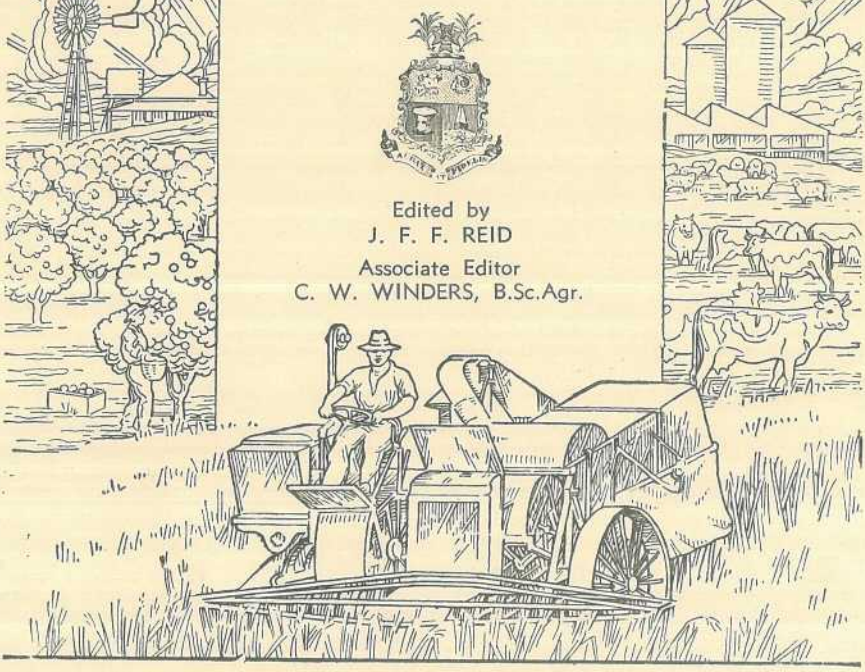
Supplement to the "Queensland Agricultural Journal," September, 1948.

Volume 65

QUEENSLAND AGRICULTURAL JOURNAL

ISSUED BY DIRECTION OF

THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK



Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

JULY TO DECEMBER, 1947

Vol. 65 Parts 1 to 6

QUEENSLAND AGRICULTURAL JOURNAL

GENERAL INDEX.

AUTHOR INDEX.

A. H. TUCKER, Government Printer, Brisbane.

Volume 65 Part 1

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THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

ANNUAL RATES OF SUBSCRIPTION.—Queensland Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.

QUEENSLAND AGRICULTURAL JOURNAL

Volume 65 1 JULY, 1947 Part 1

Event and Comment.

Fifty Years Ago.

IN July, 1897, the first issue of *The Queensland Agricultural Journal* was published. Its publication continued without a break until December, 1941, when, because of the war situation at that time, it was temporarily suspended. Publication was resumed in July, 1943. The *Journal* has, therefore, served the land industries of Queensland for nearly half a century.

History is seldom recorded at the time it is made. Institutions and movements are usually built up slowly from small beginnings and with uncertain objectives. With a magazine, however, its history is recorded in its own bound volumes. From the volumes of the *Journal*, numbering nearly one hundred, it is possible to see in correct perspective the extent of its services and evaluate its influence on the development of agriculture and stock-raising in this State.

In its initial number, the purpose of the *Journal* was adequately expressed. It was to be essentially utilitarian in character, a vehicle of current technical and practical information on farming problems and practice. The aim of the Department was to issue a publication of all-round value to the agricultural and pastoral industries and, reviewing its monthly issues over the past fifty years, that aim, it is believed, has been attained. It has won recognition in the field of agricultural journalism as an authority on primary production in Queensland through the high standards set by its contributors since its establishment. And through the years as agriculture was developing into a complex industry, showing at each step the direct influence of

science, the *Journal* has been a channel for the dissemination of knowledge newly gained by investigation, invention and improvement in farming practice in an easily readable and assimilable form.

In the first editorial announcement it was stated that the object of the Department had always been to give every practicable aid to those engaged in rural pursuits, as set out in the following excerpt from the prefatory announcement in the first issue of the *Journal*:—

> In times past with the limited resources at the command of those entrusted with the working of the Department, much has been accomplished in the way of importing new varieties of fruits, cereals, seeds, plants and implements, and by the publication of useful pamphlets bearing on matters of interest to farmers and fruitgrowers. These were widely distributed and effected their purpose fairly well. But is remained for the Government to recognize the great importance of the industry, and set practically to work to raise it to a high standard of efficiency. Experts have been engaged to carry their technical and practical knowledge to the very doors of the settlers. Thus all agricultural interests are being promoted and fostered by practical instruction from men of high attainments in their several vocations, and by the establishment of an Agricultural College and Experimental Farms from which it will, it is hoped, be found that much interesting and practical information will be periodically distributed throughout the Colony. These institutions, especially the College, will, to a great extent, practically settle the questions how to make country life attractive to the youth of the Colony.
>
> In order still further to assist the agriculturists, it has been determined by the Minister for Agriculture to issue this *Journal*, which will supersede the former spasmodic publication of special bulletins. . . . . The first number will afford a fair idea of the nature and partly of the scope of the publication, which will be issued . . . . each month, and will be posted gratis to the addresses of members of agricultural, pastoral and kindred societies.

The *Journal* originated from a series of official pamphlets called *Papers for the People*, which dealt with different branches of agriculture. Later, it was decided to issue a more authoritative series of departmental bulletins. On the establishment of the Department of Agriculture and Stock as a separate ministerial office in 1897, the need of a regular monthly publication was recognized and so the *Journal* came into being.

The first number of the *Journal*—Volume I, Part 1—was issued by direction of the Hon. A. J. Thynne, Minister for Agriculture, under the editorship of Major A. J. Boyd, F.R.G.S.Q., who continued in the editorial chair until May, 1921. In the course of his term of office Major Boyd became the friend of practically every farmer in Queensland. On the occasion of his retirement he was the recipient of appreciative notices of his great work in the cause of agricultural education from all parts of the Commonwealth.

During the half century of its existence, *The Queensland Agricultural Journal* has continued, it is believed, to fulfil its purpose in conformity with the aspirations of its founders as a beneficial influence on the progress of the land industries of the State.

Half a Century in Queensland Agriculture.

STORY OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

PART I.

J. F. F. REID.

BY Notice in the *Queensland Government Gazette* of 18th June, 1887, the Department of Agriculture was instituted under the control of the Secretary for Public Lands. The gazettal reads:—

Department of Public Lands,
Brisbane, 17th June, 1887.

NOTICE.

It is hereby notified for general information that His Excellency the Governor, by and with the advice of the Executive Council, has been pleased to establish a Department of Agriculture, to be managed by an Under Secretary, with the necessary staff, and under the direct control of the Secretary for Public Lands.

C. B. DUTTON.

Exactly ten years later the Department was separated from the Lands Department under the designation, Department of Agriculture with Colonel the Hon. A. J. Thynne, M.L.C., as the holder of the new portfolio.

The officers first appointed to the staff in 1887 under the Hon. C. B. Dutton were Messrs. Peter McLean as Under Secretary and E. G. E. Scriven as Clerk. On his appointment, the Under Secretary undertook a tour of the southern Colonies to study the organisation and services of similar Australian departments. Later in the year the Colonial Botanist, F. Manson Bailey, was transferred to the Department from the Queensland Museum.

Accommodation for the new department was provided in two small rooms, 14 feet square, in the Lands Office, George street. When the Commissioners for the Melbourne Exhibition vacated the building in William street on completion of their work, the Department was moved to the premises it now occupies and to which large extensions have been added from time to time. At first, the floor on the William street level was used as a museum of economic botany in which exhibits returned from the Melbourne Exhibition were arranged as a nucleus. These exhibits included specimens of Queensland native timbers in plank, block, and veneer. Additional exhibits necessitated the occupation of another floor for their display; according to a plan to show specimens illustrative of the wide range of Queensland's agricultural and pastoral resources.

THE FIRST DECADE.

As a lead up to the story of the Department from the date of its establishment in 1897 under its own ministerial head, it is expedient to review briefly some of its activities in the course of the preceding decade—1887 to 1897.

Queensland Ministers for Agriculture.

«»

Before 1897.

«»

Before 1897 there was no separate portfolio for agriculture in the Queensland Government. Agricultural matters were administered by the Minister for Lands or some other member of the Cabinet.

HON. C. B. DUTTON.
June, 1887-August, 1887.

HON. H. JORDAN.
August, 1887-June, 1888.

HON. M. H. BLACK.
June, 1888-August, 1890.

HON. A. S. COWLEY.
August, 1890-March, 1893.

HON. A. H. BARLOW.
March, 1893-May, 1896.

HON. A. J. THYNNE.
May, 1896-March, 1898.

Plate 1.

The first work of any moment undertaken by the Department was the distribution of seed wheat obtained locally and from the South. State nurseries at Mackay and at Kamerunga, near Cairns, were subsequently established.

The Travelling Dairy.

Early in 1889, plant for a travelling dairy was purchased and a manager, B. Jones, was appointed. Another unit was added for serviec in the North under the management of John Mahon, afterwards Principal of the Queensland Agricultural College at Gatton.

The Travelling Dairy commenced operations on 15th April, 1889, and in the course of its existence visited 166 country centres—108 in the Southern District, 12 in the Central District, and 46 in the North. In all, 2,168 farmers received tuition, and of that number 1,483 were in the Southern, 168 in the Central, and 517 in the Northern dairying districts, respectively.

At the time the Travelling Dairy started on its instructional tours there were, it was said, no cream separators in Queensland, no cheese factories, and no butter factories as they are known to-day. Butter was largely of farm manufacture, while locally produced cheese was practically unknown as an ordinary market commodity.

In 1889, butter imports to Queensland aggregated 781,442 lb. and cheese 1,297,222 lb. Exports for that year were:—Butter, 22,068 lb.; and cheese, 6,954 lb. The population of the Colony was then 406,658.

Eight years later, in 1897, butter imports were:—Butter, 240,866 lb.; cheese, 18,598 lb. Exports were:—Butter, 426,729 lb.; cheese, 3,268 lb. The population of the Colony was then 484,700.

In 1889, statistics of dairy production were, apparently, not considered as of sufficient importance to warrant inclusion in the tables of the Registrar-General. In 1897, however, dairying statistics were prominent in his annual report, as shown by the following figures:—1897 (dairy products)—Butter, factory made, 3,478,878 lb.; butter, farm made, 2,208,109 lb. Cheese, factory made, 1,897,272 lb.; cheese, farm made, 394,144 lb.

In 1897, butter factories numbered 164 (mostly small local units), operating 405 cream separators (excluding those in use by farmers). Milk supplies to these factories (or creameries) totalled 10,892,908 gallons.

This marked increase in production over the ten-year period was regarded as a result largely of the educational work of the Travelling Dairy, which also had a direct influence on improvement in dairy practice and herd standards during that period.

State Nurseries.

The State Nurseries at Mackay and Kamerunga, established in 1889, were designed for the raising of plants of economic importance and for experiments with those plants to ascertain their suitability for extensive cultivation under Queensland conditions. Sugar cane

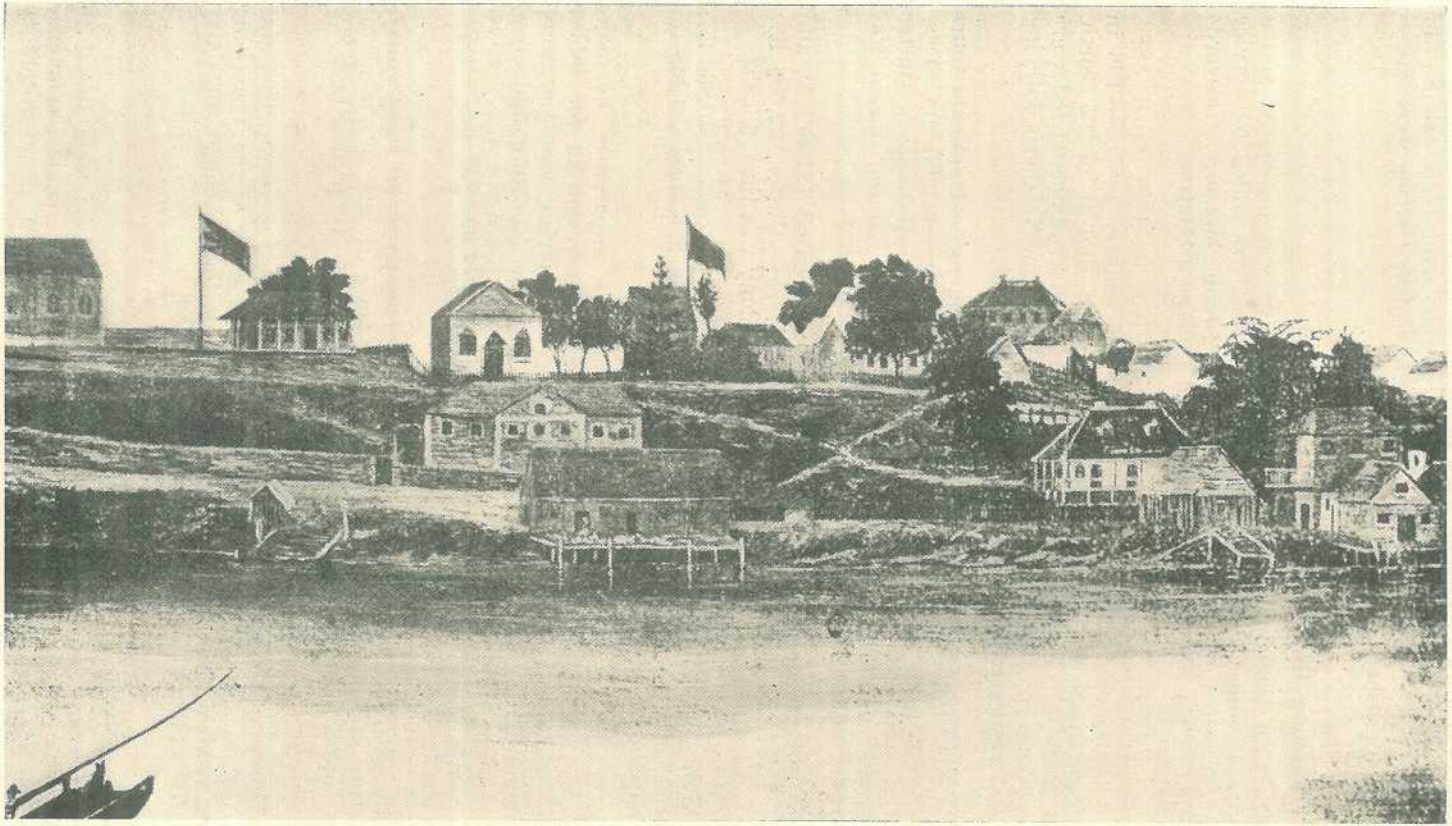

Plate 2.
SITE OF THE DEPARTMENT OF AGRICULTURE AND STOCK BEFORE 1865.

varieties new to Queensland, including some from New Guinea, were included in the propagation plots from which some notable results were obtained.

At the Mackay Nursery a chemical laboratory was installed to test the qualities of selected cane varieties.

First Instructor in Agriculture.

Professor E. M. Shelton, of Kansas (U.S.A.) Agricultural College, was appointed Instructor in Agriculture on the recommendation of the Secretary for Agriculture, United States of America, whose advice had been sought as to obtaining a suitable man "to give such instruction as may be found most likely to conduce to the advancement of agriculture in Queensland and who is well acquainted with the American methods of instruction and practical farm operation." The appointment was for three years as from February, 1890. It was extended from time to time until 1897, when Professor Shelton was appointed Principal of the Queensland Agricultural College. In the following year he resigned and returned to America. He was especially interested in the cultivation of grains and green manuring, and his name is associated with the introduction of the cowpea to Queensland as a means of maintaining soil fertility.

Coconut Planting.

In 1887, first plantings of coconut palms were made on islands off the coast with the assistance of Customs authorities, who provided the necessary sea transport. Later a cutter was obtained from the Harbours and Rivers Department for the purpose, and preparations were made to form plantations on the islands between Mackay and Bowen. Thousands of nuts were planted, but the formation of plantations ended because the cutter became unseaworthy and a substitute vessel could not be obtained. The chief difficulty met with in this work was the preservation of the plantations from fire and vandalism. Accessibility of the islands from the mainland and consequent depredations of camping and fishing parties spelled their doom. Besides coconuts, plantings of mangos, guavas, and kauri pine also were made on these islands.

Grain Crops.

Attention to grain growing and breeding dates from the institution of the Department. Among early importations were wheats from South Australia and India, and these were distributed to farmers free of charge. Before State farms were established and on which more systematic plant breeding was practised, experiment plots were cultivated at Allora, Roma, Springsure, Clermont, Barcaldine, Hughenden, and Herberton—places distant enough apart to determine the suitability or otherwise of wide areas of the Colony for grain growing.

In 1887, wheat land sown for grain totalled 8,248 acres and yielded 182,308 bushels. The population of Queensland was then 366,940 (fewer than that of Brisbane in 1947). In 1897, wheat land sown for grain aggregated 59,875 acres and the yield was 1,009,293 bushels. The full requirements of Queensland, however, were just under 3,000,000 bushels.

Ham and Bacon Curing.

Instruction in methods of ham and bacon curing was another departmental need of the early 'nineties, and arrangements were made with Mr. Watson, a ham and bacon curer of long-established reputation, to give a series of demonstrations wherever required. A plant was obtained and practical lessons were given to farmers on the same system as proved so successful with the Travelling Dairy—the farmers supplying the raw material and removing the plant from place to place in each district.

Subsequent operation of bacon factories made district to district instruction unnecessary, but it is claimed for the Department that its initiative and action gave some impetus to the establishment of bacon factories in the Colony. As with dairy products and wheat, pig meats were high up on the Queensland import list in respect both of volume and value sixty years ago.

Tobacco Growing.

To stimulate the cultivation of tobacco, an instructor, S. Lamb, was engaged in 1890. On the expiry of his term Mr. Lamb went to New South Wales under engagement in a similar capacity to the Department of Agriculture in the neighbouring Colony, but not before he had left his mark on the industry here. Seed of the best varieties were obtained from the United States and elsewhere, and the best known methods of tobacco cultivation and curing were applied, but little could be done at the time to overcome the trade prejudice against Queensland-grown leaf. Some manufacturers repudiated the departmental claim that there was a home market for well-grown and properly cured leaf. This repudiation notwithstanding, the stir caused by the interest taken in the instruction given to farmers by the Department forced Queensland-grown tobacco on to the market, and some business concerns undertook its sole manufacture. With continued low prices for their leaf, growers' interest in the crop naturally slackened, but revived from time to time as values slanted upwards to a fairer economic level.

State Farms.

By the end of the first decade of departmental history, State Farms had been established at Westbrook near Toowoomba, at the Hermitage near Warwick, at Gindie in the Emerald district, and at Biggenden in the Burnett district.

Westbrook was acquired under the *Agricultural Lands Purchase Act*, and its area was 431 acres. The site for this farm was chosen by Hon. A. J. Thynne and A. H. Benson. It was laid out originally for general farming and fruitgrowing. No provision was made for stock. For the first year the farm was under the management of H. A. Tardent who, on his transfer to Biggenden, was succeeded by H. C. Quodling, who afterwards became successively Director of Agriculture and General Manager of the Agricultural Bank. Under the new management Westbrook was developed as a stud stock farm. In 1897 various crops also were grown, of which cowpea was the most profitable in that year.

Hermitage, an area of 240 acres, was purchased from the Canning Downs Estate. The site was chosen by Mr. Benson. This farm, under the management of Mr. Ross, was worked for general agriculture and fruit production.

Gindie, in the Central Division, an area of 8,000 acres, was selected from Crown lands. It was established under the management of Mr. Watt, who afterwards transferred to the staff of the Agricultural College. He was succeeded by Mr. Jarrott, formerly of Laidley. This holding was designed to foster general agriculture in Central Queensland, principally wheatgrowing, but in after years its main purpose was beef cattle breeding.

Biggenden, with an area of 83 acres, under the management of Mr. Tardent, was designed as a crop demonstration farm in that part of the Burnett.

Diseases in Plants.

Plant diseases had long occupied the attention of the Department. Initial legislation had been advocated for some years before the first *Diseases in Plants Act* was introduced in the Queensland Parliament in 1893, but time did not permit of its passage during the session of that year. The advocacy of this measure in Queensland was prior to the action taken by the other Australian Colonies, although it did not become law until after the other Colonies had enacted similar legislation. This measure effected a great improvement in the quality of marketed fruit, and checked indiscriminate importation of plants from the South and elsewhere. At that time, action under this legislation was confined chiefly to inspection of imported fruits and plants. A provision for inspection of Queensland orchards and nurseries, for some reason or another, was allowed to remain in abeyance. Regulations under the Act were framed by a board representative of the several interests concerned. The first draft was the work of the Entomologist, Henry Tryon.

Noxious Weeds.

The Department was active at this period in the eradication of noxious weeds from Crown lands and from land reserves, in co-operation with local authorities. Although the system devised was apparently simple, local authorities had rather an indefinite idea of their responsibility for weed destruction. Powers provided in the *Divisional Boards Act* had not been extended to municipalities which, consequently, could not compel private property owners to clear their lands of noxious growths. For instance, within the boundaries of the municipalities of North and South Brisbane there were large infestations of Noogoora burr which the Colonial Botanist declared to be poisonous in the early stages of its growth. An effort was made in 1895 to destroy this weed, but the lack of power to compel property owners to co-operate rendered it futile. The destruction of this and other plant pests, including prickly-pear, was a "burning" question in 1897.

The Sugar Industry.

During its first decade, the Department was closely interested in the introduction of new varieties of sugar cane. Two expeditions were sent to New Guinea in search of canes likely to prove suitable for

Plate 3.
DEPARTMENT OF AGRICULTURE ABOUT 1894.

cultivation in Queensland, one led by Mr. Cowley of Kamerunga and the other under the leadership of Mr. Tryon. Both expeditions achieved satisfactory results.

Cane plants were also introduced from Honolulu, Fiji, and elsewhere, but, on the whole, none compared with the introductions from New Guinea. In an early record it was said: "A cane to be remembered in connection with the sugar cane industry is the Kew Seedling cane received from the Royal Gardens, Kew, and successfully reared at the State Nursery, Mackay, whence the produce thereof has been distributed throughout Queensland."

An experiment in the transportation of cane sets from Queensland to Brazil, via Cape Horn, packed in rice husks in ordinary bags proved successful.

Before 1897 a movement towards canegrowing on small areas and away from the large plantation system was gathering impetus and the services of the Department were in strong demand for advice and information on the requirements of cane farming. During the period of depression after the financial crisis of 1893, inquiries on the subject came from all parts of Australia.

Expansion of the Department.

The public services of the Department expanded with the passing of legislation requiring effective administration of matters associated with the welfare and development of the land industries. This expansion during its first ten years was described by a former Under Secretary, Mr. Scriven, who, in a summary of departmental activities, said in September, 1898: "The work of the Department of Agriculture is so varied and different from other departments . . . that it can be said that no man therein knows from one day to another what work will be done; and some idea of the magnitude of this work may be ascertained when it is remembered that in June, 1887, there were but two men to constitute the staff, while in June, 1898, there were no fewer than 112 employed permanently, excluding gardeners, ploughmen, labourers, and partially paid men. The whole of the work done by these men is purely for the advantage of our farmers and pastoralists—the main body of the population. The Department does not administer repressive laws—all the work done is original, and so it can be fairly said that the Department of Agriculture occupies by no means a secondary position in the Public Service."

UNDER THE NEW REGIME.

In July, 1897, Agriculture became a separate State Department under its own Minister and with its own administrative and instructional staffs.

In his annual report for the previous year, the Under Secretary, Mr. Peter McLean, stated that the past year had been the busiest in the history of the Department. Many new departures had been made, among which was the transfer of the Stock Department; the inception of operations under the *Plant Diseases Act*; the establishment of the Queensland Agricultural College and the State Farms at Hermitage and Westbrook; the foundation of a pure-bred dairy herd; the International Exhibition; the advertisement of Queensland in Great Britain and Ireland and

Queensland Ministers for Agriculture. Since 1897.

« »

HON. H. F. HARDACRE.
December, 1899.

HON. J. V. CHATAWAY.
March, 1898-December, 1899; December, 1899. April, 1901.

HON. D. H. DALRYMPLE.
April, 1901-September, 1903.

HON. DIGBY F. DENHAM.
September, 1903-February, 1907.

HON. W. STEPHENS.
November, 1907-February, 1908.

HON. T. O'SULLIVAN.
February, 1907-November, 1907; February, 1908-October, 1908.

HON. W. T. PAGET.
October, 1908-February, 1911.

HON. JAMES TOLMIE.
February, 1911-December, 1912.

HON. JOHN WHITE.
December, 1912-May, 1915.

Plate 4.

Germany with a display of samples of the products of the Colony; the publication of a monthly journal in place of the issue of bulletins at irregular intervals; the Agricultural Conference at Gatton; and the Intercolonial Fruit Conference. In addition, the ordinary work of the Department consequent on the establishment of a separate Ministerial portfolio had much increased.

This report was the tenth annual report of the Department, a circumstance which marked the completion of the first decade of its history. In no single year had so much progress been made. Crop returns, on the whole, had been satisfactory to farmers. Good rains had fallen over the wheat areas when needed and other settled districts shared in the benefit.

At that period, farmers' conferences, organized by the Department, were regarded as among the most effective means of stimulating production. Until then, these conferences had been district affairs, but none of them had been as successful as the All-Queensland Conference held from 10th to 12th of June at the Agricultural College, which was attended by primary producers from all settled parts of the Colony. The papers submitted were on well selected subjects, ably written and intelligently discussed.

The Third Intercolonial Fruit Conference was held in Brisbane and lasted from the 18th to 26th June, 1897. At the conference every Australian Colony, except West Australia, was represented; New Zealand also was represented. Associated with the conference was a fruit show in the Exhibition Building, which was regarded as the most comprehensive display of its kind ever held in Australia.

Dairying.

In January of that year, advantage was taken of the cold storage accommodation in the steamers of the British India Steam Navigation Company to send 63 tons of butter to London and which proved a profitable venture to the exporters. The companies which contributed to the consignment were the Central Downs Dairy Company of Allora; the North Ipswich Butter Factory; the Silverwood Butter Factory of Toowoomba; the Lowood Creamery Company of Oxley; and the Queensland Model Dairy and Fresh Food, Ice and Cold Storage Company of Brisbane. Up to that time the export of dairy produce had been intermittent and the success of this shipment gave an impetus to the dairy export trade. Previous exports to England were 9½ tons of butter in 1895, and 1½ tons of cheese in 1896.

The Travelling Dairy concluded its operations on 29th October, 1896. The growth of the co-operative idea among farmers led eventually to the manufacturing side of the dairy industry, and it was predicted that proprietary factories would soon give way to co-operative enterprise in butter and cheese manufacture. In this way, dairy farmers were following the example of sugar-cane growers who were interested in the establishment of sugar mills under the provisions of the *Sugar Works Guarantee Act*. It was pointed out, however, that before full value in the co-operative manufacture of dairy products could be assured greater attention would have to be given to breeding and feeding of dairy cattle.

A further opportunity was offered dairy farmers in the West Moreton, Darling Downs, Maryborough, and Bundaberg districts to obtain foundation stock by departmental sponsoring of competitions in herd improvement.

At that early day, concern was expressed on the possibility of margarine and margarine mixtures competing successfully with butter on the export market.

Wheat.

The area under wheat in 1896 was 35,831 acres, an excess of 7,741 acres over that of the previous year. This increase was regarded as "an infallible sign of the settlers' faith in the capabilities of the soil and climate for farming, and also of prosperity." The yield of grain was reported to be larger than that of "any other Colony in Australasia, the return being nearly 17 bushels to the acre." "Each year," it was stated, "brings forth fresh proof of the adaptability of the Queensland climate for the cultivation of wheat, and to those who understand the conditions under which this crop thrives there appears little or no reason why, instead of importing some 2,000,000 bushels of grain a year, we should not before long be exporting grain in some considerable quantities."

Some Victorians had settled near Emerald and had commenced operations on an extensive scale, but apparently success was not achieved outside the recognised wheat-growing areas of to-day.

Maize.

The cropped area for maize that season amounted to 115,715 acres, and the average yield was 26½ bushels to the acre. Prices were not satisfactory, however.

Tobacco.

Tobacco yields, although increasingly satisfactory as to volume, were affected by unfavourable markets and large stocks, for which no price could be obtained, had to be carried over. The result was that growers without incentive were losing interest in the crop. The excise duty imposed in 1894 was blamed, but it was pointed out the 2s. impost on imported leaf might reasonably be considered as a set-off. The cause of the fading interest in tobacco production, however, was not the excise duty, but the want of a market as a result of prejudice in favour of imported leaf. Queensland growers, it was reported, had not then learned sufficiently the arts of curing, grading, stripping, and packing to compete on an outside market.

Sugar.

Under the *Sugar Works Guarantee Act*, seven mills were then operating—Pleystowe, Marian, and Plane Creek at Mackay; Mulgrave at Cairns; Gin Gin, Mount Bauple, and Nerang River. The Central Sugar Mills at Mackay, North Eton, and Racecourse had continued to make progress and had paid all liabilities to the Government up to that time. The extension of small holdings continued to strengthen the demand for plant cane from Government nurseries. The total output of sugar for the year was 100,744 tons.

Fruit Export.

Two shipments of pineapples were exported to England in the course of the 1896-97 year. The first was a private experiment and a successful one, for the fruit reached London in excellent condition, but the fruit was too small in size and the prices realised were low. Another experimental shipment was sent to Canada and was delivered in good condition.

Rubber.

Rubber production was then a departmental interest, but efforts to establish it as a Queensland industry were not successful, largely because of the economic conditions associated with it. Para and Ceara rubbers were under trial at Kamerunga. Some years before, a rubber plantation had been established at Mourilyan Harbour by Messrs. Seymour and Allan, but when about to come into profitable bearing it was destroyed by a tornado.

Forestry.

Forestry was another departmental interest fifty years ago. A nursery had been established on Fraser Island; plantations, roads, and lands had been kept clean and nearly 7,000 plants had been set out. A change in the working of the nursery was decided on and it was handed over to the administration of the Home Secretary, who was to employ aborigines then living on the island. A hope was expressed in the Under Secretary's report that action would soon be taken to ensure protection for existing forests and so check the "wholesale destruction that is now going on."

FROM 1897 TO 1901.

Good average crops and fair market prices were recorded in the 1897-1898 agricultural year. Slowly, but surely, the production of the rural industries of Queensland was coming into line with out-turn of the other Australian Colonies. Queensland was naturally leading in sugar output, and average wheat yields were approaching equality with those of other parts of the continent. Increase in butter exports was attributed to the richness of the pastures of the dairy lands. Progress and development marked the administration of the Department. A fruit farm had been acquired at Redland Bay for experimental work in the control of pests of fruit and vegetables and for manurial trials. The conversion of the Government nursery at Mackay into a sugar experiment station had been decided. The *Diseases in Plants Act* became operative.

The *Queensland Agricultural Journal* had been a pronounced success from the issue of the first number in July, 1897. No less an authority than Sir J. B. Lawes, of Rothamsted, England, had written an appreciation of its usefulness and general get-up.

The transfer from the Home Secretary's Department of the Chief Inspector of Stock and his staff and the administration of the *Meat and Dairy Produce Encouragement Acts* increased the work of the Department. "The ordinary day is too short, and work has often to be carried far into the night," the Under Secretary reported to his Minister. Promised additions to the building, it was said, would "enable the whole

work of the Department (with the exception of the Stock Institute) to be carried on under one roof," and so lighten labour and facilitate operations.

Through the appointment of a tobacco expert, a complete change in methods of curing was anticipated. It was proposed to grow tobacco on the Agricultural College farm "on such a scale as will afford a fair test of the value of our tobacco in the English market." A viticulturist also was appointed.

The Department was called on to provide relief for farmers of the Wide Bay district in the form of seed supplies, principally oats and lucerne, who had lost their crops in the disastrous flood of 1898.

It was found necessary to take over the property of the National Agricultural and Industrial Association at Bowen Park. On the revival of the Association in 1898, permission was granted for the holding of its annual show on the grounds, free of rent.

At that time, it was felt that district agricultural show societies were not earning the Government subsidies allotted to them, through their neglect to function as educational bodies. Against that, however, the parading of increased numbers of pure-bred dairy stock at country shows was regarded as a happy augury for the future of the export butter trade.

There was a lively interest in those days in loans in aid of co-operative agricultural production, chiefly in respect of advances for the building of flour mills on the Downs and in the Roma and Nanango districts. The only advance made in 1898, however, was to the Bundaberg Co-operative Dairy Company.

To attract attention to the agricultural resources of Queensland, the Department sent a comprehensive range of samples to the Greater Britain Exhibition of 1899 in London. Results in the prospective fields of immigration and Empire trade were greater than had been expected. Food and forestry products were chief features in the Queensland Court.

The establishment of wool sales in Brisbane on a firm basis in the course of that agricultural year brought in business that otherwise would have remained in Sydney.

The incentive offered by a bonus on chilled meat went far to strengthen the intercolonial trade. The bonus was payable only on meat sold within Australia and was not available for frozen meat exports overseas.

The Agricultural Lands Purchase Acts were fully operative at this period. Estates purchased between July, 1897, and June, 1899, were Glengallan No. 2, near Warwick; Fitzroy Park, near Rockhampton; Pinelands, Beauaraba, Clifton No. 2 and Clifton No. 3 on the Darling Downs; and Seaforth, near Mackay.

In June, 1900, Mr. P. J. McDermott succeeded Mr. Peter McLean as Under Secretary.

Plate 5.

STAFF OF THE DEPARTMENT OF AGRICULTURE AND STOCK, 1899.

THE TURN OF THE CENTURY.

In 1901, the colonial period ended with the inauguration of the Australian Commonwealth, of which Queensland became a State.

A new departure in departmental procedure that year was the reporting of departmental activities by the Minister direct to the Governor, instead of the Under Secretary presenting the annual report to the Minister, as had been the practice previously.

The gross departmental expenditure in the 1900-1901 agricultural year was £48,812, about one-hundredth part of the whole public revenue, or about 1s. 11d. for every Queenslander. Small as was this per capita cost it was more than the amount spent on agriculture by any other Australian State.

Weaknesses in agricultural organization in Queensland were discussed in the annual report of that year. In some districts an effort was made to bring neighbouring agricultural show societies into a sort of educational union; but, in the main, each association confined its interests to its own locality. In fact, it was found that proximity was more likely to produce discord rather than unity, and there were instances of associations in places only a few miles apart who were "at open war." There was no central co-ordinating body. Beyond holding annual shows and bestowing awards for exhibits not exclusively agricultural, these associations had done little or nothing of really educational value.

Because of facilities provided by the Railway Department it was reported that hundreds of farmers visited the Agricultural College in the course of the year to gain knowledge of the operation of new types of farm machinery, modern methods of cultivation, principles of stock breeding, use of fertilizers, and of the most profitable crops to grow. A similar service to producers was provided by the experiment farms in their respective districts. "The seed time of our agricultural education system," said the Minister, "is so recent that it is, perhaps, too soon to look for the harvest. One result, however, of this diffusion of technical knowledge is that almost everywhere the farmer is sensible of the value of scientific tillage, and is eager to master and apply its principles. Indications are not wanting, too, that on the whole agriculture is advancing . . ."

The prickly pear pest was attracting greater attention, and efforts were made by the Department to find a cheap and effective means of eradication. Bunker's Hill, a portion of the State farm at Westbrook, was the field of experiment, and it was estimated that to free land from pear generally would cost from £1 to £2 an acre.

In 1902, a reward of £5,000 was offered to the discoverer of effective means of destroying prickly pear at a reasonable cost by a process not injurious to animal life. Responses came from many parts of the world, but no one had yet undertaken to conform with the prescribed conditions. Many formulas for the eradication of the pest were offered by people overseas, but none was willing to give them a trial at his own expense. Moreover, all of the formulas submitted had already been tried in one process or another without satisfactory results, particularly in respect of cost of effective application. Oddly enough, alongside a newspaper announcement of the reward there was a paragraph stating that

cattle had fattened on prickly pear in districts in Queensland where, at the time, no other fodder was available. The co-operation of all authorities concerned was sought in preventing the further spread of the pest.

The greatest agricultural industry in Queensland was still sugar-cane growing. One-fifth of the cultivated land was under cane at the beginning of the century, and to sugar was credited three-fourths of the value of agricultural exports. The Registrar-General's figures for 1900 showed that the capital invested in Queensland sugar mills amounted to nearly £3 millions, the value of the product was nearly £1,900,000, the number of mills 66, and white people employed in the industry numbered 3,105.

The Sugar Experiment Bureau was established under Dr. Maxwell and so began a service, which in due course became a leading factor in the development of the sugar industry in this State.

Dairying had continued to make rapid and enduring progress. In 1900 there were in operation 53 butter and cheese factories and 146 creameries. The output for that year was 3,875 tons of butter and 886 tons of cheese. Butter exports totalled 620 tons. Pig raising also had made definite progress.

Short courses of instruction for working farmers were commenced at the Agricultural College in 1902. The dairy course was planned for the needs of dairy factory workers as well as farmers. Of 80 graduates of the College, all but two were then engaged in primary production; the two exceptions had entered engineering. The pure-bred dairy cattle at the College included Guernseys, Holsteins (Friesian), Ayrshires, South Coast (Australian Illawarra), and Shorthorns. The pig breeds were: Improved Berkshires, Middle, Large and Small Yorkshires, and Tamworths. A small flock of sheep included Romney Marsh, Shropshire and Merino.

The Chamber of Agriculture, formed at the Agricultural Conference at Bundaberg in 1901, had a successful year. Thirteen district agricultural societies had affiliated with the Chamber, only a small proportion of the 140 societies then in existence.

In the following year, only 18 out of 150 district associations had affiliated, but, geographically, the Chamber was fairly representative as agricultural organizations in Townsville, Bowen, Bundaberg, Beenleigh and Roma were among the affiliates.

The Agricultural Bank was brought into practical operation in April, 1902, by the appointment of Sir Hugh Nelson (chairman), E. Deshon and H. L. E. Ruthning as trustees. In the preliminary work of organization, the trustees had the assistance of W. C. Green of the Agricultural Department.

The export of frozen produce continued to occupy the attention of the Department. Difficulties in obtaining adequate refrigerated space in interstate shipping and, later, in getting sufficient cargo to fill the space available were experienced. It was felt that these conditions might continue until British shipping lines made Brisbane a port of call for

mail steamers which would ensure the availability of refrigerated space and so stimulate an increase in interstate cargo consignments of perishables, such as meat and butter.

A succession of dry seasons ended in 1904 and the extraordinary recuperative power of rural Queensland was again demonstrated. Pastures had fully recovered and a big natural increase in flocks and herds was a general experience in the pastoral areas. The greatest number of cattle—nearly 70,000—in the Southern Division was recorded at Esk. In the Northern Division, principally in the Gulf country, beef herd numbers had greatly increased and half the cattle in the State were then running on northern pastures. Wool exports also substantially increased.

On 1st January, 1904, Mr. E. G. E. Scriven succeeded Mr. P. J. McDermott as Under Secretary of the Department and continued in that office for 20 years, retiring in 1924.

CHANGE IN DEPARTMENTAL CONSTITUTION.

Up to the end of 1903 the Head Office administrative staff consisted of the Under Secretary, Chief Inspector of Stock, two chief clerks, an accountant, and 12 clerks. Agriculture and Stock were separate and distinct branches. The Stock Branch was under the control of the Chief Inspector of Stock, excepting in such matters as required the authority of the Head of the Department. On 31st December, 1903, the Under Secretary (Mr. P. J. McDermott) was transferred to the Chief Secretary's Office. The Chief Inspector of Stock (Mr. P. R. Gordon) had retired on 30th June. Consequent on these changes the Stock Branch ceased to be a separate entity. The change in the title of the Department to that of the Department of Agriculture and Stock was confirmed.

Although the Department had been naturally administrative, the main line of its activities had been educational and from then onwards its technical staff was progressively strengthened.

The annual farm conferences were continued and once a year representatives of every agricultural society in the State were invited to discuss rural industrial matters under the presidency of the Minister. Proceedings were carefully reported and subsequently printed for general distribution. Minor conferences of farmers engaged in specialized industry also were called from time to time, usually for the discussion of marketing matters. The idea was to maintain a system of co-operation between the Department and the primary industries, a system which has broadened greatly during the passing of the years.

The technical instructional staff in 1904 included the Government Botanist, the Entomologist and Vegetable Pathologist, instructors in fruit culture, inspectors under the *Diseases in Plants Act*, a tobacco expert, an instructor in coffee culture, the Agricultural Chemist, the Surveyor of the Meat and Dairy Board, the Inspecting Engineer under the *Sugar Works Guarantee Act*, and the Veterinary Inspector.

Up to 1904, 320 students had graduated from the Agricultural College.

A tobacco farm had been established on leased land at Texas, on which experiments in the control of blue mould were undertaken in addition to demonstrational work in the growing, picking and curing of tobacco leaf. This farm was paying its way.

Markets for agricultural and pastoral products within the Commonwealth and overseas were under constant study by the Department. There was a surplus production of malting barley in 1904. The Queensland product was regarded as of superior quality for malting and it was decided to send a trial shipment to test the English market. Accordingly, a consignment of 50 tons was despatched in February. The result of the venture was so successful that the Agent General cabled a recommendation that farmers should be encouraged to extend their acreages under this crop.

Tropical fruits had acquired a reputation for quality on southern markets and the Department was active in the fostering of this export trade. Results of oversea consignments, however, were not encouraging. Pineapples, bananas and tomatoes were among the chief interstate exports, and Queensland was the main source of supply of these fruits for the New Zealand market.

Oversea markets for maize were considered, but investigation revealed unsatisfactory prospects.

Agricultural education in country State schools continued as a live issue. The State farms were considered as a training ground for farm youths, and a system of apprenticeship was suggested.

The need for Government supervision of exports to raise standards of quality was stressed. It was considered that only commodities of prime quality should be shipped abroad.

By 1904 the area under field crops in Queensland had expanded to 566,589 acres. The number of people engaged directly in farming and dairying was 43,591; included in this number were 6,643 women.

The 1903 wheat crop had never been exceeded before in acreage and yield—138,096 acres and 2,436,799 bushels, respectively. As a wheat growing country, Queensland was definitely on the map, largely as a result of the wheat breeding activities of the Department. The State, however, was still short of its own grain requirements.

Dairy herd improvement was reflected in steadily increasing production. Breeding stock from the Government farms was in strong demand.

A travelling instructor in poultry raising was appointed this year, as the result of increasing interest in egg production as a profitable rural enterprise.

The need for crops besides sugar cane in the tropical districts was then recognized, and a lot of attention was given by the Department to the possibilities of producing fibres, such as sisal hemp and ramie, and other suitable products, but, generally, it was found eventually that the economic factor was against commercial success in the establishment of these crops new to Queensland.

Mr. H. C. Quodling succeeded Mr. Peter McLean (Agricultural Adviser) in 1905 and was designated Agricultural Inspector.

That year the administration of the *Native Birds Protection Act* was transferred to the Department. "This Act," reported the Under Secretary, "excellent in its intention and force is, by reason of the lack of interest displayed in its provisions by the public . . . somewhat difficult of administration. The area of this State is so large that to advocate the employment of people to supervise the enforcement of the Act is without reason and, consequently, excepting in those places where there are persons who are lovers of our native birds . . . the Act is practically a dead letter. It is to be regretted that there is not more enthusiasm shown in preserving the native birds, many of which serve a useful purpose in the destruction of insect pests; but the fact is patent and beyond argument that around our towns and places of settlement the native birds have seriously diminished, for which the ease with which young people of this State can acquire firearms, and the absence of the operation of any law with regard to the carrying of them, are largely responsible. It is advocated that some restriction . . . should be placed upon this facility for shooting. The Department, at some trouble and expense, is making a collection of birds that may be placed in the category of the friends of farmers; but of what use is the instruction, at the service of those who may wish to learn, if the wholesale destruction that is now allowed to go on by default is permitted to continue unchecked? What is everybody's business is nobody's business, and as the public will take no interest in protecting what is of value to them, it is time that restrictions should be placed upon those who have not the sense or knowledge of discrimination."

Almost 20,000 acres were under introduced pastures in 1905, largely as the result of the settlement of large areas of rain forest country, particularly in the Wide Bay and Burnett district.

It was predicted that provision for stored fodder would be needed as the dairy industry expanded.

Wheat growing was extending westward in the Maranoa district, where the area sown for grain had increased by 10,000 acres. This increase in acreage was attributed to the success of wheat experiments at Hermitage which had been planned to determine the value of these trial wheats for different districts. Demonstration areas were established in the Maranoa to ensure uniformity in cultural and other practices. For the Maranoa it was claimed that conditions of soil and climate were favourable to the growing of wheat and barley, and the importance of continuing experimental work in that district on an extensive scale to determine the many factors which make for success in the cultivation of grain crops was duly emphasised.

A need for greater publicity on the activities of the Department was met in January, 1906, by the institution of a news service by which the Press was to be supplied regularly with agricultural information. This information compiled from the monthly reports of the field officers was much appreciated. The newspapers in those days must have been very generous with their space for, as reported by the Under Secretary, "as issued they (the monthly reports) occupy from, say, five to six columns of the daily Press, but to bring reports down to that limit entails considerable work."

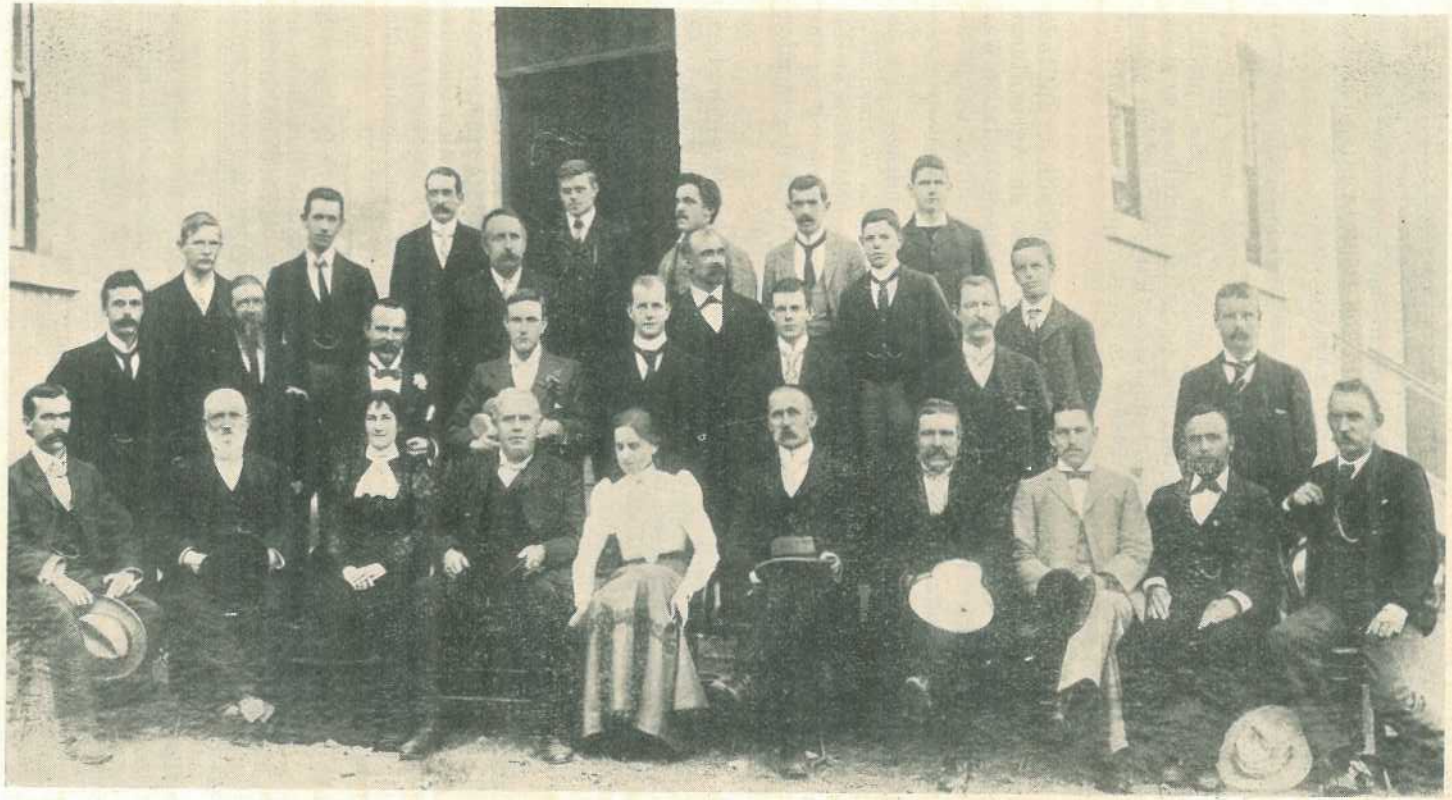

Plate 6.
STAFF OF THE DEPARTMENT OF AGRICULTURE AND STOCK, 1904.

New rural legislation which came into operation in 1906 included the *Dairy Produce Act;* the *Fertilisers Act;* the *Marsupials Act;* and the *Shearers' and Sugar Workers' Accommodation Act.* These, added to the many other statutes which the Department had been called upon to administer, naturally increased the work of the Department which was done without any addition to the administrative staff.

The 1906 report of the Agricultural Chemist is of particular interest, for it dealt in detail with milling tests of a number of Queensland wheats to provide a guide for farmers and flour millers. The fodder values of native and introduced grasses, sorghums, sweet potato vines, prickly pear and many other plants of actual and potential usefulness as stock food were also subjects of chemical analyses that year, which added greatly to the general stock of knowledge on pasture plants and animal nutrition.

A beginning was made with the training of youths with an aptitude for farming, and who were not in a position to take an Agricultural College course, at the Hermitage State Farm where accommodation was provided for ten boys. It was hoped that similar facilities would be provided at Kamerunga for training in tropical agriculture.

At its own cost, the Pastoralists' Association established a wool classing school that year, and it was suggested that this commendable move might well be backed up by the endowment of scholarships at the Agricultural College, in addition to the four bursaries granted by the State. The Department of Public Instruction also instituted a farming school for teachers at the College during their vacation.

The opening of an Intelligence Office within the Department on lines similar to the Inquiry Office within the Lands Department was mooted. It was pointed out in the 1906 report of the Department that its work was essentially associated with markets and marketing, about which exact information was very desirable. The idea behind the proposal was to have essential information immediately available to farmers and to the mercantile community. The functions of this Intelligence Office would cover, it was suggested, the obtaining and publishing of prices in interstate markets, and New Zealand, of such products as could be supplied by Queensland; the extension of the export trade of the State; the investigation of the requirements of the markets of the world in which Queensland might arrange business; the study of the conditions of supply and demand, as shown by production, imports and exports; and inquiry into matters affecting free movement of trade in primary products.

That year the Department sent representative exhibits of Queensland products, including timbers, to the Clark Centennial Exhibition in Oregon, U.S.A., and to the Australian Natives' Association Exhibition in Melbourne. Both displays brought many inquiries as to the rural resources of the State.

In those days, the Department was interested in the laying down of gardens in open places, similar to the Queen's Gardens which is still under departmental control and is one of the brightest spots in the City of Brisbane. The Queen's Park, Maryborough, was quoted as another example of this form of cultural development worthy of emulation. Other examples are the gardens in Toowoomba, the street gardens in Warwick, Mackay, Townsville, Cairns and Murgon. In Murgon, one of

Plate 7.

FORMER SENIOR OFFICERS OF THE DEPARTMENT.

Seated (Left to Right).—Messrs. R. S. Neville, Instructor in Tobacco Growing; E. G. E. Scriven, Under Secretary; George Thompson, Supervisor of Dairying; Lieut.-Colonel A. H. Cory, Chief Inspector of Stock.

Standing (Left to Right).—Messrs. Mat. Fern, Poultry Expert; A. H. Benson, Director of Fruit Culture; J. C. Brunnich, Agricultural Chemist; and H. C. Quodling, Director of Agriculture, afterwards General Manager, Agricultural Bank.

the newest of Queensland towns, the centre of a three-chain street, a chain in width, was reserved and is now a tree-shaded pleasaunce. In all such enterprises, street beautification particularly, the advice of the Government Botanist has been available to local authorities from the earliest days of the Department.

A plea for the preservation of useful wild life, especially the native bear, was made in 1906 by the Department. The bear is now fully protected, as are also many other native animals and insect-eating birds.

An interesting item in the 1906 report was this comment: "The pessimism of the man who gave utterance to the statement 'that the Darling Downs would not grow a cabbage' still finds followers whenever a dry time comes or other difficulties prevent a high return of profit from the operations of a single year, but notwithstanding those who decry agriculture in this respect, a comparison of the returns in this and preceding years clearly shows that, with the population required to handle our lands in the way in which they should be treated, Queensland will surpass in her production all the other States of the Commonwealth." Wheat yield averages over the years were quoted in support of that opinion.

State farm activities that year were extended to Roma where land known as the Police Paddock at Bungeworgorai, near Roma, was selected for the establishment of an experimental area.

Dairying continued to make remarkable progress as new lands were opened up for settlement in many parts of the State. The remarkable extension of agricultural settlement in Queensland during the first decade of the present century will be the subject of a later chapter. Among the new settlement areas were the Kingaroy, Gayndah and other districts of the South Burnett; Tuchekoi, Mary Valley and other parts of Gympie district; rich belts of country in the Central Division; and the Atherton Tableland in the Far North.

New lands were made available for group and individual settlement on the Ideraway resumption, the Binjour Plateau, Cloyna, Murgon, Goomeribong, and Wallumbilla. Areas suggested to the Lands Department for inspection were the Gogango Scrubs, Obi Obi, Belli, Barmoyea, Goomboorian and land in the Western District. Among lands discussed or inspected were three more sections of Ideraway, Biggenden, Numinbah, Inkerman, and an area around Barcaldine.

In the course of this period, legislation relating to the dairy industry was through its operation largely instrumental in raising the reputation of Queensland butter and cheese in overseas export markets. Under this legislation all dairies and factories were systematically inspected, produce graded and practical advice and instruction given where needed. The even tenor of its operation, however, was somewhat upset by the Commonwealth *Commerce Act*, but eventually the administration of this Federal measure by State Officers was arranged.

[TO BE CONTINUED.]

Through Fifty Years.

THE QUEENSLAND AGRICULTURAL JOURNAL.

J. F. F. REID.

IN JULY, 1897, the first issue of *The Queensland Agricultural Journal* came off the press in Brisbane. In 1897, topmasts of sailing clippers berthed at Petrie Bight could still be seen from Queen Street, and port marks on horse-drawn lorry loads told of opulent overseas trade expansion. Still in the pre-petrol era, progress was on the way. Along macadamized riverside roadways the successful tide of life was even clangorous, but there was hardihood in the noise and on cargoes for ships, including trial consignments of Queensland butter for London. destination names showed how wide was our Empire and how assured was our security. There, too, were other symbols of prosperity of a new land that had come from fertile minds and busy hands quickened by discovery and desire.

In that year Australia, in common with other parts of the British Empire, commemorated the Diamond Jubilee of Queen Victoria; Queensland, then a colony, was preparing to join the Australian Federation; the long peace of the Victorian period was nearing its end; events were moving towards the climax of war in South Africa.

In the intervening decades revolutionary changes have occurred in the world of men and affairs.

In 1897 the population of this continent was less than 4½ millions, and of that number fewer than half a million lived in Queensland.

Of agricultural production in Australia, it was said at that time:* "Although considerable progress has been made of late years in some directions, yet it must be admitted generally that agriculture in the Australasian colonies has only now passed the tentative stage. The typical Australian agriculturist, relying largely on a bountiful Nature, does not exercise upon his crops anything approaching the same patience, care, and labour that are bestowed by the European cultivator, nor as a rule does he avail himself of the benefits of scientific farming and improved implements to the extent that prevails in America and Europe. It may be expected that improvements will take place in this respect and that the efforts made by the Governments of the various colonies for the promotion of scientific farming will bear good fruit."

Areas under the principal crops then grown in Queensland were: wheat (for grain), 59,875 acres; oats (for grain), 1,881; maize (for grain), 115,715; barley (for grain), 1,122; potatoes, 10,803; vines, 2,020; hay, 35,764; sugar cane, 83,093 (actually harvested, 66,640); fruit, 10,399.

Queensland livestock figures in 1897-98 were: sheep, 19,593,696; cattle, 6,507,377; horses, 452,207; dairy cattle, 125,000; pigs, 97,434.

In agriculture, as in other industries, there has been remarkable progress in Queensland during the past half century; and vast new areas of arable and pastoral land north and south of the Tropic have been brought into profitable production.

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* *The Seven Colonies of Australasia*, 1897-98—T. A. Coghlan, Govt. Statist., New South Wales.

MR. JOHN MAHON.
Principal Q.A. College.

MR. A. H. BENSON.
Instructor in Fruit Culture.

MR. R. S. NEVILLE.
Instructor in Tobacco Culture.

MR. H. TRYON.
Govt. Entomologist.

MR. E. H. RAINFORD.
Instructor in Viticulture.

MR. H. NEWPORT.
Instructor in Coffee Culture.

MR. WM. SOUTTER.
Inspector of State Farms.

MR. J. C. BRUNNICH.
Chemist, Department of Agriculture.

MR. C. J. POUND.
Govt. Bacteriologist.

MR. W. C. QUINNELL.
Govt. Veterinarian.

MR. F. M. BAILEY.
Govt. Botanist.

MR. P. MCMAHON.
Curator, Botanical Gardens.

MR. A. J. BOYD.
Editor, Q.A. Journal.

MR. F. C. WILLS.
Artist, Q.A. Journal.

MR. D. JONES.
Fruit Inspector.

Plate 8.

SOME EARLY JOURNAL CONTRIBUTORS.

In these days of scientific research into every conceivable problem of the universe and of life itself, it is difficult to realize the comparative want of accurate information about agriculture in this country fifty years ago. That need, however, was recognized by the Government of the day and included in its plans for the dissemination of agricultural knowledge was the establishment of a departmental journal through which current information on the science and practice of agriculture would be conveyed directly to farmers and others interested at nominal cost. *The Queensland Agricultural Journal* was accordingly brought into being and has now attained its fiftieth year of publication since its foundation.

Early Volumes Reviewed.

A complete review of the *Journal* would require a chapter for each decade of its fifty years to cover adequately its record of service to the land industries of Queensland.

In the first article of the first number, under the heading "Some Things We Need," the author reflects on "the present position in agriculture," sketches "the aims and objects of the Department of Agriculture," and refers to "the means by which the fulfilment of these aims and objects may be promoted."

From this article it is possible to form a picture of the conditions of rural industry in Queensland fifty years ago. Sugar and bananas had to be exported to other colonies where competition with other countries had to be met. The output of sugar had not yet satisfied the demands of the domestic market; bananas were still imported by the southern colonies from Fiji. In sugar especially "competition was very keen" and to exclude importations from Java the price of Queensland sugar was depressed to a point which made "the future of that industry . . . . a matter of some anxiety, and the time has certainly come when the strictest economy will have to be enforced in every direction to secure the safety of the industry." An influx of experienced farmers from elsewhere was reported.

"In all other products which we now only partially supply to ourselves," said the reviewer, "agriculture is in a transition stage, or on the eve of it; and it behoves us to look well ahead and prepare now for the completion of the process of change which will assuredly test to the utmost the capacity of the country and its people to resist strong competition. If we take stock of our materials, we have nothing to fear in point of soil and climate . . . . There is no better soil anywhere than we have lying at our hands largely unoccupied, and under our favourable climate two good crops each year can generally be obtained. The full utilization of these advantages depends upon our farmers and on the means they employ . . . . The skilled farmer who studies his surroundings and by means of his skill and experience overcomes all difficulties in the way of his success, is happily to be found in every farming district of the colony . . . . But, on the other hand, there are farmers who have settled on our lands without adequate previous training, and who frequently are discouraged by failure in the face of hard work and earnest endeavour.

"It is at this stage that the Department of Agriculture has come into existence, and such is the condition of affairs that it has to cope with. Its creation is a clear intimation that the people of Queensland desire it to become a great agricultural country, able to sustain a successful struggle with all other countries whose competition it has to meet. That is

concisely the aim of all Queenslanders who have faith in the enduring prosperity of the country. The first duty of such a department is to take the initiative in agricultural education."

Among other needs discussed in the article was that of earnest co-operation of all primary producers with the Department of Agriculture and Stock, the Queensland Agricultural College at Gatton, and State Farms. The Department, it was claimed, had as its staff a body of specialists unsurpassed "by any similar body in Australasia," and great and enduring results from their association with the rural industries of the colony was confidently anticipated. It was added, "However excellent the teaching power or arrangements of the Department may be, however ready the people of the country, both young and old, to acquire the knowledge offered to them, no grand results can be achieved without the help of the farmers themselves."

A strong plea was entered for the formation of associations of local producers. At a few places in Queensland the combination of local farmers had been productive of great benefits, but "as a rule there is no section of the community more disorganized . . . . As a rule their efforts begin and end with their annual shows . . . . The holding of shows ought to have only a secondary place in the objects of farmers' societies . . . . At every meeting place of farmers, complaints are heard of the difficulty of disposal of their produce, the delays and expense of transport, the high interest on borrowed money, the expense and difficulty of getting good implements, and the high price of such necessaries as they cannot themselves produce . . . . Many are inclined to look upon the Government as a sort of Providence from whom all good things ought to come, and who should step into those fields of occupation which rightfully belong to individual enterprise . . . . It is not long since any attempt by a government to extend its tentacles into the private affairs of individuals would have been regarded as a deep design against the liberty of the subject, or a scheme by which it might acquire the power to crush them; and there is no saying when a state of affairs might arise when the temptation to use such a force might be too strong for resistance. The remedy . . . . . is mainly in the hands of the farmers themselves."

With union, it was stressed, farmers "can become so strong as to be able to control within reasonable limits the markets with which they deal . . . . they can equip themselves with all the means by which they may exclude foreign competition with their own products in their own markets; without union, their voices sound as discordant as those of Babel in the ears of a deafened and distracted Agricultural Department. With union, they can readily convey their sentiments to the intelligence of a sympathetic Minister . . . . and secure the removal of obstructions to progress, the adoptions of improvements, the passing of good laws and, finally, the raising of agriculture as a pursuit to the very high level to which it naturally ought to belong."

"Organization Amongst Farmers" was the title of another leading article in the first issue of the *Journal*. A meaty extract: "Of the many associations of former years, the East Moreton Farmers' Association approached nearest to the ideal union. Farmers met regularly once a month, papers were read and discussed, exhibits of various kinds of produce were laid before the meeting, and emulation was stimulated by the successes of individual members. Ploughing matches were regularly held, and the interest taken in meetings was such as to create a bond of real union . . . ."

Other leading features in this first issue were: "A Paying Crop for the West" (the sweet potato), by Henry A. Tardent, Manager of Westbrook Experiment Farm; "Coffee-Growing in Cairns;" "The Dairying Industry in Queensland," by John Mahon, Government Dairy Expert; "Fruit Culture in Queensland," by Albert H. Benson, Government Fruit Expert; "Destructive Insects Liable of Introduction to Queensland," by Henry Tryon, Entomologist; "Bee-keeping for Extracted Honey," by H. Stephens; "India-Rubber," by E. Cowley, Manager, Kamerunga Nursery, Cairns; "Probable Meat Trade with Egypt; "Contributions to the Flora of Queensland," by F. Manson Bailey, F.L.S.; and a report of four sessions (continued in the following issue) of the Farmers' Conference at the Agriculture College, Gatton, on 10th, 11th, and 12th June, 1897.

Problems of the Time.

That conference in 1897 judging by the full report of it, was regarded as an event of great importance. Delegates, of whom a full list is given, were present from every agricultural and pastoral district in the Colony. The chairman was Colonel the Hon. A. J. Thynne, M.L.C., Secretary for Agriculture. Departmental officers present were Peter McLean (Under Secretary), Professor Shelton (Instructor in Agriculture), J. C. Brunnich (Chemist), John Mahon (Dairy Expert), A. H. Benson (Fruit Expert), and Major A. J. Boyd (Editor, *The Queensland Agricultural Journal*). J. V. Chataway, M.L.A., M. Battersby, M.L.A., P. Waller (Neusa Vale) and W. Soutter (Acclimatization Society) also were present.

In the course of his opening address, the chairman referred to the bulk handling of grain as he had seen it three years previously in Canada and the United States; the need for co-operation among farmers, particularly in the purchase of machinery; and the prospects of developing the export trade in dairy produce, which depended on the improvement of dairy herds.

Among the papers read at the conference were: "The Sugar Industry and its Requirements," by E. Denman of Mackay; "Sugar Bounties," by Hon. A. S. Cowley; "Climatic Difficulties, Pests and Blights in Northern Canefields," a discussion led by J. Lely (Ingham); "Sub-Drainage," by A. Watt (Beenleigh); "Importance of Chemistry in Agriculture," by J. C. Brunnich; "Bacon Pigs and How to Breed Them," by W. R. Robinson (Toowoomba); "Farm Implements," by Professor Shelton; "Farm Servants and Farmers," by T. H. Wells (Isis); "Irrigation in Queensland Agriculture," a discussion led by J. Lely (Mackay); "The Cultivation of Wheat and Barley," by William Deacon (Allora); "Breeding and Treatment of Dairy Cattle," by John Mahon; and "Farmers' Associations," by E. Swayne (Mackay).

Many interesting sidelights on agricultural thought and opinion of the period are revealed in the faithful *Journal* report of the general discussion on each subject, particularly in respect of wages and conditions in the sugar industry which at that time was carried on with kanaka labour. Pleading for the retention of Pacific islanders in the industry, one northern delegate speaking of the labour force on one big plantation said with apparent fervour: "I tell you honestly that were those 400 kanakas taken away, this gigantic co-operative plantation would collapse . . . . Gentlemen, you can, and will I trust, assist in making this suicidal policy impossible . . . . The opinion of all those who have

visited the sugar districts, and have seen for themselves, is that kanaka labour is an absolute necessity.'' In reply to a question by a Downs farmer, the man from Mackay said that sugar could not be successfully grown without black labour—that was his opinion after 33 years' experience.

Another delegate listed the wages paid for white labour in the canefields in 1897. Throughout one crushing season two gangs earned 25s. 6d. per man after paying for rations. New hands had earned at the rate of 18s. 3d. a week clear of ration money and another shilling for extras. Older hands on similar jobs earned 25s. a week clear of everything, and others made up to as much as £2 a week. Against that, in Queensland the kanaka cost the farmer 2s. 6d. a day.

Other statements on the canefield labour position at the time are equally interesting. ''If all the kanakas in the Mackay district were taken away the industry would collapse,'' it was said. Farmers on the Downs had their labour worries too, it was asserted. One wheat farmer said that only recently he had offered two men who were doing nothing 4s. a day, but it was refused. Another cane farmer said that the kanaka question was one of economy and reliability and unless he could keep his labour he could not carry on his occupation as a cane-grower; as it was, he was handicapped by having to pay 2s. 6d. a day for cheap labour. Still another stated that every islander landed cost the planter at least £30. He formerly used to employ 90 boys, but he had leased his land to farmers to grow cane and had found this arrangement the most satisfactory. All these farmers, however, employed kanakas.

The discussion did not end, however, without vigorous opposition by southern farmers to the views expressed in favour of continued employment of coloured labour in the canefields. A Rosewood delegate, supported by neighbours from West Moreton, told the conference that farmers in his district did all their own work in cane cultivation without the aid of any coloured labour, although they got a much lower tonnage rate than the planters in the North.

The chairman tactfully steered the discussion into calmer waters, taking the broader national view, which was crystalized later in Federal legislation. The position of the Queensland sugar industry today, under Australian industrial conditions, is the obvious answer to the gloomy predictions uttered by some of the delegates to the Queensland Farmers' Conference at Gatton fifty years ago.

The Queensland Agricultural College.

Another notable event of that year was the opening of the Queensland Agricultural College at Gatton by the Governor, Lord Lamington. At the invitation of the Minister for Agriculture, Mr. A. J. Thynne, a large gathering, including many members of both Houses of Parliament, assembled in the College grounds. Departmental officers present were: Peter McLean, A. H. Benson, P. R. Gordon (Chief Inspector of Stock), John Mahon, C. J. Pound, Major A. J. Boyd, Henry Tryon and Professor Shelton.

Included in the College area was some of the best land along the Lockyer which had been purchased for £6,000. Including the cost of the buildings and other improvements the total outlay was £15,000. Accommodation had been provided for 60 students.

In the course of his opening address, Lord Lamington observed that within the area of 1,700 acres there were three distinctive soil types—rich alluvial, less fertile upland covering and a marshy tract—of which appropriate utilization would widen the experience of students in correct land use. The Government of Queensland, he said, had done the right thing in establishing such an institution which, he understood, was the first college in Queensland. The inauguration of the first college in the Colony was appropriately associated with agriculture to which the country was bound to look as its most productive industry. The institution might be regarded as "the generalization of the agricultural knowledge of the world, a kind of reservoir of which everything that is known or ascertained in regard to a particular science may be stored. Those who go out from it will, like rivulets from some system of irrigation, carry into their own localities all they have learned and gained, and afford a healthy stimulus to their neighbours in the development of the riches of the soil." Speaking especially to the students he added that if there were one defect in Queensland "it is that Nature here is almost too prodigal. In the case of individuals, as with mankind generally, adversity oftentimes produced success . . . . Students, when you go out into the world it will not be to engage in warfare. You have not to subdue some unfriendly foe. Nature lays before you, for your use her best resources. Your enterprise is indeed a peaceful one, and the furrows you will plough here or on the bosom of the rolling downs will serve to reveal rich treasures that are hidden. Your advance in time will take place on the great Western plains, and these will blossom in your wake. Corn, wine and plenty will spring from where you have trod . . . . Above all, I congratulate those who come here, as the first recruits of the great army which is to develop the lands of the Colony in the future, upon the facilities which are offered to them here to prepare for a career which is one of the most beneficial that is open to mankind."

The first College advertisement in the first issue of the *Journal* set out that it was open for the reception of students on 1st July, 1897. The College offered to Queensland youth a "direct education in the practice and science of farming. To carry out the intentions of the Government in this respect, the School has been liberally equipped for its proposed work. This equipment (in part) embraces—A Competent Staff of Teachers; A Farm consisting of 1,692 acres of land; Five Commodious Buildings; Dormitory Accommodation for 56 Students; Three Breeds of Dairy Stock; Implements, Apparatus, and Library."

Fees were fixed at £25 per annum, payable half-yearly in advance and a deposit of £1 as "a guarantee against damage of buildings and furniture. The fee covers board, washing, room rent, and lights."

Students were expected to work half-time in the field and half-time in study. Provision also was made for non-resident students.

The Golden Jubilee of the College was fitly celebrated in July, 1947, when its influence on the development of the agricultural and pastoral resources of Queensland during the past fifty years was duly acknowledged. In attendance were 400 relatives of students, ex-students and other visitors, including representatives of rural industry in all parts of the State. An added interest to the proceedings was given by the presence of six ex-students of the 24 whose names are on the original College roll. With seven others who trained there in the 'nineties, they answered a special roll call. The six originals are Messrs. R. E. Soutter, A. E. Holcombe, G. W. Jackson, C. J. C. Philp, A. R. Walker and H. C. Webb.

Mr. Soutter has since achieved especial fame as the breeder of some of Queensland's best wheats with developed characteristics of disease and drought resistance. He is still in the service of the Department of Agriculture and Stock as Wheat Breeder on the staff of the Division of Plant Industry.

Praising the valuable contribution old students had rendered to the land industries, the Minister for Public Instruction, Hon. H. A. Bruce, in the course of his commemoration address said that the College had proved the most important single factor in the development of the State. The rural resources of Queensland were so great and its area so vast that there was need for similar institutions in the Central Division and in the Far North. Probably the finest tribute that could be paid to the College, he added, was the fact that so many farmers who had been students themselves had sent their sons to Gatton to learn still more about farming.

Mr. E. F. Youngman, a student of 1898, recalled the late John Mahon, who was then in charge of the Government travelling dairy, demonstrating in that year the advantages of the first cream separator.

A fitting finale to the celebrations was a cavalcade of farm machinery, as used at the College from earliest times. Old horse-drawn ploughs were seen in operation against modern tractor-powered ploughing and cultivating equipment. The demonstrations included old-time broadcasting of seed by bucket and tray alongside the rapid mechanical devices of to-day.

Animal and Vegetable Pests and Diseases.

From the beginning, pests and diseases affecting stock and crops received a full measure of attention in every volume of the *Journal*.

The cattle tick received its first mention in the August issue in 1897 in the form of a progress report to the Chief Inspector of Stock from Dr. J. S. Hunt, who was carrying on experiments for the treatment of tick fever near Hughenden. The experiments were designed to ascertain the extent of the immediate danger incurred in inoculating clean cattle with various quantities of blood from a recovered beast; the protective efficacy of such inoculations; and the protective efficacy of small daily doses of arsenic. Results confirmed the merit of inoculation.

Prickly pear as a pest also got its first mention in the first volume.

Wheat Growing in the West.

In the February, 1898, number is an account of successful wheat-growing at Barcaldine by bore water irrigation. The first experimental plot was sown by Professor Shelton in July, 1895, but that and a sowing in the following year came to nought, because of insufficient rain. Irrigated crops, however, yielded up to 30 bushels to the acre. But it was obvious that grain-growing under natural rainfall conditions was too risky in the western country.

Near Roma, 6,000 acres were under wheat in the 1897 season, and 5,000 acres were harvested for grain; the remaining 1,000 acres were cut for hay. The variety sown was Allora Spring and individual yields were as high as 30 bushels to the acre. One farmer from Victoria stated that if the land around Roma was offered for selection in the southern Colony it would be rushed.

Farmers' Co-operation.

The benefits of co-operation and farmers' organization have been constantly kept under the notice of *Journal* readers from its earliest

issues. The formation of co-operative manufacturing and marketing associations have been fully discussed and every stimulus has been given to thought and action along these lines.

Today there are co-operative dairy associations, bacon factories and other media of mutual help throughout Queensland as part and parcel of our rural economy.

Typical of farmers' organizations early in the 50-year period under review was the Logan Farmers' Industrial Association, which at its regular monthly meetings arranged for the reading of papers on rural affairs by departmental specialists and practical farmers. For example, at its meeting in the Beenleigh School of Arts on 28th January, 1898, subjects fully discussed were "Farming and Dairying in Queensland," "Marketing of Australian Produce in England and Other Countries," and "Milking and Treatment of Milk." Farmers present were urged to co-operate with other similar associations and make known the result of their meetings through the medium of the *Queensland Agricultural Journal.*

At these meetings there was no "pulling of punches." Candour and straight speaking were encouraged. For instance, the Dairy Instructor of the time, John Mahon, did not hesitate to tell his audience at Beenleigh that during his travels throughout the Colony, although he had met some very good farmers who could hold their own even in countries where perfection in agriculture was claimed, he had also met "very lazy, careless ones, who were never intended for the land, and need never hope to be successful. Such men are generally found to be faddists or theorists . . . ." Continuing, this "straight shooter" said that in his opinion "there is a class of undesirable settlers: such as those who have no knowledge of tilling the land, who allow the Chinaman to take away the manure, who buy their vegetables from the Chinaman, and produce nothing from the land to supply their own households, and also secure a larger scope of land than their means will warrant." He did not shrink from tilting at the land policy of the period, by which areas designed for closer settlement were far too small for farmers to make a decent living. But he had a strong faith in the future of Queensland, a future "beyond the expectation of the most sanguine person." "There is no denying the fact," he said, "that no Colony in Australasia, and perhaps no country in the world, affords the same facilities for any branch of farm life as Queensland does at the present day. We have sufficient excellent agricultural land to carry millions of people . . . . . land which can be purchased at prices which I consider a gift. This is not only my opinion, but also that of practical Southern farmers who would never have visited this Colony had it not been for my inducing them to do so; needless to say, some of these farmers have disposed of their Southern homes and are now permanent residents of Queensland; others also are endeavouring to sell their holdings with a view of settling here . . . . These facts lead me to believe that there will be a great rush for agricultural lands in this Colony in the near future."

Extension of Land Settlement.

Just before the turn of the century, the tide of migration was setting in from the South. Enterprising farmers were coming from New South Wales, Victoria, and South Australia to take up land in Queensland. The vast areas of available virgin "scrub" country, regarded by early

pastoralists as valueless, was the main attraction to Southern dairy farmers particularly. Excepting those who had come from the "Big Scrub" on the rivers below the Border, the seemingly impenetrable jungles presented to the newcomers many problems. For their benefit and for others also inexperienced, much space was given in early volumes of the *Journal* to instructive articles on methods of clearing rain-forest and bringing under grass or into cultivation the extraordinarily rich volcanic soils it covered.

The past half century was remarkable for the extension of close settlement in districts in which natural conditions of soil and climate were adaptable to more intensive cultivation. Under the conditions of agricultural farm selection, both freehold and perpetual leasehold, many new farming districts, all richly endowed with the basic requirements of successful settlement, have been brought into highly profitable production.

Among the new areas of settlement were the South Burnett, Gympie, Central and Upper Burnett, Dawson Valley, the Northern Darling Downs, Chinchilla to Roma, Tara, Miriam Vale, Port Curtis, Eungella, Charters Towers, and Atherton Tableland districts.

New settlers flocked in from the older settled districts of Queensland —Fassifern, East and West Moreton and the Darling Downs—to the new lands further west and north. Added to that migration was the big influx of experienced farmers from the southern States. Some came overland, as in the covered wagon days, with their stock and plant to open up the rich untilled territories of Queensland. Young, vigorous and enterprising, these new settlers, both Queenslanders and Southerners, by their success became a definite influence on the progress and prosperity of the State.

Forestry.

In the early volumes of the *Journal*, forestry and the need of conserving the forest wealth of Queensland were subjects of regular editorial features. The "apathy with which the majority of our fellow-colonists, who are not immediately interested in the timber trade, view the question of a future supply of one of the most important of our natural products is as surprising as it is culpable" was regularly deplored. Denudation of timber on hill slopes was strongly denounced as a cause of serious soil erosion and the silting of watercourses. Recommendations from the 1890 reports on forest conservancy by P. McLean (Under Secretary), P. MacMahon (Curator of the Brisbane Botanic Gardens), and A. McDowall (Surveyor-General) were repeatedly quoted. "Suddenly, when the depredations of a careless population have produced the inevitable results," it was said, "the subject of forestry conservancy will assume a prominence not yet accorded to it, and it will be a matter of general wonder that our short-sightedness did not allow us to realize that destruction without replenishment must lead to scarcity." Again, "Forests were made for the use of man, and, if properly managed, a perpetual supply of timber for all purposes could be maintained. This has been practically demonstrated by saw-millers who held large timber selections in the Noosa district at Lake Cootharaba. These far-seeing men kept up a regular supply of kauri and hoop pine by judicious systematic thinning."

"In the early days of settlement in Queensland, when agriculture received little or no attention, the dense scrubs in the South on the banks of the Brisbane and the Logan, Albert, Pimpama, Coomera, Nerang, Pine, Caboolture, Maroochie; and, in the North, the Burnett, Mary, Johnson, Barron, Bloomfield, and other eastern rivers were rich in supplies of magnificent hoop pine, kauri pine, cedar, beech, silky oak, yellow wood, and other valuable timbers." The destruction of all species of eucalypts in the forest lands by ruthless ringbarking and thoughtless and greedy exploitation also was deeply deplored. "In time, splitters and timber-getters got to work and 'picked the eyes' out of the country. Then commenced the losses and the waste."

Years were to elapse, however, before a Forestry Service was established to conserve and control the timber resources of the State.

Introduced Pasture Grasses.

New settlers from below the Border brought with them small quantities of paspalum seed (as much as 10s. was paid for a matchboxful), and this new pasture grass was first mentioned in the *Journal* of April, 1898. The grass had been brought to the Richmond River district about five years before, where it was regarded as the best fodder or pasture grass yet introduced into that area.

Rhodes grass was another importation, supplanting paspalum in many "scrub" areas. Both grasses, as well as kikuyu and other introductions, are now well and widely established in every dairying district in the State.

Fish.

Fish was the subject of many *Journal* articles during its first decade. Native species and their habits were fully described. The introduction of trout for Border streams was advocated from time to time.

Tropical Agriculture.

Tropical fruits and other economic plants, especially coffee, have been regular features, but, in the course of time, the cultivation of many was proved more or less uneconomical under Queensland conditions. Those which could fit in with our economy naturally survived and continue to contribute very largely and on an expanding scale to the national wealth.

Agricultural Conferences.

Agricultural conferences were fully reported in early *Journals*, and the proceedings of one at Warwick in June, 1900, were regarded as so important as to warrant the publication of a supplementary volume. Previous annual conferences had been held at Gatton (1897), Rockhampton (1898), and Mackay (1899). The Warwick conference continued for four days, and in attendance were 114 representatives from farmers' associations and show societies throughout Queensland under the chairmanship of the Secretary for Agriculture, Hon. J. V. Chataway. Officers of the Department present were: P. McLean, A. H. Benson, S. C. Voller (Assistant Instructor in Fruit Culture), R. S. Nevill (Tobacco Expert), W. Soutter (Inspector of State Farms), C. Ross (Manager, Hermitage State Farm), and H. C. Quodling (Manager, Westbrook State Farm).

The subjects discussed at this farmers' "parliament" are worth recalling as burning questions in rural circles at that period. Some of them are still topical in present-day debate. Here is a copy of the Warwick agenda, leaving out the formalities:—The Progress of the Dairy Industry; Dairy Inspection; Cultivation of Sugar-cane; Our Climate; Farming and Education; The Functions of Agricultural Societies; Fruitgrowing on the Darling Downs; Strawberry-growing; Fruit for Export; Some Pests; Cultivation of Malting Barley; Lucerne and Prairie-grass Culture; The Vexed Question of Bags and Bales; Co-operation and How to Make Practical Use of It; What Tariff would be most suitable to Queensland Farmers under Federation; Freetrade or Protection; The Farmer as a Politician; Advantages Derived from the Repurchase of Lands on the Darling Downs; Agricultural Credit; Farm Manures; Timbers of Queensland and Forest Conservancy; Our Export Markets; How Far Black Labour is Required in the Sugar Industry; The Orange and Its Cultivation; and Beekeeping and Its Difficulties.

Horse Breeding.

Before the day of the farm tractor and mechanical transport, the horse was an indispensable factor in rural industry, so naturally breeding and horse-mastership were regularly discussed. A big trade with India had been built up. The South African War requirements intensified interest in the breeding of Army remounts, gunners, and other transport teams. Army authorities called attention to threatened deterioration in horse-breeding standards for both domestic and military purposes and contributed special illustrated articles to the *Journal*. The importance of the industry was stressed, and it was pointed out that "The climate, soil, capital available, and the excellent thoroughbred stock existing in Australia alike contribute towards making Australia generally a horse-producing country." A tax on stallions was suggested as a means of maintaining the high standards already attained. Horses required for military service were the heavy cavalry horse of bone, quality, and power, 16 hands; the light cavalry horse of good body and quality, 15·2 hands; the artillery horse of power and activity, 15·2 to 16 hands; and the transport horse of bone and power, 15·2 hands. The demand for these classes continued to the end of World War 1. In later years, however, the progressive mechanisation of agriculture, communication and transport reduced the demand for military and other utility classes. The horse versus the tractor for farm work has continued as a subject of controversy, and the day of the horse, especially on small holdings, is not yet done.

Irrigation of Farm Crops.

At the beginning of the century the decrease in the practice of irrigation was deplored in successive issues. The report of the Registrar-General on irrigation in Queensland for 1899 disclosed a striking decrease in the number of acres irrigated, compared with the area watered in the preceding year. In 1898 the area under irrigation was 9,648 acres (50 per cent. increase on the area previously irrigated), and in 1899 was only 6,311 acres. Curiously enough, the greatest diminution that year was in the Burdekin Delta, where to-day a remarkably effective irrigation system is in operation. Cogent comment in the report was on the "non-utilisation of the rivers of fresh water running through the rich lands of the seaboard where sugar is cultivated, as compared with Java. . . . . The whole question of irrigation is deserving of much

more attention than it has received." To-day, irrigation is a very live matter in this State, and water supply and its use in crop growing is continuously expanding as the result of a planned policy.

Agriculture in the Schools.

Agriculture as a subject in school curricula was the theme of many contributions from time to time. One earnest advocate proposed that the importance of farming and its high honour as a calling should be impressed continuously on the minds of Queensland youngsters, especially those attending country schools, who should be "convinced that the farmer carries on an honourable and independent business; that agriculture is the most important of all national industries. . . . . To reach this highly desirable result, the germ of it must be implanted in the mind of the young pupil by giving him correct ideas of the conditions under which the agricultural industry must be carried on at the present day. There is no one so well able to work upon the intelligence, the tendencies, and the tastes of children as the capable instructor who is imbued with a deep sense of the noble mission confided to him. . . . . The profession of the farmer does not solely consist, as some even yet believe, in a routine or in machine-like work which the first-comer can rapidly acquire without any effort by personal experience or by observing how things are done in his neighbourhood. On the contrary, it is a science which must be carried on by intelligent people, who know how to get at the why and the wherefore of the operations as numerous as they are varied which they undertake. It is not, therefore, sufficient to bring under their notice, but to make them see and understand the different kinds of work done in the fields, the orchards, and the farms. It is the most suitable means of making them acquire a reasoning knowledge, a knowledge of daily application concerning the cultivation of various plants, the study of domestic animals, of parasites, of the nature of arable soils, of the value and action of manures, of the multifarious labours of the farm."

In Later Years.

Within the scope of a single article it is impossible to review in detail the leading features of the *Journal* throughout its fifty years. Each decade was a period of remarkable progress in the development of every branch of primary industry. Advances in the science, practice and extension of agriculture and animal husbandry are recorded in *Journal* volumes, nearly one hundred now in number, which also contain much of the history of the Department of Agriculture and Stock and, therefore, of Queensland rural industry.

The editorial post in any official monthly periodical is no sinecure. The editor has to solicit contributions for his publication, he has to cultivate a pride in the literary craftsmanship of those who supply material for his pages, and he must insist on technical accuracy in any manuscript passing through his hands.

The standards established in the early years of *The Queensland Agricultural Journal* by its first editor have never been relaxed. This in itself is evidence of the close collaboration which exists between all those officers of the Department of Agriculture and Stock whose interest in and contributions to the *Journal* make it what it is today. This is not surprising when one reflects that the Department is designed to serve all engaged in primary industry in the State, and to whom the *Journal* is a direct channel of communication.

Plate 9.

Mr. A. F. BELL, M.Sc., D.I.C., A.A.C.I., Under Secretary, Department of Agriculture and Stock.

NEW CHIEF OF THE DEPARTMENT.

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Appointment of Mr. A. F. Bell as Under Secretary, Department of Agriculture and Stock.

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MR. A. F. BELL, M.Sc., D.I.C., A.A.C.I., Assistant Under Secretary (Technical), Department of Agriculture and Stock, has been appointed Under Secretary to the Department as from 1st July.

Mr. Bell received his early education at the Ipswich Grammar School, entered the Public Service as an Assistant in the Agricultural Chemical Laboratory early in 1916, and later enlisted and served in France and Belgium with the 46th Battery, Australian Field Artillery, A.I.F., in the 1914-18 War.

He completed his course for B.Sc. degree at the University of Queensland in 1923, and in 1924 was awarded a Sugar Research Travelling Scholarship. He travelled extensively, visiting most sugar-producing countries. He completed courses at the University of California, at which he attained his M.Sc. degree, and London University, at which he obtained the diploma of the Imperial College of the West Indies. For sometime he was attached to the staff of the well known Experiment Station of the Hawaiian Sugar Planters' Association in Honolulu.

On his return to Australia, Mr. Bell was appointed Pathologist to the Bureau of Sugar Experiment Stations. He became Assistant Director in 1935, Acting Director in 1943, and Director of Sugar Experiment Stations and Assistant Under Secretary (Technical) in 1945.

In 1926, Mr. Bell represented Queensland at the International Botanical Congress at Ithaca, New York, and in 1932 he represented the State at an International Sugar Conference in the West Indies.

During the war Mr. Bell acted as State Executive Officer of the War Agricultural Committees, and served with the Volunteer Defence Corps as a Brigade Major. At present he is Deputy Chairman of the Bureau of Investigation of Land and Water Resources, a member of the State Committee of the Council for Scientific and Industrial Research, member of the Faculty of Agriculture in the Queensland University, and a member of the Australian Chemical Institute. He is a past President of the Australian Institute of Agricultural Science and the Queensland Society of Sugar Cane Technologists, and has travelled extensively in the agricultural and pastoral areas of the eastern States of Australia. He also is a member of Brisbane Legacy.

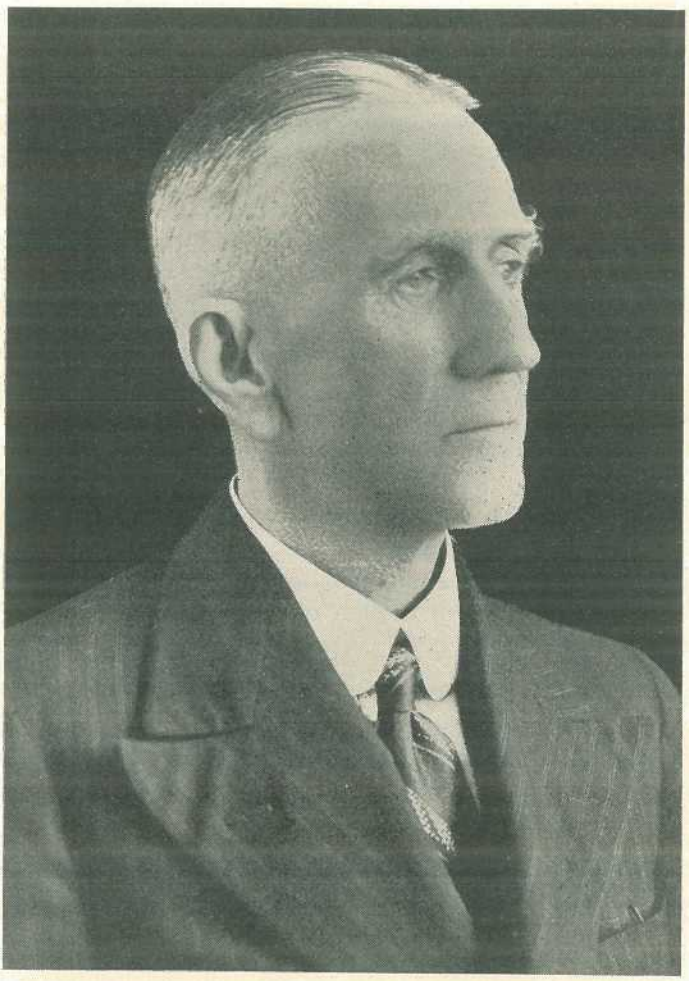

Plate 10.

Mr. R. P. M. SHORT.

Immediate Past Under Secretary, Department of Agriculture and Stock.

THE IMMEDIATE PAST UNDER SECRETARY.

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Mr. Richard P. M. Short.

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MR. RICHARD P. M. SHORT retired from the office of Under Secretary on 30th June after 49 years continuous service in the Department of Agriculture and Stock.

Mr. Short entered the Queensland Public Service as a junior in the Stock Branch in 1898 and advanced to senior grades to become eventually head of one of the most important of State Departments. He remained with the Stock Branch until 1924, when he held the positions of Senior Clerk and Registrar of Brands. He also was secretary of the Cattle Tick Committee, which consisted of representatives of the Council for Scientific and Industrial Research and of the Queensland and New South Wales Governments. While in the Stock Branch he edited "The Drovers' Guide," a former departmental publication.

In 1925, Mr. Short was appointed Senior Clerk in the Department and continued in that position until his appointment as Chief Clerk in July, 1933. In February, 1939, he was appointed Acting Under Secretary and subsequently Under Secretary.

Mr. Short also was Chairman of the Agricultural Bank Board; member of the Standing Committee of the Australian Agricultural Council; member of the State Committee of the Council for Scientific and Industrial Research; and member of the Faculty of Agriculture within the University of Queensland. He also was a trustee of parks and gardens under the control of the Department and of certain properties resumed for experimental purposes.

In his younger days, Mr. Short was associated with many sporting activities, especially cricket and tennis. He was honorary secretary of the Toombul Electorate Cricket Club in its heyday. The bowling green now claims much of his leisure as a member of the Booroodabin Club, of which he has been one of the champion rink.

Mr. Short has retired to well earned leisure with the good will and esteem of his departmental colleagues which was warmly expressed by the Minister, Hon. H. H. Collins, and a former Minister, Hon. T. L. Williams, and senior officers of the Department at a social gathering to mark the occasion of his retirement.

Irrigated Lucerne in Queensland.

W. G. FERGUSON, Adviser in Agriculture.

IRRIGATION of lucerne in Queensland is restricted mainly to the south-east corner of the State where the conditions of temperature, rainfall distribution, soil, supplies of irrigation water and proximity to markets are most favourable. Water is obtained from wells, running creeks, dams behind weirs and, in some places, from large lagoons. It is usually applied through spray lines, and delivery nozzles of the perforated dome and the butterfly types are mostly preferred. Electrical power is widely used for pumping, although tractors and stationary engines are still employed on some farms.

Soils.

Since lucerne is a deep-rooting plant and it is essential that irrigation land be well drained, the natural choice of soils is the deep, rich, porous alluvials. Clays should be avoided, not only because of their poor permeability to water, but also because of the obstacles they present to effective working. Clay loams, particularly when well supplied with lime, are desirable as they possess self-mulching properties and are usually well-drained. The use of very sandy soils is not recommended, because of their low water-holding capacity.

Preparation of the Land.

A fine well-worked seed bed free from weeds is of primary importance, for lucerne is slow-growing when young and weeds may retard growth still further or even seriously reduce the stand.

Autumn is the normal planting season and the initial ploughing, 6 inches-7 inches deep, should be done several months earlier in order to conserve moisture and establish a good tilth. Where nut grass, a serious pest of irrigated lucerne, has to be controlled, a much longer working of the ground is required, and the practice of first ploughing ten to twelve months before sowing has much to commend it. By this method, the stand of nut grass can be greatly reduced and may even be almost eliminated by vigorous working during the dry winter and spring months.

Oats and potatoes are suitable crops to precede lucerne, for they reduce weed growth and leave the land friable and mellow. Maize also may be used, although the drawback with this crop is that some difficulty may be experienced with unrotted stalks. The temptation then is to use the fire stick, thus destroying a source of much-needed humus.

At least two ploughings should be given, the final one being slightly shallower than the first. When ploughing, it is advisable to work in lands rather than by the round and round method, as the latter tends to leave a depression in which irrigation or rain water will lodge. Even if the lucerne in such depressions is not scalded, its vitality and productivity will be reduced. Very little attention has been given to grading the land in the past, but consideration should be given to the irregularities in levels which are found in most fields. After the first ploughing, the land should be left fallow to conserve moisture and after fallowing worked down with disc or tine implements. The land should be ploughed again by March and worked to a fairly shallow seed bed and fine surface mulch with harrows.

Sowing.

April is generally considered the most favourable time for sowing, for during the first quarter of the year adequate moisture can be conserved in the soil and many weeds can be eliminated. After April, weed growth is on the wane and competition with the slower growing lucerne is reduced. Growth above ground during winter is slow, but the framework of the extensive root system, so essential in the life of the stand and the weight of cuttings, is laid down. Plantings are sometimes made in the spring, either through design or circumstances, but at this time a watering to germinate the seed is generally necessary. Spring plantings not only have additional weed growth to contend with, but emphasis is on the growth of the above-ground portion of the plant to the detriment of the root system.

The amount of seed sown per acre depends on the size of the seed, its impurities and the method of sowing. Seven to 9 lb. per acre are sufficient when using a seed drill, 9 to 11 lb. per acre if broadcasting by machine and, if sownig by hand, the amount may be increased to 13 lb. per acre, to avoid a patchy strike. On irrigated lands up to 18 lb. per acre are sometimes sown where nut grass is fairly thick, but this practice results in an overcrowding of plants, light stooling, feathery stemmed small-leaved hay and a short-lived stand.

Methods of sowing depend on the implements available and the moisture content of the soil. Placing the seed in the ground is done either by seed drill, by one of several types of broadcasting machines, or by hand. The drill has the advantage of placing the seed at a desirable depth of approximately 1 in. and actually in contact with the soil moisture which is necessary for germination. Compared with other methods, it uses less seed per acre to obtain the same plant population. When broadcasting, the land is first harrowed and the seed sown either by machine or by hand. It is advisable to sow half the seed in one direction and the other half at right angles, thus tending to eliminate an uneven strike. After sowing, the harrows are used again to cover the seed and followed by a levelling drag board to give a firm smooth surface.

If irrigation is necessary to ensure germination, the water is applied immediately after sowing and levelling. However, this first irrigation should be light for though the surface may be dry, moisture should be present in the sub-soil. It is essential at this irrigation to watch for any change of wind which may cause dry patches or strips and subsequently a patchy germination.

It is advantageous to have two spray lines laid out in different sections of the field, so that, after one line has completed the desired watering, the second can be connected to the main and the ground around the first allowed to firm before the pipes are shifted to a new position.

The beneficial influence of nitrogen-forming root nodules on cultivated legumes is now well known among farmers. Lucerne is no different from other legumes in this respect and will surely benefit from the presence of the nodule-forming organism. The most certain method of ensuring that the desirable nodules are present is by sowing suitably inoculated seed. Many tests in Australia and overseas have proved that inoculated seed comes away more quickly than untreated seed, thus gaining an initial advantage against any weed growth which may occur in the newly-planted lucerne field. Sufficient inoculum to treat whatever quantity of lucerne seed is intended for sowing may be obtained for a nominal sum from the Under Secretary, Department of Agriculture and Stock, Brisbane.

Weed Control in the First Year.

The seedling stand normally requires very little attention, although at times cutworms may destroy patches within the field and these patches must be resown once the cutworms have been dealt with by poison baits or dusts.

Weed growth should be light if seed bed preparation has been thorough and can be handled by hoeing, if the area is small, or by mowing if the area is large. Two mowings will generally suffice, if winter weeds become established; and they must be made, even though the lucerne is not ready for cutting. When making a premature cutting the cutter bar should be raised so that weed seed heads are removed without damage to the young stand. It is of particular importance to note that the first cut for hay should not be made until new shoots are breaking at the crown.

Deep renovation is unnecessary during the first twelve months, a light harrowing being all that is needed to aerate the soil and retain the surface mulch.

Irrigation.

The yield of hay is directly related to the volume of water available to the plant, so that sparing or infrequent waterings will result in diminished yield or retarded growth.

The water requirements of the crop vary considerably with the season. In the summer when surface evaporation and transpiration are high, the water requirements of the crop will be high. In the winter when growth is slower and the evaporation from the soil surface is not excessive, the water needs of the stand will be noticeably reduced. Normal rainfall during spring and early summer months is not sufficient for a routine cutting every four weeks. During these months when weed growth is held in check and pests are negligible, irrigation obviates those water shortages so destructive to a lucerne stand and enables the farmer to maintain production at a high level.

The first watering, whether for the new or established stand, is given in late July or early August. This irrigation is important in that it should be sufficient to create a storage of sub-soil moisure which will allow a quick and unchecked growth for the first spring cut.

The amount applied and time of application for subsequent irrigations will, of course, be dependent on weather and soil type, and is a matter for the individual farmer to determine for himself. One irrigation of 3 to 4 inches made immediately after the crop is cut is adequate for good hay yields. A heavier application may induce waterlogging, while a lighter watering might necessitate a second before the crop is cut. During drought, two irrigations per cutting or three per two cuttings may be necessary. When two waterings per cutting are needed, the second is usually a lighter one. By January, irrigation has become incidental to rainfall and weed growths, particularly some of the grasses, are the main problem. Applications of water again become necessary from March to May, when, although cuttings become progressively lighter and take longer to mature, excellent hay, free from weeds may be cured under stable weather conditions.

Although the retention of sub-soil moisture is highly desirable in order that no excess soil cracking or major root death occur, it is wise to withhold irrigation during mid-winter and commence replenishing the sub-soil moisture in late July. This practice permits the soil to dry out, sweeten and aerate naturally. Watering continuously throughout winter causes a sodden and at times frozen surface, neither of which is beneficial to the lucerne.

Haymaking.

The indicators of good quality lucerne hay of high food value are a green colour, a crisp feel, a high percentage of foliage and freedom from weeds and grass. Quality is mainly a product of the methods used in haymaking and it is essential that all phases receive strict attention if a prime lucerne hay is to result.

The best quality hay is obtained by cutting just before the base buds break at the crown. However, continuous cutting at this stage reduces the yield and vigour of the stand; therefore, the best time to cut is when the base buds have shot or when the field is one-tenth to one-fifth in bloom. If cutting is delayed too long, however, a high leaf drop and a coarsening and hardening of the stem occurs.

This is caused by the transfer of nutrients from the stems and leaves to the upper portions of the plant. If the plants become stiff and yellow because of waterlogging of the soil or of insect attack, the crop should be cut, irrespective of the condition of the basal shoots or flowers.

The mowing of the crop should be commenced just as soon as the dew has dried from the leaves and stems. When the cutting commences, the farmer should aim to take off only as much as he can handle with the machinery and labour available. This means that he will not be forced to leave hay lying in the field in the hope that fine weather will continue. The latter practice often results in a total loss of the hay or at best an inferior product.

Treatment after mowing should be directed towards a reduction of the moisture content by 75 per cent. and the retention of leaf colour and aroma.

The first rapid reduction of moisture is achieved in the swathe where the hay wilts quickly. It should not be allowed to bleach or become brittle. The average period in the swathe on a hot sunny day is a few hours, after which the hay is raked into windrows for easier

cocking. The dump rake is most commonly used in Queensland, although the side-delivery rake which makes a better windrow is becoming more popular. Lucerne hay may be air-dried and partially cured in the windrow with the side-delivery rake, but for a prime quality hay curing should be continued in the shed or stack.

It is best to fork into tall and fairly narrow cocks which will shed rain and allow the hay to sweat and cure with maximum retention of leaf and colour. The hay should not be cocked unless it is sufficiently dry and free from rain or dew. If wet hay is cocked, extra labour will be involved in opening the cock for aeration and further drying. Should the cock become wet at a later stage, it may be necessary to open, aerate and recock. The hay is ready for carting off the field and stacking when it is crisply moist and no free moisture exudes when several stems are combined and twisted in the hands.

The usual sequence is to stack the hay and then bale or chaff when time allows or markets dictate. Stacking in the hay shed is by far the best means of giving added curing and protection from the weather. Stacks made in the open should be covered with galvanised iron.

Renovation.

Renovation is cultivation of the field carrying a growing crop. It is an operation considered essential for other crops, but practised far too infrequently with lucerne. Renovation and irrigation must be inseparable if efficiency, low costs and high yields are to be attained. They should be applied in that order after the crop has been cut and the hay removed.

Any renovation attempted during the first twelve months of the life of the stand should be in the nature of a light harrowing. Heavier working causes bruising and direct injury to the young tap root. Once past this stage, renovation, by either stiff shank or stiff tine implements fitted with a renovating tooth, or better still a specially constructed renovator, can be effected with excellent results.

The depth of the first renovation should be approximately one inch. The soil is loosened and aerated, surface rooting grasses are torn out, weeds are killed, and the soil left in a receptive state to absorb moisture. As the stand becomes older renovations become progressively deeper, until in a four-year-old stand a three-inch-deep renovation is necessary to open up a soil which has been compacted by farm implements and water.

Three renovations a year are a minimum requirement for an established stand. These consist of shallow workings in November-December and February-March to remove grass and weeds and loosen up the soil before and after the heavy mid-summer rains, and a deeper renovation in July-August to prepare for the spring and early summer cuttings. It is advisable at the time of the main renovation to obtain complete cultivation by a cross working.

Renovation naturally leaves the land slightly rough and cloddy and after a late summer working dead and dying grass clumps are fairly prevalent. The procedure then is to allow several days to elapse and then remove the grass and reduce the land to a level surface. Light harrowing and rolling followed by normal watering will dissolve the clods but should the harrows fail to remove the grass a hay rake may be used.

Disc implements are sometimes used for renovation, but they are not recommended. The cutting action of the disc splits the crown of the plants and cuts the roots, thus facilitating the entrance of disease organisms. Even though diseases do not develop, the plant injury caused is detrimental to the life and yield of the stand.

Lucerne in the Rotation.

The average life of an irrigated stand is five to six years, though eight to ten years is not uncommon. The incidence of diseases, renovation, time of cutting, frequency and amount of water and crop rotation all have an influence on the life of the stand—the crop rotation being a very important factor. Once a lucerne stand is ploughed out, it is wise to sow other crops for a period of five years before resowing to lucerne. At least once during those five years the humus content should be replenished by the ploughing in of green crops, sown especially for the purpose, because irrigation tends to accelerate the decline of soil fertility.

MINERAL FERTILIZERS.

The following statement on a lately much debated question is taken from a recent issue of *Soil Conservation*, official organ of the Soil Conservation Service of the United States Department of Agriculture:—

Dr. Emil Truog, professor of soils at the University of Wisconsin, evaluated the importance of organic matter in the soil at the Fifth Annual Conference on Conservation, Nutrition, and Health, at Ohio University, recently. Dr. Truog said:

"Much ado is being made to-day about the great importance of soil organic matter in relation to soil fertility, soil conservation, and crops of satisfactory nutritive value. This, in part, is as it should be, because soil organic matter is of tremendous importance. It facilitates the intake of water and thus reduces run-off and erosion. It also favours workability or ease of cultivation, aeration, and drainage. Fresh organic matter contains all of the elements needed for plant growth, which, as decomposition proceeds, are released in forms suitable for new plant growth.

"However, to say that chemical fertilizers such as superphosphate and muriate of potash should not be used to make up inevitable deficiencies of nutrient elements that cannot be supplied through the use of organic matter is just pure 'bunkum.' Absolutely no evidence exists to the effect that the judicious use of mineral fertilizer is at all injurious to soils, or tends to produce crops which are unsatisfactory as feed for animals or food for man. In fact, evidence, almost without end, now exists showing clearly that the use of mineral fertilizers on depleted soils promotes the growth of crops which have superior nutritive values.

"The fertility and organic matter content of gardens and other small areas may be maintained through the use of animal manure and composts. This use of composts is both feasible and commendable. However, when large areas are involved, as is the case in general farming, this practice is not feasible because of the impossibility of preparing and applying the enormous amounts of compost which would be needed. Fortunately, in general farming it is both convenient and profitable to follow a rotation of crops which provides the necessary organic matter in the form of crop residues (stubble, stalks, and roots) and animal manure produced in the feeding of crops. All that is required to make this system supply the needed organic matter is the proper use of lime, phosphate, and potash.

"It is sometimes said that 'nitrogen spells organic matter.' This means that liberal supplies of nitrogen promote such luxuriant growth that large additions of organic matter naturally follow. In the atmosphere over every acre of land, there exist in round numbers 35,000 tons of gaseous nitrogen. If these 35,000 tons of nitrogen were all transformed to a fixed (non-gaseous) form such as ammonium nitrate, the product would have a commercial value as fertilizer of over 5,000,000 dollars. How can the farmer draw upon this tremendous and inexhaustible supply of nitrogen? It is by growing legumes, which, when properly inoculated and fertilized, have the power of fixing atmospheric nitrogen which they can then use for the synthesis of proteins. Non-legumes, regardless of how grown, cannot utilise atmospheric nitrogen. They are dependent for nitrogen on that fixed by the legumes, or supplies in manure and commercial fertilizers."

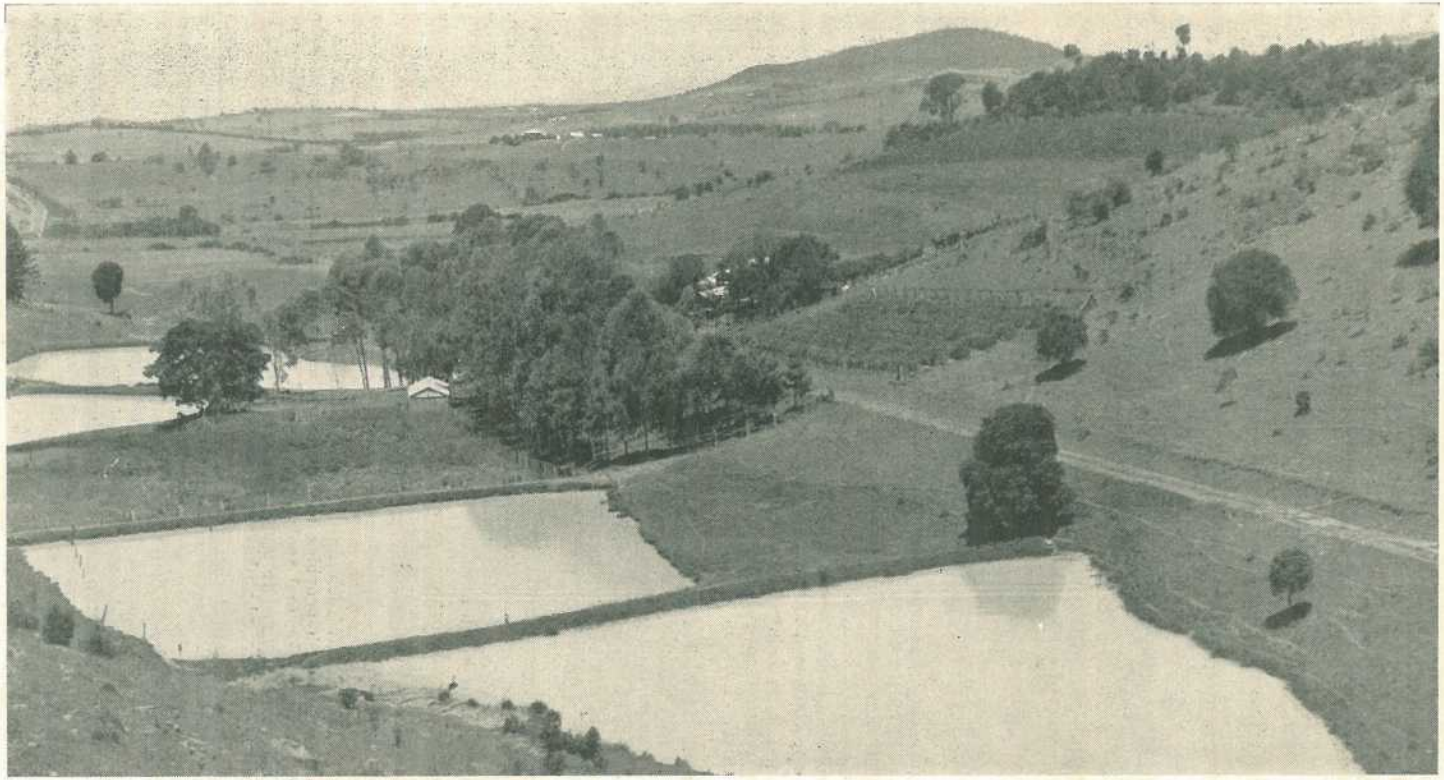

Plate 11.

FARM WATER CONSERVATION.—A Scene on the Minden Range, West Moreton, Queensland.

[Photo.: Queensland Country Life.

PLANT PROTECTION

Developments in Codling Moth Control.

N. E. H. CALDWELL, Horticulturalist.*

A FURTHER experiment in the control of codling moth was carried out in the Stanthorpe district during the 1946-1947 season, and the information obtained on several aspects of the problem may influence growers' spraying programme next season. This short account should, therefore, prove of interest.

Outline of Experiment.

The experiment was laid down in a block of Granny Smith apples. All trees received a calyx spray made up of lead arsenate 3 lb., hydrated lime 1½ lb., and water 100 galls. Eight cover sprays were applied, the timing being in accordance with the notices issued for the district by the Department of Agriculture and Stock. The following were the cover spray treatments:—

A. Lead arsenate 3 lb., white oil 2½ pints, water 100 galls.

B. Lead arsenate 3 lb., hydrated lime 1½ lb., white oil 2½ pints, water 100 galls.

C. Lead arsenate 3 lb., zinc sulphate 1 lb., white oil 2½ pints, water 100 galls.

D. Lead arsenate 3 lb., zinc sulphate 1 lb., hydrated lime 2 lb., white oil 2½ pints, water 100 galls.

E. Zinc fluoarsenate 3 lb., white oil 2½ pints, water 100 galls.

F. D.D.T. 0.1 per cent.

G. D.D.T. 0.05 per cent.

H. D.D.T. 0.05 per cent., white oil 1 per cent.

I. D.D.T. 0.1 per cent., replaced by white oil 1-60 after end of December.

J. D.D.T. 0.1 per cent., alternating with white oil 1-60 in successive spray periods.

K. White oil 1-60.

L. Control, untreated.

Codling moth incidence was severe throughout the Granite Belt, and the orchard in which the experiment was located suffered at least average losses for the season.

Weather conditions were abnormally dry for the first part of the season, but wetter than average for the remainder.

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* Formerly Entomologist, Science Branch.

Lead Arsenate Sprays.

The standard lead arsenate spray (lead arsenate 3 lb., white oil 2½ pints, water 100 galls.) gave very disappointing results. More than 40 per cent. of the apples were attacked and almost 10 per cent. of the crop was classed as "wormy." Extensive leaf burn, which normally follows the use of lead arsenate, appeared on the experimental trees receiving this spray.

The variations of the standard spray used were introduced in an attempt to lessen leaf burn. Hydrated lime, already quite widely used because of its alleged "safening" properties, did not influence either codling moth control or foliage injury under the conditions of the experiment, when added in quantities equal to half that of the lead arsenate. Zinc sulphate added to the lead arsenate spray at the rate of 1 lb. per 100 gallons improved moth control but caused increased foliage burn, some fruit blemishing and a reduction in fruit size. However, when hydrated lime and zinc sulphate were both added to the standard spray better codling moth control was obtained, leaf burn was almost eliminated and a general improvement in tree health resulted.

The lead arsenate-hydrated lime-zinc sulphate combination, while promising in some respects, leaves a very heavy residue on the fruit. Under present conditions in Queensland this must be considered a serious drawback. It is possible that modifications of the formula to reduce the total solids in the spray mixture may overcome this disadvantage to some extent, but further investigation along these lines is necessary.

Zinc Fluoarsenate.

Zinc fluoarsenate is a comparatively new insecticide which has been favourably reported on in some overseas countries. According to overseas sources, this material is said to be as efficient as lead arsenate for the control of codling moth, and less injurious to the trees.

Small supplies were recently made available and in the experiment just completed the insecticide was tested for the first time in this State. When used at the same strength as lead arsenate, the degree of codling moth control obtained was about the same as with lead arsenate and foliage injury was just as severe. It is concluded that zinc fluoarsenate is unlikely to play any part in Queensland's codling moth control programme, particularly in view of developments in the use of D.D.T., which will be discussed in subsequent paragraphs.

D.D.T. Sprays.

Promising results were obtained with D.D.T. in the 1945-46 experiment and success has been reported elsewhere with this insecticide. Hence a considerable part of this season's experiment was concerned with D.D.T.

An 0.1 per cent. spray, prepared from a mayonnaise-type emulsion, gave outstanding control of codling moth. The total fruit attacked was less than 10 per cent. and "wormy" apples comprised less than 1 per cent. of the crop. When the D.D.T. strength was reduced to 0.05 per cent., control was less efficient but still tolerably good.

D.D.T., particularly at the 0.1 per cent. strength, proved considerably more effective than any of the lead arsenate sprays in reducing infestation. In addition to the low percentage of "wormy" apples, it was noted that blemishes on "stung" fruit from trees sprayed with either concentration of D.D.T. were usually much more superficial than in the case of the arsenical-sprayed trees. Larvae are apparently affected more quickly by D.D.T. than by lead arsenate and thus do not penetrate so far into the fruit before finally succumbing to the toxic effects of the insecticide.

D.D.T. caused no foliage injury and the fruit, being well sized and free from visible residues, had a very pleasing appearance.

Contrary to last season's experience, woolly aphid populations did not reach serious levels, though there was a slight build-up in one or two trees. Mites, on the other hand, again increased rapidly on all trees treated with D.D.T. alone and caused considerable leaf mottling.

In anticipation of woolly aphid and mite increases, the three variations of the D.D.T. schedule involving white oil were introduced into the experiment. All gave a degree of codling moth control comparable with that obtained with 0.05 per cent. D.D.T. When white oil, at a concentration of 1 gall. to 100 galls. of spray, was added to 0.05 per cent. D.D.T. or, at a concentration of 1 gall. to 60 galls. of water, was used alternately with 0.1 per cent. D.D.T., mite damage was negligible. However, when white oil, 1–60, replaced 0.1 per cent. D.D.T. after the end of December, mite injury was about the same as when D.D.T. alone was used throughout.

All D.D.T.-white oil schedules caused moderate leaf burn. Where white oil at the 1–60 strength was included there was some reduction in fruit size.

Oil Sprays.

Codling moth control with white oil, 1–60, was indifferent. The percentage of fruit attacked was about the same as with the best lead arsenate spray but it was noted that the proportion of "wormy" apples was much higher. Some leaf burn occurred and there was a marked reduction in fruit size. The last-named effect makes the use of white oil at this concentration unwise, except perhaps occasionally in exceptional circumstances.

Next Season's Control Measures.

Orchard Hygiene: The standard of orchard hygiene in the Granite Belt has, generally speaking, deteriorated in the last few years. Owing to the severe moth activity last season, the number of over-wintering larvae is bound to be large. Growers should therefore pay particular attention to orchard hygiene this winter so as to reduce the spring brood of moths as much as possible. There should be a thorough clean-up of the packing shed and its equipment, followed by a liberal application of waste sump oil or an oil emulsion spray to inaccessible cracks and crevices. Trees should be examined carefully for larvae during pruning. Finally, all rubbish, both in the orchard and in the packing shed, in which larvae may shelter, should be gathered up and burnt.

Winter Sprays: As a first step in dealing with the problem of increased mite populations following the use of D.D.T., a special effort should be made to apply a winter oil spray. This should take the form of a red oil spray at a strength of 1 in 20 in late July, or, alternately, pale oil-lime sulphur, 1-1-20, towards the end of August.

Calyx Spray: The standard lead arsenate calyx spray (lead arsenate 3 lb., white oil 2½ pints, water 100 galls.) should be retained. So far no experimental work has been carried out in Queensland with a view to substituting D.D.T. for lead arsenate at this stage.

Poisoning of bees by the injudicious use of lead arsenate has attracted notice again in recent years. Careful attention should be given to the correct timing of the calyx spray. This should be applied when the bulk of the blossoms have shed their petals but before the calyx cups have become enclosed by the upturning sepals.

The question of D.D.T. poisoning of bees requires further investigation but the indications are that this insecticide is not likely to prove as dangerous as was at first thought.

Cover Sprays: If D.D.T. is used instead of lead arsenate for the cover sprays, reduced losses from codling moth can be expected. The strength advised is 0.1 per cent. actual D.D.T. However, the following contingencies must be kept in mind:—

1. If mites increase seriously—and this is liable to happen in the spring—some special attempt to control them will be necessary. The addition of wettable sulphur at the rate of 1–2 lb. to 100 galls. of D.D.T. spray has given promising results elsewhere and should be worth trying. Alternatively, an oil spray, 1-60, may be substituted for one of the D.D.T. applications. If white oil-nicotine sulphate is used to control woolly aphid it will also be of some value in reducing mite populations.
2. If woolly aphids, shows signs of getting out of hand, immediate measures should be taken to cope with them. The most obvious remedy would be to replace one or more of the D.D.T. sprays with the standard white oil-nicotine sulphate spray (white oil 2½ pints, nicotine sulphate 1¼ pints, water 100 galls.) which is effective against aphids and, before the advent of D.D.T., was perhaps the most effective spray available for codling moth control. The direct mixing of D.D.T. with nicotine sulphate is not recommended.
3. Because of the risk of undesirably heavy residues accumulating on the fruit, D.D.T. treatments should cease three to four weeks before harvesting. A substitute spray for one or two applications would thus be necessary, particularly on early and mid-season varieties, and white oil-nicotine sulphate is again suggested.

Timing of Cover Sprays: There is no evidence to suggest that the use of D.D.T. will permit the number of cover sprays to be reduced. Hence applications should be made as usual in accordance with the spray notices issued by the Department of Agriculture and Stock.

Sheep Worm Control.

RESULTS of recent research into the control of internal parasites of sheep were described and demonstrated in the course of a series of eight field days for wool growers in the central Highlands and the South-east during June. The field days were arranged by the Department of Agriculture and Stock in co-operation with local branches of the United Graziers' Association; and were conducted by Mr. H. McL. Gordon, B.V.Sc., a senior research officer from the C.S.I.R.'s McMaster Animal Health Laboratory in Sydney, assisted by veterinary officers of the Department.

In 1942 Mr. Gordon initiated a series of surveys designed to show the seasonal variations in the worm burdens carried by sheep in Queensland. Attention was focused also on the distribution and types of worms likely to cause greatest economic loss in this State. The keenness of a number of woolgrowers has been largely responsible for the success of the surveys and their co-operation with the Department and the C.S.I.R. is appreciated.

The recent field days were conducted at Mr. L. J. O. McCosker's "Codenwarra," Emerald; Messrs. Brown Bros. "Valencia," Clermont; the Show Grounds, Jericho, Barcaldine, Roma, and St. George; at Mr. A. Treweeke's "Umbercollie," Goondiwindi and Mr. W. Raff's "Waraghi," Karara. The main object was to explain the results so far obtained from the surveys and to point out to pastoralists and farmers how this information could be used in preventing outbreaks of worm infestation.

Mr. Gordon stated that the control of the barber's pole, hair and nodule worms in Queensland depended on a programme based on:—

(1) *Following a Seasonal Plan.*—By making use of the results of the worm surveys it is possible to carry out "preventive drenching" at times designed to forestall the worms. This means the administration of phenothiazine in May and August.

(2) *Drenching Plus Management.*—Correct management includes the use of the right drench at the right time, plus some system of rotational grazing and spelling, thereby completing a double attack on the parasites.

(3) *Drenching By the Weather.*—Recognizing the necessity of moisture for the eggs and larvae on the ground, it is important to drench three weeks after rain falls. This means any worms picked up after the rain are killed before they have had time to reach maturity and recontaminate the pastures.

(4) *Watch the Grazing Habits of the Sheep.*—When sheep overcrowd special areas of pasture such as hollows, water-courses, billabongs and gilgais or along bore drains, a heavy contamination with worm eggs will occur. In these places the eggs are likely to complete development and the larvae will, most probably, be consumed by grazing sheep. When this local overcrowding is seen it is an indication for some measures to check the worms, i.e. drenching or a move to a spelled paddock or both.

(5) *Work to a Plan.*—To control worms it is necessary to prepare a plan based on general station management (i.e., in relation to shearing, lambing and other activities); on weather conditions; and on the information available from the Department of Agriculture and Stock. (A new pamphlet, *Control of Worm Parasites of Sheep,* will be ready soon.)

(6) *Ask the Department of Agriculture and Stock.*—Consult your district veterinary officer, inspector of stock or sheep and wool adviser in making your plans. These officers have the latest information. If your plan breaks down, ask why?

About 400 woolgrowers attended the demonstrations. Keen discussion developed at question time after each lecture and the postmortem examinations made of the sheep submitted were watched with intense interest.

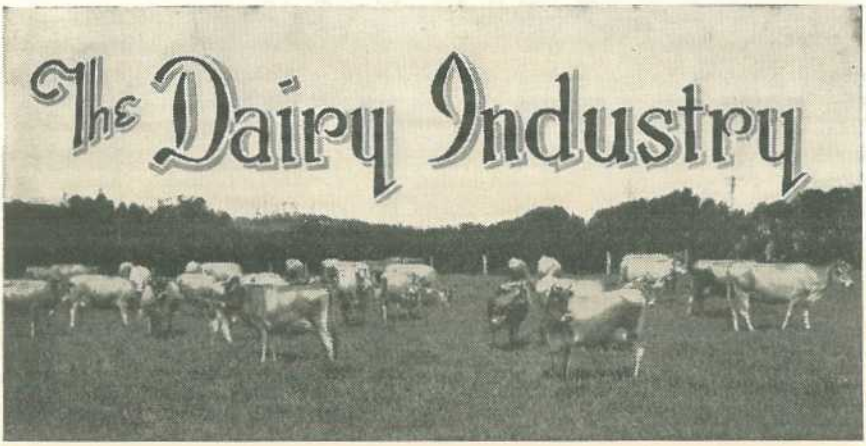
TAR STAINS IN WOOL CAUSE TROUBLE.

In addition to their other considerable difficulties British manufacturers and dyers are having trouble with tar brands in wool. Some of their complaints have come under the notice of the International Wool Secretariat, London. Last month a firm of English dyers reported to a Bradford manufacturer that tar stains were occurring to a marked degree in some of the Velour cloths supplied and were causing a slowing down of production and a certain amount of ill-feeling.

The report added: "When picked and hand-cleaned it is almost invariably necessary to send the piece back to re-scour, which of course necessitates re-dyeing and re-examining and so forth. There would appear also to be a considerable variation in the density of the fault, resulting in some cases in the time taken for hand-cleaning to be as much as two hours or more for a single piece.

"It will be readily understood from the foregoing that the dyeing of this material into light shades is very difficult, to say the least, and that it is at times impossible to get pieces into saleable condition in the shade ordered."

Acknowledging the representations made, the Bradford firm expressed sympathy with the firm of dyers and pointed out that until the wool-grower desisted from using tar or raddle to mark his sheep there was always a chance that some of it would get into the noils. The only alternative was to use carbonized and depitched noils which would add about 6d. per lb. to the price of the yarn. Even then, the letter said, they were not sure that the resultant cloth would handle quite as well as the present quality.



Milk Quality Tests.

E. B. RICE, Division of Dairying.

THE standard method of assessing bacterial numbers in milk is the plate count. It requires special laboratory facilities, can only be carried out by trained laboratory workers, does not give a result in under 48 hours, and so is unsuitable for factory use. In milk quality control schemes tests are needed which can be carried out by factory staffs in an ordinary factory test room, and give rapid results.

This paper is intended to describe tests which are applied in milk quality control work in Queensland.

These tests may be used at factories to enable an appraisal of the suitability of milk of individual producers for the liquid milk market or for cheesemaking. They may also be used for advisory purposes to reflect the care taken in production and handling, to detect the inclusion of abnormal milk such as that from mastitis cows, cows late in lactation, "soft curd" milk, or colostrum, and to indicate roughly the nature of the organisms and hence the kind of contamination. Practical experience acquired by dairy advisory officers from the tests will enable a rather accurate prediction of the cause of contamination, and on farm visits help to locate it rapidly and to recommend remedial measures. Where farmers themselves deliver milk to a factory the tests may be demonstrated to them in order to afford visual evidence of the undesirable changes which take place in milk through improper production practices. The simple factory tests do not give actual bacterial counts; this is really no disadvantage, for the main thing is to know the general conditions of production, as shown by the types of bacteria, and their effect on the product, which in practice is really what matters.

Milk quality tests should always be used in conjunction with the regular inspection of milk by smell and taste which must always be carried out by a qualified milk grader on the receiving platform of the factory. No amount of description and no scientific test at present known can replace the practical knowledge gained by long experience of grading milk and dairy products, and it is therefore essential to the making of a good grader that he should spend as long a period as possible training under the instruction of an experienced man.

The Methylene Blue Test.

The methylene blue test has been used for many years in Scandinavian countries and in America for giving a measure of the numbers of bacteria and their activity in milk, and for the grading of milk. In 1937 it was adopted in England to replace the plate count as the official method for the testing of higher grades of milk sold for human consumption, known as tuberculin-tested and accredited milk. It is now also used officially in England as a test for pasteurised milk.

Advantages of Methylene Blue Test.—The methylene blue test does not require special laboratory facilities nor technical training beyond that of a skilled factory operative, can be carried out under factory conditions, and takes not more than a few hours to obtain a result. It gives further information about the quality of milk than is possible by judging the aroma and palatability of the milk.

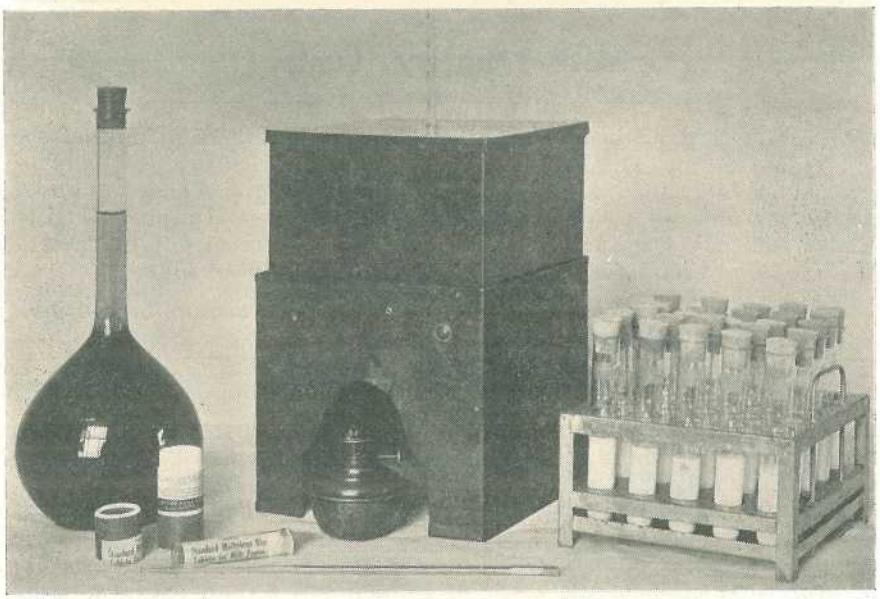


Plate 12.

APPARATUS FOR CARRYING OUT THE METHYLENE BLUE REDUCTION TEST IN THE FACTORY, USING A KEROSENE LAMP.

Application of Test.—It may be used as a test to classify the grades of milk for the market milk industry or cheese manufacture, and to fix grades for which differential prices are paid. Regular examinations of milk of individual suppliers may be made for the purpose of deciding suppliers of milk of unsatisfactory quality, and directing the attention of advisory officers to farmers most needing their services.

Regularity of methylene blue (or resazurin) testing of milk supplies received at factories is an integral part of any milk quality control scheme. Each supplier's milk should be tested weekly, if possible, but in any case not less frequently than fortnightly. Good producers appreciate the check thus kept on their shed methods.

Principle of Test.—The methylene blue test depends on the ability of bacteria to decolourise a dilute solution of methylene blue added to milk. The bacteria absorb the dissolved oxygen in the milk at a rate roughly proportional to their number. The end point, noted by complete decolourisation of the dye, appears when the oxygen has been entirely used up. The rate of bacterial activity is altered by lowering or by raising the temperature, so that a standard temperature has been fixed at 37 deg. C., and the test is conducted in the dark as the methylene blue is affected by light.

Apparatus Required.—1. A water bath, fitted with a lid and test tube racks, capable of maintaining a constant temperature of 37 deg. C. (98 deg. F.).

2. An accurate thermometer.

3. Test tubes (6 in. x $\frac{5}{8}$ in.) with a mark at the 10 ml. level and rubber corks to fit the test tubes.

4. Standard methylene blue tablets.

5. A 1-ml. pipette for measuring methylene blue solution, or a 10-ml. pipette graduated in millilitres.

6. An 800-ml. measuring flask for use in making up the methylene blue solution and a rubber stopper to fit.

Cleaning Glassware.—Measuring flask, test tubes, corks, and pipette may be sterilised in a steam chest or by boiling in water for five to ten minutes after first being thoroughly washed in a warm soda solution. The tubes should be placed upright in their rack and filled to the brim with clean water, before immersion for boiling. A sheet of aluminium, secured by screws or wire to the rack, and placed in position covering the mouths of the tubes before sterilising, will enable them to be inverted easily for draining and will protect them from contamination until ready for use. The corks may be tied in a piece of clean muslin. The apparatus should be sterilised immediately before use, and allowed to cool and drain dry.

Making up the Standard Solution.—Distilled or tank water, for making up the standard solution, may be sterilised by boiling for five to ten minutes and allowing to cool in the same vessel. It is essential that standard methylene blue tablets be used in carrying out the test. These are prepared by certain firms only and are sold in packets containing twenty tablets (sufficient for 16,000 tests). Names of firms supplying apparatus and standard methylene blue tablets will be supplied on application to the Department of Agriculture and Stock, Brisbane.

Dissolve one tablet in about 200 ml. of cold sterile distilled water in the 800 ml. measuring flask, by shaking, then fill up to the mark.

This stock solution, when corked and stored in the dark, will keep for periods up to two months. It should not be used after this.

Regulation of Water Bath.—The water bath should be filled with water at about 37 deg. C. some time before commencing the tests. The temperature should be kept steady at 37 deg. C. during the test.

The level of water outside should be above or equal to that of the milk inside the tubes.

Sampling.—As with all bacteriological samples, special precautions must be taken to exclude contamination. If sample bottles and corks or screw-tops are used, they must be sterilised by heat prior to use. Care must then be taken not to handle the mouth of the bottle or to touch any part of the cork other than the top ¼ inch, and the bottles must not be opened until just before filling and must be closed immediately afterwards.

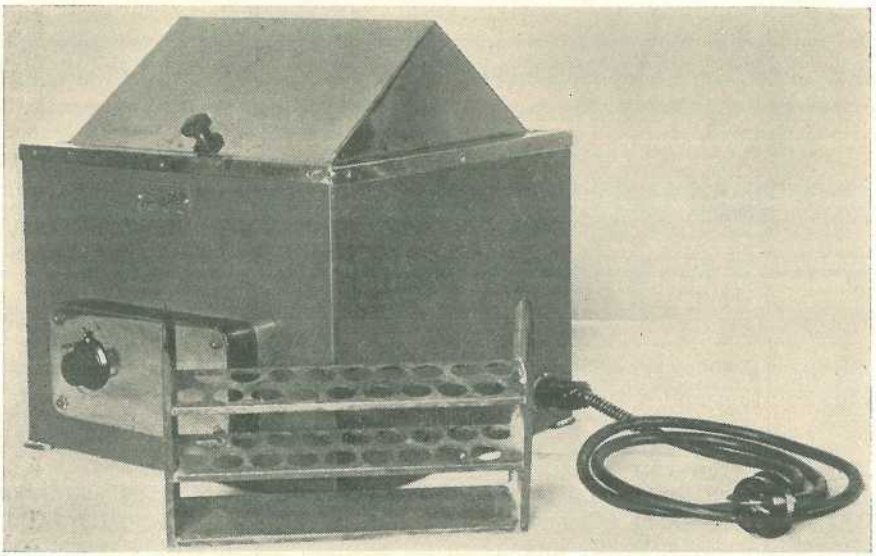


Plate 13.

ELECTRICALLY HEATED AND CONTROLLED LABORATORY WATER-BATH, SHOWING ONE TEST-TUBE RACK.

A composite sample is taken to include a proportional amount of milk from each can received. This may be done in one of several ways.

(*a*) A weighing-vat sample is easy to take, representative and as reliable as a sample taken from the cans. Use a small dipper—a 10 ml. stainless steel dipper preferably—to dip the sample from the vat.

(*b*) Stir the contents of the cans with a plunger stirrer and take the sample with a small dipper (preferably a 10 ml. stainless steel dipper). This makes it possible to pour the milk direct into the sterile test tube.

(*c*) By using a cream sampler of the long handled saucer type, stirring and sampling may be carried out in one operation and the milk placed in a sterile bottle.

(*d*) If the Wisconsin curd test is also to be carried out, pour 10 ml. of milk from the curd test jars into the test tubes to be used for the methylene blue tests.

Two samplers (or dippers and plungers) should be available. They must be sterilised for two minutes or more in a jet of live steam, or for ten minutes in boiling water, before use. They can then be used for alternate samples, one set being rinsed thoroughly in cold water then in boiling water, while milk is taken with the second set.

Where large numbers of samples are dealt with they should be placed in iced water, or testing commenced as, say, each twenty-four samples have been taken.

Testing Procedure.—When all samples have been taken, each is shaken thoroughly and a 10-ml. quantity is poured into a sterile test tube, or, if bottles are not used, this quantity is poured direct from the dipper. To this is added 1 ml. of standard methylene blue solution, and the tube is then gently inverted once to mix, and placed in the covered constant-temperature water bath at 37 deg. C. (98 deg. F.). After thirty minutes the tubes are removed for inspection, and each is inverted once to secure an even distribution of the bacteria and cream, and replaced in the water bath. This is done every half-hour. Any samples which have decolourised entirely, or to within 5 millimetres (one-fifth of an inch) of the surface, are removed and the time noted. This marks the end of the test.

Interpretation of Tests.

A slow reduction time indicates a comparatively low bacterial content, and therefore a cleanly produced and handled milk. Rapid bleaching indicates large numbers of bacteria due to lack of care in production or holding for too long at a high temperature with a consequent shortened keeping quality.

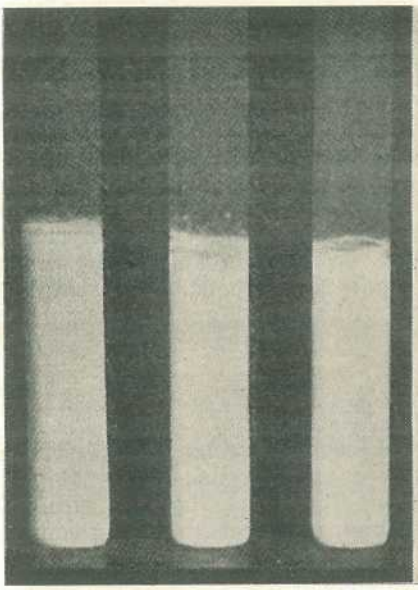
In connection with the milk quality advisory service operated by the Division of Dairying in Queensland, the following tentative standards are used: —

For the market milk trade	Good milk	Tests more than 5½ hours.
	Fair milk	Tests between 5½ and 4 hours
	Unsatisfactory milk	Tests less than 4 hours
For cheesemaking	A sample of morning's and night's milk mixed must test at least 2 hours in summer (October to March) and 3 hours in winter (April to September). When morning's milk only is supplied it should conform with standards of market milk trade.	

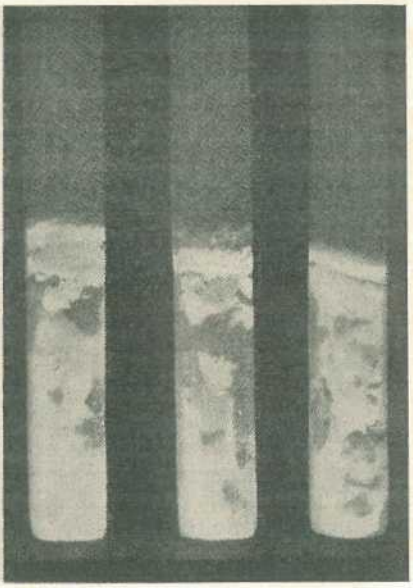
Legal Standards for Methylene Blue Test.—The Queensland Food and Drug Regulations, which relate to milk sold for human consumption, prescribe that milk shall not decolourise methylene blue within three hours if the sample is taken at any time from 1st October to 31st March, or within four hours if the sample is taken at any time from 1st April to the 30th September.

Methylene Blue Test as a Test for Pasteurized Milk.—The methylene blue test is now also used as a means of assessing the keeping quality of pasteurized milk. At 18 deg. C. (65 deg. F.) there is a close relationship between the keeping quality of milk and the time taken to reduce methylene blue. This is commercially important as a means of judging how long milk will keep after delivery to the consumer.

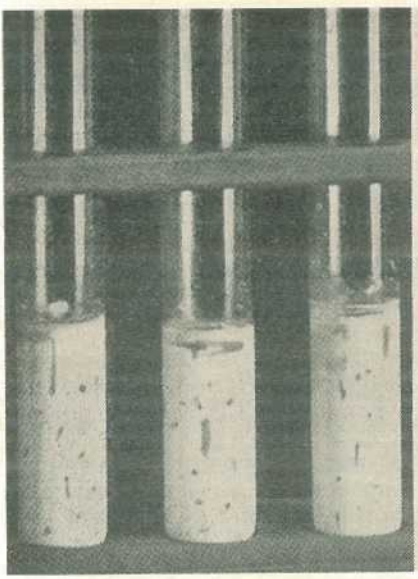
The test carried out at 18 deg. C. is, however, too time consuming. Pasteurized milk samples are therefore kept for twenty-four hours at 18 deg. C. in order to allow the bacteria to multiply. After the twenty-four hours' storage period, the methylene blue test is carried out in the usual manner. Pasteurized milk is regarded as unsatisfactory if it decolourises the methylene blue in less than thirty minutes.



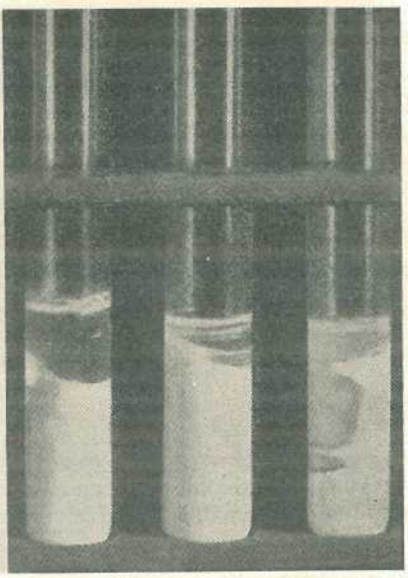
A. Gelatinous.



B. Blown.



C. Spongy.



D. Cheesy or Peptonized.

Plate 14.

COMMON TYPES OF CURD OBTAINED IN THE FERMENTATION TEST.

It should be noted that this use of the methylene blue test is primarily to ascertain the recontamination from factory equipment, bottles, &c. For checking the efficiency of pasteurization, pasteurized milk is always submitted to the phosphatase test and, according to the Health Acts of most countries, the plate count and coliform test.

The Fermentation Test.

This test is usually carried on as an extension of the methylene blue test, but may be independently conducted, in order to give an indication of the types of bacteria in milk and to this end is a useful test for advisory purposes. If the methylene blue test is extended to a fermentation test, the tubes are simply returned to the waterbath after the reduction of the methylene blue has been noted, and allowed to remain overnight. (N.B.—In factories without electricity and thus likely to have trouble in maintaining the temperature of the waterbath, the bath may be removed to the boiler room overnight to provide warmer conditions.) Next morning the coagulated curd in each tube is examined, the character of the curd giving an indication of the types of bacteria and thus of the conditions of production and handling of the milk on the farm.

Advantage.—Just as the methylene blue test gives an approximation of bacterial numbers and activity, the curd test, used as an adjunct, gives some idea of the types of bacteria which have developed in the milk. This is useful for advising farmers as to the probable cause of low-quality milk.

Interpretation of Tests.—Carefully produced milk will show a clean, smooth curd, with a pleasant acid smell. Milks less carefully produced will give gassy, peptonised, unclean and "off" smelling curds, according to the kind and extent of the original contamination and subsequent handling.

The types of curds most commonly met with (see Plate 14) may be classified according to the kind of bacteria predominating:—

Gelatinous.—Even smooth curd without gas bubbles; due to desirable lactic acid types.

Blown.—Gassy with curd collected towards the surface, and whey beneath; due to undesirable acid and gas-producing types, coliform organisms.

Spongy.—Gassy, with fine bubbles distributed throughout curd, little or no separation of whey; milk containing few desirable lactic acid types and gas-forming organisms predominating.

Peptonised or Digested.—Separation of much whey, in some cases the curd being entirely dissolved; due to casein-digesting (peptonising) organisms, and usually indicative of heavy contamination from improperly cleaned utensils.

Since the incubation temperature favours the gas-forming and casein digesting bacteria, caution is needed in interpreting a fermentation test showing slight gas if the methylene blue test was satisfactory. The fermentation test should only be interpreted in conjunction with methylene blue test results.

The Sediment Test.

This test measures the extraneous matter—hair, dust, blood clots (mastitis)—in milk. It is very useful in educating farmers to use cotton wool filter discs to strain milk at the milking shed, as the visual evidence of failure to do this is readily appreciated by producers. The simplicity of the test is a great aid in the early stages of a clean milk drive, but later, when straining becomes general practice, its value decreases. Testing the last milk in the can shows the large amount of sediment often in milk.

Advantages.—The test is well adapted to factory platform work as any person can perform it. It is simple, cheap and rapid, and the discs can be either shown to farmers who deliver their own milk, or posted.

Plate 15.
MILK SEDIMENT TESTER.

Procedure.—The can of milk is vigorously stirred with a metal stirrer prior to sampling, as thorough mixing is obviously necessary to ensure that the sediment, which will have settled to the bottom of the can, is evenly distributed throughout the milk. Each can of milk may be tested, but time usually permits only one test being made from each supplier's consignment. A portion from each can may be dipped by means of a dipper or measure until the tester is full. The sediment tester commonly used in Queensland is of the type shown in Plate 15. It consists of a metal cylinder with a capacity of 1 pint, tapered at the lower end with a bayonet clip cap into which fits a cotton disc, kept in place by a wire gauze and rubber ring; the top of the cylinder is closed by a cover, to the centre of which is attached a hand-pump.

This enables the milk to be forced through rapidly, and an even distribution of sediment is obtained on the cotton disc. The milk may be returned to the bulk. The disc is then removed, placed or pinned on a piece of clean board or allowed to dry on a square of blotting paper, numbered or bearing the farmer's name, in a dust-free place. A fresh disc is placed in the tester, which is then ready for the next sample. To protect the unused discs from dust, they should not be removed from their box until just immediately before use.

Interpretation of Tests.—As a standard for guidance in clean milk competitions, marks are awarded in accordance with the amount of sediment left on the test pad after 1 pint of milk is filtered through. A maximum of 10 or 100 marks is decided upon for milk showing complete freedom from sediment, and intermediate marks allotted according to the amount of sediment. A typical set of discs is shown in Plate 16.

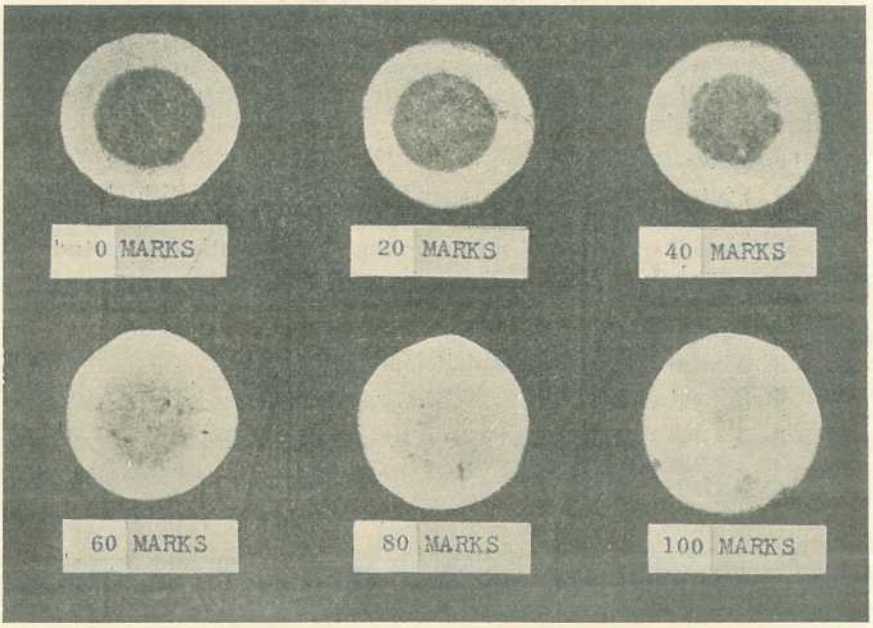


Plate 16.

SEDIMENT PADS SHOWING COMPARISONS BETWEEN RELATIVE AMOUNTS OF SEDIMENTS IN DIFFERENT BATCHES OF MILK.

In Queensland the interpretations used are—

Grade.	Conclusion.
A—Very clean	Milk filtered
B—Clean	
C—Dust specks ..	Unrinsed utensils or storage in dusty place
D—Dirty	Milk obviously unfiltered
E—Very dirty	

One test each week, of the whole supply from each farmer, made not always on the same day, will be advisable to start with—later, once a fortnight or once a month may be quite satisfactory.

The sediment test will show clearly which milk contains the largest quantity of visible dirt. It will not, however, show without some additional test which milk is the purest. It must be remembered that by thoroughly straining into clean cans on the farm and no subsequent opening of them, the farmer may succeed in removing all visible dirt, but this does not necessarily mean that his milk is really pure, for straining cannot remove the invisible impurities and obnoxious bacteria may still be present in large numbers.

In advisory work, emphasis should be more on the farmer regarding the farm strainer itself as a sediment tester, and minimising the amount of dirt which gets on the strainer cotton wool disc, rather than relying on the strainer to "clean" milk.

The Wisconsin Curd Test.

This test is mainly used at cheese factories to examine the quality of the milk from each individual supplier. It helps to pick out any milk which will give trouble in regard to flavours, texture, and keeping quality of the cheese.

Apparatus Required:—

1. Pint glass jars or 4 oz. pomade jars, preferably with aluminium or bakelite covers. The latter are a convenient size as only a small quantity of milk, yet enough for satisfactory tests, is used.
2. A water-bath. (A cut-down kerosene tin or small tub will suffice.)
3. A small oil lamp or spirit lamp.
4. Rennet extract.
5. A 2 ml. pipette, or a piece of narrow-bore glass tube, for adding rennet to the test jars.
6. A thermometer.
7. A knife for cutting the curd.

Cleaning Glassware.—All glassware must be clean and near-sterile. It should be washed after use in warm water containing a suitable cleanser and near-sterilised by placing in a vat or bucket, to which water is added to cover the contents, and then bringing to the boil by means of live steam. This should be done early in the morning or the night before so that all apparatus will be in readiness for the test.

Sampling.—As each supplier arrives at the factory, a representative sample of the well-stirred milk is placed in a sterile glass jar so that it is about two-thirds full. The lid is put on and it is then placed on one side in a cool spot, until samples from other suppliers have been taken.

Procedure.—When all samples have been collected the pomade jars are placed in the water bath and brought to a temperature of 98 deg. F. as quickly as possible. This may be accomplished by having the initial temperature of the water in the bath at 110 deg. F. The water in the bath should be level with the upper surface of the milk samples. Gently shake the jars occasionally with a rotary motion, to ensure a uniform temperature.

Place a thermometer in a separate jar containing milk for reading the temperature. When the milk reaches a temperature of 98 deg. F. add four drops of rennet extract to each pomade jar (10 drops if pint bottles are used). Mix thoroughly by giving the jars a rotary motion. Replace the jars in the water bath and observe when the milk coagulates. Allow to stand until the coagulum is firm, which usually takes twenty minutes. Then cut the curd in several thin strips and a second time at right angles to the first cut to assist in the separation of whey. Rinse the knife in hot water after cutting each milk curd before using it for cutting the curd of another jar, and so avoid carrying contamination from one milk to another. Allow the curd to settle. In about thirty minutes note the odour and flavour of the whey which will have settled in each jar, and carefully pour off the free whey. Repeat the draining of the whey at intervals over a period of six hours or more.

As the samples are held under conditions similar to those pertaining to cheesemaking, the organisms present develop readily and may give rise to "off" odours and/or texture defects. The curd jars may be left overnight in a warm place (say, near the boiler). Next morning they are finally opened, all free whey drained off and the curds examined. Each curd is cut into two pieces for this purpose.

Interpretation of Tests.—Types of curds commonly met with are:—

Firm and solid, free from gasholes on the cut surface, bright colour, pleasant aroma.—This is due to a desirable lactic acid fermentation and indicative of carefully produced milk.

Gasholes (small).—The milk contains gas-forming bacteria of the coliform type, due to utensils, manurial dust, impure water, or soil contamination. Sometimes the milk is so contaminated as to cause a puffy, spongy curd, when serious failure in dairy hygiene is indicated.

Strongly digested, off smelling curd, the curd often being largely dissolved.—Improperly cleansed utensils commonly cause this condition. Casein-digesting bacteria are often responsible for the peptonisation (breaking down of casein).

Large, round holes or fisheye slits in curd, accompanied by a yeasty or fruity aroma.—The milk is contaminated by yeasts. This is usually due to cans improperly cleaned after being used for whey. Neglected milking machines may also be responsible for this type of contamination.

"Off" aromas.—These may be caused by undesirable organisms although the texture of the curd is not affected.

Overacid, mealy, soft curd, with dull, bleached colour.—The milk contained excessive bacterial numbers as a result of poor hygiene and failure to cool and keep cool.

Soft curd.—This may be noted, especially in dry times, when the solids-not-fat content of milk is depressed.

Albuminous curd.—This may indicate the inclusion of colostrum or milk from cows suffering from mastitis.

Slimy, ropy.—These conditions usually indicate contamination from cows which have waded in dams, creeks, &c.

A rather soft, bulky curd, having a fine slimy coating.—This is often noted when the milk of a number of freshly-calved cows is included in a supply.

Contracted curd, often with a tough yellowish surface.—This is noted in curds from milk of cows in advanced lactation, or "stripper" cows.

Resazurin Test.

In England the resazurin test is used in connection with the National Milk Testing and Advisory Scheme. The test does not entirely displace the methylene blue test which is still used for high-quality milks for which a higher price is paid, and as a test to define a standard below which milk for the market milk trade cannot fall without risk of the producer being prosecuted.

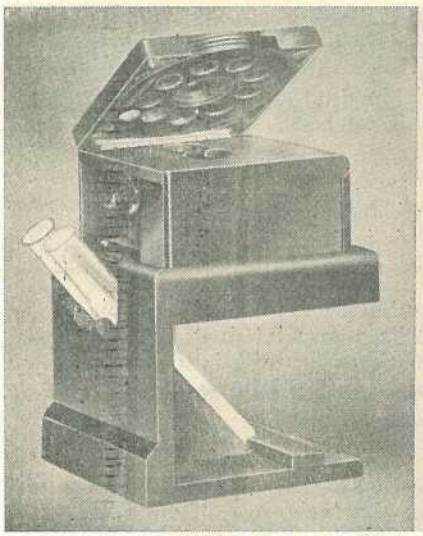


Fig. 1.

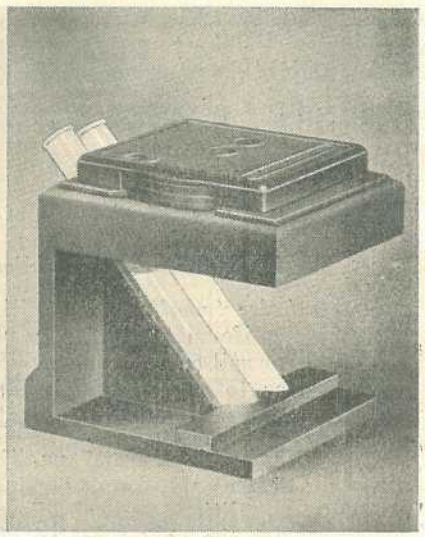


Fig. 2.

Plate 17.

TWO TYPES OF COMPARATOR USED FOR THE RESAZURIN TEST.

Advantages.—The advantages claimed for the resazurin test over the methylene blue test lie in the quick result given, a ten minute test having been developed, and its ability to differentiate pathological (mastitis) milk. The principal use of the resazurin test is to enable suspected poor-quality milk to be rapidly tested and kept apart from milk satisfactory for pasteurizing for the liquid milk market, and also in connection with milk quality control schemes, to direct field officers' assistance where it is most needed.

Sampling.—The precautions in sampling and care of glassware already described in discussing the methylene blue test apply equally for the resazurin test.

Apparatus.—The same equipment is used as for the methylene blue test and additionally a colour comparator (Plate 17) is required.

Making up the Resazurin Solution.—Distilled or tank water is boiled for thirty minutes and allowed to cool. When the water is cool, measure 50 ml. into a clean sterile measure, add one resazurin tablet and shake to dissolve. This gives a .005 per cent. solution for using in testing milk. A fresh batch of solution must be prepared for each day's testing. Names of suppliers of approved resazurin tablets will be supplied by the Department of Agriculture and Stock, on request.

Procedure.—A thoroughly representative sample of the milk is taken and 10 ml. placed in the test tube. 1 ml. of a .005 per cent. solution of resazurin is added, the tube stoppered and inverted twice. It is convenient to work with batches of five tubes, placing them simultaneously in the water bath, kept at 37 deg. C. (98.6 deg. F.) noting the time, and after ten minutes removing them from the water bath and immediately matching the colour which has developed against the appropriate colour disc in the comparator. To do this, place the tube of milk in the instrument and rotate the discs until the disc which matches the colour in the milk tube is noted. Record the disc reading. During the test the resazurin-milk mixture may change from a blue colour through mauve to deep pink and finally, with bad samples, to white. The standard resazurin test colour glasses, numbered 0 to 6, are as follows:—

Colour Glass No.	Colour.
6	Blue
5	Slightly mauve
4	Mauve
3	Pink-mauve
2	Pink
1	Deep pink
0	White

Interpretation of Test.—

Resazurin Disc Reading	Milk Category
4 or higher	A. Good-quality milk suitable for pasteurizing for liquid consumption.
3½ to 1 (both inlusive)	B. Insufficient care in production and handling. Milk only fit to be used for manufactured products.
½ and 0	C. Very poor hygiene in production. Milk rejected and returned to producer.

PRODUCTION RECORDING.

List of cows and heifers, officially tested by officers of the Department of Agriculture and Stock, which qualified for entry into the Advanced Register of the A.I.S. and Jersey Societies' Herd Books, production records for which have been compiled during the month of May, 1947 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Mature Cow (Standard 350 lb.).				
Tara Flower	C. K. Roche, Warwick	10,223·45	430·409	Murray's Bridge Pansy's Gift
Bileena Flo 2nd	C. K. Roche, Warwick	10,108·1	383·899	Tara Governor
Junior 4 Years (Standard 310 lb.).				
Sydmouth Lorna	T. Vayro, Helidon	7,543·4	358·69	Sydmouth Beauty
Senior, 3 Years (Standard 290 lb.).				
Navillus Showgirl 4th	C. O'Sullivan, Greenmount	14,714·8	516·233	Greyleigh Eros
Mt. Camp Thelma 34th	Madge Bros., Southbrook	10,172·56	392·79	Rosenthal Red Major
Junior, 3 Years (Standard 270 lb.).				
Fairvale Laurel 2nd	W. S. Henschell, Yarranlea	12,712·9	590·243	Bingleigh Jean's Monarch
Fairvale Doris 7th	W. S. Henschell, Yarranlea	10,166·4	455·823	Bingleigh Jean's Monarch
Yarranvale Madge	W. D. Davis, Chinchilla	6,913·05	322·592	Sunny View Royal National
Pilton View Sally 3rd	C. K. Roche, Warwick	7,230·9	270·545	Sunny View Myrtle's Renown
Senior, 2 Years (Standard 250 lb.).				
Fairvale Minerva 3rd	W. Henschell, Yarranlea	9,222·15	379·67	Bingleigh Jean's Monarch
Sunnyside Daisy 45th	R. Moore, Kingaroy	6,662·8	269·587	Cosy Camp Isaac
Sydmouth Vivian	T. Vayro, Helidon	6,793·25	260·166	Navillus Paros
Junior, 2 Years (Standard 230 lb.).				
Trevor Hill Fairy Dove 3rd	Madge Bros., Southbrook	6,762·54	308·465	Trevor Hill Bosca
Fairvale Doris 10th	Madge Bros., Southbrook	6,000·16	262·884	Fairvale Reward
JERSEY.				
Mature Cow (Standard 350 lb.).				
Westwood Larkspur	F. Porter, Maleny	8,284·9	526·524	Hunstrete Emperor's Volunteer
Gem Leila	W. Bishop, Kenmore	9,949·75	510·412	Calton Lothean
Westwood Goldilocks	F. Porter, Maleny	8,307·2	496·170	Hunstrete Emporer's Volunteer
Lermont Bud	J. Schull and Sons, Oakey	9,205·55	461·533	Selsey Samares Hallmark
Morago Loyal Watch	W. Bishop, Kenmore	8,557·0	428·155	Oxford Robin
Trinity Cute Dove	F. Z. Eager, Petrie	8,478·45	421·858	Samares Cute Prince 3 (imp.)
Trinity Crowning Daisy	J. Sinnamon and Sons, Moggil	7,882·15	407·941	Trinity Crowning Effort
Elwyn Bright Eyes	E. J. Dunning, Stanmore	8,060·85	384·53	Glenside Lone Star
Jersey Park Golden Thread	R. J. Browne, Yangan	7,527·9	377·327	Trinity Pioneer
Romsey Blossom	J. Wilton, Killarney	7,274·6	375·3	Oxford Dainty Peer
Trinity Cute Poppy	J. Sinnamon and Sons, Moggil	7,137·11	362·362	Samares Cute Prince 3 (imp.)

SENIOR, 4 YEARS (STANDARD 330 LB.).

Westwood Silver Bells	F. Porter, Maleny	9,386·35	610·83	Westwood Brown Victor

JUNIOR, 4 YEARS (STANDARD 310 LB.).

Trinity Princess Rose	J. Sinnamon and Sons, Moggil	9,104·6	484·428	Trinity Lily's Lad
Trinity Princess Royal 2nd	J. Sinnamon and Sons, Moggil	8,120·11	459·097	Trinity Crowning Effort
Trinity Graceful Lady	J. Sinnamon and Sons, Moggil	9,201·91	453·837	Trinity Crowning Effort
Trinity National Girl	J. Sinnamon and Sons, Moggil	7,438·57	362·788	Trinity Crowning Effort

JUNIOR, 3 YEARS (STANDARD 270 LB.).

Nairfale Lady Laura	R. J. Browne, Yangan	6,888·1	367·141	Nairfale Noble Count
Elwyn Noble Lassie	E. J. Dunning, Stanmore	6,517·55	366·571	Navua Noble Lad
Navua April Dawn	C. A. Edwards, Alderley	7,324·75	364·253	Dreamer's Hamptonne Star
Elwyn Rose Marie	E. J. Dunning, Stanmore	5,279·2	275·984	Navua Noble Lad

SENIOR, 2 YEARS (STANDARD 250 LB.).

Lermont Bright Girl	J. Schull and Sons, Oakey	5,858·4	352·131	Selsey Samares Hallmark
Elwyn Noble Queen	E. J. Dunning, Stanmore	6,106·8	322·734	Navua Noble Lad
Glenview Faith	F. Z. Eager, Petrie	6,080·95	303·585	Trinity Gov. Hope

JUNIOR, 2 YEARS (STANDARD 230 LB.).

Nairfale Likeness	R. J. Browne, Yangan	7,101·1	359·897	Nairfale Golden Receiver
Boree Gift's Pleasure	A. Visini, Gympie	6,777·7	319·77	Maurfield Larkspur's Gift
Ashview Pearl	C. Huey, Sabine	4,996·2	275·419	Trecarne Victor 4th

Shade Trees and Windbreaks on the Pig Farm.

T. ABELL, Assistant Adviser, Pig Branch.

ACKNOWLEDGMENT is due to the Government Botanist and officers of the Forestry Department for supplying information regarding species of trees and their distribution included in the following notes.

To obtain good results in the piggery the stock should be of the correct type, properly fed, and housed to ensure the maximum of comfort and freedom from disease. Where pigs are run in paddocks some provision should be made for shelter from the hot summer sun and protection from cold winter winds, in addition to the dry sleeping quarters. This can be done cheaply and profitably by planting the most suitable trees.

Windbreaks and shade trees are valuable not only for their primary use as shelter; when planted in rows as windbreaks they give valuable aid in preventing erosion of the paddocks, and some of them have a cash value as mill timber when mature.

As even the quickest growing trees require a few years to reach a useful size, and may be expected to live for many years, haphazard planting should not be made. Careful planting will save errors which may not otherwise be noticed until the trees have been planted for some years.

Firstly the farmer should decide the number of pigs his farm is capable of carrying and allot the area of land for the piggery accordingly, making provision for any proposed increase if necessary. Then he should consider the piggery layout and, when a good plan has been evolved, stick to it. An established piggery may not be built to a suitable plan, in which case gradual alteration over a number of years may be planned to convert it. Therefore the tree plantings should be made with a definite future objective in view, so that when the piggery is completed the trees will be in their correct places. Windbreaks thus will be planted so that the trees are along the boundary of the piggery from which the troublesome winds blow, and shade trees placed so that the pigs can use the shade from the hot afternoon sun.

Careful thought should be given to selection of trees. It is necessary to choose those which suit the climatic and rainfall conditions of the district, resist frosting, make fairly rapid growth, and live for a number of years. It is a good plan to look around the district and note the trees

that thrive under conditions similar to those on the home farm. Also, if any school forestry plots are in the neighbourhood, they should be inspected to see what some of the unfamiliar trees are like, and if they are likely to do well at home. If an officer of the Forestry Department is stationed in the district a talk with him will ensure the selection of suitable trees for your conditions.

There are two classes of tree from which to make a choice, native trees and imported species. Many of the native trees provide good shade, and if rapid-growing varieties are planted they are quite suitable. Those that are inclined to grow tall are often improved by judicious lopping to increase the number of spreading branches. Certain trees which carry scanty foliage when growing in scrub or forest make excellent well-spread shade trees when planted singly in the open. The Brigalow (*Acacia harpophylla*) is a good example of this type.

Plate 18.

A windbreak of *Pinus patula*, giving the required compact shelter to a suitable height.

[Photograph by courtesy of the Forestry Department.

Shade trees should carry a fairly dense foliage on branches well spread out from the trunk. It will be necessary to prune the lower branches from some to give ample clearance above the ground and allow the early morning sunshine to penetrate beneath the tree and help to keep the ground sweet and dry. The Poinciana is an excellent shade tree, as the head of well-spread foliage is carried several feet above the ground. It is, however, subject to frost damage.

Deciduous trees are useful in certain positions, as they provide shade in summer, and when the leaves have fallen in winter the sun can sweeten the ground beneath the tree. The Mulberry and Jacaranda are two good examples, as they will grow in a wide range of soils, provided there are no heavy late frosts to kill new growth.

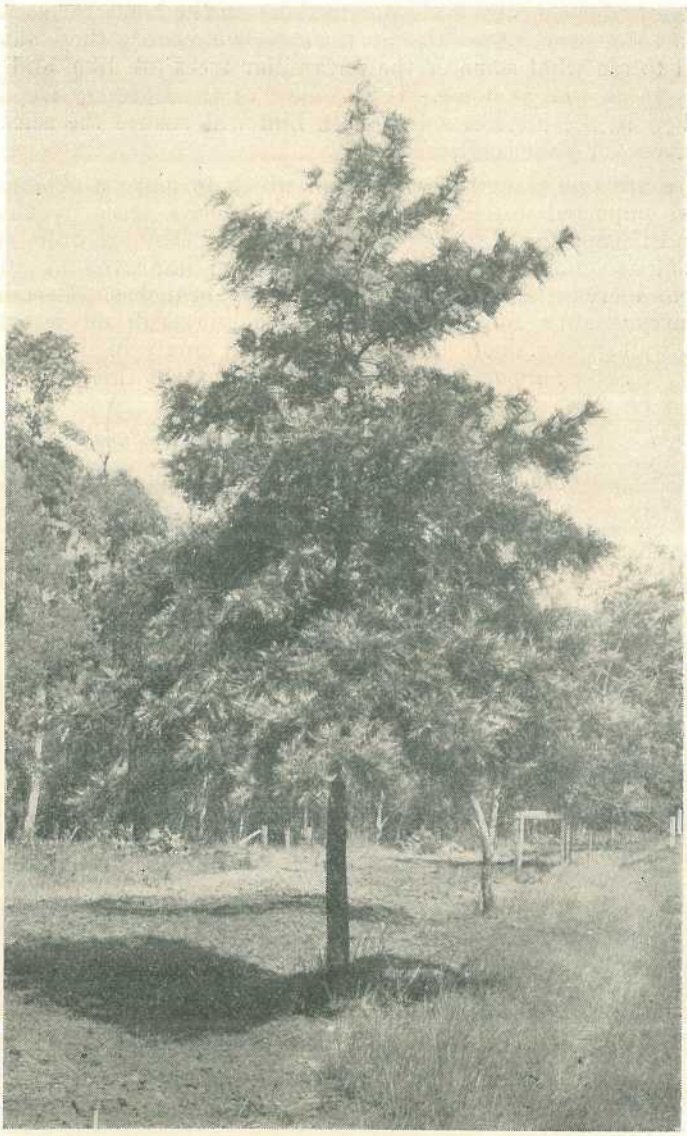


Plate 19.

When grown singly in the open many of the native trees provide good shade. The young Silky Oak above is carrying ample well-spread foliage.

Of the better known trees the Mango, Weeping Fig, Jacaranda, Poinciana, Camphor Laurel, Portuguese Elm, and Silky Oak provide good shade; the Queensland Nut, Cape Chestnut (*Caledendron capense*) and *Buddleia madagascariensis* are suitable for positions where smaller trees are required.

Trees for windbreaks are required to provide compact shelter to a fair height rather than to spread over a large area, hence different trees are generally used, though some of the shade trees make good

windbreaks when planted in rows. The windbreaks should be planted outside the piggery fence so the pigs cannot root up the ground and make wallows beneath the trees. Planting in two rows is generally recommended, distance between trees and rows varying according to the tree planted and whether pruned or not. For instance, the Mexican cypress is planted 8 feet between trees, 5 feet between rows, with the trees of the second row opposite the centre of the gaps in the first row, when unpruned, and about 5 feet apart when pruned to a fairly low windbreak.

As many trees do not give complete shelter down to ground level it is advisable to plant shrubs as a low hedge on the outside of the windbreak. Some native shrubs can be used for this work, a good specimen in the lighter coastal soils being *Leptospermum citratum* (lemon-scented ti-tree). Others such as Privet, Cassia, Buddleia, Pittosporum, and the Mexican and Arizona Cypress give good low shelter if planted a few feet apart and pruned to form a dense mass.

Plate 20.

The dense foliage of this Broad-leaved Pepperina is carried well above the ground, allowing the morning sunshine to keep the earth beneath the tree dry and sweet.

[*Photograph by courtesy of the Forestry Department.*

In addition to the native trees and others used in parks and gardens, several of the pine and cypress species are useful if soil and climatic conditions are favourable. These trees in general are resistant to frost. As a guide to plantings in the area from Rockhampton to the southern border, embracing the main pig-producing areas, some suggestions are given below. It should be remembered that these are only suggestions, and the remarks in the paragraph on tree selection should be noted carefully before making a selection.

COASTAL AREAS.

Rainfall over 40 Inches.

Windbreaks—

Sandy soils: *Callitris cupressiformis* (Coastal or Sand Cypress), *Callitris columellaris.*

Heavier soils: *Cupressus lusitanica* (Mexican Cypress).

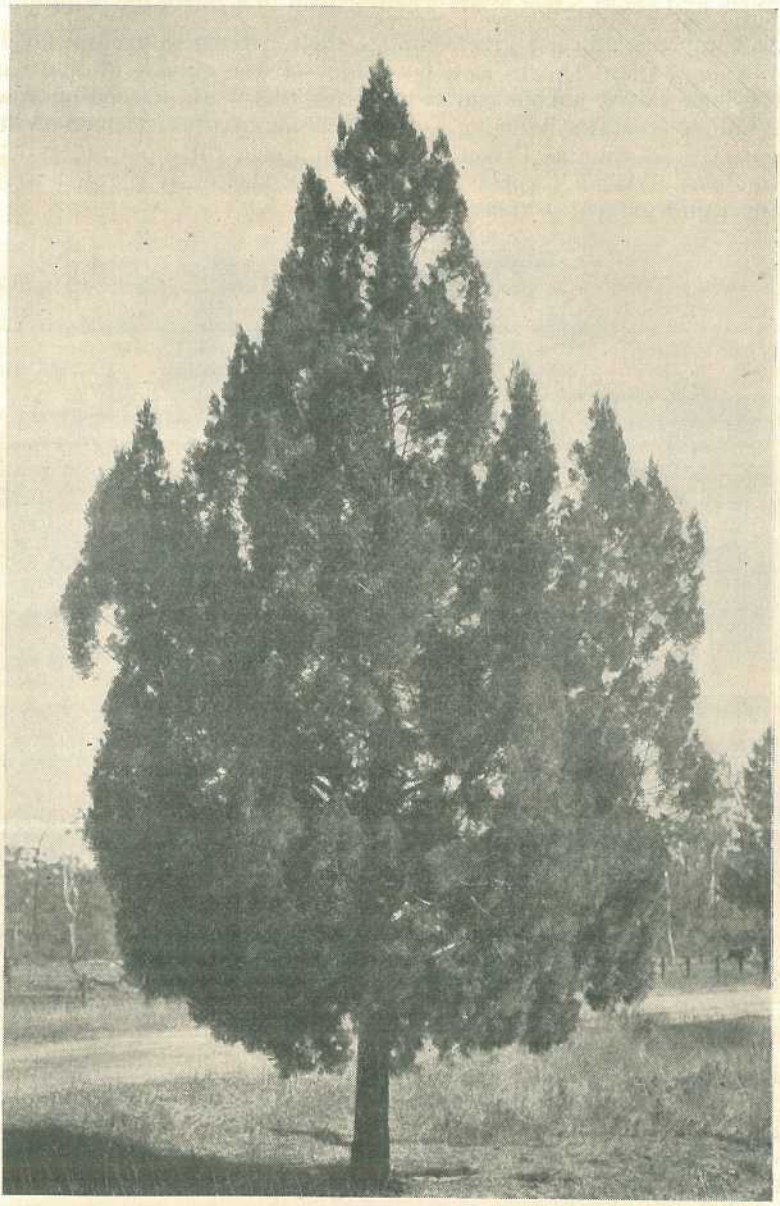


Plate 21.

The Sand Cypress does well on the light sandy soils of the coastal belt. In addition to forming a good windbreak when planted in double rows, well-grown single specimens are useful shade trees.

Shade Trees—

Pinus taeda (Loblolly Pine), *Pinus caribaea* (Slash Pine), *Pinus patula* (Patula Pine).

Remove the lower branches from these three pines as they grow to obtain headroom. They can also be planted in two rows to form windbreaks.

On scrub soils the Patula Pine, Hoop Pine, and the Queensland Nut will give good results, the latter two away from heavy frosts.

Plate 22.

When the lower branches are removed to give ample head room the *Pinus patula* is a shapely shade tree. Compare the manner of growth with the same trees in the windbreak.

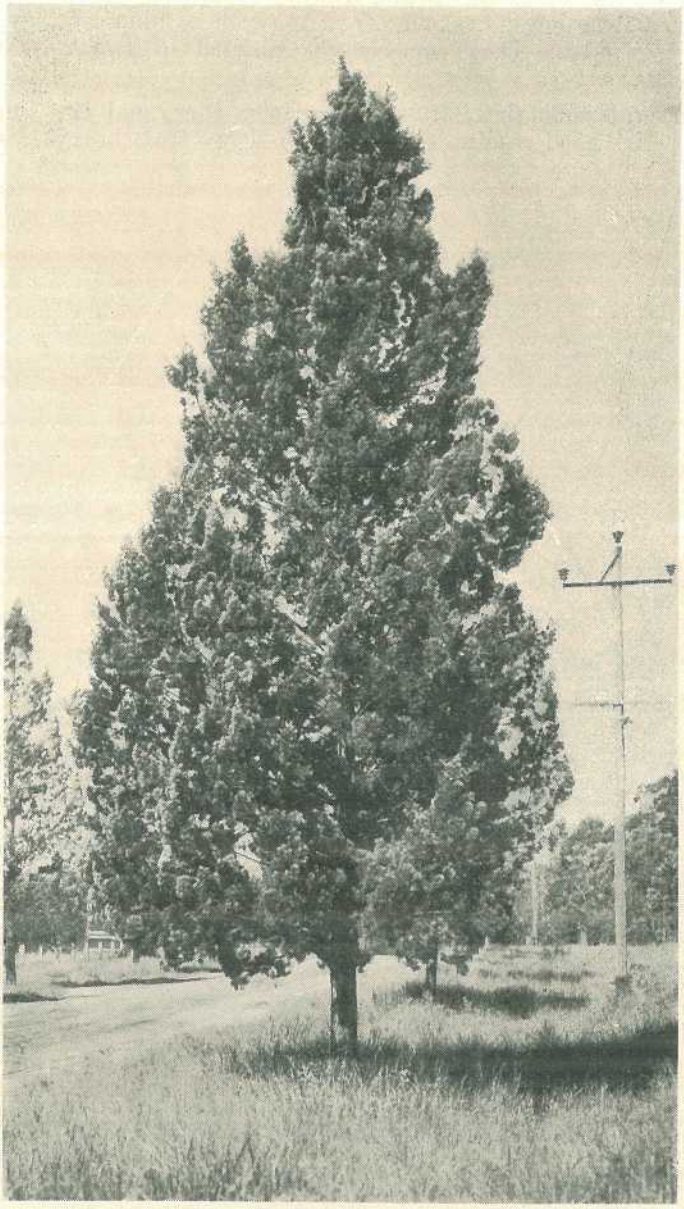


Plate 23.

The Western Cypress prefers a light sandy soil. Like the Coastal or Sand Cypress, it may be used for windbreaks or shade trees.

30 Inches to 40 Inches Rainfall Areas.

Windbreaks—

Cupressus arizonica (Arizona Cypress. Prefers deeper soils).

Shade Trees—

Pinus patula (Patula Pine).

The broad-leaved Pepperina (*Shinus terebinthifolius*) is a good shade tree, as it is flourishing under a wide range of soil and climatic conditions.

DARLING DOWNS.

Windbreaks—

Except in heavy black soils: *Cupressus arizonica* (Arizona Cypress), *Cupressus torulosa* (Torulosa Cypress), *Cupressus lawsoniana* (Lawsoniana Cypress).

Shade Trees—

Except in heavy black soils: *Pinus patula* (Patula Pine), *Pinus longifolia* (Chia Pine), *Platannus occidentalis* (Plane Tree).

Windbreaks—

Heavy soils: *Pinus longifolia* (Chia Pine. Two rows), *Cinnamomum camphora* (Camphor Laurel).

Shade Trees—

Heavy soils: *Pinus lonifolia* (Chia Pine), *Cinnamomum camphora* (Camphor Laurel), *Grevillea robusta* (Silky Oak).

In the lighter sandy soils of the Downs, the Western Cypress (*Callitris glauca*) is a useful tree for shade or windbreaks.

In addition the Jacaranda, Pepper Tree, Chinese Celtis (*Celtis sinensis*)—sometimes called Portuguese Elm—Phytolacca bella sombra, Brigalow, and Wilga are good shade trees for the Darling Downs.

GRANITE BELT.

Windbreaks—

Cupressus lusitanica (Mexican Cypress), Cupressus arizonica (Arizona Cypress).

Shade Trees—

Pinus patula (Patula Pine), *Pinus radiata* (Insignis Pine).

The above list is mainly to show the distribution of the pine and cypress trees and is not a list of all suitable species. Many trees mentioned in the text, such as the Mango, Jacaranda, Fig, Broad-leaved Pepperina, Silky Oak, Portuguese Elm, and Camphor Laurel, have a wide distribution and can be grown successfully in a number of districts.

The following trees may be obtained by applying to the Secretary, Forestry Department, George Street, Brisbane:—

Callitris cupressiformis, Cupressus lusitanica, Cupressus arizonica, Hoop Pine, Silky Oak. Supplied in planting tubes at 35s. per hundred.

Pinus taeda, Pinus caribaea, Pinus patula, Pinus radiata, Pinus longifolia. Price 10s. per 100, but not in planting tubes.

Many of the other trees can generally be obtained from nurserymen, cost depending on size of the tree and its availability.

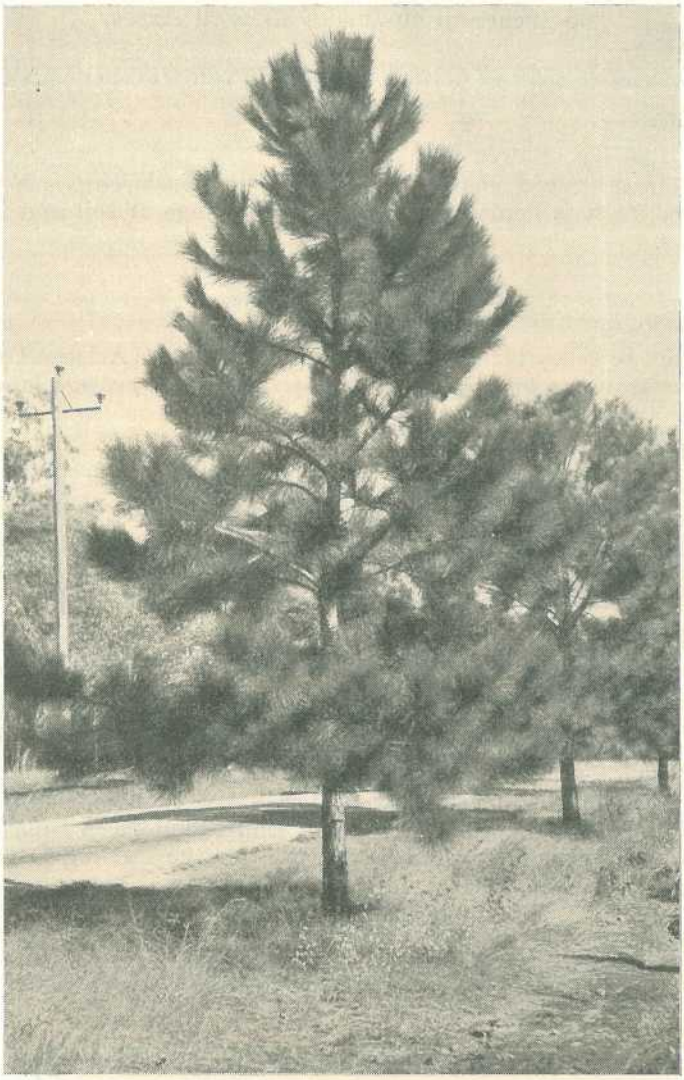


Plate 24.

When grown under suitable soil and rainfall conditions the Slash Pine (*Pinus caribæ*) quickly develops into a useful shade tree.

All trees when planted should be protected from stock. Windbreaks should be outside the piggery fence, and if necessary cattle kept away by a second fence. Shade trees in the piggery should be protected by a strong tree guard, for the pigs will root out or ringbark unprotected trees. When there is a possibility of the young trees being damaged by frost or hot sun some form of covering should be placed over the guards. Never plant trees in hollows or positions where the ground may become waterlogged.

Farmers are advised not to plant the White Cedar, as the berries from this tree are poisonous to pigs.

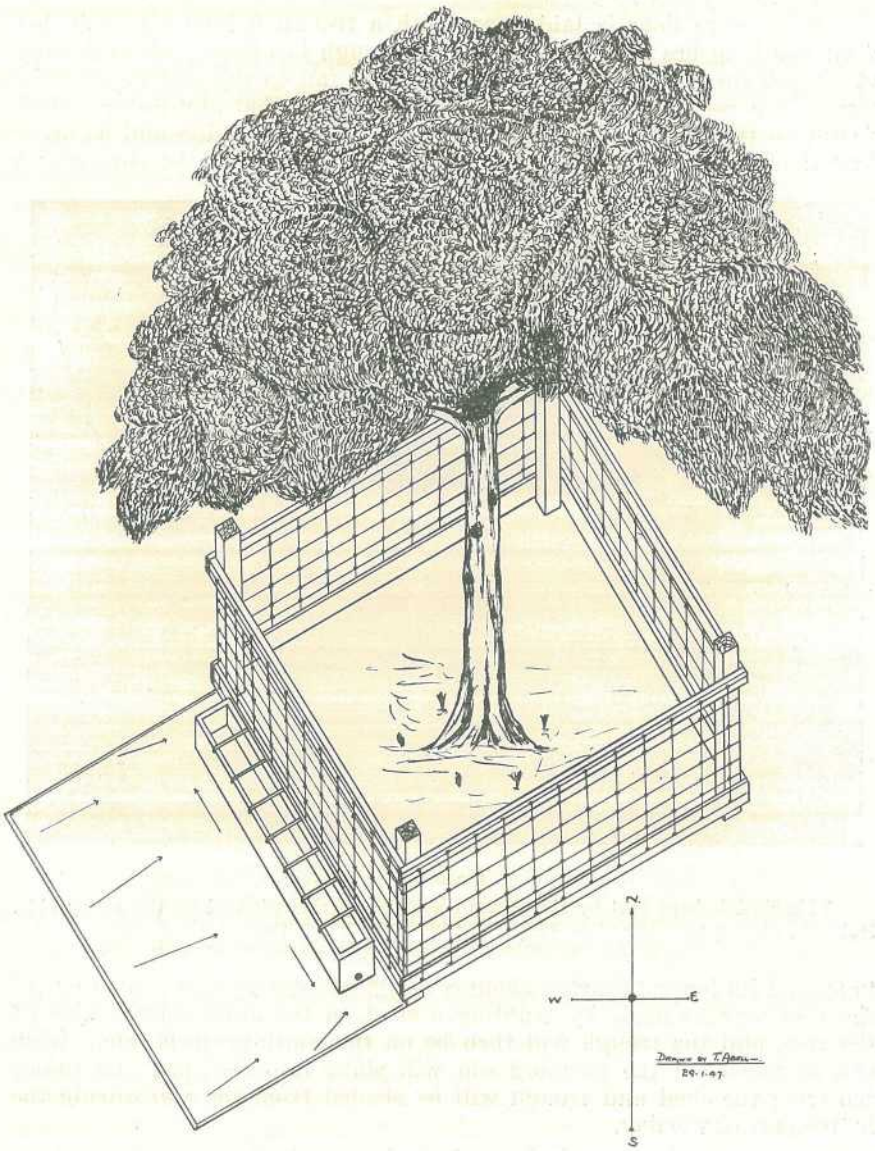


Plate 25.

Plan of combined shade tree and water trough. A shed may also be built to take advantage of the tree's shade.

A method of supplying clean cool drinking water to pigs without having a sloppy mess around the trough, and at the same time providing water for the shade tree, is given here. It is advisable to plant a tree that does not lose its leaves, and the soil must be well drained.

A concrete floor is laid down with a trough 6 inches to 9 inches deep and 9 inches wide let into it; the trough has bars let into the top at 10-inch intervals. The floor has a slight fall to the side nearest the tree with a raised lip on the other three sides, so that any water spilled drains to the lower side. A tree is planted on this side and securely fenced off from the pigs. As the tree grows it should be encouraged

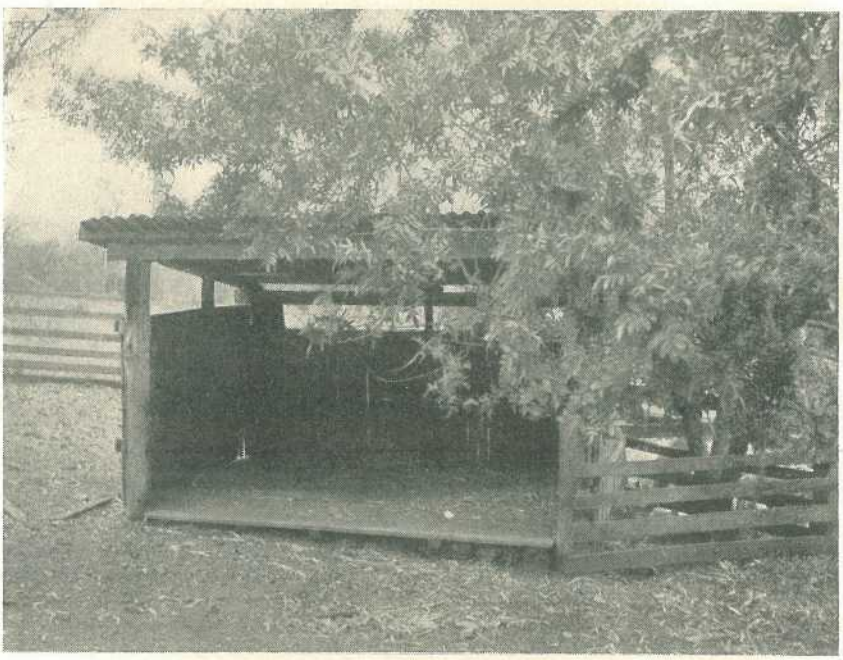


Plate 26.

This shed is kept cool by the Broad-leaved Pepperina planted on the sunny side. Note the strong tree guard to keep the pigs away from the roots.

to spread its lower branches about 8 feet above the ground. Full use of the tree may be made by building a shed on the north-eastern side of the tree, and the trough will then be on the south-western side. With this arrangement the morning sun will shine into the shed and under the tree; the shed and trough will be shaded from the sun during the hotter part of the day.

Wallows and accumulations of damp dead leaves beneath trees are possible sources of infection by worm parasites, hence it is necessary to allow the morning sun to penetrate beneath the tree; remove and burn dead leaves, prevent wallows forming by providing adequate drainage, and erect a pig-proof tree guard.

Trees intelligently used around the piggery can help considerably in the task of keeping the pigs healthy and contented, and any effort required to establish them will be repaid amply in the future.

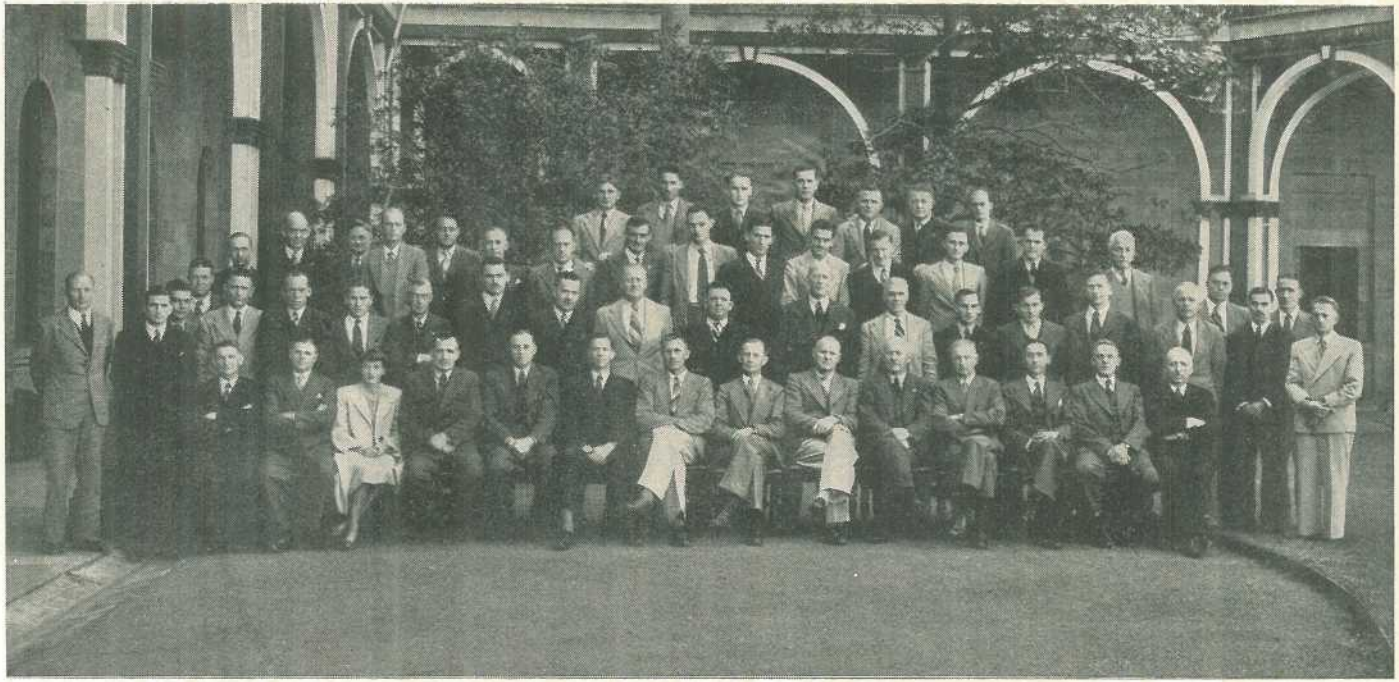


Plate 27.

ANNUAL CONFERENCE OF THE AUSTRALIAN VETERINARY SURGEONS' ASSOCIATION, BRISBANE, JUNE, 1947.

MARKETING

Marketing and Economic Notes for June.

Markets in the East.

"WHAT will be the world pattern of production and trade a few decades hence? When the Orient becomes industrialized it will have a greater density of population per square mile than any other continent, even greater, perhaps, than the United Kingdom. It will be impossible for the Orient to feed itself on any reasonable nutritional standard, even if per acre yields were brought up to the level of the Netherlands. The logic is that the Orient when it can afford to will become a permanent importer of a part of its food supply and the tonnage involved will be enormous. The food can only come from the more sparsely populated continents, Australia, North and South America, and perhaps Africa."

(Extract from an address presented by P. Lamartine Yates, Food and Agricultural Organisation, at the annual meeting of the American Farm Economics Association, Philadelphia, December 27, 1946.)

World Food Supply.

Despite world-wide efforts to increase production, early crop conditions in important producing areas indicate that the world food supply for the 1947-48 consumption year may be little, if any, larger than in 1946-47, according to the United States Department of Agriculture. Declines in grain production are indicated in several importing countries, but may be offset by increased production in the principal exporting regions.

Central Queensland Egg Marketing Board.

Egg producers in Central Queensland, with the assistance of the Marketing Division of the Department of Agriculture and Stock have established a producer-controlled marketing board for eggs in the region extending from Bundaberg to Mackay.

The Egg Board has assumed control as from the 1st of July and has arranged with the Central Queensland Meat Export Company at Lakes Creek, Rockhampton, to act as its agent in the receiving, handling and marketing of eggs.

Producers in this area now control their own industry in their own interests and thus will assist in placing their industry on a firmer footing.

Production Trends—June.

Milk and cream production is declining as herds are drying off, but quality is satisfactory, and dairy cattle are holding condition.

Receivals of eggs by the Queensland Egg Marketing Board during June were approximately 398,600 dozen as compared with 342,846 dozen for June, 1946.

Cotton ginnery receivals during the month were light, and difficulty is being experienced in securing pickers. Grades and staple lengths of most consignments have been satisfactory.

Fruit and vegetables have matured more slowly than was anticipated, because of dry, cool weather conditions.

It is estimated that the 1947 sugar crop will produce 550,000 tons of sugar.

Stock generally in the pastoral areas are maintaining their condition, and prospects for supplies for slaughter are fairly good.

GENERAL NOTES

Staff Changes and Appointments.

Following the appointment of Mr. A. F. Bell as Under Secretary of the Department of Agriculture and Stock, Mr. R. Veitch, B.Sc. (Agric.), B.Sc.For., F.R.E.S., Director of the Division of Plant Industry, has been appointed Assistant Under Secretary (Technical) in the Department. Mr. Veitch is a graduate of the University of Edinburgh, and after service in Fiji, joined the Department as Chief Entomologist in 1925. He became Director of the Division of Plant Industry (Research) in 1937.

W. A. T. Summerville, D.Sc., Director of Horticulture, succeeds Mr. Veitch as Director of the Division of Plant Industry. Dr. Summerville joined the Department in 1922, and was for some years Officer in Charge of the Horticultural Field Research Station at Nambour. In 1936 he was sent abroad by the Department and made extensive travels investigating methods of production.

Mr. N. J. King, Senior Adviser, Sugar Experiment Station, Bundaberg, has been appointed Assistant Director of the Bureau of Sugar Experiment Stations, Department of Agriculture and Stock.

Mr. King joined the Department in 1922. In 1938 he represented Queensland at the International Conference of Sugar Cane Technologists held in Louisiana.

The resignation of Dr. F. H. S. Roberts as Acting Director of Research in the Division of Animal Industry has been accepted. Dr. Roberts has been appointed to an important position in the Council for Scientific and Industrial Research, but it is understood that his services will still be available to the pastoral industry of Queensland.

Dr. J. Legg will assume the position of Director of Research in the Division.

Mr. A. R. Nott, Acting Divisional Veterinary Officer, Rockhampton, has been appointed Divisional Veterinary Officer, Department of Agriculture and Stock, Rockhampton.

Fertilizer Rationing.

The Minister for Agriculture and Stock, Mr. H. H. Collins, has announced that because of the shortage of sulphate of ammonia available for import into Australia, it is necessary to reintroduce a modified system of rationing. A limited amount of nitrate of soda will be available free of rationing.

Sulphate of ammonia will be available for use in the production of fruit and vegetables only in mixtures, and mixtures will not be permitted to contain more than 10.5 per cent. nitrogen in the form of sulphate of ammonia. As mixtures are not required in the Lockyer and Fassifern districts, potato growers in those districts will be granted a limited quantity of straight sulphate of ammonia. No straight sulphate of ammonia will be available for any other fruit or vegetable crop.

Sugar growers, if they desire to use either straight sulphate of ammonia, or sulphate of ammonia in the form of mixtures, should place orders with the dealer of his choice before the 15th August, 1947. So far as the grower is concerned, no further application will be required.

Rations will be announced as early as possible. In the meantime, in order to spread delivery and take advantage of any transport facilities that are available, any sugar grower who desires straight sulphate of ammonia may obtain not more than one-half of the amount of his ration during the period 1st July to 31st December, 1946.

All straight sulphate of ammonia delivered as from the 1st June, 1947, onwards will be taken as part of the grower's ration.

The position will be reviewed as soon as the supply position warrants. Other fertilisers will not be subject to rationing.

D.D.T. in Tick Control.

The Minister for Agriculture and Stock (Hon. H. H. Collins) has announced the receival of a progress report on experiments carried out in the Brisbane Valley area in the use of D.D.T. for tick control. These experiments with D.D.T. at a strength of ·5 per cent. were initiated in June, 1946, since when over 5,000 head of stock have been through a dipping vat provided for the purpose, and the results were very satisfactory. Consequently it was subsequently decided in October last to charge a second vat with D.D.T. at a strength of ·25 per cent., and the result of this experiment should be available soon.

The property on which the experiments are being conducted carried cattle heavily infested with ticks when the experiments were initiated, in spite of regular dipping in arsenical preparations. Since October last no arsenic has been used in the dip, and, notwithstanding that conditions on the property have been favourable for tick life, infestation is lighter than for many years.

The Minister has advised that further work will be continued on the use of D.D.T. preparations for dipping of ticks, not only to ascertain its efficacy for eradication, but also to check up on the most economic methods for its use.

Price of Raw Sugar.

The Minister for Agriculture and Stock (Hon. H. H. Collins) has announced the issue of a proclamation fixing the delivery price of raw sugar for the 1947 season at £18 4s. per ton f.o.b., for up-to-peak sugar. Conditions of acquisition are the same as last season. He wished to re-affirm that it was the intention of the Government to adhere to the f.o.b. policy, said Mr. Collins. Under this basic principle, the mill-owner is responsible for costs, charges, storage and losses until his sugar is delivered to the Sugar Board f.o.b. in accordance with the proclamation.

Consideration has been given to the position of excess sugar and, although little excess sugar may be produced this season, it has been decided to maintain past principles under which excess sugar was marketed outside the No. 1 pool if a market could be found for it. At present, there is an unsatisfied market which will return a higher price than the No. 1 pool.

Sugar Board arrangements include a scheme for equitable removal of raw sugar from the various districts, and, under normal conditions, this operates justly if sugar can be shipped in accordance with the scheme. Where interruptions to shipments occur because of industrial trouble, or any other cause, difficulties arise; but this may occur under any scheme.

In-store advances made on sugar in stock and the taking over of deterioration on sugar not shipped by the end of February remove to a great extent the burden on mill-owners by delayed or unequal shipments. These measures may not materially assist districts which get their sugar away expeditiously, but help very much, as they were designed to do, districts which may be under the disadvantage of inadequate clearances.

Ginger Marketing Board.

Mr. G. C. Burnett, of Buderim, has been elected unopposed as growers' representative on the Ginger Marketing Board to fill the vacancy caused by the death of Mr. L. T. Kurburgh.

State Wheat Pool Election.

The Regulations dealing with State Wheat Board Elections under *The Wheat Pool Acts*, 1920 *to* 1930, have been rescinded, and new Regulations issued. In the main, the new Regulations provide for the substitution of straight-out voting for preferential voting, and the insertion of provisions dealing with the submission of nominations by candidates.

It is provided that candidates may withdraw from the election after nomination, provided they deliver a signed notification not later than three days after the closing date for nominations. It is also provided that if a candidate dies or becomes disqualified between the closing date for nominations and the date of the election his name will be omitted from the ballot-papers if they have not then been prepared. If they have been prepared, but not issued, the candidate's name will be deleted; and if they have been prepared and issued, any votes cast for the dead or disqualified candidate will be disallowed. Certain representations were made for an alteration of the system of voting from the block system to the ward system, but it has been provided that the block system shall be retained.

Rural Topics

Makers Learn from Users.

"Let the other fellow experiment" is a saying that looks all right at first glance, but the implication is that the farmer should never get off the well-defined road, or out of the old well-worn rut. "Nothing venture, nothing win," and often it is a good thing to straddle the rut, or find a new way round. Take agricultural machinery, for instance. How often has the maker been indebted to the user? In fact, many of our modern farm implements and machinery units had their origin in the fertile brain of farmers, who gave a lot of thought to the finding of easier and quicker ways of doing a job. Machinery makers acknowledge the value of many a suggestion that farmers have made for the more effective working of their field units. A famous agricultural machinery manufacturer, addressing a gathering of farmers many years ago, said that "the makers must learn from the users." So, if we are satisfied always to let the other fellow experiment and do not use our own brains and opportunities, or if we keep the results of our own experience to ourselves, we may be guilty of mental laziness or carelessness, thoughtlessness, or even selfishness. The fact remains, however, that users have given manufacturers something more than useful hints. This form of co-operation is obviously valuable to rural industry generally.

Keep the Tractor in Trim.

The increased use of mechanical power since the war makes it timely to remind farmers that no machine will continue to yield its best performance without something more than routine attention at intervals, and the tractor that has a season of hard work behind it will now repay expert scrutiny and adjustment.

Skilled inspection makes it possible to correct small troubles which, if neglected, may entail costly repairs and the loss of the tractor when it is urgently needed. The result will be the added certainty of full power and efficiency whatever the job, and of trouble-free running during the busy days ahead.

Periodic inspection and overhaul is essentially a job for the trained mechanic using modern tools. Leading dealers, for example, are equipped with scientific instruments for tracking down troubles at an early stage and specialised tools for correcting them. Similar results cannot be obtained by rule-of-thumb methods.

It is not possible to give an exhaustive list of points likely to need attention. Everything depends upon the length of time that the tractor has been in service, and the manner in which it has been handled and maintained.

The serviceman can check the engine for power and regular running, correcting any mechanical faults that have developed, and adjusting the fuel and ignition systems. Any sign of knock in the engine or transmission should be carefully investigated and remedied before serious damage occurs.

Engine knocks often indicate the need for adjusting big end or main bearings, although if the tractor has been in use for some time the cause may be "carbon knock," the cure for which is decarbonisation.

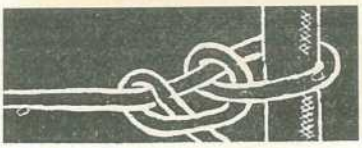
The garage man can also check the steering, clutch and transmission, brake adjustment, wheel bearings, &c. He will satisfy himself as to the efficiency of the cooling system, and check the condition of all oil and grease retaining washers and covers.

If the paint has become badly damaged we suggest the advisability of repainting, which is desirable to prevent rust spread.

GADGETS AND WRINKLES

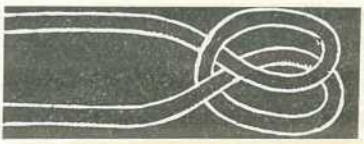
HANDY HITCHES.

Hitches form a useful group of knots similar in construction to the true knot, with the exception that its free end is usually held against the object by the tight part of the rope.



The double half hitch (Sketch 1) makes a secure fastening, even when the load is intermittent.

It is made by tying a half hitch in the usual way. After the end of the rope has been passed through the loop, it should be brought under around the standing part of the rope and through the loop formed.



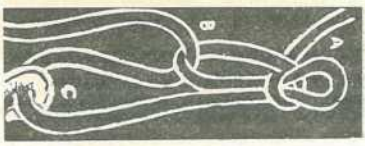
The clove hitch, useful for fastening guy ropes to posts or securing rabbit snares to pegs, is made by forming a loop by passing the end of the rope under the standing part fairly well back from the end of the rope. Form a second loop, similar to the first loop. Pass the second loop over the first loop (Sketch 2*a*) and slip the double loop formed over the object to which the rope is to be fastened, and draw tightly (Sketch 2*b*).

A secure method for handling pipe can be ensured by studying this diagram of the well-pipe hitch.

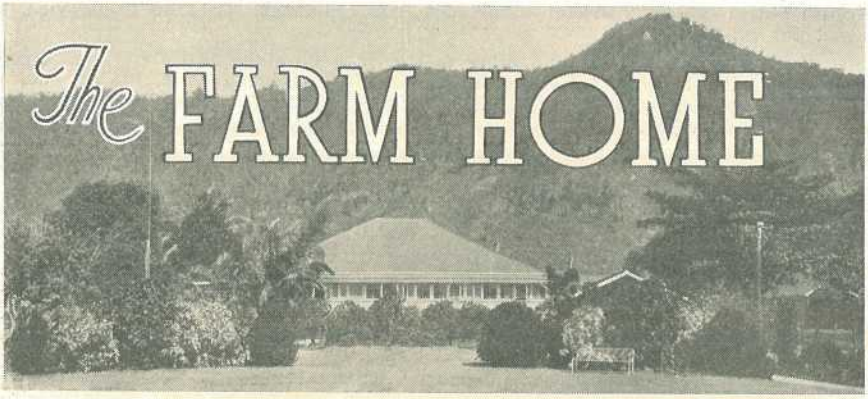
The hitch is very desirable for handling pipe, because it can be raised or lowered on the pipe without loosening the knot itself in any way, and invariably holds the pipe secure when the load is applied upon the standing part.

It is made by wrapping the end of the rope three or more times below the standing part. Pass the end over and around the standing part and through the opening between the end and the standing part, and draw tightly.

A convenient fastening for a rope used in binding a load is the rope tackle or hay knot. It is the only hitch which will permit the tightening of a binding rope to any degree.



In making the hitch, first form a bight in a rope about twelve or fourteen inches long, and turn a half hitch about the end of the bight with the standing part of the rope. Pass the end of the rope through a convenient ring or hook at the bottom of the hay cart (*c*), through the bight (*b*), thus tightening the standing part of the rope (*a*) over the load.



Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

DON'T TREAT CHILDREN'S COLDS LIGHTLY.

WE might say there are two kinds of colds; the kind children catch and the kind which catch the children.

The colds they catch are the ones handed on by the careless people and other children who have colds and who sneeze or cough into the atmosphere and do not cover their mouths and noses with a handkerchief.

Using common drinking vessels or kissing on the mouth are equally sure ways of catching colds. So are the crowded rooms and buildings with poor ventilation into which so many children are taken even in winter.

Colds which catch the children seem to be caused by germs already in the throat, ordinarily harmless but ready to go to work once resistance to them is broken down. Sudden chilling, insufficient sleep, too many sweets and cakes and not enough of the protective foods—milk, butter, eggs and fruit—all undermine bodily resistance.

Colds need serious treatment. When a child shows signs of starting a cold—"snuffly" nose, burning eyes, and a prickly feeling in the throat—put him to bed and keep him there until the symptoms subside. Give him a light nourishing diet—milk and milky foods, vegetable broth, fruit drinks and fruit, especially oranges—and plenty of water to drink. A hot bath at night is good provided the child is put straight into warm pyjamas and popped into a warm bed afterwards. The chest may be rubbed with warm camphorated oil or similar preparation, and the child should be propped up on a higher pillow than usual to make it easier for him to breathe and prevent his throat tickling. If the cough is troublesome or the child complains of earache or pains in his head, your doctor should be called. Use only the medicines he prescribes. It is not usual to give medicine to babies or very young children.

Colds can be prevented. Better than treating a cold is preventing it. To do this keep children away from people with colds even if they are members of the family. Do not kiss children on the mouth yourself or allow others to do so. Do not take little children into crowded buildings like picture shows or have them out at night especially in winter time when so many people have colds. Give each child his own cup to drink out of at home and at school and see that cups and spoons are washed in scalding soapy water after use. Clothe children suitably for the weather—keep their feet and legs warm and dry. Wet shoes and stockings should be changed at once. See that they have plenty of play in the fresh air and sunshine and above all give the right kind of food for health.

If your child is always catching cold take him to your doctor or a toddlers' health centre if one is available and have him examined. Most of this advice is good for grown-ups too.

Further advice on this and other matters can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters *"Baby Clinic, Brisbane."* These letters need not be stamped.

IN THE FARM KITCHEN.

Onion Broth.

Mince 6 large onions and fry them in 2 oz. butter for five or six minutes. Add 3 cups white stock and simmer for 45 minutes. Put through a sieve and keep hot. Melt 1 tablespoon butter in a saucepan, add 2 tablespoons flour, cook a little, then add 2 cups hot milk and stir until mixture thickens. Simmer for five minutes, then add onion mixture. Beat 2 egg yolks well with ¼ cup milk, add to soup and season with salt and pepper, and, if liked, a little cayenne. Do not allow soup to boil after yolks are added, but turn into individual earthenware pots. Sprinkle with a little grated cheese and place in hot oven or under griller to melt cheese. Serve at once.

Cream of Spinach.

Cook 1 bunch spinach in the usual way and rub through a fine sieve. Melt 2 level tablespoons butter in a saucepan, add 2 level tablespoons plain flour and cook a little, add 2 cups stock and bring to boil and then simmer for 5 minutes. Now add 2 cups hot milk and spinach, salt and pepper, and if liked a little grated nutmeg. A little cream may be added just before serving.

Three in One Cookies.

Cream ¼ cup butter or 2 dessertspoons each of dripping and butter, ½ cup sugar, pinch of salt, and 1 egg. Beat well. Fold in 1¼ cups of self-raising flour and ½ cup cornflour well sifted together, add vanilla essence to flavour. If too stiff, add a little milk. Divide mixture in three parts.

For kisses, bake in small teaspoons on greased slide and join together with white icing when cold.

For iced cookie, roll in small balls, place on greased slide and flatten with fork. Ice with pink icing when cold.

For jam drops, put teaspoons of mixture on greased slide, make wells in centre with floured finger, and fill with jam (plum or raspberry). Bake in a moderate oven until golden brown. Store in airtight tins.

Orange Fruit Cake.

Quarter cup butter, ½ of a cup of sugar, 1 egg, ⅔ of a cup of orange marmalade, 2 cups flour, 1 teaspoon baking powder, ½ teaspoon carbonate soda, ½ teaspoon spice, ½ cup chopped raisins, ½ cup chopped nuts. Cream butter, add sugar, beat egg, beat together, add marmalade. Sift flour, soda, baking powder, spice, and add to mixture raisins, nuts. Bake in a loaf tin in moderate oven.

Sultana Scones.

Six ounces flour, a pinch of salt, 2 oz. of lard or margarine, 1 teaspoon of baking powder, 1 oz. of castor sugar, 1 oz. of sultanas, 1 gill of milk. Mix the salt, flour, and baking powder and sift them. Rub in the lard, add the sugar and the sultanas free from stalk. Stir in milk to form a dough that is soft but not sticky. Turn it on to a floured board and form into two rounds. Mark each round in four and bake in well-greased sandwich tins in a hot oven 20 to 30 minutes.

Brown Scones.

Eight ounces of wholemeal flour, 1 oz. of dripping, 1 oz. of sugar, 1 teaspoon of cream of tartar, ½ teaspoon of carbonate of soda, ¼ teaspoon of salt, 1 gill of milk. Sieve together the flour, salt, soda, and cream of tartar, and add the sugar. Mix all dry ingredients together and add the milk, stirring all together with a wooden spoon. Turn the mixture on to a floured board, shape it into two round, flat cakes. Put them on a greased baking tin, cut each in four, and bake in a

QUEENSLAND WEATHER IN JUNE.

Over average district rainfall totals in the Peninsula and North Coast Barron areas were mainly due to light daily showers along the coastal fringe. The most useful over average distribution occurred in Lower West and Far South-West where district averages were 106 and 128 points respectively, mainly the result of a rain spell on the 4th and 5th. Light to useful benefits spread east through the Warrego and Downs to the South Coast, but during the rest of the month practically no rain was recorded in the State except on the Tropical Coast, and except for the abovementioned areas all other districts were well below the usual light to moderate seasonal averages. In the wheat-growing and other farming areas of the south-east quarter an additional half inch to inch agricultural rain during July would consolidate the favourable conditions of May. Normal dry weather wintering conditions are being experienced over inland pastoral areas, except for a belt of country which stretches from the Central-Western Border areas, the Central Interior, to the Central Highlands. Many districts in this belt registered only patchy and poor amounts during the summer and commenced the dry season under unfavourable conditions.

Pressure.—A shallow depression in southern Queensland and northern New South Wales connected with another low centre off the south-east coast of New South Wales on the 4th and 5th produced the only rains of the month in southern Queensland. Although there was considerable activity in the low pressure belt over waters south of the Continent, most of Australia was under the influence of a fine weather series of continental "highs," lacking any definite inland trough formations between the systems. As a consequence prevailing south-east winds brought several periods of moderate seas along the Tropic Coast with the usual daily showers in the far north section.

Temperatures.—Maximum temperatures were above normal throughout the State, mostly from 1 to 2 degrees. Minimum temperatures in tropical sections were mostly above normal, but below normal in the Subtropics, up to 4 degrees at Mitchell. Many frosts were experienced in the south-east quarter of the State, especially round the Downs and Maranoa where Bybera had 26 nights under 40 degrees, Stanthorpe 25, Dalby and Warwick 24, and Mitchell and Tambo 21. Low terrestrial minimum readings included 13 degrees at Bybera (29th-30th), 16 degrees at Stanthorpe (30th), and 16 degrees at Mitchell (30th).

Brisbane.—Pressure $\frac{9+3}{2}$ 30.084 inches (normal 30.076 inches). Temperatures—Mean maximum 71.2 degrees (normal 69.3 degrees); mean minimum 49.2 degrees (normal 51.1 degrees); mean temperature 60.2 degrees (normal 60.3 degrees). Highest daily temperature 78.2 degrees on 24th; lowest daily temperature 41.1 degrees on 30th. Rainfall.—29 points on 1 day (average 259 points on 8 days). Sunshine.—265.8 hours (normal 189.3 hours). Record.—Previous highest 261.7 hours in 1946. Frosts (Suburban) 3 nights (normal 2.8).

The rainfall position is summarised below—

Divisions.	Normal Mean.	Mean June, 1947.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	58	186	221 above
Peninsula South	45	58	29 ,,
Lower Carpentaria	51	12	76 below
Upper Carpentaria	83	3	96 ,,
North Coast Barron	205	226	10 above
North Coast Herbert	285	237	17 below
Central Coast East	197	22	89 ,,
Central Coast West	130	5	96 ,,
Central Highlands	159	7	96 ,,
Central Lowlands	117	8	93 ,,
Upper Western	67	15	78 ,,
Lower Western	73	106	45 above
South Coast, Port Curtis	251	16	94 below
South Coast, Moreton	297	37	88 ,,
Darling Downs, East	183	65	64 ,,
Darling Downs, West	159	43	73 ,,
Maranoa	158	34	78 ,,
Warrego	134	64	52 ,,
Far South-West	101	128	27 above

Commonwealth of Australia, Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

AUGUST.

Supplied by W. J. NEWELL, Hon. Secretary of the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.30	5.18	Cairns	17	41	Longreach	29	40
6	6.27	5.21	Charleville	26	28	Quilpie	36	34
11	6.23	5.23	Cloncurry	41	58	Rockhampton ..	4	16
16	6.19	5.26	Cunnamulla ..	30	28	Roma	16	18
21	6.14	5.28	Dirranbandi ..	21	17	Townsville	15	35
26	6.10	5.31	Emerald	14	24	Winton	33	47
31	6.04	5.33	Hughenden ..	26	44	Warwick	5	3

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	p.m.	a.m.
1	4.27	5.57
2	5.22	6.40
3	6.17	7.19
4	7.12	7.54
5	8.07	8.27
6	9.01	8.58
7	9.57	9.28
8	10.54	9.59
9	11.54	10.32
10	..	11.09
11	12.57	11.51
	a.m.	p.m.
12	2.03	12.41
13	3.11	1.38
14	4.16	2.44
15	5.17	3.54
16	6.11	5.06
17	6.57	6.15
18	7.38	7.22
19	8.15	8.25
20	8.49	9.26
21	9.22	10.25
22	9.56	11.24
23	10.31	..
		a.m.
24	11.09	12.21
25	11.51	1.18
	p.m.	
26	12.38	2.13
27	1.28	3.05
28	2.21	3.54
29	3.16	4.39
30	4.11	5.19
31	5.06	7.55

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville	27;	Cunnamulla	29;	Dirranbandi	19;
Quilpie	35;	Roma	17;	Warwick	4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	29	10	44	25	19	0	52	28
6	20	17	36	32	11	8	42	37
11	13	27	28	43	2	18	31	51
16	12	26	27	42	2	18	30	50
21	22	15	38	30	13	6	44	35
26	30	10	45	24	20	0	53	27
31	25	13	41	28	16	3	47	32

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	52	5	66	34	50	20	43	6
3	45	10	61	37	46	23	37	10
5	36	19	55	43	40	28	30	17
7	27	29	48	50	33	35	22	25
9	17	38	41	57	26	42	15	33
11	12	48	38	62	23	48	11	40
13	5	53	35	66	19	51	5	44
15	6	51	35	64	20	50	6	43
17	14	41	39	58	24	44	13	35
19	26	30	47	50	32	35	22	25
21	36	19	55	43	40	28	30	35
23	45	10	61	37	46	23	37	10
25	53	6	67	34	50	20	44	7
27	54	4	67	33	51	19	44	5
29	51	6	65	34	49	20	42	7
31	43	13	59	39	44	24	36	13

Phases of the Moon.—Full Moon, August 2nd, 11.50 a.m.; Last Quarter, August 10th, 6.22 a.m.; New Moon, August 16th, 9.12 p.m.; First Quarter, August 23rd, 10.40 p.m.

On August 15th the Sun will rise and set 16 degrees north of true east and true west respectively, and on August 7th and 20th the moon will rise and set approximately at true east and true west respectively.

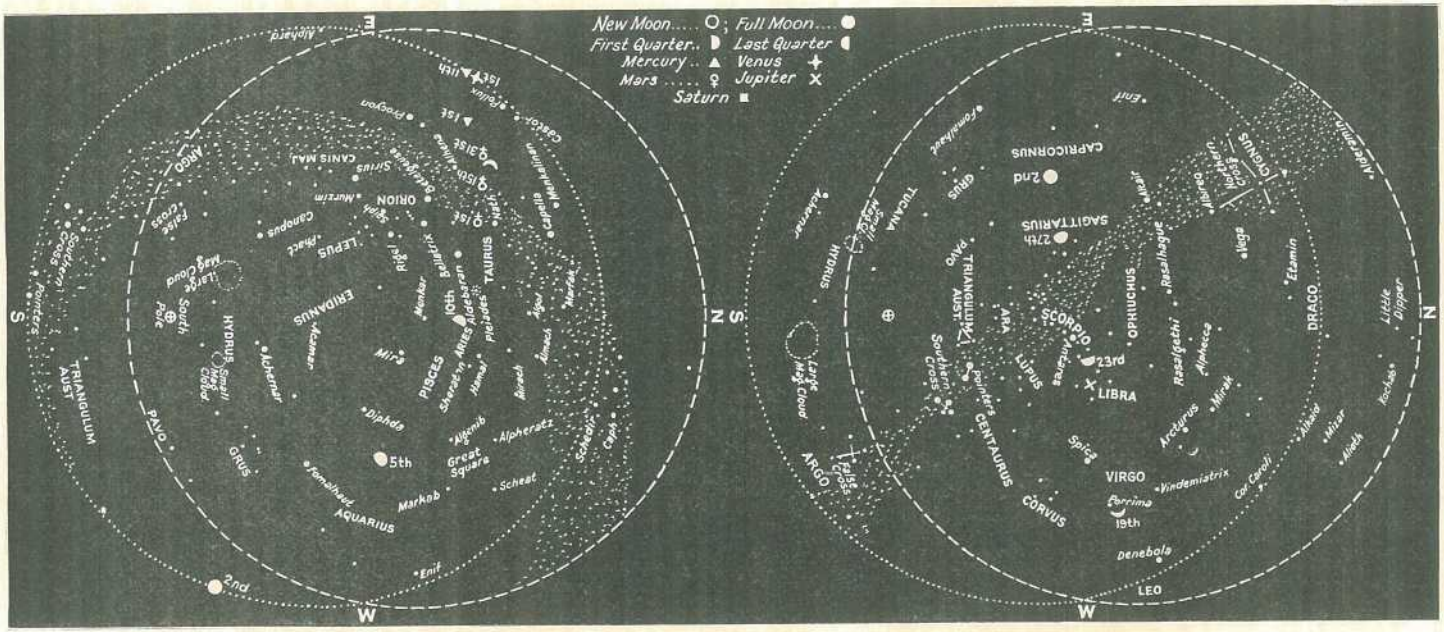
Mercury.—At the beginning of the month, will rise over 1 hour before the Sun and will reach greatest angle west of the Sun on the 3rd. About the 11th, it will be in line with Castor and Pollux, and on the 29th will be at superior conjunction. At the end of the month it will set only 6 minutes after the Sun.

Venus.—At the beginning of August will rise only half an hour before the Sun and by the end of the month will be almost in line with the Sun.

Mars.—In the constellation of Taurus will rise between 3.30 a.m. and 4.30 a.m. at the beginning of the month and by the end of the month, in the constellation of Gemini, it will rise between 2.45 a.m. and 3.45 a.m.

Jupiter.—Still in the constellation of Libra. At the beginning of August, Jupiter will set about one hour after midnight and by the end of the month it will set about one hour before midnight. It will be the only naked-eye planet in the evening sky this month.

Saturn.—Too close in line with the Sun to be seen, being in conjunction with the Sun on the 5th. At the end of the month it may be seen with difficulty, low in the east during morning twilight, when it will rise about 1 hour before the Sun.



Star Charts.—The chart on the right is for 7.15 p.m. in the South-east corner of Queensland to 8.15 p.m. along the Northern Territory border on the 15th August. (For every degree of longitude we go west the time increases 4 minutes.) The chart on the left is for 10 hours later. On each chart the dashed circle is the horizon as viewed from Cape York and the dotted circle is the horizon for places along the N.S.W. border. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about one hour later than the time stated for the 15th and at the end of the month about one hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JUNE RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of years' records.	June 1946.	June 1947.		June.	No. of years' records.	June. 1946.	June. 1947.
North Coast.	In.		In.	In.	*South Coast—cont.*	In.		In.	In.
Atherton	1·73	42	0·64	2·45	Gatton College ..	1·72	44	0·09	0·63
Cairns	2·89	61	0·74	3·76	Gayndah	1·82	72	0·02	0·03
Cardwell	2·09	71	0·39	1·33	Gympie	2·60	73	0·05	0·56
Cooktown	2·09	67	0·47	1·62	Kilkivan	2·14	62	..	0·42
Herberton	1·18	57	0·27	1·41	Maryborough ..	2·93	72	0·18	0·29
Ingham	2·49	51	0·09	1·66	Nambour	3·69	47	0·16	0·31
Innisfail	7·41	62	1·35	8·71	Nanango	1·95	61	0·06	0·44
Mossman	2·97	19	0·74	4·82	Rockhampton ..	2·51	72	..	0·07
Townsville	1·38	72	..	0·17	Woodford	2·78	55	0·06	0·33
Central Coast.					*Darling Downs.*				
Ayr	1·48	56	..	0·16	Dalby	1·63	73	..	0·90
Bowen	1·64	72	..	0·24	Emu Vale	1·45	47	..	0·44
Charters Towers ..	1·31	61	..	0·09	Jimbour	1·53	64	..	0·64
Mackay	2·74	72	0·07	1·03	Miles	1·69	58	0·02	0·20
Proserpine	3·22	40	..	1·03	Stanthorpe	1·88	70	0·20	0·67
St. Lawrence ..	2·46	72	..	0·02	Toowoomba	2·33	71	0·06	0·94
South Coast.					Warwick	1·70	78	..	0·58
Biggenden	2·16	44	0·06	0·20	*Maranoa.*				
Bundaberg	2·79	60	..	0·20	Roma	1·49	69	0·02	0·25
Brisbane Bureau ..	2·59	95	0·22	0·29	St. George	1·49	62	0·17	0·46
Caboolture	2·74	67	0·17	0·27	*Central Highlands.*				
Childers	2·40	48	0·07	0·17	Clermont	1·68	72	..	..
Crohamhurst	4·29	50	0·23	0·36	Springsure	1·76	74	..	..
Esk	2·14	56	..	0·41					

CLIMATOLOGICAL DATA FOR JUNE.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure. Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	79	65	84	26	58	19	376	11
Herberton	..	72	54	79	24, 25	42	19	141	8
Townsville	..	78	60	84	26	50	13, 14	17	2
Brisbane	30·11	71	49	78	24	41	30	29	1
Rockhampton	30·13	75	47	82	24, 25	36	20	7	2
Darling Downs.									
Dalby	..	67	36	74	23, 24	28	19	90	1
Stanthorpe	..	61	31	68	23	21	30	67	1
Toowoomba	..	63	40	69	3, 22, 24	32	30	94	1
Mid-Interior.									
Georgetown	30·03	85	56	89	25	43	14	Nil	..
Longreach	30·16	79	47	87	24	41	6, 20	20	1
Mitchell	30·21	68	34	79	23	25	30	42	1
Western.									
Burketown	..	84	57	91	26	50	14	14	2
Boulia	30·11	75	47	85	22, 26	36	30	44	1
Thargomindah	30·15	67	44	79	22, 23	36	28	79	1

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.