to his progeny, thus enabling his owner to decide whether the bull should be culled or retained.

(*c*) Breeders will be required to pay a yearly registration fee of £2 and a testing fee of 10s. per cow per lactation. These charges will assist to defray some of the cost of the work of recording which, up to the present, has been borne entirely by the State.

(*d*) The production of all cows submitted to test will be published. The publication of all results will enable the industry to determine the worth of a herd rather than the value of a few individual cows.

Table 2 shows the number of cows of each breed under test which were due to complete their lactation during the year.

TABLE 2.

DETAILS OF PURE BRED PRODUCTION RECORDING.

Breed.	Number of Cows completing Lactation.							
	Total.		Passed.		Failed.		Withdrawn.	
	1947–48.	1948–49.	1947–48.	1948–49.	1947–48.	1948–49.	1947–48.	1948–49.
	No.	No.	No. and %	No. and %	No. and %	No. and %	No. and %	No. and %
A.I.S.	338	660	156 (46·1)	314 (47·6)	70 (20·7)	140 (21·2)	112 (33·1)	206 (31·2)
Ayrshire	18	43	7 (38·9)	15 (34·9)	6 (33·3)	12 (27·9)	5 (27·8)	16 (37·2)
Friesian..	Nil	7	..	3 (42·8)	..	..	..	4 (57·2)
Guernsey	36	72	16 (44·4)	42 (58·3)	8 (22·2)	12 (16·7)	12 (33·3)	18 (25·0)
Jersey	492	645	242 (49·2)	385 (59·7)	116 (23·6)	141 (21·9)	134 (27·2)	119 (18·4)
Total	884	1,427	421 (47·6)	759 (53·2)	200 (22·6)	305 (21·4)	263 (29·7)	363 (25·4)

The number of cows passing the required standard showed an increase of 338 over the previous year, while the percentage passing was 53·2 compared with 47·6.

During the year the following production records were established:—

A.I.S.—Junior 3-year-old.

W. H. Thompson's "Alfa Vale Model 29th," 14,516 lb. milk, 691 lb. butter-fat in 273 days.

Jersey.—Senior 4-year-old.

C. W. & E. M. Barlow's "Wyreene Daisy Bell," 11,397 lb. milk, 599 lb. butter-fat in 273 days.

Table 3 shows the average production for each age group of each breed for cows which have completed lactation records from 1930 to 31st December, 1948.

TABLE 3.

BREED PRODUCTION RECORDS FOR REGISTERED HERD BOOK STOCK COMPLETING LACTATION RECORDS OF 273 DAYS BETWEEN 1930 AND 1948.

—	Ages of Groups.							
	J2.	S2.	J3.	S3.	J4.	S4.	Mature.	All Ages.
A.I.S.—								
Number of Cows ..	1,039	590	389	289	218	202	902	3,629
Average Milk lb. ..	6,807	7,277	7,712	8,622	8,373	8,893	9,706	8,056
Number Butterfat lb.	272	294	311	337	339	354	389	323
Average Test Per cent.	4·0	4·04	4·03	3·9	4·05	3·99	4·00	4·0
Ayrshire—								
Number of Cows ..	59	30	27	44	12	14	82	268
Average Milk lb. ..	6,128	6,385	7,326	7,671	6,940	8,956	8,067	7,308
Average Butterfat lb.	243	255	289	301	284	365	326	292
Average Test Per cent.	3·96	3·98	3·94	3·92	4·09	4·07	4·03	3·99
Friesian—								
Number of Cows ..	39	20	15	6	3	8	23	114
Average Milk lb. ..	7,679	9,000	8,338	9,055	100,16	9,457	12,103	9,235
Average Butterfat lb.	295	328	303	330	337	364	435	338
Average Test Per cent.	3·84	3·64	3·67	3·65	3·36	3·85	3·59	3·7
Guernsey—								
Number of Cows ..	38	35	27	12	6	5	24	147
Average Milk lb. ..	5,641	6,049	6,684	6,352	7,142	7,150	7,976	6,842
Average Butterfat lb.	280	290	334	314	351	369	391	319
Average Test Per cent.	4·96	4·79	5·0	4·94	4·92	5·16	4·9	4·92
Jersey—								
Number of Cows ..	1,446	460	389	316	245	186	827	3,869
Average Milk lb. ..	4,962	5,492	5,903	6,322	6,526	6,801	6,999	5,853
Average Butterfat lb.	265	296	316	338	349	364	370	312
Average Test Per cent.	5·34	5·38	5·36	5·34	5·34	5·35	5·29	5·33
Red Polls—								
Number of Cows ..	3	3	..	..	..	..	6	12
Average Milk lb. ..	5,293	6,122	..	..	..	..	7,373	6,541
Average Butterfat lb.	212	244	..	..	..	..	277	252
Average Test Per cent.	3·99	4·0	..	..	..	..	3·75	3·86

Grade Herd Recording.

This is divided into—

(i.) Farmers' own sample method;
(ii.) Group herd recording.

The number of farmers using the farmers' own sample method is still decreasing. A number of former users of the scheme have joined Herd Recording Units in their districts.

During the year 25 herds were tested under the scheme, and the number of cows tested was 1,208, of which 303 completed their lactation period.

Average figures for completed lactations are:—Milk, 4,073 lb.; test, 4.17 per cent.; butterfat, 170 lb.

The following is a dissection of testing records for the year, showing numbers and percentages of cows producing various amounts of butterfat:—

	Cows.	Per cent.
Less than 100 lb. butterfat	38	12.54
From 100 to 149 lb. butterfat	87	28.71
From 150 to 199 lb. butterfat	101	33.33
From 200 to 249 lb. butterfat	40	13.20
From 250 to 299 lb. butterfat	16	5.28
Over 300 lb.	21	6.93

Group Herd Recording.

This scheme, which was commenced in January, 1948, is being well supported by dairymen. It provides for the formation of Herd Recording Units in various districts. Each unit, which consists of from 20 to 22 herds, is in charge of a Herd Recorder who visits each farm monthly. During the year the State Industrial Court granted an award covering the employment of Herd Recorders.

It was anticipated that the number of units in the State during 1948-49 would be 30, and the number which is operating is 29. The anticipated number would have been reached and exceeded but for the shortage of equipment and there is a list of applications on hand awaiting the arrival of necessary equipment. The formation of some units was also delayed owing to the inability to secure Herd Recorders. This may prove to be a bar to the anticipated expansion in the coming year.

Owing to the shortage of clerical assistance, mechanical methods of recording were investigated. Tentative arrangements have been made for the staff of the Government Statistician to undertake this work on an automatic recording machine. This will relieve the strain on the clerical staff and allow it to concentrate on the various allied surveys of data.

Following the formation of units in various districts, the following results have been noted:—

(*a*) Farmers are immediately culling those cows showing a very low production.
(*b*) Members of units are showing increasing interest in supplementary feeding.
(*c*) Some districts are becoming more interested in pasture improvement.
(*d*) Increased interest is being shown in breeding methods.

The year commenced with eight units in operation. This number increased during the year to 29.

Under the rules governing Grade Herd Recording the end of the recording year is 30th September. After this date data for each unit will be compiled. It is hoped to compile data on the following:—

(*a*) Average production per cow per lactation.
(*b*) Average length of lactation.
(*c*) The effect of the month of calving on production.
(*d*) The effect of the month of calving on length of lactation.
(*e*) Average production of various age groups.
(*f*) Length of lactation of various age groups.
(*g*) The effect of the length of lactation on production.
(*h*) The effect of fat test on production.

During the coming year it is expected that the number of units will increase to 50 or 60. The formation of these is dependent on the availability of equipment and recorders.

During the year the Australian Techincal Sub-Committee on Dairy Cattle Production met and discussed Grade Herd Recording. It was decided that all States of Australia should adopt uniform rules governing Herd Recording. The rules in this State will need only slight alteration to bring them into the required uniformity; the main alteration will be to raise the length of the lactation period recorded from 270 days to 305 days. The 305 days (approximately 10 months) lactation will bring Australian records into line with most other dairying countries of the world.

The Sub-Committee also decided that all States should adopt uniform rules to govern sire surveying and calf identification. A start will be made on these as soon as full particulars are distributed amongst the States.

HERD WASTAGE SURVEY.

This survey was continued during the year. The date obtained during 1947-48 have been compiled and an article is being prepared for publication. This supplies information on—

(*a*) the percentage of wastage caused by various diseases;
(*b*) the percentage of cows calving each month;
(*c*) particulars of sex of calves and the percentage of each sex reared;
(*d*) the manner of disposal and percentage of calves so disposed of;
(*e*) the number of acres per head of dairy cattle;
(*f*) the number of cows and heifers per bull.

This information is compiled for the whole State and for various districts within the State.

The co-operation of the farmers who have continued supplying the required information is greatly appreciated.

COMMONWEALTH GOVERNMENT DAIRY INDUSTRY EFFICIENCY GRANT.

During the year plans were implemented in connection with the grant by the Commonwealth Government of £68,000 yearly for five years with a view to raising the standard of efficiency of the dairying industry. The work

which is planned under this scheme is very wide in scope and will include actual demonstrations on selected farms throughout the dairying districts, expansion of grade herd recording and related matters such as a herd wastage survey and sire surveys, pasture management practices and generally improved feeding of dairy herds, dairy farm competitions, publicity, a mobile film unit, efficient milking and other shed practices and dairy farm machinery demonstrations.

The farm demonstrations have as their objective better pasture management and general feeding practices, more efficient milking procedures and the improvement of the quality of milk and cream. Among the farms selected there are some of average standard, some above average and some below average due to environmental disabilities.

It is hoped that the work to be carried out on the demonstration farms will provide basic factual information on the results to be achieved from the application of scientific methods under the varying environmental conditions which exist in various dairying districts of Queensland, and thus show farmers how improvement can readily be brought about under their own particular district conditions by the adoption of practices shown on the demonstration farms to be important in dairy farming economy.

Report of the Dairy Research Branch.

Mr. L. E. Nicholls, Senior Dairy Technologist.

The principal activities of the Dairy Research Branch have been conducted at the three laboratories at Head Office, Hamilton, and Toowoomba, where chemical and bacteriological problems of the butter, cheese, and market milk industries have received attention. Butter and market milk investigations are carried out mainly at the Brisbane and Hamilton laboratories, whilst investigations on cheese industry problems are conducted at Toowoomba.

Features of the year's work have been the increasing attention given to butter quality problems, the further improvement of market milk quality and the effect of improved methods of starter culture control on cheese quality. These have been made possible by the activities of specialist officers at Toowoomba and Brisbane.

The year's programme of work has included in the main investigations on quality problems of milk, butter, and cheese, routine quality control of dairy products, general analytical work, chemical engineering and the testing of dairy glassware, general advisory service to the industry, and the training of new dairy officers in routine field tests.

MARKET MILK INVESTIGATIONS.

The following market milk problems have received consideration.

Seasonal Variations in the Chemical Composition of Milk.

This investigation, now covering eight farms within the Brisbane district, has after approximately two years' work shown very definite seasonal trends, with conspicuous declines in solids during the late winter and early spring months. To enable a more complete analysis of the constituents alternate monthly sampling is now being made. The first year's monthly results have been collated, and the trends examined. The composition of bulk milks of all the herds varied widely during each month, the extent of variation being governed by the breed and seasonal conditions. The trend of variation in all herds was generally similar for fat, total solids, solids-not-fat, total protein, casein and lactose. This early work indicated the effect of breed, feeding practices, herd management, quality of pasture and milking methods on the composition of milk. The investigation is now being re-designed with a view to determining to what extent a decline in the protein content of pasture is related to the variations in milk composition and yield, and if possible whether by adequate feeding alone, with or without protein meal, more or less constant composition of milk can be maintained throughout a complete lactation. The variation in the composition of milk has special significance, as it involves both the fat and solids-not-fat standards and is also responsible for differences observed in the curd characteristics and yields obtained during cheese-making.

Milk Quality Determination with Resazurin Dye.

Numerous milk quality examinations comparing the resazurin dye test with several standard tests have failed to yield sufficient evidence to warrant the use of this test in preference to the methylene blue test. Both have reaffirmed the previous year's disadvantages, particularly over the winter months. Tests are proceeding with the object of reducing the disadvantages by the introduction of a standard temperature incubation, preferably in water, prior to testing.

Counting of Thermoduric Bacteria.

The importance of thermobacteria in causing high counts in pasteurised milk has been further demonstrated. To assist the determination of faulty supplies, an apparatus has been evolved to give a quicker method of performing such counts. An experimental whirling machine (Plate 9, facing page 80) has been designed to permit the counts to be done satisfactorily in large numbers by the roll tube method. Inoculations of the medium with the milk are made by means of a calibrated loop. Thus pipettes, dilution blanks, and Petri dishes are eliminated

and each count uses approximately half the medium required for the plate count. In addition, the method is five to 10 times as fast as the plate count. The machine designed spins two tubes at once in cold water and allows for alternate changing over. The equipment offers a practical method whereby milk factories can more readily determine undesirable milk quality, and already one Association has put the apparatus into operation and plans to develop payment for quality based on the thermoduric count and the methylene blue test.

Storage Compensation in the Methylene Blue Testing of Raw Milk.

In previous experimental work the fall in methylene blue reduction time which raw milks suffer as a result of storage was determined. The work showed clearly that the present method of testing raw milk by the methylene blue test shows inaccuracies, particularly if the milk is received and sampled at the depot very late. The difference is greater as the temperature increases. Two ways in which allowance can be made for this storage period have been considered:—

1. By taking the reduction times and calculating back to a common hour from the time-temperature relationship.
2. By immersing all samples in running tap water until, say, noon and commencing all tests at that time.

Tap water is preferred to air as the incubation medium because it has been found to be fairly constant in temperature, with a seasonal variation of the order of 10-15 deg. F. between winter and summer. The results obtained so far have shown that the storage procedure cannot be applied to mixed evening and morning milk, but suggests that it could be used with morning milk.

Keeping Quality of Pasteurised Milk.

This work has been advanced further to determine an appropriate standard for the keeping quality of pasteurised milk when held at room or refrigeration temperatures. Approximately 500 examinations have been made during winter and summer months on milk 24 hours after processing. Whilst the decline in keeping quality is not so marked during the winter months, a rapid decline in quality occurs over the summer period. In this regard comparisons are being made with the British Standard of 30 minutes decolourisation time in the methylene blue test after holding the sample of pasteurised milk for 18 hours at 20 deg. C.

Use of Nylon Filters.

Laboratory examinations have been made of the use of Nylon material for the efficient filtration of milk. Various gauges of material tested have indicated that Nylon filter cloth may prove more efficient than materials at present used for filtering milk in pasteurised milk plants. Very efficient removal of suspended matter was obtained without effect on the fat content. Large scale trials at milk plants are to be undertaken when further materials are received.

Pure Culture Investigations.

To facilitate the identification of coliform organisms in milk, a comparison of the various bacteriological media is being made. The coliform bacteria are of special importance because of their effect on the keeping quality of milk and as an index of the conditions of hygiene in pasteurising plants.

Preliminary investigations, principally with starter bacteria, have been made to determine the effect of filtering bacteriological media on colony development. The work is also being extended to ascertain to what extent plate counts of pasteurised milk are affected by the filtration of media. There is reason to believe that colony development is restricted where filtration is practised.

CHEESE INVESTIGATIONS.

Bacteriophage Studies.

Seventy samples, comprised of starters, whey and rennet, have been investigated for the presence of bacteriophage. On several occasions rennet has been found to be the cause of starter failure. The isolation and study of phages has continued. Purification has been effected by picking plaques off squared plates. This has been followed by subculturing and then filtering to obtain cell-free filtrates. The simplest method of obtaining the titre of a phage preparation was found to be testing the preparation in serial dilutions against the respective starter strains. Work is now being carried out to determine the diminution in titre of a phage suspension on prolonged storage.

Control of Bacteriophage by Ultra-Violet Light.

Preliminary experiments aimed at determining whether ultra-violet light radiation is lethal to bacteriophage for cheese starter cultures have been conducted.

The first experiments were designed to test the extent of phage destruction when phage preparations in milk, dried milk smears, whey, and dried whey smears were exposed to the radiation at various distances from the mercury vapour tube.

In an attempt to find a quantitive measure of bacteriophage destruction, the petri dishes containing the phage preparations were rinsed with pasteurised milk, after exposure starter added to the milk and then acidity production over a six-hour period determined. Several points are indicated in the results:—

1. Phage destruction was not absolute, for in no case did acidity production of a treatment equal that of the control.

2. There was a marked effect on phage virulence, shown by the difference in acidity production between all treatments and the phage control. There are indications that ultra-violet light causes attenuation of phage, since even though in no instance was the phage entirely destroyed acidity production progressed slowly in most instances.

3. There was some difference between the effects of the various phage preparations on phage survival. The effect was most marked in the case of whey, where in every instance acidity production was higher than in all other treatments.

Destruction of Air-borne Phage.

The ineffectiveness of ultra-violet light for the prevention of failures in starter cultures at

cheese factories necessitated a withdrawal of the plant from the factory and a further check on its efficiency under laboratory conditions.

To test the effect of ultra-violet radiation on phage in air the mercury vapour tube was fitted into a specially designed metal container through which air could be passed at the rate of 30 to 40 litres per hour. The bubbling of air through a very concentrated phage suspension and then through the container failed to transfer the phage into the air. However, phage-laden air was produced by atomising a phage suspension. After the air in the container had been irradiated for half an hour no phage was detected in the sample. When the light was switched off active phage was present. Further work is planned to obtain more specific information concerning the time necessary for effective radiation. The experiments, however, so far indicate that air-borne phage does not constitute the principal source of infection in Queensland cheese factories.

In no instance has phage been picked up in Petri dishes of milk exposed to the air. This is probably because few Queensland factories have whey separators. However, it is believed that an important source of phage infection in factories may be contamination from the operative's hands and clothing while starters are being propagated.

Use of Dichloroethyl-ether for Control of Cheese Mites.

Following successful experimental work with dichloroethyl-ether as an acaricide, the use of the fumigant has been extended to several cold stores and cheese factories with beneficial results. Convenient apparatus suitable for any cheese factory has been developed (Plate 10) and control measures determined for different sets of conditions. A paper covering various aspects of the treatments is being prepared.

Composition of Queensland Cheese.

This work has been initiated with a view to ascertaining the average composition of Queensland cheese from year to year and to determine to what extent the composition varies with seasonal conditions. So far 229 cheese samples have been examined. Already a marked difference is noticeable between summer and winter figures, particularly in relation to the higher moisture contents during the winter periods. Results are illustrated graphically (Fig. 1.) Field officers at Toowoomba are co-operating in this work and making adjustments in manufacturing procedure where needed.

Aspergillus Infection of Processed Cheese.

A severe infestation of mould in processed cheese was reported. Initial control measures were complicated by mites, which were believed to be assisting spread of the mould spores, and the high acidity of the cheese. Control methods applied successfully included improved factory hygiene and processing room conditions, effective sealing and pressing of the cellophane coverings, treatment of the wrappers and the control of mites.

Rennet Manufacture.

At the request of the Queensland Meat Industry Board preliminary work was commenced on

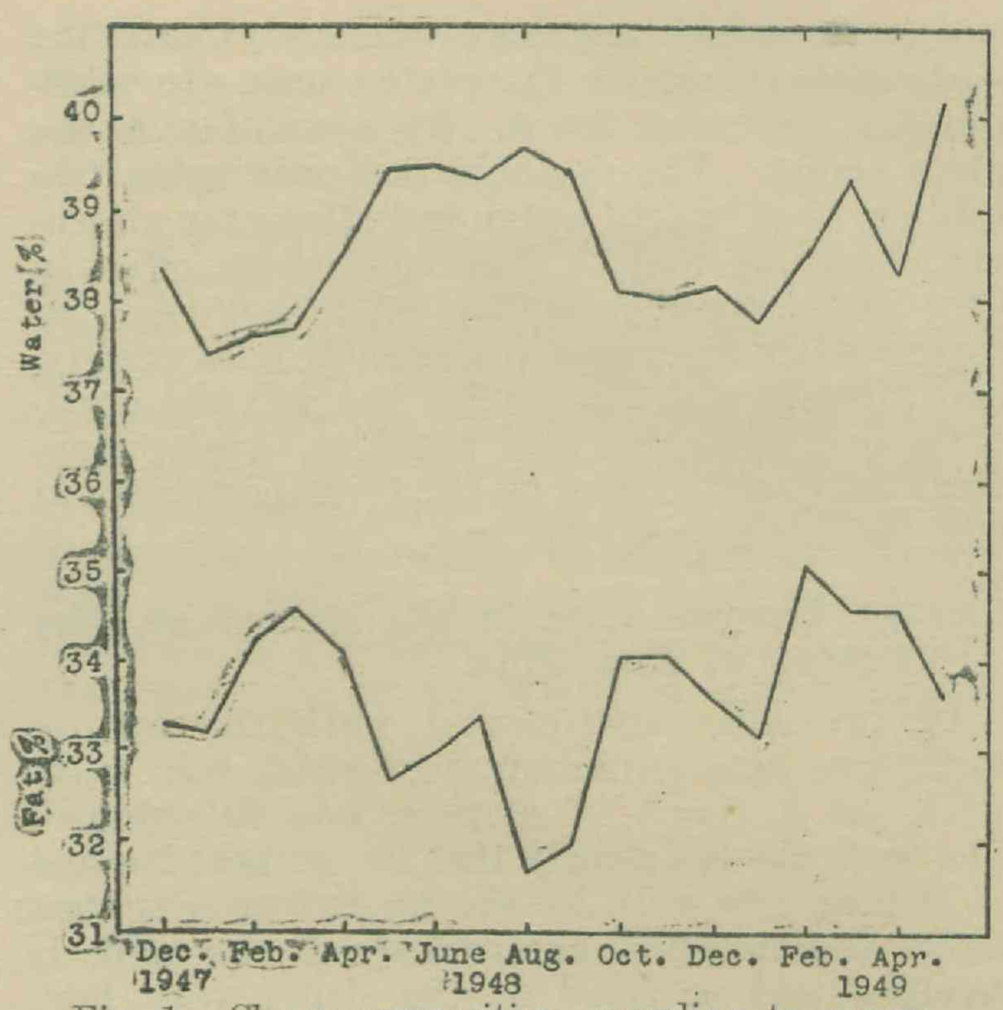


Fig. 1.—Cheese composition according to season.

methods of rennet making with vels of various ages. Determinations of keeping quality, pH, strength, bacteriological quality, aroma and turbidity, as well as the effect on curd quality as judged by the vitality test, have been made. A large scale trial of the laboratory made rennets at a cheese factory has been arranged.

BUTTER INVESTIGATIONS.

Keeping Quality Trials.

Last year a start was made on the examination of factors influencing the keeping quality of Queensland butter. This year the work has been extended with the co-operation of the Queensland Butter Board and examinations of butters for moisture, salt, curd, fat, free fatty acid acidity, copper, iron, and melting point, bacteriological analyses, and determination of pH and peroxide values both before and after cold storage, have been made. All relevant manufacturing data have also been provided. Apart from indicating the standard of efficiency of factory operations, the investigation should eventually provide information on the most important factors associated with the deterioration of normally manufactured butter in handling and cold storage.

Bacteriological Survey of Queensland Butter.

This work was commenced at the Hamilton Laboratory. It has been designed to obtain information on the types of bacteria found in butter factories, their relative importance in relation to bacterial counts and the production of defects, and the importance of the various pieces of equipment in factories as sources of contamination.

Mottles in Butter.

Studies on mottles in butter, a defect which causes considerable degrading from time to time, have been given attention in the field and the laboratory. Microscopic evidence (see Plate 11) revealed the part played by the incompletely dissolved salt crystals as the cause of the condition. A technical noting was prepared with suggestions for control.

pH of Butter Serum.

These investigations have been introduced into the Butter Improvement Service as a

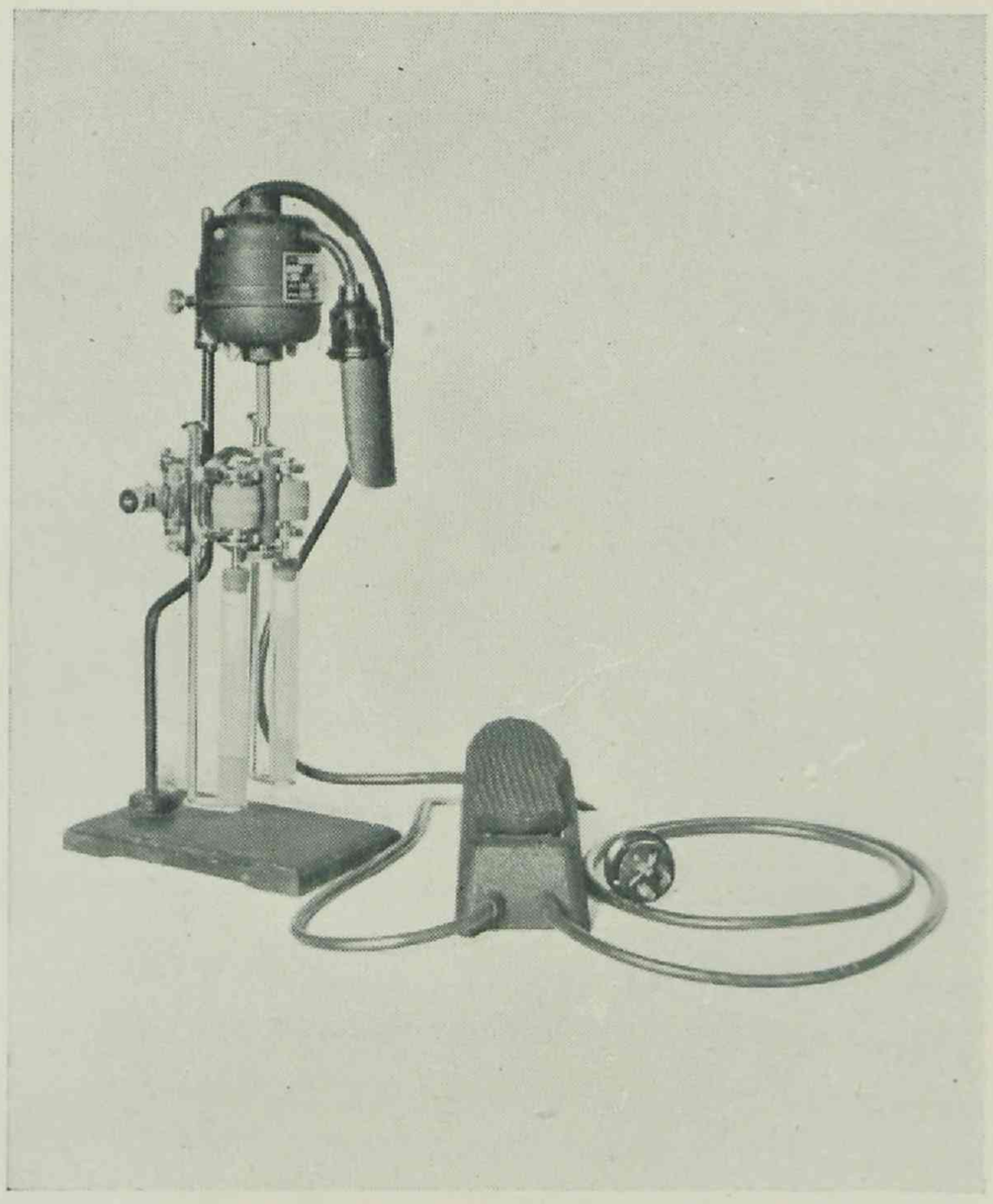


Plate 9.—An experimental whirling machine which has been devised in the Dairy Research Laboratories for the purpose of assisting in pasteurised milk quality determination.

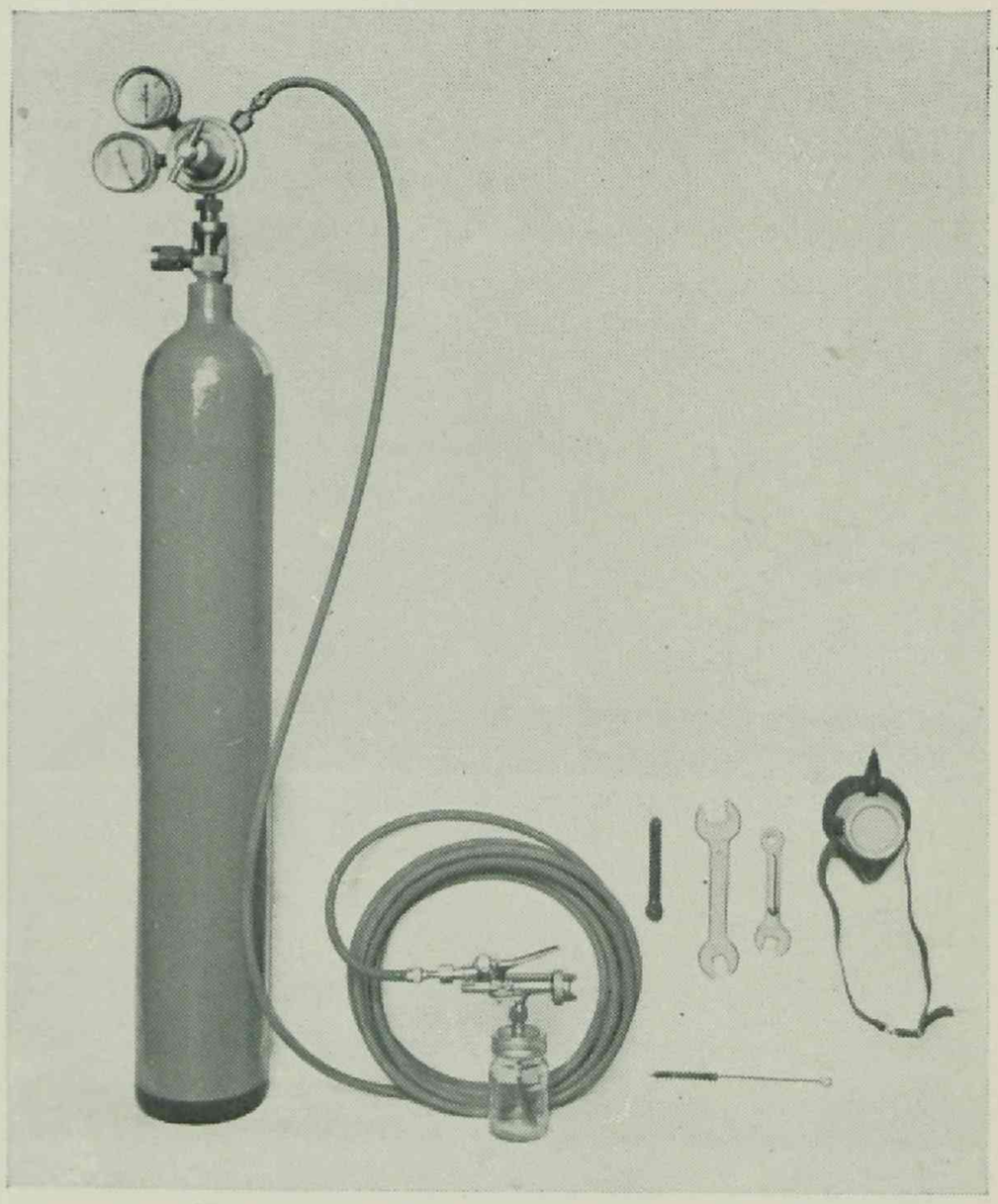


Plate 10.—Apparatus designed for the fumigation of cheese stores with dichloroethyl-ether for the control of cheese mites.

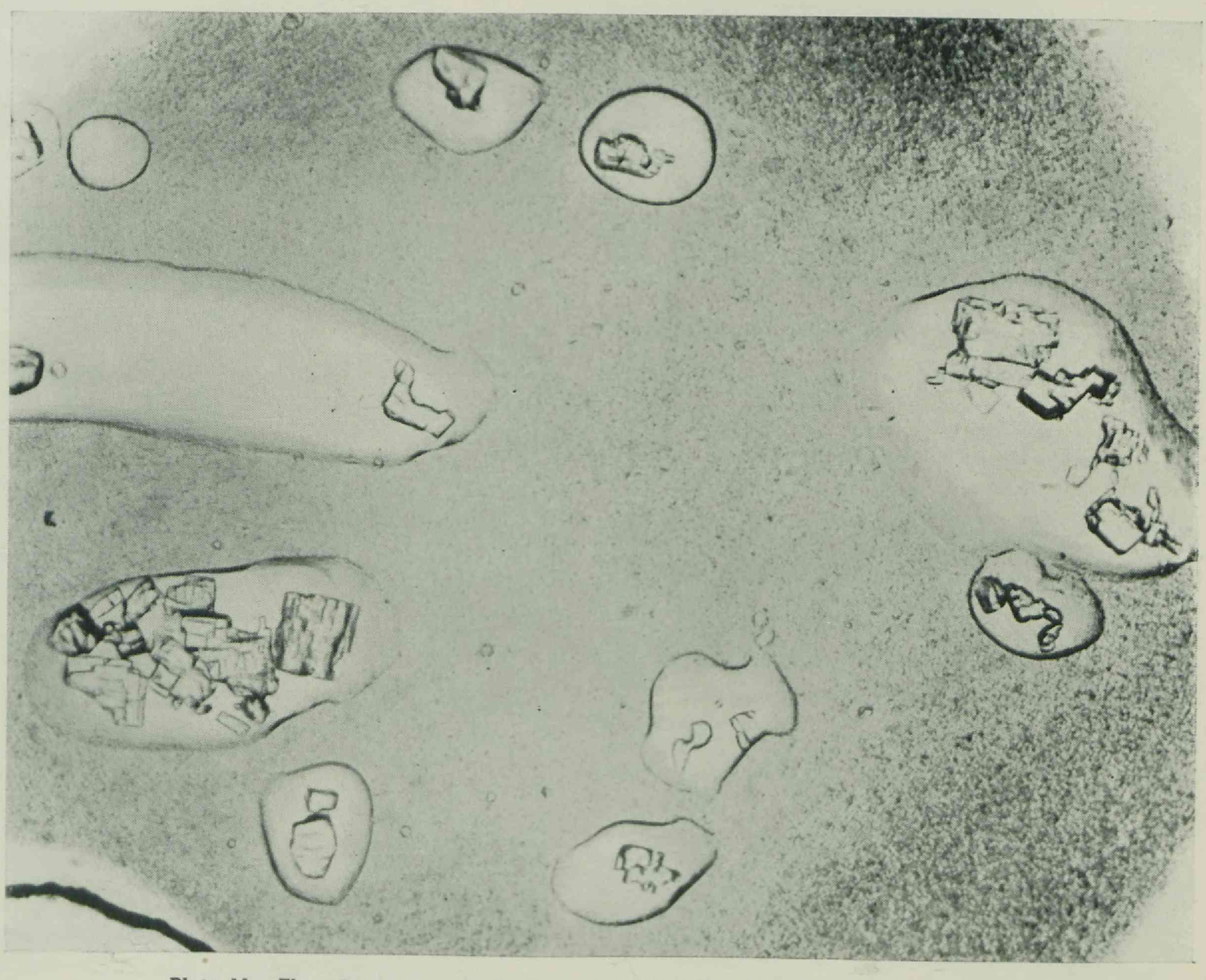


Plate 11.—The microscope reveals the cause of mottling in butter. Water migrates towards undissolved salt crystals, resulting in the formation of very large droplets. These do not reflect light to the same extent as do the normal small droplets and the butter appears mottled.

means of improving the accuracy of cream neutralisation in butter factories and thereby improving keeping quality. A limited pH range of 6·8 to 7·2 was arbitrarily chosen as a standard accepted by most authorities. Investigations are proceeding, however, to determine the best range for Queensland conditions. The summarised results are shown in Table 1. They reveal that progress is being made in increasing the percentage of samples within the recommended range. However, variability is still high.

TABLE 1.

Quarter.	Number of Samples.	Present Distribution of Samples—pH Range.			Arithmetic Mean.	Standard Deviation.
		5·6–6·7.	6·8–7·2.	7·3–8·2.		
July–September, 1948	143	7	32	61	7·46	0·401
October–December, 1948 ..	229	12	31	57	7·32	0·492
January–March, 1949	404	9	42	49	7·26	0·466
April–May, 1949	271	7	25	68	7·40	0·470
Total	1,047					

Secondary Timber Trials for Butter Box Manufacture.

The rapidly diminishing supplies of butter box timbers necessitated an investigation in conjunction with the Commonwealth Scientific and Industrial Research Organisation and the Forestry Department as to the suitability of some secondary species of Queensland timbers for butter box manufacture. Packing of the experimental butter boxes was done at the Kingston, Caboolture, and Esk butter factories, and the consignments despatched to the cold stores. The experiment will be concluded in August. Results of the tests so far concluded do not warrant undue optimism with regard to the suitability of secondary timber species for butter box manufacture. In the meantime Queensland factories are using increasing quantities of imported fibre-board boxes.

Weed Taints in Butter.

Officers of the Commonwealth Scientific and Industrial Research Organisation who are investigating this problem have worked with the Dairy Division's field and laboratory officers.

The seasonal influence of weed taint in Queensland butter is considerable, resulting in much degrading each year. To assist in the more accurate identification of weed tainted cream, particularly during the cooler months, trials were made at two factories with a weed taint detector developed in New Zealand. With the use of this apparatus degrading was reduced. However, the technique of operation under commercial conditions has yet to be improved and further work is contemplated during the season when weed taint is prevalent.

Plate Count Accuracy.

A further 84 samples from 14 boxes of butter were subjected to 336 bacteriological and 55 chemical examinations in a continuation of a survey of the accuracy of the plate count as applied to butter. The accuracy of the methods in use on factory surveys was further examined in one experiment involving 44 tests. This work has been undertaken with a view to ensuring accurate interpretations of bacteriological platings both in the laboratory and when surveys are conducted at butter factories.

Field Survey Investigations.

This work has been confined mainly to checking the efficiency of existing techniques applied in the cleansing and sterilizing of dairy equipment on demonstration farms and the effectiveness of various detergents and chemical sterilizers.

Evidence so far gathered indicates that recognised practices are often not followed in dairy cleansing and sterilizing operations. Bacteriological examinations of swabs and rinses collected from properties have confirmed these findings and improved methods for more efficient operations are now being investigated. Trials to determine the most suitable dairy cleaner include the use of various alkalis, buffers to reduce corrosion, water softening preparations and wetting agents. In addition, milk quality examinations, rinse tests, and swab tests are being used to confirm the efficiency in each case.

Modern Milking Techniques.

This work has been extended to demonstration farms and has involved, (*a*) the encouragement of milk let-down by improved milking shed practices, (*b*) fast milking and (*c*) non-stripping following machine milking.

BUTTER IMPROVEMENT SERVICE.

The work performed has involved routine bacteriological and chemical examinations of butters taken at random at the time of grading, advisory services, factory surveys, and investigations into several problems.

The routine examination of 2,325 churnings of butter from 45 factories involved the performance of 9,300 bacteriological tests in an endeavour to assess factory hygiene standards and to indicate the main sources of contamination likely to affect butter quality.

The average bacteriological quality index for the year was 231, an improvement of 19 over last year's results. Figure 2 indicates the steady improvement over the past 3 years and gives evidence of seasonal trends.

Guidance to the factories in standardising the chemical composition of butter produced involved 2,295 moisture and 2,312 salt determinations. For those factories under the Butter Improvement Service the average butter composition is estimated as: Moisture 15.59 per

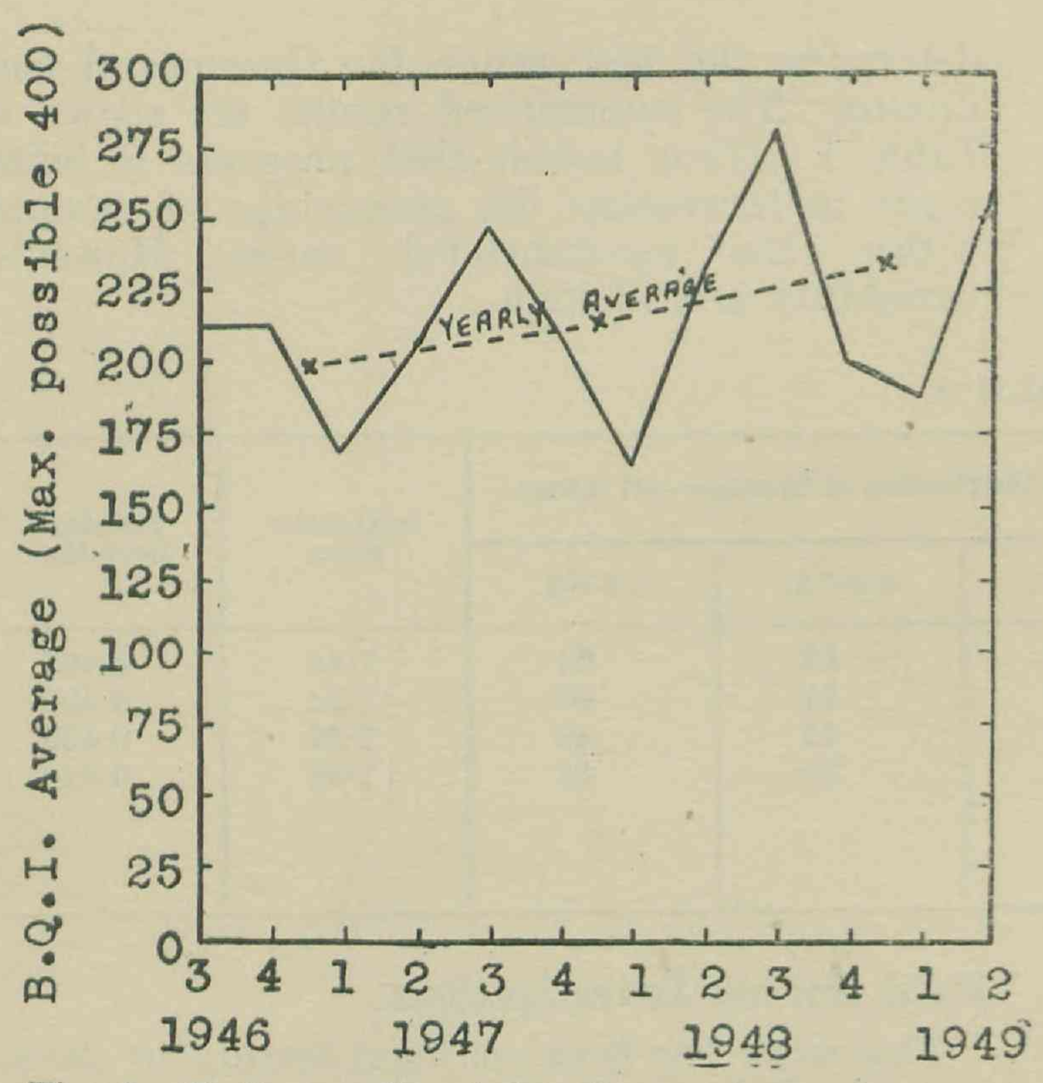


Fig. 2.—Butter quality index figures for each quarter, 1946-1949.

cent.; Salt 1.29 per cent.; Curd 0.83 per cent.; Fat 82.29 per cent. For all factories (after making an allowance for the Port Curtis group) the estimated composition was: Moisture 15.62 per cent.; Salt 1.33 per cent.; Curd 0.83 per cent.; Fat 82.22 per cent. Both sets of figures are an improvement on the previous year's results.

Advisory Services.

In addition to the preparation of routine Butter Improvement Service reports, advisory circulars were prepared on technical aspects of four subjects. The competitive aspect in the quarterly Butter Improvement Service reports was emphasised by the introduction of a points score for moisture and salt content. The scale of points was designed to give most credit to moisture control and to regularity of results. The scheme was introduced for the January-March quarter of 1948 and appears to be showing good results, as indicated in Table 2.

TABLE 2.

Quarter.	Number of Samples.	Average Per Cent. Moisture.	Average Per Cent. Salt.	Average Points Score. (Maximum 100).
January–March, 1948	471	15·47	1·21	70·0
April–June, 1948	391	15·53	1·19	76·5
July–September, 1948	484	15·51	1·29	77·4
October–December, 1948	456	15·56	1·32	79·5
January–March, 1949	741	15·62	1·29	83·0
April and May, 1949	476	15·65	1·27	83·8

Field Work.

Eighteen bacteriological surveys were made at butter factories in an endeavour to correct some specific defect or to give general advice on improving factory hygiene. Reports and recommendations were presented in each case. This work involved a further 900 bacteriological tests. Attempts were also made in several cases to locate and find remedies for manufacturing defects.

Cream Neutralisation.

A start has been made on a study of the factors involved in cream neutralisation and the production of a butter serum of the recommended pH. Five laboratory experiments, necessitating 190 chemical examinations, were conducted.

Preventive Measures for "Rabbito" Butter.

Patted butter from six factories has at times in previous years developed the defect "rabbito." Preventive measures involving wash-water treatments, neutralisation, cream equipment and churn sterilization, butter-working, salting and cold storage have been advised upon so as to avoid a recurrence of the defect.

Improvement in Bacteriological Quality of Butter.

The improved bacteriological quality of butter over the past 12 months is considered to be due to some of the following improvements applied in many factories:—

(*a*) Intensive processing of cream by the vacreator, including use of duplicate pasteurisation equipment.

(*b*) New equipment, including vats, churns and metal butter packers.

(*c*) Treatment of water supplies and particularly butter wash waters.

(*d*) Hot water supply tanks for use in cleansing, and the increasing supplies of suitable detergents and sterilizers.

CHEESE QUALITY.

Starter Control in Cheese Factories.

A total of 850 cultures of lactic acid starters was supplied to the cheese industry. In addition, many introduced strains from New Zealand, other Australian States, and Great Britain were tested. Phage race relationships of all distributed cultures have been determined so that factories may be advised of the most desirable rotations.

A paper covering important aspects of modern starter culture control and propagation was published during the year. The benefits of this work are reflected in the improved starter equipment now operating in 13 cheese factories. A specially designed bulk starter cabinet and mother culture outfit with water seal lids and steam protected inoculating inlets was manufactured during the year and is now in use at Mt. Tyson cheese factory. It embodies the most modern methods of culture control yet installed in an isolated starter room.

A demonstrational water seal lid fitted with alternative types of inoculating vents has been made for use in demonstrating the technique of propagation. The lid is accompanied by a brass cylinder for holding starter pipettes during sterilization and use and a flame ring through which the inoculation is made.

Dropping Bottles for Mother Cultures.

A new procedure has been devised for carrying in the factories the number of starter strains required for a rotation, thus obviating large amounts of bulky glassware and equipment. The method makes use of a small culture container which carries its own subculturing apparatus in the form of a dropping bottle of 1 oz. capacity fitted with screw-cap carrying a rubber teat and glass dropper. Inoculation is performed by means of the dropper. The parts of the dropping bottle are easily taken to pieces for cleaning.

Trials to Increase Percentage of Choice Quality Cheese.

With improved buildings and factory equipment, improved methods of starter control and a good standard of manufacture, milk quality is considered the limiting factor to further improvement in cheese quality. An effort is being made to determine to what extent milk quality is affecting cheese quality. A number of refrigerators are being installed on farms in the Murgon district, and the milk therefrom manufactured into cheese. The experiment has been designed to compare the qualities of cheese made from :—

1. Both night's and morning's milk uncooled.

2. Night's milk cooled and held overnight in a farm refrigerator.

3. Night's milk treated as in (2) mixed with chilled morning's milk.

The milk so treated will be (*a*) pasteurised and (*b*) unpasteurised at the factory. In each case sufficient milk has been provided to enable normal commercial manufacture at the factory. The trials also will afford an opportunity of assessing the importance of farm refrigeration of milk in the production of high quality cheese. Experiments will continue over both the winter and summer periods and the cheese will be graded by Commonwealth and State graders.

MARKET MILK QUALITY CONTROL.

The laboratory and field advisory services were continued on behalf of the Brisbane Milk Board. There has been an appreciable increase in the work because of the extension of milk pasteurisation and the additional number of plant surveys.

Milk Examinations.

Including raw and pasteurised milk, a total of 118,491 samples was examined, necessitating 121,505 tests by depots and the Dairy Research Laboratory.

Raw milk supplies to wholesale vendors depots were under constant supervision. Depot testers working in collaboration with the Dairy Research Laboratory performed 81,625 methylene blue tests and 24,588 fat tests. In the laboratory, 4,285 low quality milks were microscopically examined and advice notes forwarded to producers; 2,508 bulk raw milks supplied to pasteurising depots were examined, involving 4,992 tests. The average fat content of raw milk supplied to all depots was 3.69 per cent. Photomicrographs of milk smears have been prepared to enable field officers to discuss the quality problem with the farmer. Nearly 2,400 visits were made to dairy farms for the purposes of quality improvement.

Improved Quality of Raw Milk.

The fat content of milk received at the depots has been fairly well maintained in bulk, although there are still quite a number of individual suppliers below the 3·3 per cent. butter-fat standard in morning's deliveries, due principally to the uneven milking intervals. Compared with the previous year, there has been a substantial reduction in the number of low-quality milks examined microscopically. In addition, only six suppliers were suspended from supplying for a period of three days, as compared with 15 last year and 54 the previous year. The improvement is attributable in no small measure to the work of the field advisory staff and the improved cleansing, sterilizing and cooling facilities provided by producers.

Pasteurised Milk.

Bottled pasteurised milk in Brisbane has been examined daily—1,081 samples were submitted to 4,095 tests for plate count, coliform organisms, phosphatase test and fat percentage. Of these, 97·4 per cent. showed a negative phosphatase test, indicating a high standard of pasteurisation efficiency at the various depots. The average fat content was 3·90 per cent.

Milk quality control at pasteurised milk depots has been further extended, 48 factory surveys having been carried out during the year. Particular attention has been given to the efficiency of bottle-washing and standards devised for the commercial sterilisation of bottles. Field and laboratory officers made 342 visits to milk depots. Comparison with the previous year's results indicates a further improvement in the bacteriological quality of pasteurised milk, due mainly to the higher quality raw milk and the modern pasteurising, bottle filling and bottle washing equipment now in use. Processors have shown a lively interest in the laboratory control work and a readiness to install the latest equipment to ensure efficient results.

The rapid expansion of milk pasteurisation throughout the State, the high percentage of bottled milk and the increasing use of tankers for milk transport are factors assisting the production of a high quality milk supply in both city and country areas.

GENERAL ANALYTICAL WORK, TESTING OF DAIRY GLASSWARE AND CHEMICAL ENGINEERING.

This work has comprised routine analytical work, analyses for engineering purposes and determinations made in connection with investigational projects, principally a study of the variations in milk composition.

Ten factories were visited for the purpose of investigating chemical engineering problems, most of which were associated with water treatment, refrigeration, waste disposal, insulation, heat requirements and pasteurisation. Miscellaneous activities have included the testing of steam sterilizing units placed on the market by various manufacturers, farm electric water heating units and corrosion problems in farm refrigeration units.

DIVISION OF MARKETING.

Report of the Director of Marketing (Mr. H. S. Hunter).

In continuation of the practice adopted last year it is again proposed to separate the Annual Report required of the Director of Marketing under "*The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1946," from the report of the Division's activities included in the Departmental Annual Report.

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) 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 Activities.

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 Peanut Industry Protection and Preservation Acts, 1939 *to* 1941.

Branch officers have continued to provide Government representation on 17 of the 22 boards which are now operating under one or other of the above Acts. The various officers concerned have been actively engaged in the duties associated with the administrative, legal, and economic problems involved in the course of the activities of each board. Throughout the year members of the staff have attended approximately 185 meetings and conferences of various kinds in the course of their duties.

The period of transition from the organisation of marketing under emergency war legislation is now complete and marketing can now be considered to be established on a peacetime basis. There are, in fact, signs in many industries that the seller's market condition which developed during the war is now changing in favour of the buyer. This is perhaps best exemplified in the export sphere, where the first really significant check to the ever increasing price level occurred in April, 1949. The Acting Commonwealth Statistician has reported that the export price index for 20 items comprising about 85 per cent. of the value of Australia's total exports fell 12 per cent. in that month. The main fall was in wool. The rise in export prices that has taken place in the last 10 years is indicated by a comparison of the average price levels for the three years ended June, 1939 with 1947-48 and 1948-49 levels. Giving the former period an index number of 1,000, the relevant figures for these two years are 2,847 and 3,400. The latter apparently represents a peak.

The Division has been required during the year to give particular attention to various aspects of marketing and marketing developments and these are briefly reviewed in the following paragraphs.

Wheat Stabilisation.—Following a number of conferences between the various States and the Commonwealth Government, final agreement was reached during the year on an Australia-wide plan of wheat industry stabilisation. The new scheme, which replaces the emergency wheat marketing and stabilisation plan which operated during the war under National Security legislation, has many points of similarity to its predecessor but departs from it in important respects, such as the elimination of production control, the limitation of the guarantee, and the use of complementary State legislation. Complementary legislation enacted in this State gave the Queensland State Wheat Board a substantially greater measure of autonomy in the handling of the crop than was provided in the wartime legislation.

Wheat Grading.—The Division has been engaged on consideration of proposals relating to the institution of an Australia-wide system of wheat grading and is represented on the Interstate Committee set up to examine this matter. The final report of the Committee was elaborated during the year, when it was reported to the Australian Agricultural Council that the introduction of a system of classification of wheat on a quality basis, whilst desirable on a number of sound theoretical grounds, would not be practicable or warranted under existing conditions. The Committee recommended against any immediate setting up of an Australia-wide system of classification but recommended that States be encouraged to develop, as far as practicable, a system of quality classification based on silos and districts. It was recognised that in Queensland a system of classification on delivery which suits its local conditions was well established and should not be disturbed. It was decided that the Committee should reassemble to examine the position at any appropriate time in view of possible changes in the international wheat situation, in dietary standards and in the knowledge of the subject of classification obtained in the intervening period.

Bulk Handling Wheat.—The question of the desirability of instituting a system of bulk handling in the wheat industry was given some attention during the year, when preliminary steps were taken to collate data relating to wheat intake centres. The Director visited New South Wales during the year to examine existing installations in that State and to discuss various relevant matters in this connection with wheat handling authorities. The rapid growth of the Queensland industry has posed a real problem in regard to methods of handling and intake and much inquiry and analysis will be necessary before any final conclusions can be reached.

Tobacco and Potato Boards.—A considerable amount of time has been spent in connection with the elaboration, in conjunction with the respective marketing boards, of marketing plans for tobacco and potatoes under statutory control.

The two new commodity marketing boards, which represent means whereby growers in this State have sought to continue some of the benefits of organised marketing following their wartime experience of controlled and stabilised conditions, are now in full operation.

The Potato Marketing Board assumed control of the South Queensland crop on 1st October, 1948. For administrative convenience, Commonwealth control of the northern crop was continued until 30th November. The Tobacco Board, which had been constituted on 22nd July, 1948, assumed control of the sale of tobacco leaf in Queensland on 24th September, 1948. Although machinery to permit interstate discussion of potato growers' problems by marketing organisations is available through a Commonwealth-wide growers' organisation and through meetings of a co-ordination committee of the boards in each State, there is no similar facility in the case of tobacco. To date Queensland is the only State which has established a marketing board and some arrangements for growers to meet on an interstate level to discuss such problems as a roster of auction sale dates and matters of mutual interest is necessary.

Onion Marketing.—During the year the Division was engaged in the preliminary steps leading up to the formation of an onion marketing board in Queensland and in the various necessary discussions with growers' representatives and others relating to the elaboration of a plan for marketing the onion crop under a scheme of statutory control in southern Queensland.

Grain Export.—The Division has been engaged in the establishment of voluntary pools to handle grain sorghum and maize export and in the work which arose from this export.

General.—Considerable difficulty has been experienced during the year in obtaining the staff necessary for the expansion of the activities of the Division. Further expansion of the services which provide production trend reports, crop forecasts and market price reports has been virtually impossible. A heavy strain on the restricted staff available to the Branch has been occasioned by the increase in the number of boards and the many problems which have arisen as a result of the operations of existing organisations.

A most pressing and urgent need within the Division is the development of a well defined statistical section to co-ordinate the use of the diverse statistical material that is handled by the Division as a result of its varied activities. With the extension of its activities into the field of production trend reporting and market price reporting, together with the ever increasing intricacy of the economic and physical aspects of marketing, statistical co-ordination is an essential prerequisite to the adequate use of the data available.

The continued functioning of the State Exports Advisory Committees has been brought into question by the action of the Chambers of Manufacturers in some of the States, including Queensland, in withdrawing their representatives in accordance with a recommendation of the Federal Executive Committee of the Associated Chambers of Manufacturers of Australia to the effect that the State Committees should be disbanded whilst the Federal Exports Advisory Committee should continue to function. All other interests represented upon the Queensland Exports Advisory Committee have expressed themselves as being in favour of its continuance. The question remains undetermined pending a clarification of the attitudes of the Committees in the other States.

The Division was represented by the Assistant Director (Mr. Defries) on the Wool Research Advisory Committee formed to direct a programme of economic and land utilisation research in the wool industry which is being carried out by members of the staff of the University of Queensland.

The contribution that has been made by Queensland's marketing legislation to the economic stability of many Queensland primary industries has received wide recognition both within and beyond the boundaries of the State. This system of marketing, however, was introduced at a time when instability was a marked feature of rural economics and when the economic pressure of other sections of the community was weighted heavily against the farmer. Considerable work has devolved on the Division during the year in its efforts to afford some guidance to various commodity marketing boards in the use of the extensive powers that are wielded by them and their executives by reason of the provisions of the Marketing Acts. These Acts recognise the producer's right to control the marketing of each product, but experience is showing that some vigilance is necessary to ensure that producers' marketing boards do not assume a monopoly of control in which the interests of the customer and the consumer are not adequately protected. The temptation to relax quality standards, for instance, under conditions of a seller's market have been all too evident in some cases.

Of recent years there has been trenchant comment by high authorities, such as the Lord Lucas Committee in the United Kingdom and the Rural Reconstruction Commission in Australia, concerning the operation of the system of producer controlled marketing with statutory powers of compulsion which, while perhaps not fully justified as applied to conditions in this State, do have a very real significance as indicative of a trend of thought which if widespread

in the public mind constitutes a potent danger to the whole system.

The opportunity has been taken during the year to submit articles of economic interest to the *Queensland Agricultural Journal* and for officers to undertake radio talks outlining some of the Division's activities.

Coarse Grains Industry.

Some prominence has been given to the export of coarse grains from Queensland in the past few years, although falling export prices may now tend to thrust these industries back into their former reliance on the Australian market. Although no summer grains were exported from southern Queensland from the crops of the 1947-48 season, which were affected by drought, export of northern maize of that year was permitted to the extent of 8,000 tons.

Arrangements are now being made for the export of 7,000 to 8,000 tons of the 1948-49 grain sorghum crop by the Queensland Grain Producers' Co-operative Association Limited.

Approval has also been granted by the Minister for Commerce and Agriculture for the export of 6,000 tons of maize from the 1948-49 southern Queensland crop, and in this connection the Maize Growers' Co-operative Association, which controlled the previous export from South Queensland, has been recommended to the Commonwealth Government as the body to be granted the export permit.

Approval to export 8,000 tons of maize from the 1948-49 North Queensland crop has also been granted to the Atherton Tableland Maize Marketing Board.

Much difficulty was experienced by the Barley Marketing Board in arranging for the export of some 50,000 bushels of barley from the 1947-48 crop. A sale of this quantity to Malayan breweries at U.S. $157 per ton (20s. 10d. per bushel) had to be cancelled when negotiations were almost completed, owing to inability to obtain an import procurement license in Malaya. A further sale to France at over £1 per bushel had to be cancelled because of sterling difficulties. After further enquiries, the Australian Barley Committee in London advised the Board that, although the sample was of good quality and would meet a ready market at 22s. per bushel, it was not possible to obtain shipping space for such a small parcel. However, after some deterioration had occurred through the action of weevils, the parcel of 59,509 bushels was eventually exported in December, 1948, at a price of 9s. 6d. per bushel f.o.b. Brisbane.

No difficulty was encountered with the export of 52,262 bushels from the 1948-49 crop, which were sold at 10s. 6d. per bushel f.o.b. Brisbane.

The general trend of all coarse grain prices at the close of the period under review was downward, and although there was far from any suggestion of a collapse of prices it seemed that in view of the large surpluses available from the main suppliers much would depend upon the ability of potential customers to buy, which is of course intimately bound up with the future of the European Recovery Programme and the freeing of international trade generally.

However, demand within Queensland and Australia for these grains for stock feeding should increase in future years if present trends in this direction continue.

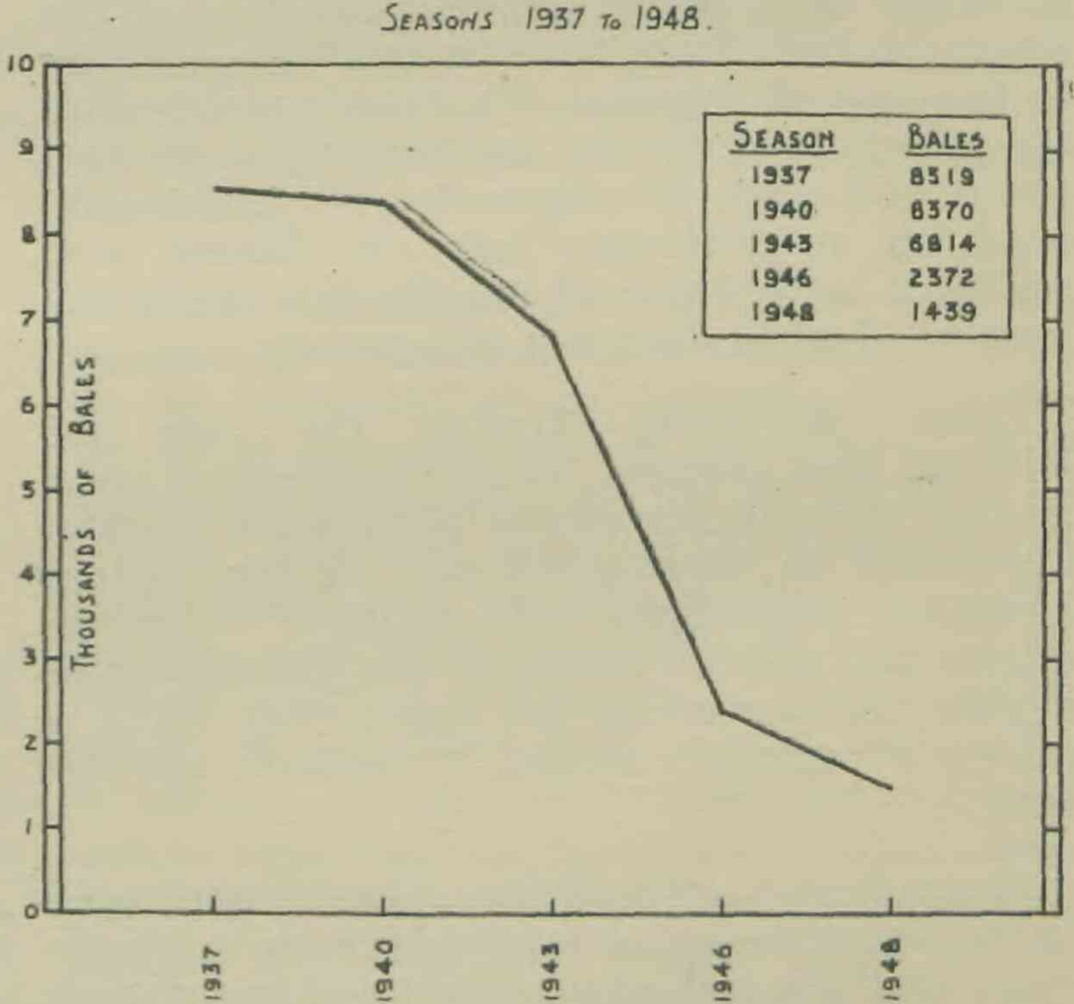
The Cotton Growing Industry.

The cotton industry, which suffered a considerable decline during the war and post-war years owing to shortage of labour and to the inadequate returns as compared with other industries, has been making strenuous efforts to re-establish itself as an integral part of the Queensland rural economy. This crop was the subject of discussions at the Premiers' conference in August, 1948, when it was referred to the Tariff Board for investigation. The Commonwealth Government also referred to the Tariff Board, which held a public enquiry in May, 1949, an application made by The Cotton Marketing Board and the State Government for a five-year agreement for the industry to provide for a guaranteed average net return to growers of 25d. per lb. raw cotton, with provision that two years before expiry of the agreement conditions be re-examined with a view to defining terms for an extension for a further period of five years.

In the course of these discussions and enquiries, much emphasis has been placed on the need for growers to receive for a period of at least five years a guaranteed average net return high enough to provide a satisfactory incentive.

The decline that has taken place since prewar is clearly demonstrated in Figure 7, which shows at three-yearly stages from 1937 to 1946, and for 1948, production in bales of raw cotton lint.

Fig. 1.



The Dairying Industry.

A feature of the dairying industry during recent years has been the diversion of an increasing quantity of milk to consumption as whole milk. This tendency was given impetus during the war years, particularly in central and northern Queensland, by the demand from large numbers of Allied and Australian servicemen stationed in these areas and by the satisfactory prices obtaining for whole milk for human consumption as compared with the return to farmers on butter and cheese. The result of this diversion, as well as the fall in production generally

since 1938-39, has been reflected in reduced exports, notwithstanding the rationing of butter on the local market. Milk used as whole milk for human consumption in Queensland amounted to 19,964,085 gallons in 1938-39. In 1947-48 the corresponding quantity was 35,343,072 gallons, an increase of 83.6 per cent.

As a result of a supplementary cost survey undertaken early in 1948 by The Joint Dairying Industry Advisory Committee, which body had been appointed by the Commonwealth Government following upon the acceptance by the Commonwealth Government of the principle of according producers returns based on cost of production, a revised farm production cost of 2s. 2d. per lb. (commercial butter) was established. To permit this payment being made to producers, the Commonwealth Government agreed to an objective return to manufacturers of 266s. 6d. per cwt. as from 1st July, 1948, which was met by an Interim Equalisation of 236s. per cwt. and a continuance of Commonwealth subsidy of 30s. 6d. per cwt. With regard to cheese, as in the case of butter the increased return to the industry from 139s. 4.9d. per cwt. to 149s. 4.9d. per cwt. was met by a price increase. Subsidy paid on cheese as from 1st July, 1948 continued at 15s. 4.9d. per cwt., i.e., at. the same rate as operated from December, 1947, to June, 1948.

A further survey by The Joint Dairying Industry Advisory Committee has recently been completed and the results were announced in June. The Committee's survey has established a further increase of 2½d. per lb. (commercial butter) in production costs. The dairying industry, through the Commonwealth Dairy Produce Equalisation Committee Limited, has also presented a case for an increase from 2.55d. per lb. to 3d. per lb. (commercial butter) to cover increases in cost of manufacture. The Commonwealth Government, while accepting the recommendations of both these bodies, has referred the question of an increase in the domestic price to the State Prices Commissioners.

The Egg and Poultry Industry.

Following discussions between representatives of the British Ministry of Food, the industry, and the Commonwealth Government, regarding the possibility of substantial increases in production to meet the needs of the United Kingdom market, agreement was reached between the United Kingdom and Australian Governments, and the then existing contract for the sale of Australian eggs to the United Kingdom was terminated on 30th June, 1948, and provision made for a new contract commencing with the season 1948-49 and extending up to and including the season 1952-53. The objective of the new contract was an export target of 3,500,000 cases of eggs in all forms from Australia per season. Under the contract, prices in Australian currency are as follows:—

	s.	d.	
Egg in shell (15 lb. pack) ..	2	4	per doz. f.o.b.
Egg pulp	1	8·9	per lb. f.o.b.
Egg powder	7	0	per lb. f.o.b.

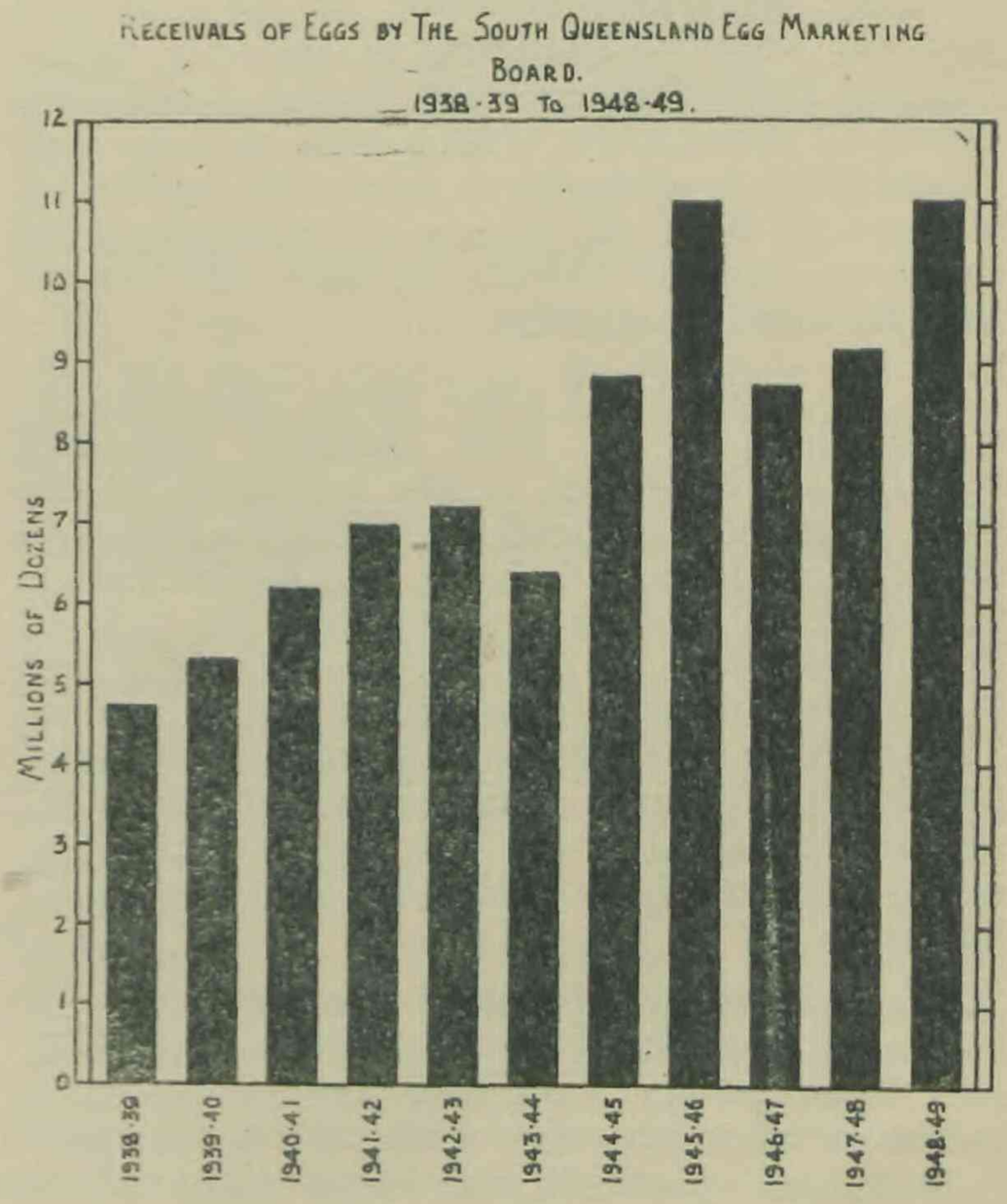
In response to strong representations from the industry, in which it was claimed that the burden of increasing production costs made the above prices uneconomic to the Australian industry, the Minister for Commerce and Agriculture arranged for the Bureau of Agricultural Economics to undertake a cost of production survey.

The survey established a production cost of 30.51d. per dozen, which cost includes interest at 3⅛ per cent. on farmers' equity in farm assets and 3.39d. per dozen State marketing costs, but does not include any allowance for down grading, which the survey estimated at 1.61d. per dozen eggs. Adding ½d. per dozen to cover charges made by the Australian Egg Board on export eggs, the need for an average price of 2s. 7d. per dozen was established. Representations have already been made by the Minister for Commerce and Agriculture to have the present contract price of 2s. 4d. per dozen increased.

Production during the year was maintained at a high level, although in Central Queensland difficulties were experienced as a result of the cyclonic disturbances which resulted in flooding and destruction of property in the early months of 1949. The Central Queensland figures reveal, however, an increase of 18.6 per cent., this year's receivals by the Central Queensland Board being 589,768 dozen compared with 497,151 dozen in the previous year.

Receivals by the South Queensland Board for each of the years ended 30th June, 1939, to 1949, inclusive, are illustrated in Figure 2, which indicates the trend in egg production in this State. Receivals for 1948-49 amounted to 11,051,040 dozen, an increase of 20 per cent. on 1947-48.

Fig. 2.



Statements indicating the means by which eggs were disposed of by the Boards in 1948-49 are given in Table 1, with the relevant figures for 1947-48 for comparison.

TABLE 1.

DISPOSAL OF EGGS BY THE TWO EGG MARKETING BOARDS.

(*a*) *The Egg Marketing Board South Queensland.*

Market.	Egg Disposals (Dozens).	
	1947–48.	1948–49.
Sales in shell (local and interstate)	5,017,927	4,705,875
Sales in shell (exports to U.K.) ..	1,470,060	2,465,730
Sales in shell (exported other than to U.K.)..	30,000	251,841
Eggs pulped (local)	2,080,466	1,254,304
Eggs pulped (export)	591,326	2,336,259

(*b*) *The Central Queensland Egg Marketing Board.*

Market.	Egg Disposals (Dozens).	
	1947–48.	1948–49.
Sales in shell (local)	207,745	226,721
Sales in shell (export to U.K.) ..	22,200	111,330
Eggs pulped	252,167	251,622

Total eggs exported from Queensland during 1948-49 amounted to 2,828,901 dozen. In addition, pulp for export absorbed 2,339,015 dozen eggs. Export markets other than New South Wales and the United Kingdom included Malaya, Arabia, Hong Kong, and New Guinea.

The market for dressed poultry is not controlled by the Egg Boards, but to some extent has contributed to the stability of the industry in Queensland. Prices paid by the poultry abattoirs to farmers show an increase on previous years. These increased payments have been made possible by the satisfactory prices received from overseas buyers of dressed poultry.

The Fruit and Vegetable Industry.

The bogey of the fruit and vegetable industry has always been the glut period, and now that the easy marketing situation of the war and post-war years is changing in response to expanding production and the altered purchasing power of consumers, considerable activity can be expected in attempts to formulate marketing schemes to ward off threats of instability arising from lack of balance between the market available and production.

In the main, what gluts there have been in recent times in the fruit industry have not manifested themselves to the consumer in the form of greatly reduced prices in the orthodox supply and demand fashion. No doubt there is a number of explanations for this, but it is of importance that, by and large, over-supply has been most apparent in the poorer quality article. This would tend to result in depressed wholesale prices, with greatly enhanced marketing wastage and consequent low returns to producers, rather than to produce low retail prices to stimulate sales.

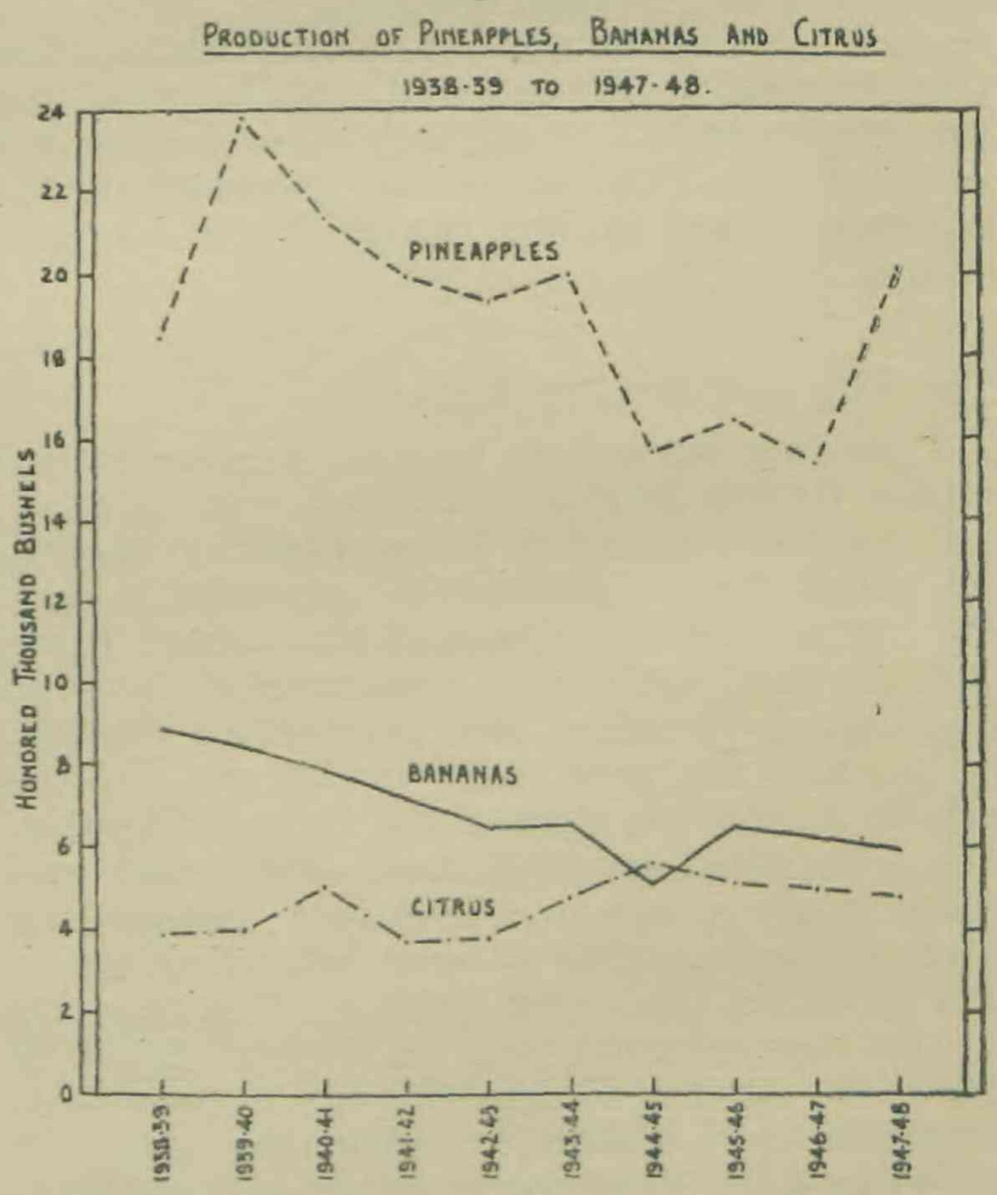
The need to divert poorer quality or unsuitably sized fruit from the fresh fruit market is, of course, widely recognised in the industry, and some effort has been made in the past year to put into operation marketing plans which would assist to control this aspect. The citrus industry, for instance, has, following a ballot of growers, given power to the Committee of Direction of Fruit Marketing to assume the necessary power to control the wholesale marketing of all Queensland citrus fruit and to divert low quality or small sized fruit from the best fruit market.

The development of the growers' co-operative cannery at Northgate has enabled the pineapple industry to meet what might otherwise have been the most difficult marketing situation in recent years and has given growers a very important degree of control over the market. Assistance has also been rendered to a significant degree by the cannery to many other fruit industries, particularly where the Committee of Direction of Fruit Marketing is enabled, by its power of direction, to control the diversion of fruit to the processing industry. Valuable work is also being done at the cannery in connection with the preservation of orange juice.

There was an attempt during the year also to obtain a wide degree of control over the wholesaling and ripening of bananas through the powers of direction of the Committee of Direction of Fruit Marketing, but this was defeated by a small margin at a ballot of growers. The Committee's diversion scheme, whereby over-supplies on the Brisbane market are diverted to Sydney and other centres, was continued through the year. This scheme was considerably assisted by the expansion of facilities in Sydney for the wholesaling of bananas. Valuable experimental work on the processing of bananas was continued at the Brisbane cannery during the year. Tinned preserved bananas, if successfully marketed, would represent a valuable pioneering effort in the industry.

Figure 3 illustrates the trends which have taken place in the citrus, pineapple and banana industries since prior to the war.

Fig. 3.



During the year, the Committee of Direction of Fruit Marketing celebrated its 25th anniversary. In those years the organisation, which is democratically based upon local associations of fruit and vegetable growers and representatives elected on a commodity basis to the various Group Committees, has developed from small beginnings to an extensive business undertaking, with branches extending from Cairns in the

far north of Queensland to Albury on the Victorian border. The functions of the organisation, which has an annual turnover of over £2,800,000, are varied and include, in addition to marketing under powers of direction when required by a 60 per cent. majority of the growers, such activities as transporting fruit and vegetables to the main Australian markets, acting as Farm Produce Agents on a commission basis, merchandising, wholesaling, retailing and manufacturing.

The more recent developments in the growth of this organisation include the establishment and operation of a co-operative fruit cannery and the improvement of fresh fruit and vegetable distribution in badly served areas, such as some of the western towns, by the opening of retail branches.

The Government has assisted the organisation in these developments. Finance was secured for the necessary capital and working expenditure for the cannery under a State Government guarantee. The cannery, which has a sales turnover of about three-quarters of a million pounds a year, has proved to be a valuable dollar earner. Sales of canned pineapples to Canada between the commencement of operations of the cannery in July, 1947, and 30th June, 1949, amounted to £A809,589.

Amending legislation enabled the Government's powers of acquisition to be used to provide the C.O.D. with land and buildings for the operation of retail fruit and vegetable branches in country towns. After gaining experience and training staff at Nambour, Gympie and Rockhampton, retail branches have been opened also at Charleville, Roma, Charters Towers, Innisfail, Bowen and Mackay. A shop is in course of erection at Longreach and a branch will be opened there as soon as it is completed.

Fruit Cases.—The fruit case problem has been acute since the war years and the continued very keen demand by the building industry for all available suitable timber indicates that little relief can be expected for some time. Moreover, the demand for commodity cases is very strong and with values for these comparatively high this also provides very keen competition for fruit case users.

The seasonal nature of the fruit and vegetable industries is such that growers use their full supply of cases over a comparatively short period. To provide full case requirements during these short seasonal periods is a burden on millers. The alternative left to growers—that is, buying the millers' off-season output of case shooks—has created some difficulties, due to the shortage of pine and the unsuitability for storage of the many substitute timbers that have to be used.

A move in the direction of the collective buying of cases by growers on a large scale was made possible when on the 16th June, 1949 a successful ballot of growers was conducted by the Deciduous Sectional Group Committee. This will enable the Committee to strike a levy on produce marketed to raise funds for the administration of a scheme whereby the C.O.D. would provide finance to secure for growers in the Granite Belt at least one million cases from sources outside the usual sources of supply of cases for the district. This step followed the failure of the effort mentioned in my last report to elaborate and organise an equalisation scheme designed to provide Stanthorpe growers with cases at uniform cost irrespective of where the cases were manufactured.

The apparent decreasing quantities of suitable timber available from mills which in the past have supplied fruit case requirements points to the necessity for obtaining fairly large quantities from new areas, e.g., the far north of Queensland. This will result in increased costs due to the long distances of transport.

The possibility of obtaining cases or case timber from New Zealand was investigated by an officer of the Committee of Direction of Fruit Marketing. His report was that there did not appear to be any possibility of obtaining case timber from that source due to the high cost involved.

Sales of second-hand fruit cases for the financial year ended June, 1949 by dealers licensed by the Second-hand Fruit Cases Committee, exceeded the average sales of one and one-quarter million cases per year. The demand by growers from all districts for these cases showed an increase each month, and stocks of all types of cases were extremely low throughout the year. The Stanthorpe district was supplied with 20,000 more cases this year than during the previous 12 months.

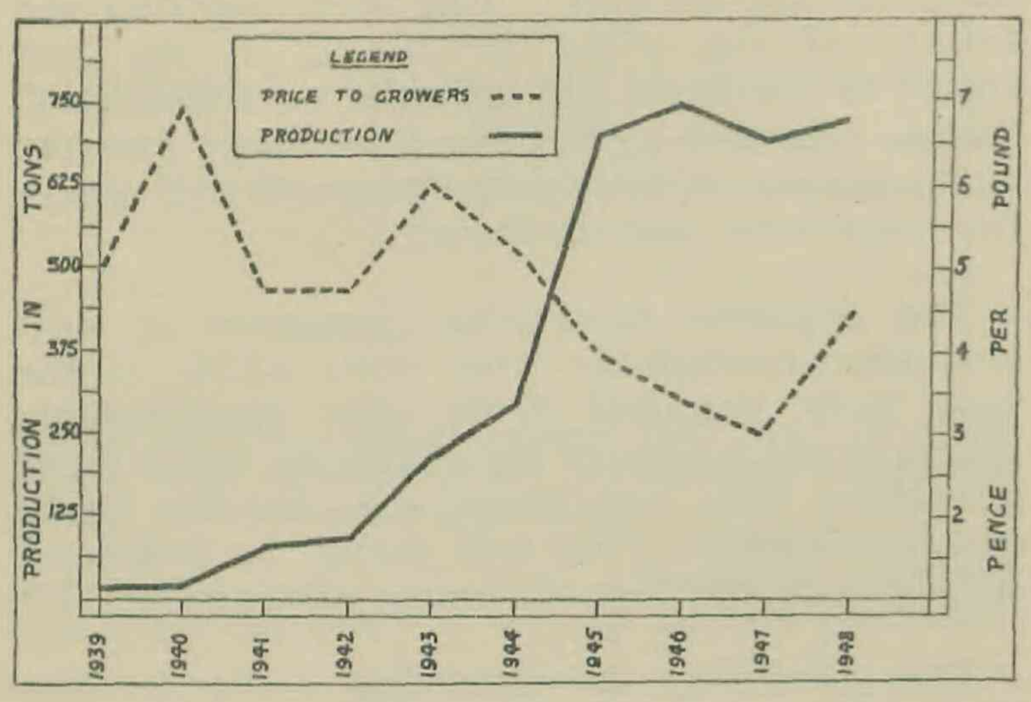
The Second-hand Fruit Cases Act, which applies only to the south-eastern portion of the State, has made it possible for cases to be used over and over again in the industry, and thus a substantial contribution has been made to the alleviation of the shortage.

This scheme, originally a war-time measure, has been of such assistance to the fruit and vegetable industries in the post-war period of timber shortage that repeated requests have been made by the C.O.D. and the Chamber of Fruit and Vegetable Industries to have this temporary legislation confirmed as a permanent Act.

The Ginger Growing Industry.

The ginger growing industry in Queensland, although still confined to the Buderim district, has expanded rapidly during the past six years. After the outbreak of war in 1939, shipping restrictions resulted in a considerable reduction in the quantities of Chinese ginger imported, and by the end of 1942 the importation of ginger virtually ceased. This opened up the Australian market of approximately 1,500 tons per annum to local producers. However, growers, though realising the opportunity to expand production, were unable to do so immediately because of the limited market for green ginger due to the lack of processing facilities. This was remedied with the erection of a pre-treatment factory at Buderim by the Buderim Ginger Growers' Co-operative Association in 1941, and, with the constitution of the Ginger Marketing Board on 16th July, 1942, the way was open for expansion. The growth of the industry since 1939 is strikingly illustrated by Figure 4, which also indicates movements in returns to growers over the same period.

Fig. 4.—Ginger production and returns.



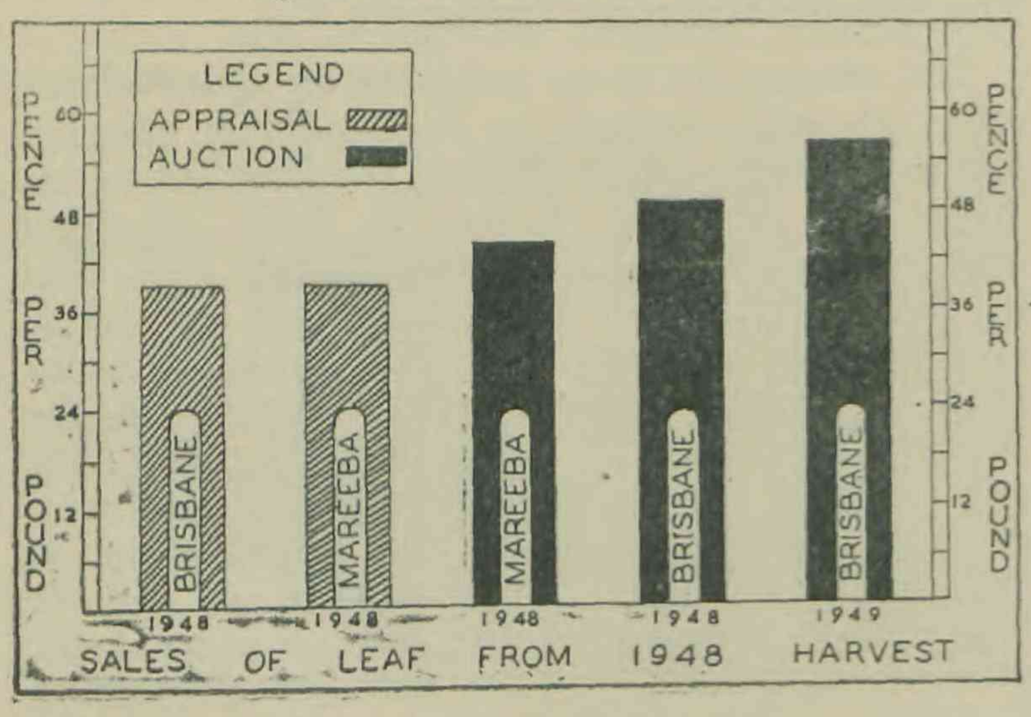
The 1949 crop was originally estimated at 1,000 tons. However, a setback due to lack of rain and to sunburning was experienced during the early growing period, and although good seasonal conditions later resulted in some recovery of the crop only 500 to 600 tons are now expected to be harvested. The 1948 harvest produced 720 tons.

During the year, the Board has explored the export market and interest has been shown by the United Kingdom, Canada and the United States of America. Before the last war, these markets were monopolized by Chinese ginger.

The Tobacco Industry.

Owing to their dissatisfaction with the prices being received for their leaf through The Australian Tobacco Board, growers' organisations pressed for the abandonment of control under the National Security Act in order that the sale of leaf could be conducted by the newly-constituted State Board. On 24th September, 1948, the National Security (Tobacco Leaf) Regulations relating to the appraisement and sale of tobacco leaf were revoked and The Tobacco Leaf Marketing Board took over the functions of marketing. An auction system was instituted and a sharp increase in the average prices realised for leaf immediately resulted. This is illustrated in Figure 5, showing prices realised under appraisal and auction for leaf from the 1948 harvest.

Fig. 5.—Tobacco Leaf Prices.



In considering the above graph it must also be noted that included in the three sales by auction were quantities of leaf which had previously been rejected under the appraisal system. Sales by The Tobacco Leaf Marketing Board from the 1948 harvest amounted to 644,971 lb., which realised £123,879. The Board has already sold approximately 700 tons of leaf from the 1949 harvest.

The figures set out in Table 3 show the area and production of tobacco leaf in Queensland and Australia during the past 5 years.

Table 3.

TOBACCO AREA AND PRODUCTION, 1943–44 TO 1947–48.

Year.	Queensland.		Australia.	
	Area.	Production.	Area.	Production.
	Acres.	Lb.	Acres.	Lb.
1943–44	2,348	1,779,232	6,616	4,633,000
1944–45	1,862	1,314,208	4,775	2,844,000
1945–46	1,897	1,411,536	3,971	2,505,000
1946–47	2,255	1,968,848	4,492	4,231,000
1947–48	1,912	1,581,440	3,792	2,539,000

The small percentage of Australian tobacco requirements represented by local production is apparent when it is considered that Australian consumption, which had increased by about 30 per cent. since the immediate pre-war period, is now in the vicinity of 33,000,000 lb. per annum whilst Australian production for the 1947-48 season was only 2,539,000 lb., of which Queensland accounted for 1,581,000 lb.

The Wheat Industry.

Following a series of conferences early in the period under review, finality was reached in attempts to formulate an Australia-wide wheat industry stabilisation plan. The major provisions of this plan are as follows:—

(i.) A guaranteed base price of 6s. 3d. per bushel (bulk) f.o.r. ports, to vary with an index of costs of production.

(ii.) A stabilisation fund is established and a tax of 50 per cent. of the excess of export price over the guaranteed price, with a maximum of 2s. 2d. per bushel, is to be paid into the fund.

(iii.) The guarantee not to apply to any quantity exported in excess of 100,000,000 bushels.

(iv.) No restriction of acreages except on marginal areas.

(v.) The plan to extend over the crops from 1947-48 to 1952-53 inclusive.

The State Governments were required to enact legislation to ensure a home consumption price equal to the guaranteed price and to authorise an approved organisation to receive from wheat growers all wheat delivered and finally to empower the direction of wheat by the Australian Wheat Board at any time to an approved organisation.

The plan was submitted to wheat growers and a ballot was conducted in each of the four major wheat growing States—New South Wales, Victoria, South Australia, and Western Australia—during the latter half of 1948. A majority of growers in each State voted in favour of the plan, and the necessary complementary State and Commonwealth legislation was then enacted to meet the requirements of the Constitution.

In one very important respect this plan departs from what was generally accepted as an inevitable concomitant of such a scheme, i.e., production control. The legislation does not make any provision for the control of production, although States have agreed to ensure that wheat growing on marginal areas will be regulated.

As far as Queensland is concerned, the plan also departs radically from the type of organisation set up under National Security control in that the State's wheat marketing legislation has been retained intact and is fitted in as an integral part of the Commonwealth-wide scheme. The desirability of this approach is shown by the need to ensure that the Queensland Board is enabled legally to continue the Hail Insurance and Wheat Classification Schemes which have been of such value to Queensland growers. The stabilisation legislation provides that effect is given to the plan by the State Wheat Board delivering wheat to the Australian Wheat Board on behalf of Queensland growers. The wheat will in the first place be delivered to the State Wheat Board under the Wheat Pool Act, and be paid for by the State Wheat Board in accordance with this Act. The State Wheat Board will deliver the wheat to the Australian Wheat Board, and be paid for the wheat by the Australian Wheat Board under the new stabilisation legislation.

The Australian Wheat Board constituted under this legislation is now operating under the plan and the guaranteed price for the 1948-49 wheat crop, after adjustment with the index of costs of production, has been established at 6s. 8d. per bushel.

After the failure of the International Wheat Agreement of 1948, due to non-ratification by the United States of America, machinery was set in motion in an endeavour to obtain a new agreement and one has now been written, which, if ratified by a sufficient number of the countries concerned, will come into operation on 1st August, 1949. Australia's export quota under the new agreement is 80,000,000 bushels per year for the four years ending 31st July, 1953.

The very substantial decline in export prices which has taken place in the last 12 months emphasises the value of both the Stabilization Plan and the International Wheat Agreement.

Considerable expansion has taken place in the wheat industry in Queensland since the end of the war. A record crop of over 14,000,000 bushels was harvested from 608,000 acres in 1948, and by 30th June, 1949, 13,539,934 bushels had been delivered to the State Wheat Board. It is estimated that a further 777,000 bushels have been retained on farms for seed and feeding purposes. When this is compared with the 1940-45 average of 5,167,474 bushels from 312,267 acres, and the previous 1947-48 record of 10,684,563 bushels from 462,239 acres, the high rate of expansion is apparent.

The sale of wheat for local consumption for all purposes during the cereal year ended 30th November, 1948, was 7,409,306 bushels, an increase of almost half a million bushels over the 6,929,377 bushels consumed during the previous year, when a shortage of wheat for stock feed existed.

To the 30th June, 1949, 625,538 bushels of wheat had been exported from the 1947-48 crop and 3,096,539 bushels from the 1949 crop. The export of wheat from the 1947-48 crop has now been completed, but further shipments of the 1948-49 season's wheat are still to be made.

In the period under review many complaints were made of the quality of wheat being supplied to the stock feed trade. The very low quality of this wheat was due to the fact that a considerable quantity of the feed wheat delivered from the 1947 harvest which still remained unsold had been seriously affected by heavy rains during harvesting and had further deteriorated through weevil infestation during the long period of storage. Most of this old season's wheat has now been sold.

The Market Reporting Service.

The Service, which has as its object the collection and dissemination of accurate and representative wholesale prices of a wide range of commodities, was continued throughout the year.

The "Daily Official Market Quotations" published each day contains details of wholesale prices realised in Brisbane for fruit, vegetables and farm produce. This information is disseminated daily by radio and press and in addition some 62 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.

A special report in respect of fruit and vegetables from other States sold in Brisbane is furnished each day to the Australian Broadcasting Commission for inclusion in its daily broadcast of interstate market reports.

A "Weekly Market Report" is prepared each Friday which summarises the week's trading in the Brisbane Wholesale Fruit, Vegetable and Farm Produce Markets and also includes ruling wholesale prices for wheat, flour, bran, pollard, butter, cheese, bacon, ham, lard, honey, beeswax and eggs. Requests have been received from some 47 bodies for the regular supply of copies of this Weekly Market Report.

Complete and detailed daily records of wholesale prices of fruit, vegetables and farm produce are kept by the Division. Many enquiries are made for this information.

There is clearly a need, however, for these statistics to be further analysed, collated, and prepared so that they can be presented in a form which would indicate the more important trends which are taking place. Only in this way would it be possible to make the fullest use of the wealth of statistical material that is being made available as a result of this service. With price trends for the important fruit and vegetable products adequately outlined not only during the seasons of each year, but also year by year, it should be possible to correlate them with trends in marketing practices and with production. From these relationships there could be established a source of advisory material of value not only to growers themselves, but all those who are engaged in or in any way concerned with the industry. Work of this nature has been held in abeyance up to the present owing to the pressure of other duties on existing staff but it is hoped that with some reorganisation of and addition to the staff next year it will be possible to make some progress in this direction.

The Crop Reporting and Forecasting Service.

Further progress was made during the year in connection with crop production forecasting. 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 of total production. The information on which these reports are based is obtained primarily from farmers, known as honorary crop correspondents, situated in key localities. From 1st July, 1948, to 30th June, 1949, 16 reports have been issued on the following crops:—Potatoes (4); maize (4); barley (3); wheat (3); grain sorghum (2).

No additional crops were added during the year. Rather was an effort made to improve the existing organisation for the five crops mentioned by surveying the geographical and numerical relationship of crop correspondents to the important centres of production. To this end, the lists of honorary crop correspondents have been kept constantly under review, and, with the co-operation of field officers of the Division of Plant Industry, further crop correspondents have been enrolled in those centres which it was felt were not receiving adequate representation in the reports. Visits have been made by officers of the Division to various centres in the State for the purpose of discussing crop forecasting with field officers and prospective crop correspondents. Much still remains to be done in this sphere, as it has become increasingly apparent with experience that it is essential for the officers responsible for the reports to maintain very close touch with the industry if their judgments and summaries are to reflect actual conditions and represent a sound analysis of the material provided by correspondents.

The corps of honorary crop correspondents is being changed continually in this manner, as well as by correspondents leaving the industry or in a few cases losing interest in the work. The number of correspondents at 30th June was 249, comprising 56 reporting on potatoes and 193 reporting on one or more grains. The number of reports received in connection with each crop are as follows:—Wheat 116; grain sorghum 104; maize 60; potatoes 56, barley 20.

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 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*.

During the past year, the monthly report on production trends has been further expanded to include information covering a monthly rainfall summary table and comments on the weather during the month (by courtesy of the Commonwealth Meteorological Bureau), figures showing receivals of honey and beeswax by agents of The Honey Marketing Board, information on the utilization of wheat, and a new table showing detailed information on receivals and disposals of eggs by the South Queensland Egg Marketing Board. In addition, sections dealing with fruit and vegetables have been revised and enlarged to present a more informative picture of trends in production of these crops rather than a mere report of marketing prospects as formerly.

As a result of these additions, the monthly report has been extended to an average of over 20 pages, and it is considered now presents more fully and concisely relevant information on agricultural and pastoral production trends in Queensland. To increase the value of the report still further, efforts are being made to reduce to a minimum delays in preparation and distribution so that it will be made available very soon after the close of the month to which it refers.

Since the beginning of the year, circulation of the report has been further increased. There are now 250 addresses on the free distribution list, which includes interstate and overseas addresses.

The two types of reports issued by the service are designed primarily to offer timely and accurate information needed not only by farmers in the planning of their production programme but also by the many firms and institutions which provide goods and services to the farming community. Government Departments, financial institutions, machinery firms, transport and storage agents, firms which handle farm requirements, merchants and agents, seedsmen, case mills and bag suppliers, all find this type of information of great value in the organization of their business. In other words, an earnest attempt is made to assist the development and the implementation of constructive marketing plans by providing information which is available from no other source.

Reports are widely distributed by mail as soon as they are published and they are also adequately disseminated throughout the State with the co-operation of the radio, city and country press, and the various farmers' periodicals, and in this way are made readily available to the farming community without delay.

That the very close connection between forecasts and the problems of marketing is fully appreciated in this State is emphasised by the growing demand for the reviews of production conditions and prospects. It is the aim of this service to give assistance to those who are concerned with the building up of a constructive programme of agricultural development by providing accurate and timely information as to trends in rural production. This is fundamental to stability in agriculture.

Primary Producers' Co-operative Associations.

The legislation under which Primary Producers' Co-operative Associations are registered, viz., "*The Primary Producers' Co-operative Associations Acts,* 1923 *to* 1934" *is* designed to encourage and direct true co-operative effort among primary producers.

To protect the legitimate co-operative from exploitation by organisations and individuals masquerading under co-operative designations, the Acts prohibit the use of the word "Co-operative" in the name of any corporation

unless not less than three-fifths of its shares and its voting power are held by the persons who are producers and suppliers and unless the democratic principle of one member one vote is adopted.

Since the passing of the original Act in 1923, 232 associations and two federations have taken advantage of this provision. Of this number, 23 have wound up voluntarily, leaving a net registration of 209 associations and 2 federations at 30th June, 1949.

The sales turnover of Primary Producers' Co-operative Associations in Queensland now exceeds £15,000,000 per annum. They are possessed of land and buildings valued at approximately £1,700,000 and machinery, plant, and other fixed assets valued at approximately £3,000,000.

Report of the Standards Branch.

MR. F. B. COLEMAN, STANDARDS OFFICER.

Summary of Operations.

The work of the Standards Branch for the year 1948-49 is summarised in Table 1; comparative totals of samples, &c., for the two previous years are included—

TABLE 1.

SUMMARY OF BRANCH OPERATIONS.

—	1948–49.					Total.		
	Seeds.	Fertilizers.	Pest Destroyers.	Veterinary Medicines.	Stock Foods.	1946–47.	1947–48.	1948–49.
Samples received from—								
Inspectors of the Branch—								
(*a*) Being offered for sale in the State	3,095	17	7	..	74	3,135	1,295	3,193
(*b*) For export	13	..	..	..	53	..	48	66
(*c*) Imports	1,290	..	..	..	..	..	376	1,290
Dealers	2,227	..	3	4	1	2,155	3,276	2,235
Buyers	23	..	..	..	2	41	62	25
Government Departments ..	616	..	..	..	3	643	989	619
Experimental and additional tests	2,840	..	..	..	..	3,056	2,765	2,840
	10,104	17	10	4	133	9,030	8,811	10,268
Licenses issued	..	257	..	405	..	665	679	662
Registrations effected	..	216	301	294	305	839	795	1,116
Registrations refused	..	..	1	46	..	16	18	47
Board meetings and/or Committee or Sub-Committee meetings ..	29	..	24	21	..	33	63	74
Number of inspectional visits made to stores in the State	..	..	..	..	..	237	299	321
Analyses carried for this Branch in the Chemical Laboratory ..	..	5	9	3	6	167	190	23

During the year an effort was made to free the branch's staff from extraneous emergency duties, which have claimed a good proportion of their time in the war and post-war years, so that attention might be given to their legitimate responsibilities. This was only partly successful because of the allocation to the Branch of functions associated with inspection of export grain at the port of Brisbane.

Inspections were carried out covering the following territory:—Brisbane, South Coast, Fassifern Valley, Lockyer Valley, Darling Downs to New South Wales border, near North Coast and the Mary Valley Line. A total of 92 visits and return visits was made to towns in the above areas, and 321 stores were inspected.

Seeds for Sowing.

It is a matter for concern that the quality of seeds offered for sale for sowing is much below the standard attained before the war and in many instances below the standard required under the Seeds Acts. This may be due to a war-time accumulation of seed held in seed stores and the lack of proper policing of the provisions of the Seeds Acts.

During the year, 10,104 samples were examined at the Seed Testing Station. Of these, 4,398 were samples taken by inspectors of the Branch, 2,227 were from seed dealers, 23 from farmers, 616 from other Government Departments, and 2,840 represented experimental and additional tests.

Of the 4,398 samples taken by inspectors of the Branch, 1,303 represented goods seeking entry or exit from Australia, 2,449 were vegetable seeds, and 646 were farm seeds.

The 2,840 experimental and additional tests consisted of 986 of the former and 1,268 of the latter, which were carried out on Rhodes, Paspalum, Prairie, Urochloa, and Buffel grasses as the seed was suffering from lack of maturation, and 586 retests.

Table 2 sets out details as to action taken in respect of seeds for sowing found not to comply with the provisions of the regulations under the Act. For comparison the figures relative to the past four years are shown. An improvement in the quality of packet seeds is noted.

TABLE 2.

ACTION TAKEN ON UNSATISFACTORY SEEDS.

—	1944–45.	1945–46.	1946–47.	1947–48.	1948–49.
Vegetable seeds—					
Destroyed or rendered unfit as seed for sowing	457 lb.	1,662 lb.	1,027 lb.	2,468 lb.	3,659 lb.
Farm seeds—					
Destroyed or rendered unfit as seed for sowing	..	30 lb.	247 bags	261 bags	302 bags
Cleaned under supervision of an Inspector	..	..	331 bags	345 bags	10 bags
Packet seeds (3d. and 6d.) destroyed	..	..	6,697 packets	619 packets	321 packets

The examination of samples taken by inspectors from various vendors reveals that the quality of seeds being offered for sale as seed for sowing is far from what could be desired. One in every six samples of vegetable seeds so taken failed to comply with the provisions of the Seeds Acts, owing principally to the lack of germination, and in addition, in the case of French beans, to the presence of live insects. One-half of the cabbage and onion, slightly over one-half of the marrow, and one-third of the cucumber seed samples failed to reach the prescribed germination standards. The bulks to which these samples related were destroyed as soon as possible after discovery. In the case of farm seeds again one sample in every six failed to meet the prescribed standards, due to lack of germination, presence of prohibited seeds and live insects or excessive amounts of weed seeds and inert matter. One-third of the mangel seed examined failed to comply with the germination standard and nearly one-half of the canary seed failed due to the presence of weed seeds. *Salvia reflexa* and *Datura* spp. were the main prohibited weeds found.

In several instances over one-quarter of the stock of seed for sowing held by seed sellers has been destroyed and in one store 51 per cent. of the stock on hand was found not to reach the germination standard. In each case necessary action was taken. The destruction of this seed represents a considerable financial loss to the seller. Unfortunately, the Department receives little help from purchasers of inferior seed for sowing, which makes the task of policing the Seeds Acts more difficult.

The need for sellers of seeds to check the quality of every bag of beans offered for sale cannot be too strongly stressed. In one instance, in a consignment of 200 bags 18 were found not to comply with the prescribed standard for germination. From the grower's point of view it is important that the bag or portion of a bag which he buys complies with the standards under the Acts. It is not sufficient that a majority of the bags in a consignment received by the seller is satisfactory.

Samples submitted by sellers for testing often do not represent the bulk. Experience indicates that buyers also are prone to draw samples from the best or worst bags available, whichever suits their convenience. Seed dealers and growers selling on non-representative samples are not eager to have samples drawn by seed inspectors because of the probability that the bulk will be condemned.

The free seed testing service available to buyers of seed for their own sowing is seldom used. During the year only 23 samples of seed for testing under the free scheme were received. From this one could assume that the average buyer of seed for his own use is quite satisfied to rely on his own judgment of the appearance of the seed. The personnel engaged on seed inspection and seed testing have the opportunity of examining hundreds of samples every year; they would not presume to foretell the results before testing. Poor looking samples frequently comply with the prescribed standards, whereas bright, good looking samples may be utter failures.

A source of very poor seed is represented by farmer-to-farmer sales. These seeds should never be purchased unless the actual quality is ascertained, and such is in accordance with the requirements of the Seeds Acts.

The efforts of the Branch to enforce the provisions of the Seeds Acts as vigorously as possible can be helped very considerably by buyers exercising discrimination in their purchases, and, where they find that they have received unsatisfactory service, by immediately contacting the Department at Brisbane with full facts so that the matter may receive urgent attention. It is of little use giving details of an incident that happened some time previously, and no incidents are capable of investigation unless evidence such as cash sale dockets, invoices or correspondence is produced.

Seed Testing Conference.

The Branch was represented at the sixth conference held at Launceston for the formulation of uniform rules for seed testing in Australia, such being based on the International Rules for the testing of seeds. While uniformity between the States was agreed upon, it cannot be implemented in full until various difficulties have been overcome.

One of these difficulties relates to the examination of Rhodes grass by the International method. This method takes three times as long as the Irish method now being used in Queensland. Samples for export are examined by the International method; it would be impossible to do the 300 or more samples which are received each year by this method, due to the tedious nature of the work.

Seed Certification.

Considerable progress has been made in the certification of seeds for sowing by embracing tomatoes and papaw in the scheme.

The crops and varieties thereof eligible for certification are—

Hybrid maize—Q23, Q431, Q499, Q629, Q692, Q716, Q717, Q739.

Grain sorghum—Wheatland, Kalo, Early Kalo, Hegari.

Sweet sorghum—Sugardrip.

Sudan grass—Roma.

Beans—Brown Beauty.

Tomatoes—Q1, derived from Sioux; Q2, derived from Grosse Lisse; Q3, derived from Valiant; Q4, derived from Rutgers.

Papaw—Bettina QP1; Improved Petersen QP2.

A hybrid maize school was held at the Queensland Agricultural High School and College, Lawes, on 15th and 16th February, 1949, for the purpose of instructing seed certification officers, 10 of whom attended.

Table 3 sets out the amount of certified seed which has been produced since the scheme came into operation in 1946-47.

A total of 180 acres of Wheatland grain sorghum was rejected before harvesting because of either adverse weather conditions or infestation with *Datura* sp.

Two acres of beans were rejected on account of the incidence of halo blight, anthracnose and isariopsis in the growing crop.

Due to the unsatisfactory growth of one acre of tomatoes, the crop was rejected for certification.

The seed produced from six acres of Hegari was refused certification on account of low germination.

Wheatland grain sorghum aggregating 503 bushels was refused certification on account of low germination.

Only 100 lb. of French beans was certified, which amount was used for replanting for certification purposes the following season.

The production of certified tomato seed (218¾ lb.) was an outstanding success.

Unfortunately, adverse weather conditions—a dry planting time followed by excessive rain—will result in the loss of more seed of the various crops that will be harvested in the next few months.

TABLE 3.

PRODUCTION OF CERTIFIED SEEDS.

Year.	Hybrid Maize.	Sorghum.			French Beans.	Tomatoes.	Papaw.
		Grain.	Sweet.	Roma Sudan.			
	Bush.	Bush.	Bush.	Bush.	Lb.	Lb.	Lb.
1947–48	..	600	..	..	..	..	..
1948–49	306½	523	..	..	100	218¾	..

The production of certified seed bears no comparison with the procedure followed in the production of ordinary seed, with the result that the amount of seed harvested per acre has no relation to the amount of work required to be undertaken or the difficulties to be overcome in the production of the crop. In the case of hybrid maize, one-quarter of the crop represents tassel rows, from which the ears are not harvested for certified seed. In the case of sorghum, which includes grain and sweet sorghums and Sudan grass, the rows must be not less than 21 inches apart. In the case of tomatoes, only sufficient fruit is harvested to provide the required quantity of seed. Furthermore, the insistence of a high standard of quality and freedom from disease necessitates rejections that would not operate in the production of seeds under normal conditions. Even though adverse weather conditions may reduce the output below a normal economic level, the resulting crop must still be harvested because of the value of the variety or strain involved.

Due to adverse weather conditions, the probationary period of three growers of hybrid maize was not completed, and the registration of six acres for the production of commercial hybrid maize was cancelled due to the probable contamination of the crop by an adjoining maize crop.

During the time that the seed certification scheme has been operating, it has been necessary to continually revise the procedure in order to smooth out difficulties as they arose.

One of the definite limiting factors in the scheme is that, in addition to performing their ordinary work, the seed certification officers are required to carry out the necessary duties connected with the production of certified seed. Extension of the scheme is a vital necessity, as it will mean an improvement in production of the crops concerned, but this extension is entirely dependent upon the staff position.

During the year seven Committee and 23 Subcommittee meetings have been held.

Fertilizers.

During the year, 216 fertilizers were registered and 257 licenses were issued to fertilizer dealers.

The fertilizer supply position has not yet stabilised itself and temporary shortages of various ingredients have resulted in the registration of a number of mixtures that were only available for a limited period.

Sulphate of ammonia was again in very short supply. Approximately 28,000 tons of this fertilizer were made available; this, on present estimates, is 20,000 tons short of

requirements. The biggest proportion of this fertilizer is being used in the cultivation of sugar cane. Again reliance had to be placed on importation from England in an effort to augment the quantities manufactured in Australia, where to date through various difficulties full production has not yet been reached, and until such time as the proposed manufacture of sulphate of ammonia in Tasmania is in full operation Queensland will be dependent upon importations from overseas.

The price of sulphate of ammonia was raised during June to £20 17s. 6d. per ton, Brisbane; at the same time, this commodity is attracting a subsidy of £500,000 to enable it to be sold in Australia at this price.

Supplies of nitrate of soda are still unavailable for agricultural purposes. Queensland suffered a slight shortage of superphosphate due to the demand overtaking the capacity for production, but this has now been remedied. The subsidy of £2 5s. per ton will be continued during the coming year, which permits superphosphate to be sold at £7 per ton in Queensland. The annual subsidy on superphosphate during the year for Australia was £3½ million. This State is in a far better position than the southern States, which are experiencing a shortage of pyrites due to lack of shipping, added to which is the difficult position prevailing in providing containers.

The price of blood and bone fertilizer has risen to £8 10s. per ton net.

Owing to decreased killings a serious shortage of organic fertilizers still exists, with no prospects of any alleviation. The potash supply position is very satisfactory at present. Unfortunately, due to lack of other ingredients, many properly-balanced fertilizers required for particular crops cannot be made available.

Table 4 sets out the price of fertilizers for six years.

Pest Destroyers.

In the course of the year 301 pest destroyers were registered and nine samples were analysed by the Agricultural Chemist for the Branch. One preparation was refused registration. There were 24 meetings of the Pest Destroyers Board.

This year is the commencement of a three-year registration period for pest destroyers. During this period all marketed preparations coming within the ambit of the Pest Destroyers Act are reviewed.

New pest destroyers are constanly being brought forward. DDT is now well established in the horticultural and pastoral fields and benzene hexachloride has made considerable advance during the past 12 months for the control of external parasites on cattle and for other purposes.

Hormone-type weedkillers consisting essentially of 2, 4-dichlorophenoxyacetic acid are now readily available for selective weed control and some organic phosphates in the preliminary stages are promising as miticides and insecticides.

Veterinary Medicines.

A further 294 veterinary medicines have been registered, making a total of 517 so far in the 1948-50 registration period. There were 21 meetings of the Veterinary Medicines Board. A total of 46 preparations were refused registration. The number of licenses issued to dealers to sell veterinary medicines amounted to 405.

TABLE 4.

FERTILIZER PRICES.

Name.	1938.	1940.	1943.	1947.	1948.	1949.
	1st February.	March.	1st January.	January.	May.	June.
	£ 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 0c	18 10 0c	18 10 0c	*d*
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*	20 17 6*b*
Superphosphate—						
22% P_2O_5	5 6 6	5 18 6	7 19 6	7 4 0c	7 4 0c	7 0 0c
18% P_2O_5	..	..	..	6 19 6	..	..
Blood	10 15 0	11 0 0	11 0 0	..	..	..
Blood and Bone 5 : 15 : 0 ..	7 10 0	7 15 0	7 15 0	7 15 0	8 10 0	8 10 0
Bone 3½ : 23 : 0	7 10 0	7 10 0	7 10 0	7 10 0	7 10 0	*d*
Sulphate of Potash 48% K_2O ..	15 10 0	17 7 6	21 10 0	..	..	*d*
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. *d* Supplies not available.

The maximum price of mixed fertilizers is ascertained by taking the unit values as set out in the Prices Commissioner's Schedule and making a calculation, where necessary, taking into consideration the degree of fineness, mixing charge, and any other allowances that may be provided for.

Preparations to which the Veterinary Medicines Board has given a great deal of attention during this registration period are condition powders and tonics. The claims made for such preparations were rather vague and tended to refer more to the treatment of symptoms than to the cause of any malady. In fact, some

labels showed no claims whatever, only dosage rates. This would imply that they should be given to healthy animals. The Veterinary Medicines Board has now decided that no preparation will be accepted for registration if it is advocated for the treatment of healthy animals. Some of these preparations were refused registration; others were accepted after the labels were amended to the satisfaction of this Branch.

Stock Foods.

The number of stock foods registered for the year amounted to 305, representing an increase of 25 over last year's figure. Six samples were analysed by the Agricultural Chemist.

The supplies of protein concentrates of animal origin do not yet appear to be sufficient. Especially does this apply to the needs of poultry mashes, and as mentioned in previous reports the position will not be relieved until there is an improvement in the supplies of protein concentrates of vegetable origin.

Advertisements.

The control of advertisements relating to the various commodities with which this Branch is associated has been continued·, particularly in relation to advertisements intended for publication in the *Queensland Agricultural Journal.*

On reading some of the matter submitted, it would appear that some organisations have extended a poetic license to their advertising matter, which in many cases can only be considered as a trap for the unwary. If these advertisements were allowed to appear they would tend to undermine the work carried out by the Branch, which functions to protect the primary producer. Further, the publication of such advertisements would be most unfair to those organisations which confine their advertising to statements of fact.

Directions for Use of Pest Destroyers and Veterinary Medicines.

During the year a complaint was received that the use of a cattle dip had resulted in the death of several stock. An investigation revealed that the material had been used at a concentration far exceeding the recommended dilution which appeared on the label. Many people are inclined to make up a solution in accordance with the directions for use and then add a little more just to make sure, with tragic results to animals. Users should realise that directions for use of a pest destroyer or veterinary medicine are approved by the respective Boards only after careful consideration, and they should be adhered to.

Imports and Exports.

Details of the goods examined at the port of Brisbane for the purpose of the Quarantine Act and/or Commerce (Trade Description) Act and/or to comply with contracts where the term of sale specify that a Government Certificate is required as to the specific quality are set out in Table 5.

TABLE 5.

IMPORTS AND EXPORTS EXAMINED.

Kind.	Quantity.
Imports—	
Vegetable seeds	3,226 lb.
Garden peas	896 bags
Farm seeds	12 bags
Parcel post	104 parcels
Exports—	
Seeds for sowing	1,433 bags
Grain for stock feeding—	
Wheat	3,595 bags
Barley	31,098 bags
White French millet	44,008 bags
Setaria italica, sometimes called Panicum	28,096 bags
Japanese millet	5,110 bags
Canary	274 bags
Sunflower	150 bags
Bird seed	10 cases

CLERICAL AND GENERAL DIVISION.

Report of the Assistant Under Secretary (Administrative) Mr. W. T. Gettons.

CLERICAL STAFF.

The expansion of the activities of the Department in research, advisory, regulatory and other fields has not been accompanied by an increase of clerical staff sufficient to cope adequately with the additional accounting, recording, purchasing and general clerical services demanded. This is due, of course, to the insufficient number of juniors offering for employment in industry generally, but the position with respect to clerical occupations in the Department is accentuated by the fact that many entering wish to be attached to technical branches and subsequently qualify for appointment to technical positions.

It is unlikely that sufficient juniors content to remain in clerical positions in the Department will be available until more opportunities exist for promotion of highly efficient clerks to positions comparable in status with those of technical officers generally.

One aspect of the shortage of clerical staff is that highly qualified technical officers on occasion are obliged to attend to matters that could be effectively handled by clerical officers on a lower classification. In the past this has been particularly evident at the smaller country centres, where field officers have had to sacrifice some field activities to attend to clerical work attached to their positions. As opportunity offers, clerical assistance is being provided at country offices to relieve technical officers of routine clerical work, and this practice is increasing the efficiency of the technical services as well as facilitating the transaction of public business at important centres.

RECORDING, ACCOUNTING, ETC.

The Records Branch continues to handle an extremely large volume of correspondence and other matter for recording. The number of letters arriving at Head Office by mail exceeds 400 a day, and there is a correspondingly large amount of outward correspondence requiring registration and filing, as well as intra-office communications. Some of the activities of the Department have many ramifications, and one particular subject—for example, operations under the Dairy Industry Efficiency Improvement Grant—may require scores of separate files. The dissection of correspondence in this manner has led to greater flexibility and easier reference. Certain routine letters are now being filed under a simple system in branches.

The volume of work falling on the Accounts Branch and the Commercial and Despatch Section has increased proportionately with the expansion of departmental activities.

TRANSPORT.

The Department operated a fleet of up to 141 cars and utilities during the year and these vehicles travelled a total of 911,649 miles for the 12 months. Although a number of new vehicles was added to the fleet during the year, the Department is still seriously short of transport. Few of the vehicles which it has been possible to secure are suitable for some of the unformed roads which many officers are required to use, and this fact has necessitated a redistribution of vehicles among district officers.

The motor vehicle pool of eight cars and utilities maintained at Head Office has proved inadequate for the 60 or more technical officers who rely on the pool for transport to nearby country districts, and the fleet will be increased as opportunity offers.

AGRICULTURAL RE-ESTABLISHMENT ALLOWANCES.

The Department took over on 1st July, 1946, the duties connected with the payment of agricultural allowances under the *Commonwealth Re-establishment and Employment Act of* 1945 which had previously been performed by the Deputy Commissioner for Repatriation. This legislation provides for the payment of living allowances to eligible discharged members of the Forces who desire to establish or re-establish themselves in an agricultural occupation, either on their own account, as active members of partnerships or as share farmers.

The applications received and the payments made up to 30th June, 1949, are as follows:—

	Queensland.			Total for Commonwealth.		
	£	*s.*	*d.*	£	*s.*	*d.*
Applications received	2,420	0	0	13,591	0	0
Applications approved ..	2,023	0	0	11,241	0	0
Applications rejected or withdrawn ..	346	0	0	2,016	0	0
Applications not finalised ..	57	0	0	334	0	0
Total amount of allowance paid	£344,528	1	10	£1,735,351	9	4

The average number of applications received each month for the year ended 30th June, 1949, was 32.

Three officers are employed on administration connected with the allowances. The expenses are paid by the Commonwealth Government.

INFORMATION SERVICES.

A consolidation of Departmental information services was effected at the beginning of the year with the merging into an Information Branch of existing services concerned with publication and distribution of journals and pamphlets, publicity, photography, and library maintenance.

The Department's journal for farmers—"The Queensland Agricultural Journal"—which commenced in 1897, had a monthly circulation of nearly 12,000 copies during 1948-49. The charge made to primary producers for this journal remains at the nominal figure of one shilling per annum. The Brisbane Milk Board continues to subscribe on behalf of several hundred milk supplies in its area with the object of increasing efficiency of production, and other organisations have also taken steps to bring the journal to the notice of their members. As there are roughly 45,000 rural holdings in Queensland, the journal goes into about 30 per cent. of farm and station homes. The corresponding figures for the Victorian and New South Wales official agricultural journals are about 25 and 33 per cent. respectively.

All aspects of crop and livestock raising and dairying in Queensland (except sugar cane, which is covered in the "Cane Growers' Quarterly Bulletin") are dealt with in the journal, the treatment ranging from comprehensive articles on a particular subject to topical notes. Many of the articles which appear in the journal are subsequently issued in pamphlet form for distribution to enquirers on specific subjects and for use by field officers in their advisory activities. A total of 120,000 leaflets and pamphlets based on journal articles and covering 70 different subjects was printed during the year.

Scientific papers by Departmental officers are published in the "Queensland Journal of Agricultural Science," a quarterly established in 1944 for this purpose. This journal has a wide distribution to scientific institutions in other States and countries and a great deal of useful material is received in exchange.

Considerable use has been made of broadcasting services in informing the agricultural community of approved methods of production, disease control, etc., and in acquainting the city dweller with the problems of the man on the land and incidentally with the solution of some of their home garden problems. Sixty 10-minute broadcast talks were given by Departmental officers of all Divisions during the year. Special thanks are due to the Rural Department of the A.B.C. for its co-operation in this respect.

A special effort is being made to convey information on agricultural matters through the metropolitan and country newspapers. To this end arrangements are being made to recommence the Weekly News Bulletin of information for farmers which was suspended in 1943, and to provide frequent press releases on agricultural topics of the day.

The "Agricultural and Pastoral Handbook" series of four volumes issued a few years ago and enthusiastically received by farmers, teachers, and students throughout Australia is now out of print and the re-writing of these and additional volumes has been commenced. The volume dealing with pests and diseases of plants is expected to be available early in 1950. The advent of newer insecticides has entailed considerable revision of the first edition of this volume, and advances in other lines have likewise been so great as to require virtual re-writing of volumes.

The Photographic Section was called upon to photograph about 400 specimens and other subjects for various Branches for record and publication purposes. A considerable amount of developing and printing work was done on behalf of branches and approximately 4,000 prints (including 500 enlargements and colour prints) were made during the year. Lantern slides were prepared for use in rural education by Departmental officers. Field trips were made with both still and motion cameras to record rural activities, and motion pictures were shown at several centres at the request of branches.

Many thousands of publications were received in the Central Library, which now has a very comprehensive range of literature for the use of Departmental officers and visitors. Rearrangement of library holdings to facilitate easy reference was commenced during the year, but because of staff shortage is proceeding slowly. Periodicals and pamphlets from many countries are circulated amongst Departmental officers, and no officer, however distant from Head Office, is remote from world literature on his particular subject.

An educational display was again made by the Department at the Brisbane Exhibition. Because of the impracticability of adequately representing the whole range of current Departmental activties, the arrangement of the display is now on the basis of a single subject or theme for each Branch represented. This, it is felt, has a more direct appeal to the viewer without understating the scope of the Department's operations. Educational exhibits were also made at several country shows.

MISCELLANEOUS.

Some 22 gardeners have been employed by the Department in maintaining grounds and gardens at Government House, Parliament House, the Queensland Museum, the Supreme Court, Queen's Park, and the Immigration Centre at Kangaroo Point.

The administration of the 47 Acts administered by the Department, while largely the direct responsibility of individual branches, has nevertheless necessitated a considerable amount of work by central administrative officers.

By Authority: A. H. TUCKER, Government Printer, Brisbane.