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Event and Comment.

Banana Growing in the North—Departmental Encouragement.

"There are indications of a revival of banana growing in Northern Queensland, which, I consider, are worthy of every encouragement, and so that the industry may be developed on proper lines, it has been arranged that there shall be conducted at the various sugar experiment stations in Queensland a series of experiments in connection with banana growing."

This opinion and the announcement of this decision were given to the Press by the Minister for Agriculture and Stock (Hon. W. Forgan Smith), recently when he declared that the industry of banana growing was worthy of increased attention.

In former years, said he, the industry was carried on in a fairly large way in the Northern Rivers district of New South Wales, but owing to the incidence of bunchy top in the plantations there the production of bananas had materially decreased in the sister State. The banana was now primarily grown in Southern Queensland, but, in former years, the far North was the chief producer of the fruit in this State, and now there were indications of a revival of banana growing in Northern Queensland.

In the experiments to which reference had been made the several varieties of bananas would be tried out with the view of determining which produced the largest yields and the best quality fruit, as well as which would stand most satisfactorily the stress of transit conditions from the plantations to market.

There were indications that under-size fruit was attributable to lack of soil nutrition or to indifferent methods of cultivation and the care of the plant generally. The experiments would aim at definitely deciding this point. Consideration would also be given to the advisability or otherwise of introducing additional varieties from overseas. The tests to be carried out on the sugar experiment stations would be limited in area, and the costs in connection therewith would be borne by the department and would not be made a charge on the funds of the experimental stations.

Fruit Marketing Organisation Act—Continuance in Operation.

The Minister for Agriculture, Hon. W. Forgan Smith, has informed the Press that on the 15th November a petition was presented to him asking for the taking of a ballot on the question of the continuance or otherwise of the Fruit Marketing Organisation Act. When this Act was first passed in 1923, a clause was inserted to the effect that the Act should continue in force for a period of three years from the date of its coming into operation, and should be continued thereafter by Order in Council for a further period of three years unless, on the requisition of 500 registered fruit-growers, a ballot on the question of continuance be demanded, and on the taking of such a ballot a majority of registered fruit-growers demand discontinuance. In anticipation of such a requisition the Minister stated that at his instigation regulations were promulgated in the "Government Gazette" of the 16th October, 1926, providing the necessary machinery for the ballot, and in these regulations it was stipulated that the necessary requisition signed by 500 registered fruit-growers had to be handed in on or before the 15th November, 1926. At the same time, provision was made whereby any fruitgrower (not already automatically registered by reason of his being a member of a local association) could effect registration by applying direct to the department. A petition was handed in on the 15th November, but it was not formal inasmuch as it was not signed by the full number of 500 registered fruit-growers. Certain persons acting for the petitioners were informed of this fact and told that they would, so far as the Minister could do so, be given an opportunity of rectifying matters. Three weeks had elapsed since the date when the petition had to be filed and only about ten out of the seventy-five unregistered signatories had become registered in that time. As the ballot should in the ordinary course be completed before the end of the year, it is not now practicable to give further time for signatories to register, as such a course would not permit of the ballot-papers being sent out and returned before the end of the year. Under the circumstances, the Minister stated that he had no other course open to him but to rule the petition as out of order. The Fruit Marketing Organisation Act will therefore operate for a further period of three years, and the fact that growers did not lodge a formal petition indicates that the majority of growers are satisfied that the Committee of Direction is performing useful service on their behalf.

Radio and Rain.

Does the widespread operation of wireless bring drought? This startling question (says the "Brisbane Courier" in a recent issue), which, as the French put it, "gives to think furiously," emerges from a discussion raging recently in both England and France as to whether wireless was the cause of the unprecedented rains and chilly conditions that persisted so unseasonably in both countries during last April, May, June, and July; and which, it is to be noticed, have marked almost every year during those months ever since 1914. During the war it was freely asserted that the unparalleled cannonades from Switzerland to the sea, and elsewhere, were the cause of the freakish precipitations over parts of Europe; but when the Armistice ended the fury of the guns the weather did not improve to any very marked extent. All the scientists and meteorologists spent time and grey matter trying to trace the alleged cause and effect; but all equally were at a loss. Then M. Painleve, afterwards Premier of France, who had filled the post of Minister for War during the great struggle, advanced the theory that the Hertzian waves were responsible. Wireless, of course, had continued and increased, and has gone on increasing, since the cannon fell silent; so "there seemed to be something in it," says "Engineering." He called attention to the fact that the introduction of Hertzian waves into a tightly closed room, where the air is absolutely transparent, causes little drops of water to form on the faces of those present in the room. He explained that the

Hertzian fog found in every home had become ionized and electrified, thus forming rain. Of course this roused a regular storm of assertion and counter-assertion; some of the authorities declared that, so far from wireless waves causing moisture to be precipitated, they caused it to dissipate, or, rather, prevented it from forming. As our conditions are antipodal, the odds are that what causes dryness in Europe will cause wetness here, and vice versa. Perhaps this explains the dry conditions we are not enjoying.

The Country Women's Association—A Year of Progress.

The year's work of the Queensland Country Women's Association was reviewed at the annual meeting of the council in Brisbane in the course of the month, and showed the rapid strides the association is making. "The progress of the association is the best evidence of the appreciation of the women," said the Premier (Hon. W. McCormack), who occupied the chair. Of more than two hundred branches only two or three had gone into recess until times should improve, and the work of the association had gone steadily forward, the membership increasing during the year from 7,000 to nearly 11,000. The branches increased in number from 145 to 220. The report of the secretary (Miss J. White) stated as evidence of the progress of the association that each division had found it necessary to establish a paid secretary and office at its headquarters. Rest tents, rest rooms, emergency funds, and travellers' aid committees were important branches of the work, and the monthly meetings, lectures, and demonstrations, and the social gatherings also were important activities. At Christmas time practically every branch provided pleasure for the children in the district, and gifts were sent to the hospitals. Libraries had been opened in places where there were no School of Arts, and in some places recreation grounds had been provided for children. Interest had been promoted in municipal and community life. Educational facilities in the country had been given special attention, and interest has been shown in hospitals, ambulances, first aid classes, and all matters concerning public health.

The several deputations to the Government had always been courteously received and their requests given careful and sympathetic consideration; and although all requests were not granted there was a very important one, namely, that for travelling dental clinics, that had been successful. Several gifts of suitable land had been made for rest rooms and seaside homes. It was the obstacle of finance that had precluded some of the requests for improvement in educational matters being granted.

Country Women's Clubs—The American System.

After carefully investigating the methods of the Farm Bureau movement in America, Mr. David Kelly, of Parkes, New South Wales, who recently returned to Australia, reported to the advisory council of the New South Wales Agricultural Bureau that the New South Wales Government would be well advised to proceed to develop the bureau movement, and the appointment of district instructors, as more likely to give general satisfaction to the various agricultural interests. Although Mr. Kelly preferred Australian methods in bureau matters, he says that very satisfactory results have been achieved in many American counties as a result of the establishment of women's clubs in rural areas. These clubs operate similarly to the Agricultural Bureau. Small communities of farmers' wives and daughters (ten or twelve would be sufficient) form themselves into a club and agree to meet in each others' homes fortnightly. The programme of meeting places is arranged alphabetically, so that every home is visited. The hostess for the day provides the refreshments, and the utensils, which belong to the club, are moved to each place as required. The objects of the clubs are to increase the social intercourse, to encourage mutual improvement, and to discuss all matters relating to women's welfare. This system differs vitally from the Country Women's Association, in that the American women make their own homes the place of meeting, whereas the Country Women's Association here has a common meeting place in the towns. Our method results in the gathering together of a fine body of the leading women of the district, who do excellent public service, but the American club system is perhaps more effective in getting in touch with the more isolated homes, which have the greater need of social assistance, and it also helps to develop local leadership and local organisation, with apparently very happy results.

Bureau of Sugar Experiment Stations.

CROP PROSPECTS.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, has returned from an official visit to the sugar areas of Bundaberg, Mackay, Herbert River, Tully, Johnstone River, Babinda, and Cairns. At Bundaberg, which was seen on the way north in October and again on the return journey this month, very little rain had fallen, and the whole country was exceedingly dry—no green grass to be seen anywhere. The cane crop had not made the growth expected earlier in the year, and the estimates formed had been much reduced. At Childers the crushing was a very small one, practically only a quarter crop. A little rain fell at Bundaberg in October, but not enough to do any good. It is surprising to find the young ratoon cane looking so well as it does, but as yet it has not made much demand on the soil. The early plant cane is suffering, and rain is now most urgently required, not only for the cane but for stock, pastures, and waterholes.

At Mackay good rains had fallen in September, and about the middle of October the whole area presented a fine appearance; the cane crops had improved, and the country generally was green. The mills were working smoothly, and the earlier estimates were being for the most part realised. On the other side of the ledger in the prolonged dry spell quite a lot of cane had suffered, and much damage had resulted from frosts in several subdistricts. On returning to Mackay four weeks later, in November, the good effects of the rains had disappeared. Everything was exceedingly dry again, the rich green appearance of the grass had been lost, and the country was rapidly assuming a dry brown look. The young cane, however, on well-cultivated land looked well, and the plantings for next year had been good. The total mill estimate had been slightly reduced, and it was now anticipated that the total production for the Mackay district would be 69,000 tons of raw sugar in place of 73,000 tons estimated in July.

The Parleigh mill, which was taken over by the farmers from a private company this year, was reported to be doing good work, between 4,000 and 5,000 tons of cane being put through weekly. This mill did not commence crushing till 8th September, following a very complete overhaul. The commercial cane sugar in the cane, the extraction, and efficiency have all been good. Owing to the large crop a good deal of the Homebush cane was being sent to Marian and other mills. This mill expects to finish early in January.

The Marian mill, which had installed a complete new crushing plant and other additions, now contemplates further improvements in the shape of a quadruple effect, new chimney stack of steel 100 feet high by 8 feet in diameter, fan and engine for induced draught, one 15-foot subside, new fugals, large fugal engine, Thomson-Wolverhampton boiler of 8,050 feet heating surface, which will make 25,000 in all. This mill at present is putting through over 5,000 tons weekly, the average commercial cane sugar in the cane being 13.75 per cent.

The Plane Creek mill had crushed 86,200 tons of cane up till the 14th November at the rate of about 5,400 tons a week. A new 6-foot by 35-inch crushing mill is to be installed next season. This will much improve the extraction. A very fine solid weir has been erected across Plane Creek, by which 20,000,000 gallons of water are held, which will ensure a remarkably fine supply of water for milling and distillation plants. The new power alcohol distillery is well under way, but delays in delivery of steel have caused the work to be not so well forward as was anticipated. It is now considered that it will be March of next year before operations are commenced. Two enormous molasses tanks have been completed—one to hold 450,000 gallons, and the other 750,000 gallons. The building will be a fine one, equipped with the most modern distilling appliances.

A good deal of Red Rot is present in the cane areas, particularly in M. 189, 1900 Seedling, and Malagache. Farmers are cautioned to destroy all stools showing this disease by ploughing out same and planting up with more resistant canes, such as Q. 813. Advice on the matter can always be obtained from the Bureau of Sugar Experiment Stations, Brisbane.

The rainfall at Mackay this year has been very low, only 26.52 inches being recorded at the Mackay Sugar Experiment Station up till the end of October. No satisfactory year's rainfall has been experienced since 1921.

The Herbert River district had also suffered greatly from the long continued dry weather, and although abnormal rains (up to 16 inches) were experienced in September, it did not have the effect of increasing the crop very much, the two mills expecting a smaller tonnage than was estimated early in the year and considerably less than last year. Another factor which tended to reduce both the crops and the quality thereof was severe frost. It is estimated that 1,500 acres of the cane supplying the Victoria mill was damaged this year. This coming on top of the severe drought caused much loss. It is very exceptional for the Herbert River district to experience frosts of so severe a nature. The Long Pocket and Fairford cane presented a fair appearance, but more rain is required. The company have extended the 2-foot line into Lanneroost. Seedling raising is taking place at the Macknade Nursery, but comparatively few have been raised so far.

Operations at the fine new mill on the Tully have been considerably hampered by strikes, the mill supply being disorganised for over three weeks, due to cutters wanting green prices for burnt cane. This strike was apparently settled on 29th October, but it broke out again on 1st November, when it was again settled. This strike was most unfortunate for farmers who were just beginning canegrowing and who were looking forward to a good run this year to reimburse their expenditure. The mill was doing fine work, but much difficulty was found as the result of men drifting away during the interruption, which meant the training of another lot of inexperienced men.

The average rainfall on the Tully for the last eight years has been 142.04 inches, somewhat less than Innisfail.

The country around Innisfail had also experienced remarkable rains in September, up to 18 inches having been registered in parts. This had given a great impetus to the young cane, which on the whole was looking exceptionally well and forward. The dry weather which has prevailed since then, however, has considerably dried up the grass, and further rains would now be welcome. A large amount of Leaf Scald disease is present about Innisfail, and farmers should act with great care in planting. The circulars sent out by the Bureau on this disease should be studied. The Colonial Sugar Refining Company has also recently issued a bulletin on the subject.

Banana-growing is increasing, and hopes are expressed that this industry will soon play a very important part in the further development of North Queensland and prove of considerable benefit to the sugar industry by affording another use for scrub lands. Professor Goddard, who is taking a keen interest in this matter, is of opinion that the lands are eminently suitable for bananas, and that a great industry can be built up.

The three mills at Innisfail were getting rapidly through their large crops. Estimates have improved in this locality due to the fine September rains.

At Babinda the grub damage had been light this season. The young cane was looking well, and a large crop is being crushed. The estimate has increased by 20,000 tons of cane from that furnished in July. About the usual area has been planted for next season. The mill is working well and with satisfactory results.

Hambledon and Gordonvale were dry during October; the rainfall had not been so great as at Babinda and Innisfail. The crops being handled by Hambledon and Mulgrave were larger than anticipated earlier in the year. Mulgrave's crushing a week or two ago exceeded 7,000 tons for the week, while the commercial cane sugar was about 15 per cent.

The cane at the three Experiment Stations has now all been harvested, and preparations for next year's work are well forward. The Entomological Laboratory was also visited.

SUMMARY.

The approximate estimate has improved to some extent, and is now close on 3,000,000 tons of cane. An estimate of the yield of raw sugar will be furnished shortly.

All the estimates north of the Herbert River have gone up, while nearly every mill from the Herbert south has decreased its figures. This is always the case in times of drought, and tends to emphasise the special fitness of North Queensland for canegrowing, as in dry periods their yield is almost always better than in very wet years, while droughts (as such) are unknown. For instance, the Tully area, in spite of so-called dry weather, has experienced a rainfall of 87 inches to October of this year.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Kesterby) has made available the following report (1st November, 1926), from Mr. E. Jarvis, the Entomologist at Meringa:—

During the last four years we have experienced what may be described as prolonged drought conditions, which have to some extent interfered with field experiments. Instead of the average annual rainfall of about 90 inches, our records at Meringa Laboratory during this period have varied from about 42 to 73 inches per annum; our total precipitation for these four years (1922-25) having been, collectively, 251.53 inches, as against the average for that period of 360 inches.

Such climatic conditions, however, although hindering cultivation and normal growth of the cane, have exercised at the same time a very desirable check on the increase of the beetle pest, thus affording no slight compensation to those growers who have the misfortune to suffer very materially during normal seasons from the ravages of cane grubs.

It is satisfactory to note that our principal cane beetle has again received a decided set back, before able to rally from a previous severe check sustained during the three years 1922 to 1924.

Climatological Control of Greyback Cockchafer.

It is very interesting to trace the manner in which this exceedingly valuable repression of so formidable a pest has been at present accomplished by the simple operation of natural factors of a meteorological character.

Such climatic control usually results from more or less prolonged drought conditions, the degree of efficiency attained being, in the case of our cane beetle, dependent upon the time of year and duration of the period over which such influence is exercised.

Apparently the most important phase in the life-cycle of this insect—looked at from an economic standpoint—is that of its pupal condition, which happens to be passed underground in an oval chamber formed by the grub at depths varying from six to fifteen inches or more. Although occupying a position so well calculated to exclude possibility of attack from predaceous insect or other enemies, these cockchafers, after transformation to the imago state about six weeks later, find themselves practically imprisoned in their subterranean cells, from which escape is impossible until the surrounding hard dry soil shall have become sufficiently softened by heavy rains to allow them to tunnel upwards and reach the surface.

Now, it is all important that just before and for some time after pupation of the grubs of this insect in June or July, the rainfall should continue normal throughout a period of five months—viz., June to October—in order that such transformation may take place at the proper depth, and the soil remain moist until commencement of the flying season.

Should abnormally dry conditions prevail during these months, coupled by a precipitation far below the average throughout the preceding period of January to May, a check to the activities of this species must assuredly follow.

In the event, however, of such climatic conditions being continued through November and December, the check sustained is generally of great severity, and enormous numbers of these beetles must inevitably perish hopelessly in their underground pupal chambers.

Glancing back a few years we find that the last decided outbreak of this pest occurred in 1921, when the annual rainfall was no less than 124.50 inches, being, in fact, 34.50 inches above the average.

This gave the enemy a chance to recover from slight climatological checks experienced during 1918 to 1920, and had the precipitation in 1922 been normal they might again have appeared in sufficient force to have occasioned very serious damage.

Fortunately the annual rainfall in 1922 happened to be 26.70 inches below the average, and instead of getting 9.87 inches during the critical period of June to October we recorded 7.52 inches. Such adverse conditions would alone have served to curtail the increase of this cockchafer; but being followed, as they were, by an exceptionally dry November and December, in which the rainfall was 10.85 inches below the average for these two months, the result was an additional set back of unusual severity.

In the year 1923 this species again received a blow, which falling on top of that experienced the preceding season (1922) reduced its numbers to comparatively harmless proportions. These desirable conditions having resulted from the rainfall

chancing to be 47.19 inches below the annual average, while the amount registered for the critical period of June to October was only 275 points, as against 9.87 inches, the usual average for these five months.

Although 1924 favoured the increase of *albohirtum*—the rainfall throughout June to October being only 1.65 inches less than the average—its feeble attempts to regain ground were once more doomed to defeat during the following year (1925), when the annual precipitation fell again to 21.67 inches below normal, and instead of recording 9.87 inches during June to October, the rainfall at Meringa for this period was 4.99 inches. To make matters worse for this pest the fall during November and December collectively, happened to be 6.94 inches below the average.

The table given below indicates clearly the intensity of the various successive checks received by this cane beetle during the last four years. The most significant rainfalls are underlined, since these were chiefly instrumental in bringing about its control.

—	ANNUAL RAINFALL AT MERINGA LABORATORY.		NO. OF INCHES DURING JUNE TO OCTOBER.		NO. OF INCHES DURING NOVEMBER AND DECEMBER.		—	
	No. of inches recorded at Meringa Labora- tory.	No. of inches below average rainfall.	Rainfall at Meringa Labora- tory for June to October.	No. of inches below average for June to October.	Rainfall at Meringa Labora- tory for November and December.	No. of inches below average, November and December.	Average annual rainfall during the period of 1921 to 1925.	Decrease in average annual rainfall, 1921 to 1925.
1921 ..	124.40	..	10.91	..	13.06			
1922 ..	<u>64.70</u>	25.30	7.52	2.35	<u>2.70</u>			
1923 ..	<u>42.81</u>	47.19	<u>2.75</u>	7.12	6.63	6.29	457.50	83.47
1924 ..	73.69	16.31	8.22	1.65	17.56			
1925 ..	68.33	21.67	<u>4.99</u>	4.88	5.98	6.94		
	<u>374.03</u>				<u>45.30</u>			

With reference to the rainfall during January to August of 1926, and the possibility of its affecting the numerical increase of our greyback cane beetle, it is interesting to note that during this period of five months we have recorded 40.00 inches, which is 32.58 inches below the average amount.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (22nd November, 1926) from the Entomologist at Meringa, Mr. E. Jarvis:—

Importance of Artificial Control Methods.

Whilst in Victoria recently I made a point of visiting several chemical factories and other manufacturing works in order to obtain samples of various by-products, &c., of an insecticidal nature for future trial against cane grubs.

Some of these have given encouraging results in our laboratory, and appear deserving of further tests under practical field conditions.

A few additional patent insecticides have also been recently forwarded to this station from Brisbane and elsewhere, among which may be mentioned "Chlorocide B," "Qua-Sul," Sodium Sulpho Carbonate, Sulphur Mono-Chloride.

Such outside activity indicates perhaps, a fuller realisation amongst lay workers in this connection of the economic significance of entomological research work. At the present stage of the cane-grub problem, however, it seems to me that instead of endeavouring to find new remedies, it would be more advantageous to concentrate experimentation for the most part on the discovery of cheaper and more practical methods of applying such insecticides as may already have been found by experience to be thoroughly effective against the grubs of this cane beetle.

In these days, when the control of insect pests by means of introduced predaceous and parasitic natural enemies plays so important a part, and has in some cases

proved of such inestimable value, one is apt to regard other and less fascinating remedial methods as somewhat irksome and commonplace by comparison.

Growers would do well to remember that these latter forms of control are likely to continue to hold first place in the work of combating most of our insect pests, seeing that the results obtainable by the use, for example, of such artificial remedies as poison-baits against "Army worms," grasshoppers, &c., or of arsenical and other sprays for coping with plant-eating beetles, may generally be depended upon to yield beneficial results within a few hours after application; whereas, the help hoped for from the activities of some introduced parasite is at the best problematic, and one must be willing—after perhaps years of waiting—to accept ultimate failure. On the other hand, in the event of success crowning the efforts of the parasitologist the results secured in this way may be of incalculable monetary value to the world at large.

While in entire sympathy with, and fully realising the great economic importance of parasite control, I would at the same time advise our farmers not to neglect the practice of such artificial means of controlling their chief cane insects as are recommended from time to time in the monthly reports and "Entomological Hints" published by the Bureau of Sugar Experiment Stations in the "Queensland Agricultural Journal" and "Australian Sugar Journal."

Noies on Cane Butterflies.

Melanitis leda Linn. (Leaf Butterfly).—This butterfly was first recorded by the writer as being harmful to the foliage of cane in June, 1916, at which time both its eggs and larvæ occurred in fair numbers on young cane plants at Meringa.

Subsequently, both forms of the Australian race of this widely distributed insect—viz., *Melanitis leda banksia* Fab. and *M. leda banksia* F. *barnardi* Lucas—were bred by the writer at Gordonvale from eggs deposited on leaves of sugar-cane.

During the last few years the caterpillars of this insect, although doubtless present in canefields, appear to have escaped notice, a few odd specimen only having been collected by us from time to time while searching for "Army worms," &c.

A very interesting infestation of this cane butterfly, however, was discovered last October at Saw Mill Pocket by the Assistant Entomologist, Mr. A. M. Burns, the caterpillars being present in great numbers and causing considerable damage to young cane plants. More than one hundred were collected for breeding at our laboratory, in order to study the various parasitic insects which control the increase of this butterfly.

Up to the present a species of Tachinid fly appears to be its chief enemy, the only other parasite obtained from these caterpillars being a species of braconid wasp. Amongst the large number of butterflies emerging from the pupæ only one specimen of the variety *banksia* was secured, all the others being examples of the form known as *barnardi*. This well-known butterfly, which measures about three inches across its expanded wings, is chocolate or red-brown on the upper surface, merging into dull orange on the forewings which are deeply scalloped on outer edges and ornamented with a conspicuous black eye-like blotch enclosing two large white spots.

The coloration of the lower surface in variety *banksia* varies from light to very dark purplish-brown, and is crossed by a few blackish lines resembling the veins of a leaf, the outer angles of the hind-wings being prolonged in the form of two short tails; while in *barnardi* both the upper and lower surfaces of the wings are of a lighter brown, ornamented with six to nine unequal sized blue or more often white-centred black spots, encircled by a yellowish ring edged with dark brown. These eye-like spots or ocelli are situated near the outer margin of the lower surface of the wings. The caterpillars of this butterfly can be easily distinguished from those of other lepidopterous species affecting cane owing to the presence of two long blackish horns arising vertically from each side of the head, and by its tail extremity being prolonged horizontally into two fleshy points. When fully grown it is about 1½ inches long, with body tapering gradually towards each end.

Parasera mathias Fab. ("Large Skipper" Butterfly).—This common hesperid has a wide range of flight, extending from Port Darwin to Brisbane, and occurs also on the leaves of sugar-cane in other countries. It was first recorded as affecting cane in Queensland during 1914, when caterpillars of this insect were observed by Mr. A. P. Dodd damaging the foliage of sugar-cane at Harvey's Creek. The larva is pale sea-green with three faint but darker green dorsal stripes, the sub-dorsal ones edged below with light yellow. Anal segment pale bluish-green, extremity of dorsal portion semi-circular and edged with white hairs. Like other closely related species of Hesperidae the caterpillar feeds under cover, drawing together the edges

of a leaf-blade near the point of same in such manner as to form an almost cylindrical tube, in which, being effectually hidden, it is comparatively safe from attacks of birds and other enemies. Specimens of this cane-skipper were found recently by Mr. A. N. Burns associated with caterpillars of *Melanitis leda* at Saw Mill Pocket.

Telicota Augias-krefti McLeay ("Skipper Butterfly").—This species was also found at Saw Mill Pocket last month in company with larvae of *M. leda*. Its habits are very similar to those of the preceding insect, from which it differs, however, in the form and coloration of the larval and pupal stages. A detailed account of the abovementioned cane butterflies will be found in Bulletin No. 3 of this Bureau, Div. of Entomology, pp. 22, 23, 24; and Bulletin No. 9, pp. 11 to 13. The only other butterflies recorded by us up to the present as injurious to cane are the two hesperids—*Padraona hypomoloma* Lower, and *Padraona marnas* Feld., the latter being our commonest species around Meringa and Gordonvale.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report (20th November, 1926) from the Southern Assistant Entomologist, Mr. R. W. Montgomery:—

Wireworms.

Certain wireworms or larvae of the family Elateridae (Click beetles) have long been in disfavour in many localities on account of their notorious habit of attacking young plant cane, and the Pinalba district is one in which these pests abound. Though they are credited with doing damage throughout the whole year, they cause the most concern just after the spring planting season, when the greatest portion of the cane is planted there. Therefore these Pinalba farms and others in the surrounding districts of Nikenbah, &c., were visited in the early part of October, with a view to making certain observations and investigations on the habits of these wireworms. This year they have been troublesome only on a few farms, and elsewhere their damage has been more sporadic, thus rendering the carrying out of investigation work more difficult under these circumstances.

On looking superficially over a block of cane where wireworms are known to occur, much of their damage is not seen, for they attack newly planted sets soon after having been placed in the ground, and by eating out the eyes cause the failure of that set, although the roots may have developed from the nodes quite normally. The surest sign of their damage is the appearance of "dead hearts" amongst the young shoots of the young plant cane, but these may also be caused by such pests as the "black beetle" (*Pentodon australis*), mole creeper (*Gryllotalpa* sp.), and the moth borer (*Phragmatiphila truncata*), &c. Wireworm damage, however, can be distinguished from that of these other pests with similar habits by the sight of a small brown hole underground on the outside of the shoot, where the insect has commenced operations. This hole extends into the soft central tissues, constituting the growing portion of the shoot, and is always much smaller than any caused by the pests enumerated previously. If the hole be situated high up on the shoot, the lower portion sometimes keeps growing as usual, pushing the higher dead portion above it and out of the centre of the whorl, and in this way the plant suffers little check. When these central tissues are eaten through lower down on the shoot, all growth in that shoot stops, except that eyes are either developed at its base adjacent to the set, and from these new shoots appear, or on the other hand the set dies.

If a plant showing a "dead heart" with the above characteristics be examined, the investigator may not necessarily find a wireworm in close association with it, for in most cases after having pierced the shoot and fed for a few days on the softer portions, it travels along the row to succeeding sets, inflicting similar damage on these, until one sees several dead hearts in succession. Therefore the most opportune time to capture wireworms is when the central heart is showing the first signs of wilting, and to observe this, the most favourable period of the day is the early morning. This happens because the rays of the sun, striking obliquely, have not reached their maximum strength, neither have they had sufficient time to cause the young leaves to droop. Now a plant showing wireworm attack will have the outside leaves of the whorl quite fresh while the heart will be curled and commencing to shrivel, and it becomes quite easy after a little experience to differentiate between the two conditions. If this plant be uprooted a wireworm will usually be found close to the shoot or set. A few wireworms taken in this manner were brought back to the Bundaberg laboratory with the object of breeding them to the adult condition and noticing any peculiarities in their habits.

***Pentodon Australias*, the "Black Beetle" or "Set Eater."**

The occurrence of this beetle, its association with cane, its damage and the method of locating it, can be couched in similar language to that used in describing the wireworm above. Indeed, so much are they alike in their habits that several of these were taken while searching for wireworms in canefields in the Pialba district. However, their damage differs slightly from that of the wireworm, and can readily be recognised by the characteristic appearance of torn and broken fibres of the outer leaves on the underground portion of the shoot. These broken fibres sometimes run straight up the shoot as far as the ground level, while at other times the fibres are torn in the form of a spiral. Also there is usually one large hole where the beetle has gnawed into the tender central portions of the shoot. The set itself often has holes eaten into it, as well as having the eyes eaten out, and at first sight it would appear that this was the work of a grub, but as a matter of fact the beetle itself is responsible for this damage. This was proved by caging beetles alone in a tin in which cane sets had been planted. A few weeks later, when examined, the sets had rooted, but all the eyes had been eaten out, and large irregular holes had been eaten through the hard rind into the central and softer fibres of the set.

Natural Methods Tending to Minimise their Effects.

Mention has previously been made concerning the apparent association of these pests (i.e., the wireworm and black beetle) with paspalum land, in which case growers would do well to keep down paspalum grass as much as possible. However, two very serious faults, and obvious ones, too, which tend to handicap farmers in their efforts against these pests are (1) insufficient cultivation and (2) the use of inferior plants.

(1) Paddocks intended for canegrowing are sometimes given two shallow ploughings, and then drilled out and planted, and it will be realised what a deplorable condition the soil is in. Clods of soil and lumps of paspalum grass serve as habitats for both of these pests, as well as having a tendency to make the plants stand on end when dropped from a planter, instead of normally lying flat in the drill.

(2) The use of inferior plants, however, is far more prevalent and is to be condemned. Small thin sets are very commonly used, and it is surprising to note the number of growers who have adopted this malpractice. The result is that when one shoot suffers attack there is not sufficient nutriment remaining in the set to send forth another shoot, and the set dies. It was quite the reverse on another farm which had suffered slight damage. This had been planted with good thick M. 1900 seedling plants, and the ones that had been attacked were invariably sending out new shoots from the sides, and the effects of the wireworms would have been almost negligible, except perhaps in making the plant stool out a little prematurely.

With such positive results in favour of better plants, it is difficult to understand why farmers will continue with the penny wise and pound foolish method of using small thin sets. When approached on this score the only objection I had farmers raise against the use of longer sets with at least three eyes, was their alleged tendency to stand on end in the drills to which I have referred under (1), but surely with a better soil condition and the use of modern planters this difficulty could be overcome, and should prove no obstacle at all.

FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports (19th November, 1926):—

Waterview.

The principal point the writer would like to impress on growers in this area is the immediate necessity of dealing with Mosaic disease. They are recommended to carefully select plants, and not plant maize near the cane. Some farms on this area are at present showing almost 100 per cent. Mosaic attack.

In the last report a simple and effective method of plant selection was outlined. The writer recommends that no cane plants be taken from the Burnett River (Avoca downwards) until the Mosaic disease is more under control.

Oakwood.

Young plant and ratoon cane look fair, and if reasonable rains occur between now and Christmas there will be a good chance of a payable crop next year.

Cane varieties doing well in this locality are E.K. 28, Q. 813, M. 1900, and D. 1135. The first named is rapidly coming into favour, the growers finding it to be a cane of vigorous growth and high sugar content. The writer has been recommending more extensive planting of this cane for some years past. Growers are recommended to plant more green manure crops. It is most desirable, in belts that suffer from periods of dryness, that a good humus content should prevail in the soil.

Gin Gin.

The cane in this district is healthy on the whole. Details:—

Autumn plant—Good strikes, slow growth;

Spring plant—Fair strikes, slow growth;

Ratoons—Rather shy; but, on the whole, satisfactory; slow growth;

Standover—Healthy, what is left; no particular growth.

The black Maroondan soils are at present being farmed more efficiently than ever before. Farmers have excellent prospects of good crops next year. H.Q. 285, M. 1900 Seedling, and Q. 813 are the most favoured canes. D. 1135 is still largely grown.

Some disease was found in almost all varieties inspected in the Gin Gin areas; the only cane that the writer found apparently immune was Uba.

Nambour.

Some very good crops are being cut, particularly Q. 813. Only minor instances of loss through gumming are reported. The disease may never reach epidemic proportions as it did last year, if the growers maintain their present carefulness in plant selection. Q. 813 is proving very resistant, and is at present an entirely satisfactory cane for local conditions.

The Northern Field Assistant, Mr. A. P. Gibson, reports (8th November, 1926).

MOSSMAN.

Rainfall.

Only 40.27 inches had been recorded for the year; this is far below the mean. Canegrowing is now confined to the valleys or lower levels; years back it was raised high up on the hillsides of the nearby mountain ranges; to-day these slopes are thickly carpeted by a waving brown sea of matted blady grass. The high rugged mountain range is near the coast, and in consequence a splendid rainfall is generally assured. The cane areas generally have much broken ground, and intersected by numerous short, fast running fresh water creeks; such ground and creek banks grow vegetation of all kinds in profusion and are highly favourable harbourages for rats.

The Crop.

The 1926 area to harvest is a few hundred acres greater than that of last year. Timely rains have revived the crop wonderfully with the result that most of the paddocks harvested, more especially the plant cane, is cutting beyond expectations in quality and quantity. It is now considered that the early estimate will be realised. The whole crop is burned prior to harvesting; green rates for cutting burnt cane are being paid. It is not possible to judge with any degree of accuracy the exact quantity of cane to burn so that it can be removed before deterioration sets in, therefore overmuch is burned, and at times fires do get out of control; one farmer had the misfortune of having over 500 tons burned in this way. Rain fell soon after and it was not wholly treated for some seventeen days. Cane at all times does not reach the factory in a fresh condition because of the scattered farms. The speeding of cane to mill after burning or cutting is of great importance.

Harvesting is proceeding smoothly. Small gangs are mainly operating and the harvested cane loaded on to trucks and removed either on rails or truck waggons. The crop generally is good cutting.

The mill was to have started on the 11th June, but did not commence until 5th August, from the start the quality was excellent. September rains somewhat reduced the c.c.s. to 13.76, since, drier conditions have prevailed, and the mill average was advanced to 14 c.c.s. The cane being milled is of good length and composed of many varieties. Mill work has improved, in one week it crushed 5,053 tons, its greatest since its inception; last year 10,503 tons of sugar were manufactured, this

year it is expected that the record will easily be overshadowed. The sugar is sent to Port Douglas over the Shire Council's small gauge railroad, costing 14s. a ton, and removed to Cairns by some of the smaller freighters. The factory had crushed nearly 43,000 tons up to 9th October.

Soils.

Mossman soils for the greater part overlay an almost impervious stratum of clay, varying from 6 to 10 inches deep; it becomes cohesive when wet and refractory when dry, especially if left unworked at a critical time. It is greatly deficient in organic matter and lime; it is possible to restore the former by the growing and burning in of vegetable matter. Lime is indispensable for the healthy growth of plants, and it furnishes an important base which is helpful in the process of nitrification. The price of this here would be prohibitive for profitable use. There is a fine undeveloped deposit of lime in the area, which possibly would be a great asset if opened up.

Cultivation.

The new crop had not altogether received the necessary care and attention that it so much requires—some growers, the day long, are operating truck waggons, thus neglecting the 1927 crop. Weeds are quickly over-mastering some fields and the soil is losing its moisture and becoming refractory; such a condition could have been arrested by timely inter-tillage of cane rows. The prospects generally favour the planter who ratoons or cultivates the crop interspaces as soon as practicable. The weather is most favourable for weed killing, in consequence growers should be going their hardest mulching the interspaces and in every way striving to promote the growth of cane, thus encouraging its stooling and assisting to arrest moisture lost by capillary attraction.

Ratooning.

Many paddocks have not been cultivated since harvesting. The general practice is to throw away from the cane rows by ploughs and the crown or middles rolled or sledged even; when the ground is saturated and the cane small it is an advantage to leave such drills open, for they greatly assist in removing the surplus water; during dry periods these open furrows have opposite consequences and should be filled in thus reducing evaporation.

Planting.

Many paddocks could not be prepared for planting prior to the September rains, therefore this operation had been delayed and was being continued. It is too late for Badila planting, in fact the area, save in parts, cannot be classified as being very suitable for this kind. Varieties doing well and apparently suitable for the district are as follows:—Badila where land is suitable, D. 1135, Q. 813, E.K. 28, and B. 147. Unfortunately H.Q. 426 seems susceptible to all diseases, so that it is only a matter of time when it must become a prohibited cane.

Pests and Diseases.

Farmers should take more interest in the selection of disease free plants. Pests and diseases are increasing in parts of the North, and our great industry is endangered; some planters realise the position and are faithfully striving to eliminate them; others are undoing the good work. With patience and hearty co-operation destructive pests and diseases could in a large measure be controlled.

Rats are very bad and are badly injuring the crops, in parts; they eat through the stem anywhere and sometimes remove the eyes. The quality is seriously affected; higher harvesting rates must be paid, besides losses in weight. The writer thinks they are the medium by which diseases such as Leaf Scald and gum are carried, the organism responsible for the disease being transported from diseased to healthy cane and inoculated with the teeth. Saltwater growers have decided to give 1d. per ton of cane towards systematic rat poisoning.

Grubs and dry weather had killed small patches of cane, this being more noticeable on a porous red soil hillside farm at Cassowary, and here and there along the alluvial flats. Wireworms and tenebrionid moth borers were killing ratoon shoots.

Diseases.

Leaf Scald and Leaf Stripe are serious diseases in parts and continue to spread. Cane rust was found widespread on H.Q. 426 throughout the area, and one stool of Mosaic on the same variety. The prospect for the coming season is again hopeful, the ratoons and plant cane are looking well, but again wanting rain. Profitable sugar-growing and manufacturing in these parts is becoming a struggle.

TULLY.**Weather and Rainfall.**

The Tully and Innisfail annual rainfall seem about equal; they fall short of that received at Babinda. One unusually high fall of 18.46 inches was recorded at Tully for September, this increased the year's total to 86.73 inches. Since then the weather has been hot and dry.

A great awakening has taken place since the completion of Queensland's newest mill and the North Coast railroad to Cairns. What was an inaccessible, unpopulated belt two years back, now carries an ever-increasing population which is speedily making accessible roads and converting virgin lands to promising cane farms.

The Crop.

Generally speaking this is most irregular, much of it is plant cane; it continued to grow steadily throughout the winter months and had not been seriously troubled by pests or diseases, therefore was yielding a crop of quality and one overshadowing early estimates.

Harvesting.

Cutting was not in progress when the area was inspected, but had continued uninterruptedly to the 11th October when a strike was declared. Operations were, however, resumed on the 29th October. The delay at a time when the weather was ideal and the cane quality possibly at its best was most unfortunate, and in consequence planters were greatly worried, for their future depended so much on the harvesting of this, their maiden crop.

The weekly capacity of the mill is being gradually raised; 77,000 tons had passed between the rollers to the end of October. This would have been 90,000 tons had there been no cessation of operations. Approximately 61,000 tons remain to be treated; some of this is very backward and probably will not be cut. On the face of things it would appear the factory cannot treat all the cane offering this year.

Cultivation.

Not much land is under the plough therefore little cultivation is practised. A big all-round improvement was noted in the field, much trash could not be burnt last month so it was rolled.

Varieties.

Badila (N.G. 15) has quickly made good in its new home. It is most unfortunate for the district that diseased canes are widespread, and it is only by the hearty co-operation of all interested that these can be eradicated. Where the land is suitable, Badila should be grown. Much of the Tully is too poor for this kind, therefore any of the following varieties—7 R. 428 (Pompey), Q. 813, E.K. 28, Korpi, Orambo, D. 1135, and B. 147, can be recommended. H.Q. 426 and Goru family are too susceptible to disease and may soon have to be entirely eradicated.

Pests.

Army worms, rats, wallabies, white ants, and mound building ants were located. Fields having their interspaces covered by stacked cane, tops or trash have been most severely attacked by the army worm. A poison solution made from the following and sprayed on the cane leaves in advance of this pest has proved effective—3 lb. lead arsenate to 50 gallons water.

Rat destruction is increasing, here there are many fresh water creeks, the banks of which are quickly becoming grassed and are breeding places for this pest. The only way of safeguarding this area is by systematic poisoning right from the start.

The mound building ant is troubling growers tilling a coarse grainy land, where it is said they nip off the root system from the newly-planted sets.

Diseases.

Leaf Scald and Top Rot are common. The former is prevalent throughout the greater part of this area, but to a lesser degree in the Lower Tully. This disease had been extended to many of the newly planted areas; it is recommended to have affected canes destroyed, otherwise the cane knives and rats must continue to spread this by direct inoculation. Whole stools have completely died from the effect of Leaf Scald.

Prospects for 1927 are at present very bright. Ratoon and plant cane alike are looking splendid. This state of affairs, in conjunction with the ever-increasing cane area, must return a big crop for the ensuing season.

EL ARISH AND JAFFA.

Poor to good crops are being harvested, much of the stubble under crop is old and really requires renewing. There is not a great deal of plant cane. Leaf Scald disease is well established. H.Q. 426 and the Gori family are more seriously affected. Most of the crop is burnt before cutting. Ratoon shoots were being killed by the larvae of the big moth and tineid borer, mainly found adjacent to unclean headlands.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING OCTOBER, 1926 AND 1925, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Oct.	No. of Years' Records.	Oct., 1926.	Oct., 1925.		Oct.	No. of Years' Records.	Oct., 1926.	Oct., 1925.
<i>North Coast.</i>					<i>South Coast—</i>				
	In.		In.	In.	continued:	In.		In.	In.
Atherton ...	0.92	25	0	0.11	Nambour ...	3.02	30	0.54	1.70
Cairns ...	1.89	44	0	0.25	Nanango ...	2.32	44	0.15	0.07
Cardwell ...	2.04	52	0	0	Rockhampton ...	1.85	39	0.01	0.70
Cooktown ...	1.09	50	0.06	0.07	Woodford ...	2.56	39	0.31	0
Herberton ...	0.91	39	0	0.06					
Ingham ...	1.59	34	0	0.12	<i>Darling Downs.</i>				
Innisfail ...	2.94	45	0.09	3.62	Dalby ...	2.04	56	1.16	0.22
Mossman ...	2.94	13	0.09	2.66	Emu Vale ...	2.16	30	0.76	0.30
Townsville ...	1.28	55	0.07	0.09	Jimbour ...	1.86	38	1.37	0.22
					Miles ...	2.01	41	0.63	0.19
<i>Central Coast.</i>					Stanthorpe ...	2.58	53	0.06	0.60
Ayr ...	1.02	39	0	0	Toowoomba ...	2.57	54	1.29	0.38
Bowen ...	1.08	55	0	0.06	Warwick ...	2.30	61	0.80	0.17
Charters Towers ...	0.69	44	0.23	0					
Mackay ...	1.78	55	1.22	0.23	<i>Maranoa.</i>				
Proserpine ...	1.82	23	0	0.17	Roma ...	1.78	52	0.22	0.36
St. Lawrence ...	1.78	55	0.12	0.06					
					<i>State Farms, &c.</i>				
<i>South Coast.</i>					Bungewong ...	1.52	12	0.22	0.21
Biggenden ...	2.27	27	1.60	0.25	Gatton College ...	2.05	27	0.82	0.14
Bundaberg ...	2.02	43	0.74	0.61	Gindie ...	1.42	27	0	0.15
Brisbane ...	2.52	75	0.87	0.35	Hermitage ...	1.89	20	0.63	0.44
Childers ...	2.45	31	0.51	0.66	Kairi ...	1.10	12	0.22	0.02
Crohamhurst ...	3.61	30	0.50	1.38	Sugar Experiment Station, Mackay	1.56	29	0.75	0.21
Esk ...	2.42	39	0.42	0.39	Warren ...	2.14	12	0	0.07
Gayndah ...	2.38	55	0.43	0.16					
Gympie ...	2.70	56	0.40	1.31					
Caboolture ...	2.53	39	0.36	0.61					
Kilkivan ...	2.58	47	0.00	0.18					
Maryborough ...	2.63	54	1.05	0.82					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year and for the same period of 1925, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,

Divisional Meteorologist.

REPORT OF THE AGRICULTURAL CHEMIST.

THE WORK OF THE YEAR.

The report of the Agricultural Chemist, Mr. J. C. Brümich, embodied in the annual report of the Department of Agriculture and Stock, contains much valuable information, and from it the following interesting notes have been taken:—

The Soils.

The largest number of soil samples were received in connection with sugar-cane, cotton, and maize culture.

The samples of soils taken in the Atherton Tableland from virgin land, normal land, and sterile patches (Nos. 2383-5) are of particular interest, as shown by the analysis given on Table I. The virgin land shows the largest amounts of total and available potash, with high humus and nitrogen contents. The sterile patches contain an excessive amount of lime. In many of the soils the available potash is too low for successful maize culture.

According to the results of experiments made by Mr. W. T. McGeorge with reference to the availability of potash in Hawaiian soils, the amount of available potash found, by treatment of the soil with 1 per cent. citric acid solution, is a valuable guide for the application of potash fertilisers to sugar-cane crops.

Soils with less than 0.02 per cent. of available potash will, with rare exceptions, respond to fertilising with potash salts, regardless of the lime contents of the soil. Soils with a range of available potash between 0.02 and 0.03 per cent. usually show a slight response, especially if the lime contents are also low. Soils containing more than 0.03 per cent. will not give, with few exceptions, a profitable return from application of potash fertilisers.

The availability of the potash appears to be closely related to the presence or absence of lime.

In looking over our table of soil analysis we find that only 6 soils contain more than 0.03 per cent., 21 more than 0.02 and less than 0.03 per cent. of potash, so that the great majority of our soils should respond to fertilising with potash salts for sugar-cane, maize, and many other crops.

The determination of *soil acidity* by various methods was continued, and in a few isolated cases we found high mineral acidity in samples of soil from Maleny, Cooroy, Bauple, Pialba, and Maroochy.

Investigations carried out elsewhere have clearly shown the association of mineral acidity with various root diseases in many crops, like sugar-cane, maize, and pineapples. The toxic alumina salts, the cause of high mineral acidity, can only be neutralised in the soil and in the plant tissues by a very heavy application of soluble phosphoric acid in addition to liming the soil, and in most cases the cost of such treatment would be prohibitive, and the simplest plan is not to cultivate such acid areas, which fortunately are very rare.

The three soils from Java, given at the bottom of Table I., were submitted by Mr. Brooks, and are supposed to be typical cassava soils. These soils show an enormous variation in their composition, and, according to these analyses, almost any soil appears to be suitable for cassava culture.

The analyses of the principal soil types from Woolthorpe and Walloon, on the Dawson River irrigation area (Nos. 2364-2370), are of considerable interest, and show that soils suitable for almost any crop are represented in this area.

The soils from the Callide cotton research farm show, with a few exceptions, greater uniformity, and analysis proves them to be of good fertility, rich in mineral plant foods.

Waters.

No further samples of waters have been received from stock inspectors with reference to suitability of saline waters for stock, and this important question has not been cleared up.



PLATE 108.—MR. J. C. BRÜNNICH, F.I.C., F.A.C.I., AGRICULTURAL CHEMIST.

Mr. Brunnich was born at Gorizia, Austria, where his father was stationed as a minister of the Lutheran Church. In early youth he went to Switzerland, where he was educated. He studied chemistry under Victor Meyer and George Lunge, the well-known professors at the Federal Polytechnic School at Zurich. Specialising in sugar chemistry he gained practical experience in sugar factories in Bohemia and Russia. Returning again to Switzerland to do his military service as an officer of artillery, he made the acquaintance of the family of Dr. Müller, who practised for many years in the Gayndah district in Queensland, and on his glowing accounts of this State Mr. Brunnich decided to come out here. He arrived in 1885, and secured the management of a small sugar refinery at Mullumba and later became manager of another small mill at Port Darwin. He then joined the staff of the Colonial Sugar Refining Company, with whom he remained for ten years. He was mill manager and chemist at Homebush, in the Mackay district, where, under his direction, much experimental work was carried out, particularly in relation to cultivation, fertilising, and green manuring. He also conducted the first experiments there with the injection of carbon bisulphide for the destruction of cane grubs. In 1897 he was offered and accepted the position of Agricultural Chemist to the Government. Among other duties he held a lectureship in chemistry at the Agricultural College at Gatton. He organised the laboratory of the Agricultural Department, which is considered to be one of the most efficiently staffed and the most completely equipped in the Commonwealth.

For many years Mr. Brunnich has been a member of the Royal Society (Queensland), of which he is a past president. In 1905 he was elected a Fellow of the Institute of Chemistry of Great Britain and Ireland, and is a foundation member and Fellow of the Australian Chemical Institute.

Dipping Fluids.

Out of the 435 dipping fluids analysed, we found only 114 of effective strength, containing between 7.5 and 8.5 lb. of arsenic per 400 gallons, and 78 showed more or less oxidation. In four cases, the addition of skim milk at the rate of 2 gallons to every 100 gallons of dipping fluid brought about a reduction of the arsenic acid to arsenious in about a week's time, and prevented further oxidation for several months.

This simple process, first recommended by Mr. L. Cohen, the chemist of the tick board of control of New South Wales, can be strongly recommended whenever skim milk or butter milk is available, and does away with the costly recharging of dips, in which oxidation of the arsenious acid with the less effective form of arsenic acid has taken place.

Viscera.

Thirty-four samples of viscera and stomach contents were analysed, and in fifteen cases the presence of poison was proved.

Dairy Produce, &c.

Under the Dairy Act a large number of parchment papers used for butter-wrapping were analysed, and in several cases mouldiness of butters was traced to parchment paper containing, contrary to the regulations of the Dairy Act, large amounts of glucose.

Rennet.

Samples of rennet, manufactured in New South Wales, were tested and found to be of excellent quality, equal to the best imported rennets.

FOODS AND STOCK FOODS.**The Queensland Nut.**

Of interest are the analyses of a thin-shelled variety of the Queensland nut (*Macadamia ternifolia*) submitted by the grower, Mr. J. F. Waldron, Upper Eungella, Tweed River, New South Wales.

	No. 1. Thin-shelled Nuts with hull rather green.	No. 2. Thin-shelled, hull ripe.	Ordinary Variety with hull ripe.
	Grammes.	Grammes.	Grammes.
Average weight of hull	8.7	..	9.75
Average weight of nut	8.2	7.8	14.8
Average weight of shell	4.8	4.7	10.8
Per cent. shell	58.7	59.9	73.2
Average weight of kernel	3.4	3.1	4.0
Per cent. kernel	41.3	40.1	26.8
Analysis of kernel—			
Moisture, per cent.	28.2	6.1	11.8
Protein, per cent.	8.9	8.7	8.6
Oil, per cent.	52.8	72.7	70.0
Carbohydrates and fibre, per cent.	8.2	10.5	7.1
Ash, per cent.	1.9	2.0	2.5
Hydrocyanic acid	trace	Nil	Nil

Green hulls contained 4.5 per cent. of tannin.

It will be noticed that, although the kernel of the thin-shelled variety is somewhat smaller than that of the ordinary variety, the percentage weight of the kernel is very much larger, so that 1 lb. of the thin-shelled nuts yields 6½ oz. of kernel, as against 4½ oz. of kernel in 1 lb. of the ordinary variety.

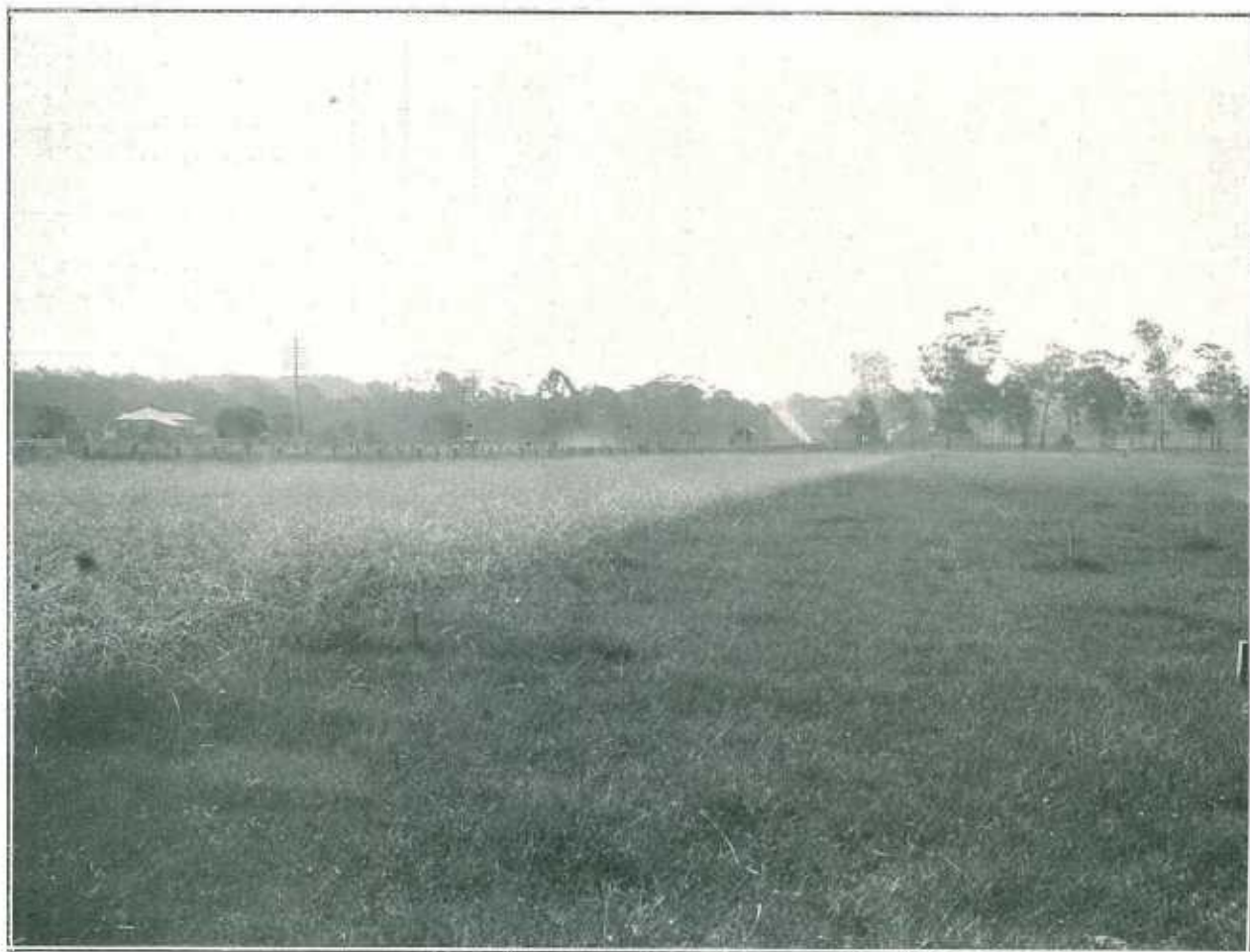


PLATE 109.—RUNCORN PASPALUM RENOVATION PLOTS.

On left, effect of ploughing; on right, unploughed. Ploughed April, 1925; photo. taken 6th February, 1926.

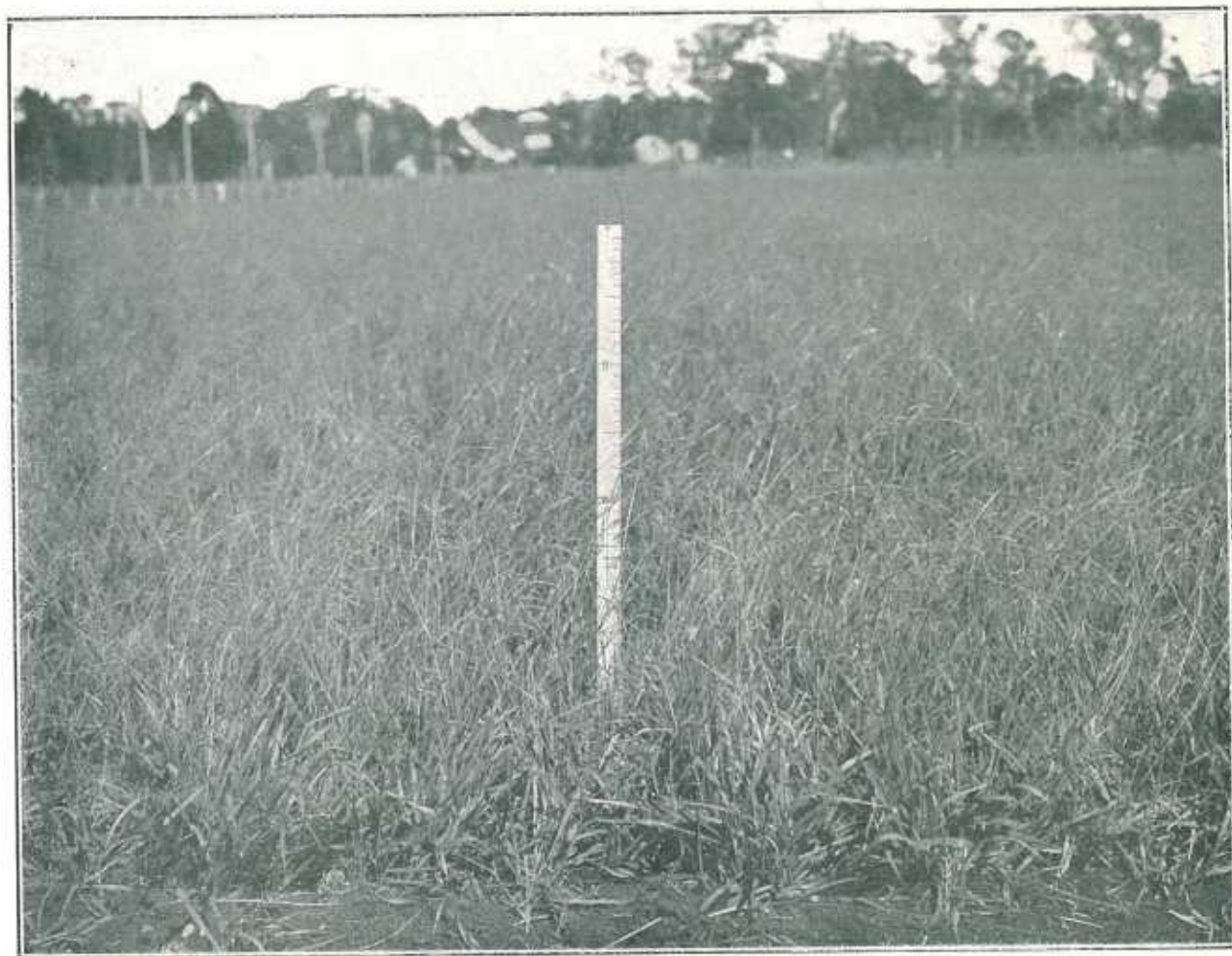


PLATE 110.—RUNCORN PASPALUM RENOVATION PLOTS.
Close-up view of ploughed portion.

Peanuts.

Mr. P. F. Coleman obtained a nice collection of varieties of peanuts from the New South Wales Department of Agriculture; the analyses of which are herewith given:—

Variety.	Crude Protein.	Crude Fat.
	Per cent.	Per cent.
Sogatum	25.5	51.5
Pondicherry	23.6	51.4
Natal common	28.5	49.7
Brazil	23.1	50.4
Mauritius	25.5	50.8
Transvaal	23.6	49.6
Chinese	29.1	47.9
Valencia	29.9	47.4
Virginia runner	20.6	53.0
African	30.5	47.1
Virginia bunch	23.3	50.5
White Spanish selected	27.0	50.8
Carolina	26.4	51.7
Virginia	25.9	48.4
Barbadoes	24.7	52.0
Norfolk Island	25.5	52.9
Spanish	28.0	48.5
White Spanish	27.5	48.8
Carolina Rhodesia	23.6	49.1

The cultivation of peanuts should be very much extended, and many of our sandy loams are eminently suited for their culture.

Peanuts not only yield a large percentage of valuable oil, but the by-product, the peanut cake, is the most nutritious of oil-cakes, containing over 40 per cent. of digestible protein, which contains a particularly high amount of lysine, an amido-acid absolutely necessary for maintenance and promotion of growth.

Stock Feeding in Dry Areas.

The feeding of starving stock, more particularly of sheep, has been a serious and costly problem in a large portion of our pastoral areas during the present season. Grain, chiefly maize, was largely used, but it was soon found that the animals did not do well, after feeding with grain was carried on for some time, and this was chiefly due to want of suitable roughage. It is quite impossible to feed sheep with the necessary amounts of concentrated foods, unless some roughage is given, which is required to form the "cud." If no roughage is available on the spot, the cost of handling and transport makes the cost of roughage obtained elsewhere quite prohibitive. The only solution of the problem is the conservation of fodder, whenever possible, to provide for the years of drought, and bush hay will keep its food value even after fifteen years or more of storage.

All sorts of schemes of feeding were tried by stockowners; in some instances meals, chiefly cotton-seed meal and linseed meal, were mixed with salt, and consequently a large number of sheep died of salt poisoning, as the drinking water was also rather too salty. Feeding of a good quality of white maize was also found to be disastrous, as white maize is deficient in certain vitamins which are present in yellow maize.

Feeding of chopped-up whole sugar-cane was not successful. Green sugar-cane tops have a fair food value, but are low in protein, but when using the whole stalk of the cane the food value, with regard to protein, is still much more lowered, and is not improved by the addition of molasses, which is only a condiment and makes dry foods more palatable. Sheep could not possibly consume a sufficient amount of chopped sugar-cane alone, and must die of protein starvation.

Proposals are made to utilise the megass of sugar-cane mills, with the addition of molasses, as a roughage to be put on the market, but there is practically no protein in the megass and molasses, and, therefore, such a roughage would not be worth the cost of transport.

As I found that the local ideas on the value of stock foods and the principles of feeding are in many cases very elementary, I prepared a short pamphlet on "Stock Foods," which is available to all interested on application to the Department of Agriculture and Stock.

I will just give a brief statement with reference to the amounts of various stock foods to be supplied to give a sheep the necessary amount of protein for its maintenance.

A 100-lb. sheep requires per day from 2 to 2½ lb. of dry matter, containing 0.12 lb., or about 2 oz., of digestible protein. This amount of protein is supplied by about 6 lb. of couch grass, 8 lb. of good mixed pasture or saltbush, 10 lb. of green cane tops (a quantity just about as much as a sheep could consume in a day), 20 lb. of chopped whole sugar-cane and tops, 6½ lb. of good bush hay (this gives about 6 lb. of dry matter, or more than double the amount a sheep could eat), 17 lb. of poor bush hay, 1½ lb. of lucerne chaff, 120 lb. of wheat straw, 2 lb. of maize or barley, 1 lb. of bran, 1½ lb. of kubettes, ¾ lb. of treacle cubes, and ½ lb. of linseed meal.

From these figures it is easily seen that a sheep fed only on bush hay or on chopped sugar-cane must starve.

Megass feed would have not as much value as wheat straw, and pinewood sawdust or wood shavings might just as well be utilised as megass.

Stock Licks.

Licks are largely used at present by stockowners—who, however, have no idea what they contain, and in many instances pay high prices for licks which are practically only salt. Licks do not come under the provisions of the Stock Foods Act, and, therefore, purchasers should demand some guarantee on the composition of licks before buying.

The following three analyses of licks, obtained from users, show that only the first has some medicinal value:—

	A.	B.	C.
	Per cent.	Per cent.	Per cent.
Moisture	3.89	1.47	0.60
Insoluble matter	4.50	trace	Nil
Iron and alumina		0.90	Trace
Magnesia	0.67	0.82	Trace
Lime	14.67	..	0.30
Phosphoric acid	7.85	Trace	Nil
Phosphoric acid, water soluble	3.26		
Sodium chloride (salt)	9.30	91.31	99.0
Sulphur	18.80	Nil	Nil
Sulphuric acid	7.27	2.69	0.30
Arsenic	0.40	Nil	Nil

Home-made licks, made up from special bonemeal and salt, or finely-ground Nauru rock phosphate, using 2 to 3 parts of phosphate with 1 part of coarse salt, are already largely used with highly beneficial results. A very interesting article on "Phosphorus in the Live Stock Industry," reprinted from the South African "Agricultural Journal," appeared in the "Queensland Agricultural Journal" (March, 1925), which should be read by every stockowner. Short articles on the same question appeared in the "Queensland Agricultural Journal," March and April, 1926.

Pasture Improvement.

Renovation of paspalum pasture has become an important question, and several experimental plots have been started by the Department in various places in Queensland, to ascertain the advantages of treating old paspalum pasture by ploughing and fertilising, leaving unploughed portions as controls.

At Maleny the ploughed portions recovered very quickly, and much larger cuts of grass were obtained from the ploughed plots than from the unploughed plots. At Cooroy, however, only the last cutting showed an increased yield in the ploughed plots over the unploughed ones, and this is due to the fact that the soil at Cooroy was shallower and the ploughing was done much more roughly.

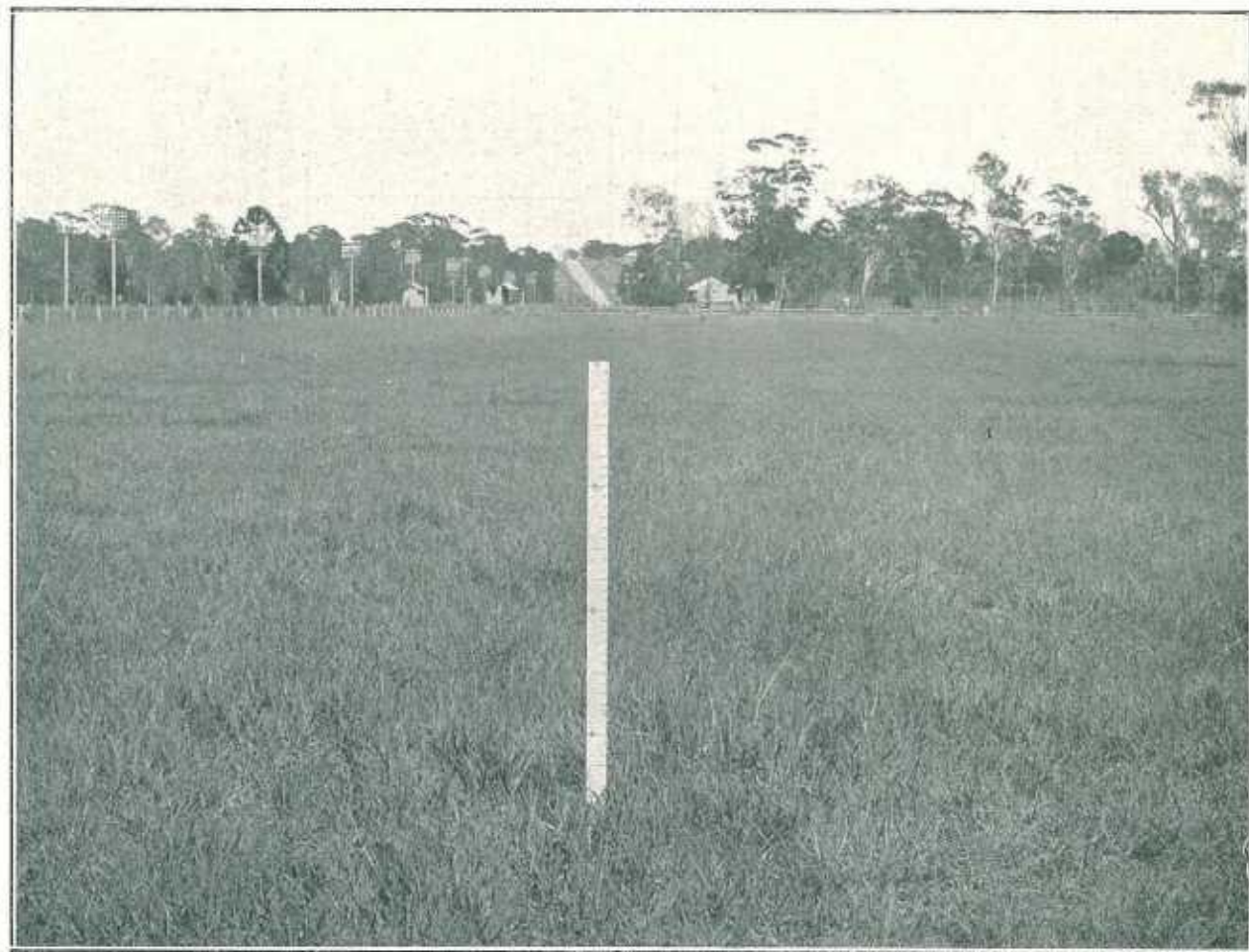


PLATE III.—RUNCORN PASPALUM RENOVATION PLOTS.
Close-up view of unploughed portion.



PLATE 112.—FODDER PLOTS AT RUNCORN.

View of Foxtail Millet Crop; sown 5th January, 1926. Photo. taken 8th February, 1926.
On left, unmanured; on right, manured,

The following table gives the yield of dry matter contained in the grass by all the cuttings made from time to time:—

Fertiliser Used per Acre.	MALENY.		COOROO.	
	Tons per acre of dry matter obtained by—			
	8 Cuttings 16/4/25 to 23/2/26.		6 Cuttings, 20/11/25 to 24/4/26.	
	Total tons per acre.	Gain or loss over average yield of unfertilised plots.	Total tons per acre.	Gain or loss over average yield of unfertilised plots.
PLOUGHED PORTIONS.				
	Per cent.	Per cent.	Per cent.	Per cent.
Nil	4.88	— .16	1.44	— .21
$\frac{3}{4}$ ton agricultural lime	5.52	+ .48	1.80	+ .15
$\frac{1}{2}$ ton air-slaked lime	4.80	— .24	1.68	+ .03
1 cwt. Nauru phosphate	5.20	+ .16	1.50	— .15
Nil	5.20	+ .16	1.86	+ .21
$\frac{1}{2}$ cwt. Nauru phosphate and $\frac{1}{2}$ cwt. superphosphate ..	6.24	+ 1.20	2.64	+ .99
1 cwt. Nauru phosphate, $\frac{1}{2}$ cwt. potassium sulphate, $\frac{1}{2}$ cwt. nitrate of soda ..	6.16	+ .92	1.56	— .09
1 $\frac{1}{2}$ cwt. basic superphosphate	6.72	+ 1.32	1.20	— .45
UNPLOUGHED PORTIONS.				
Nil	2.64	— .96	1.86	— .63
$\frac{3}{4}$ ton agricultural lime	2.80	— .80	1.86	— .63
$\frac{1}{2}$ ton air-slaked lime	3.54	— .06	2.16	— .33
1 cwt. Nauru phosphate	3.28	— .32	2.10	— .39
Nil	4.56	+ .96	3.12	+ .63
$\frac{1}{2}$ cwt. Nauru phosphate and $\frac{1}{2}$ cwt. superphosphate ..	4.80	+ 1.20	3.78	+ 1.29
1 cwt. Nauru phosphate, $\frac{1}{2}$ cwt. potassium sulphate, $\frac{1}{2}$ cwt. nitrate of soda ..	3.92	+ .32	3.06	+ .57
1 $\frac{1}{2}$ cwt. basic superphosphate	3.60	..	2.46	— .03

The results of the weighings of square yards obtained from the enclosed portion of each of the plots showed great variations, and only one of the experiments, with the application of Nauru phosphate-superphosphate mixture, showed a decided gain in all four plots. The plots with complete fertiliser gave a gain in three plots and a loss in one, whereas the plots dressed with basic superphosphate showed a considerable increase in only one of the four plots.

A large amount of analytical work, both with individual cuts of the grasses and of composite samples, was carried out, but no definite conclusions can be drawn from the results obtained. It is quite useless to publish complete tables of these analytical figures, but I will give a short summary of the results of the average analyses of all the cuts from the various plots, and also the maximum and minimum amounts found.

These amounts are calculated on the green material as cut, which contained an average moisture of 70 per cent., and, therefore, the amounts in the dry materials would be about three times as much:—

	Protein.	Fibre.	Ash.	Phosphoric Acid in Ash.	Lime.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
IN GREEN MATERIAL.					
Cooroy, ploughed plots	3.9 (3.5—4.2)	9.9 (8.9—10.6)	3.2 (2.9—3.4)	.094 (.090—.111)	.222 (.085—.250)
Cooroy, unploughed	3.2 (2.9—3.4)	8.4 (9.4—10.6)	2.2 (2.0—2.4)	.068 (.059—.079)	.091 (.078—.102)
Maleny, ploughed plots	3.0 (2.5—3.5)	7.2 (6.1—8.2)	2.4 (1.9—3.1)	.112 (.097—.135)	.256 (.205—.325)
Maleny, unploughed plots	3.1 (2.4—3.7)	7.8 (5.6—11.5)	2.8 (2.0—4.2)	.110 (.088—.126)	.313 (.155—.630)

Runcorn Paspalum Trials.

Due to unfavourable season, only one cut of the ploughed and unploughed plots of this experimental area was made, on the 12th May, 1926; but no conclusions can be drawn from the weights obtained from 1 square yard of each plot. Difference in the growth apparent in the first growth, more particularly in the plots fertilised with fine bonemeal and with complete fertiliser, showing better growth and greener appearance than any of the other plots, disappeared as the grass got older. The difference between the growth of the grass on the ploughed and unploughed portions is very striking, and is clearly shown in the photograph. The grass on the ploughed portion is of much more vigorous growth and has more flag than on the unploughed plots. The bare patches left after ploughing between the furrows are at present covered with young seedling paspalum.

As the quantity of fertiliser applied at first was undoubtedly on the low side, trying to keep the cost low, a further application of fertilisers has been made this year, and the cuttings to be made in the coming spring should show great differences. Arrangements, however, must be made to obtain true average weights of grass from each plot, by cutting and weighing the whole of each plot, or at least a large proportion of it.

Fodder Plots.

An interesting series of experiments with fodder crops were also carried out at Runcorn, and proved the great advantages derived from fertilising. The following table gives the results of yield and analyses of the crops grown under rather adverse climatic conditions, and we find in two cases the weight of the green and dry material practically doubled by the use of fertilisers. The fertiliser used was a 6-16-4 mixture applied at the rate of 645 lb. per acre.

The season was not all favourable, and between the time of sowing (6th January, 1926) and harvesting (2nd March, 1926), only 145 points of rain were registered in January and 18 points in February.

The crop of the fertilised maize was of much better growth than that of the unfertilised plot, only the weight is not any better because the crop was thinned out by pigeons getting at the freshly-sown maize. The sorghum yield was also very much better than indicated by the weights obtained, and the photograph given of these plots shows a very great difference between the fertilised and unfertilised plots.



PLATE 113.—RUNCORN FODDER PLOTS.

Close-up view of Saccaline. Sown on 5th January, 1926; photo. taken 8th February, 1926. Unmanured and manured.



PLATE 114.—RUNCORN FODDER PLOTS.
Close-up view of Foxtail Millet; unmanured and manured.

Only a small amount of hydrocyanic acid, in quite harmless quantities, was found in the youngest stages of growth in Sudan grass and Saccaline sorghum.

These fodder trials will be repeated this year on similar lines.

RESULTS OF FODDER PLOT TRIALS.

	ANALYSES OF GREEN MATERIAL.							EIGHT WEEKS GROWTH.		HYDROCYANIC ACID IN GREEN SAMPLE.		
	Moisture.	Crude Protein.	Carbo-hydrates.	Crude Fat.	Crude Fibre.	Crude Ash.	Lime in Ash.	Tons per Acre.		Cut 2-4-26.	Cut 23-2-26.	Cut 23-2-26.
								Green.	Dry.			
Foxtail millet (<i>setaria italica</i>)—												
Manured ..	53	2.6	25.6	.5	15.4	3.2	.49	4.9	2.3	Nil	Nil	Nil
Unmanured ..	52	2.2	24.5	.5	16.2	4.6	.42	2.5	1.2	Nil	Nil	Nil
Maize—												
Manured ..	77	1.0	13.0	.2	7.3	1.5	.13	11.3	2.6	Nil	Nil	Nil
Unmanured ..	80	1.1	10.6	.2	6.7	1.5	.07	12.1	2.5	Nil	Nil	Nil
Sudan grass (<i>sorghum sudanense</i>)												
Manured ..	64	1.3	19.7	.4	11.9	2.8	.18	4.6	1.6	0.75	Nil	Nil
Unmanured ..	66	1.6	17.8	.3	10.9	3.4	.22	2.4	0.8	0.5	Nil	Nil
Saccaline sorghum (<i>sorghum vulgare</i>)—												
Manured ..	71	1.0	17.2	.3	7.7	2.8	.12	7.8	2.3	2.0	Nil	Nil
Unmanured ..	68	1.3	17.7	.4	9.0	3.6	.17	6.2	2.2	1.0	Nil	Nil

9.0 = $\frac{1}{2}$ grain of H.C.N. per lb.

CHAIRMANSHIP OF THE CENTRAL CANE PRICES BOARD.

RETIREMENT OF MR. JUSTICE O'SULLIVAN.

The Minister for Agriculture, Hon. W. Forgan Smith, referred, in the course of a recent Press announcement, very appreciatively to the work of Mr. Justice O'Sullivan, who has just resigned the chairmanship of the Central Cane Prices Board under the Cane Prices Act. The Act was passed in October, 1915, and Mr. Justice O'Sullivan was appointed the first chairman of the Central Board on the 9th December of the same year. He continued in that position, without intermission, for eleven years. The manner in which the work of the Central Board has been carried out, with satisfaction to both the growing and milling interests, has been due to the able and impartial manner in which Judge O'Sullivan presided over the functions of the Central Board. As illustrative of the intrinsic progress made by the sugar industry since the Act was passed, the following figures are illuminating:—

	1915.	1925.
Area crushed	94,459 acres	189,466 acres
Total Cane crushed	1,152,516 tons	3,668,232 tons
Average Cane per acre	12.20 tons	19.36 tons
Total Sugar produced	140,496 tons	485,585 tons
Sugar produced per acre	1.49 tons	2.56 tons
Cane required to make a ton of Sugar	8.20 tons	7.55 tons
Total value of Sugar produced	£2,528,928	£9,482,989

Mr. Forgan Smith added that he was expressing the views of the whole of the sugar industry when he stated that during the period of his term as chairman, Mr. Justice O'Sullivan had enjoyed the fullest confidence of the growers, the millers, and the Government.

HIGHWAY IMPROVEMENT IN QUEENSLAND.

* THE WORK OF THE MAIN ROADS COMMISSION.

What the Romans thought, wrought, and taught in the way of sound citizenship as expressed in public highways that have stood the wear and stress of centuries serves, perhaps, as something in the way of inspiration to the Authority to which has been entrusted the construction of arterial highways in rural Queensland.

In these days of almost universal motor transport main road construction is receiving greater and intenser attention. The district that will prosper most is the district that has a well-maintained system of road communication.

Looking to a future Queensland balanced in industry, and balanced in everything else that matters, a widespread realisation is evident that the broad highway is one of the strongest influences in the development to the full of our national life.

The subjoined abstract from the Annual Report of the Main Roads Commission for the current year gives some idea of the work of that Authority. We are also indebted to the Commission for permission to reproduce the fine set of plates accompanying it.—Editor.

Below in a recent essay on "The Road" says in his introduction:—

"We have arrived at a chief turning point in the history of English highways. New instruments of locomotion, a greater volume of traffic, a greater weight in loads, and vastly increased rapidity in road travel have between them brought us to this issue; either some very considerable and immediate change in the character of the road, or a serious and increasing handicap in our rivalry with other nations through the strain and expense of an outworn system."

If this be true of a country whose road construction began with the Roman invasion, then what of such a country as this with its vast spaces requiring proper means of communication for development and social intercourse? That we have arrived at that turning point is instanced by the fact that in 1922 the motor vehicle registrations in the State totalled 11,000, whilst to-day (four years later) they total 47,000 net.

The increase of motor trucks in the same period is from 500 to 2,300.

This tremendous increase in mechanical road transport has brought its attendant troubles in the maintenance of roads, and serious consideration is required as to the means which should be adopted for financing the cost of this maintenance.

The old methods of maintenance are insufficient wherever the bulk of traffic consists of motor vehicles, and it has become necessary to bitumen surface many new roads.

In the early stages, maintenance work was confined to repairs of existing old roads, making boggy places temporarily passable, and patching up old bridges, but the construction of every mile of new road has entailed a responsibility for its maintenance. The report of the New Zealand Highways Board indicates that the cost of maintenance under present conditions of rural traffic has increased to over £50 per mile per annum over the total length of roads controlled by the Board, many of which are probably unconstructed.

One hundred thousand pounds will be absorbed this year in the maintenance of the main road system of this State, and the requirements are growing at a rapid rate.

The March of the Motor Vehicle.

The problem of location of new roads assumes a somewhat different aspect to-day to that of a dozen years ago. The horse at best could double his tractive effort for but a short space of time and thus a steep grade greatly limited his load.

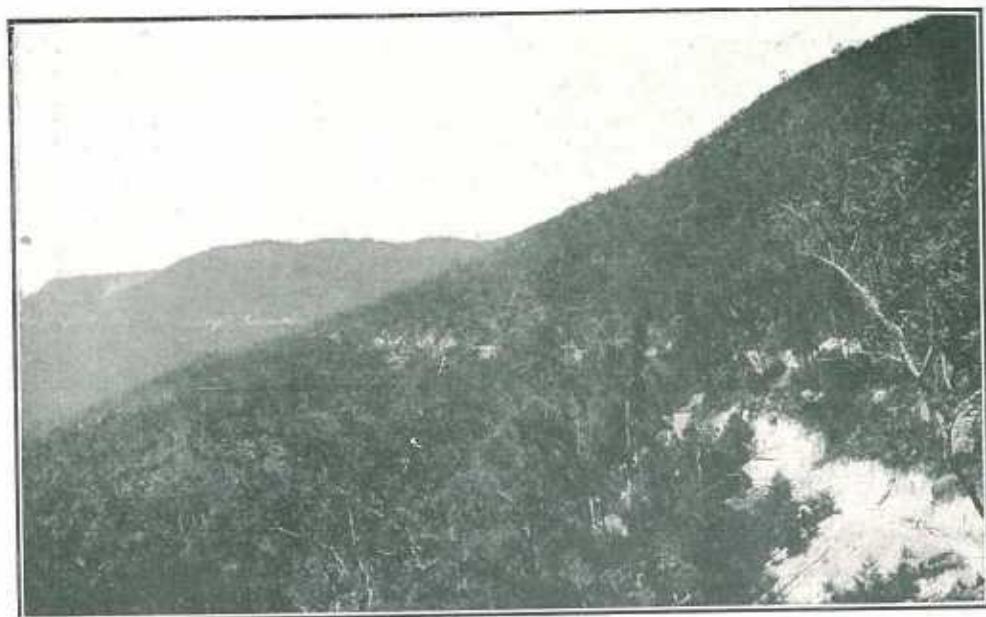


PLATE 115.—CAIRNS-TABLELAND ROAD, NORTH QUEENSLAND. GENERAL VIEW SHOWING ROAD ALONG MOUNTAIN SIDE.



PLATE 116.—CAIRNS-TABLELAND ROAD. SECTION NEAR TOP OF RANGE.



PLATE 117.—BURRUM SHIRE. LOW-LEVEL BRIDGE OVER BURRUM RIVER, UNDER CONSTRUCTION.



PLATE 118.—KOLAN SHIRE. GIN GIN CREEK LOW-LEVEL BRIDGE, GIN GIN-MIRIAM VALE ROAD.

The motor vehicle by momentum and gear changes makes light of short comparatively steep grades, and practically no loss of energy occurs due to undulating grades (which are often necessary in order to obtain the shortest possible line between two given points), provided the height climbed in each rise is not greater than that just necessary to allow the vehicle to coast down the opposite side of the hill without unnecessary application of brakes. Every foot climbed above such a height represents lost energy.

On the other hand, unnecessary length introduced into the road means a loss which according to the report of the Brisbane Cross River Commission may be averaged at 6d. per vehicle mile.

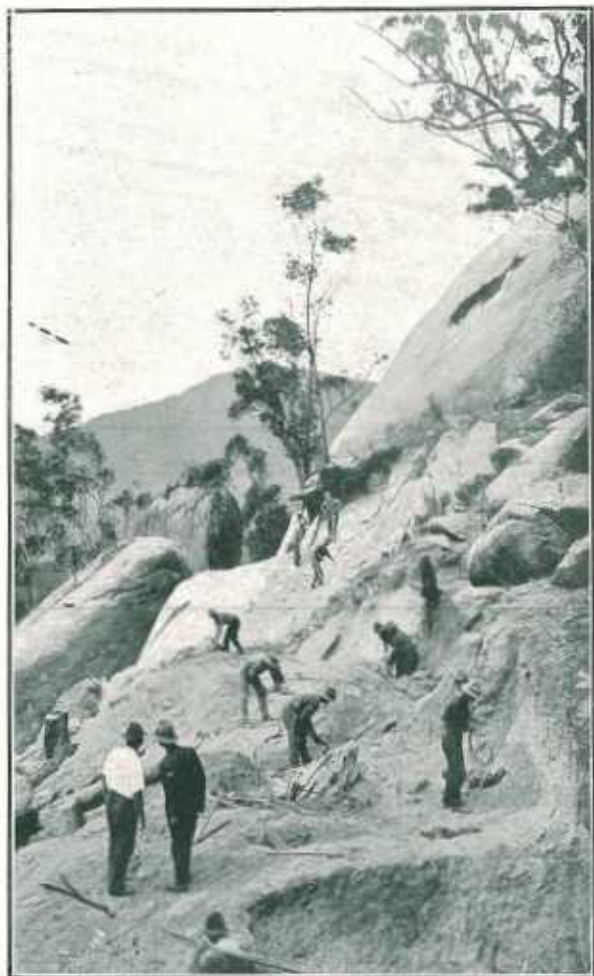


PLATE 1119.—CAIRNS-TABLELAND ROAD. MEN WORKING MACHINE ROCK DRILLS.

As an example, 500 vehicles a day travelling an unnecessary length of one-tenth of a mile on easy grades will occasion a waste expenditure of £456 per annum, or nearly one pound per vehicle.

It would be a much better proposition for the owners of those vehicles to pay an extra tax of £1 per annum to the road funds and thus make it available for maintenance of correctly located and soundly built roads rather than have it wasted in useless effort. The losses due to grade and unnecessary climbing are equally serious although not so obvious, but it may be said generally that to-day alignments and grading problems are of equal importance.

The Brisbane Cross River Commission has also estimated that the average power and maintenance costs per foot ton for road vehicles equals .019d.

Five hundred vehicles unnecessarily climbing, say, 200 feet per day, would represent a loss of energy of 100,000 foot tons having a value of £8, or £2,920 per year.

These figures will instance the necessity for care in locating new roads.

Whilst the motor vehicle can climb undulating grades under the conditions previously mentioned without loss of energy, serious losses and severe limitation of loading would be imposed by the imposition of long, steep grades, and it is

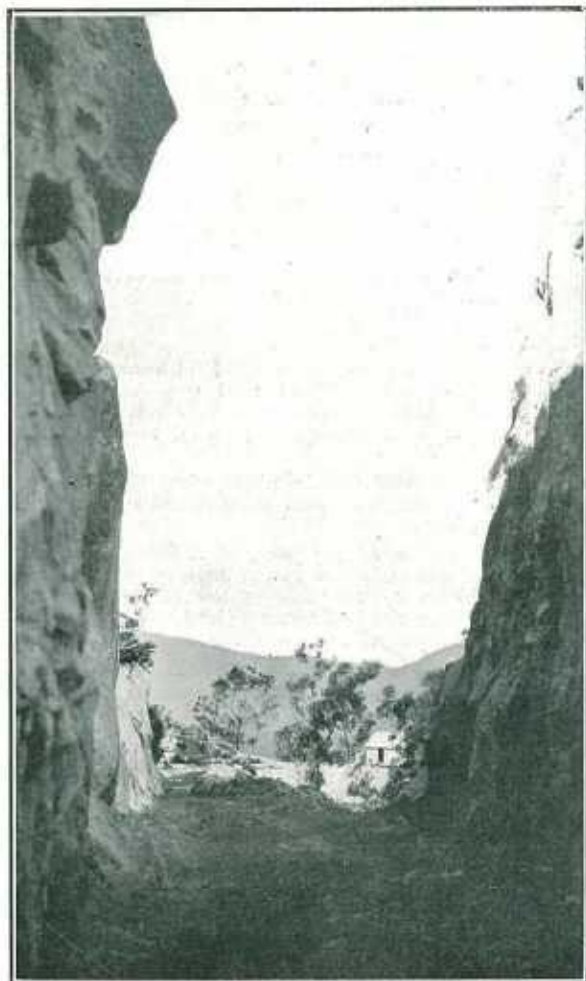


PLATE 120.—CAIRNS-TABLELAND ROAD, SHOWING
GRANITE CUTTING.

therefore of great importance that long grades should not be steeper than 5 per cent. on main routes, although many instances occur where it becomes necessary to adopt a steeper long gradient. The Palmwoods-Montville road at present under construction is an example.

A grade of 5 per cent. could have been obtained on a certain route at a very greatly increased capital cost, including the capitalised value of maintenance, but a grade of 6 per cent. or thereabout was adopted for the reason that sound country for construction was secured and the top of the road emerged at a point on top of the Blackall Range which very much better suited the whole area to be served.

The works in the Northern division are, in a number of instances, designed to open up practically virgin country, and it must here be stated that the shires have willingly shouldered their very considerable obligations.

The Value of Good Roads—Concrete Evidence.

Certain very important evidence of increase in the wealth of a district due to the construction of a road was recently brought out at depositions from Maleny requesting an extension of the road system. The depositions represented dairymen, merchants, butter factory and milk supply interests.

Cream cartage contracts between Maleny and Landsborough were stated as showing a saving of £800 per year, whilst passenger fares have been reduced by 50 per cent. as a result of the construction of the new road. It may be assumed that back loading charges for ordinary merchandise have been greatly reduced also, but the biggest factor of all is that Maleny now supplies over 1,000 gallons of milk daily for Brisbane. The extra profit on this milk for the farmer as compared with cream is stated at £25 per day, or £9,125 per annum. It is hoped to double the quantity in the near future. The regular supply of this milk was impossible until lately, when the construction of all the worst sections of the Landsborough-Maleny road were completed. This additional prosperity must surely also be reflected in increased railway earnings. The supply of 1,000 gallons of milk by rail to Brisbane alone represents approximately 4 tons of extra freight per day.

The old road cost £1,600 a year to maintain, whilst the new road, giving 100 per cent. of service in all weathers, has not cost more than a few hundreds in maintenance since the opening of the first section nearly three years ago. Considerable sums have, of course, been expended in keeping old sections in repair during construction of the new.

Strong evidence exists in Kingaroy district to show that great savings in freight charges have resulted from main road construction after allowing for interest and redemption payable thereon, whilst very considerable trade and interchange of products have been brought about owing to improvements effected to Kingaroy-Bell road.

A much greater impetus still will be given when the deviations necessary to shorten length and improve gradients have been effected in the vicinity of Bunya Mountains, near Porter's Gap.

The opening, in the course of the year, of a bridge over the Boyne River, in the Burrandowan area, was acclaimed as the most important event in the history of the settlement and will prevent that interruption of traffic which was previously so common, and will eliminate risks of recurrence of unfortunate loss of life which has occurred previously in attempts to cross the flooded river.

Tourist Roads.

The cost of the Range section (on the Cairns Range road between Little Mulgrave River and Lake Barrine—a distance of sixteen miles) up to 30th June of this year amounted to £129,410 1s. 8d., and its construction involved very heavy rock excavation over the greater portion of the length.

Financial considerations limited the construction to that sufficient for one-way traffic, which is regulated according to a published time-table. The ruling gradients are 5 per cent. with due compensation on curves.

Roads are needed not only for pure development purposes, but for health reasons, to enable people to readily obtain a change of climate from coast to highlands and vice versa. The Cairns Range road may be bracketed in this respect with the Maroochydoore, Tewantin, and Redcliffe roads, and such roads as Tambourine and Canningra-Beechmont, inasmuch as they both open up scenic beauty and are developmental in character.

The Townsville Council has offered to subsidise a road to Hervey Range to the extent of £600 per annum practically for health purposes, and Thuringowa Shire offers another £200 per annum for an entirely different reason.

It may be here not inopportune to draw attention to the necessity for a tourist road vote which should be employed for opening up such places as the National parks, waterfalls, and camping grounds at high elevation in various parts of the State.

It is seldom that such projects fall within the ambit of main road operations. From a business point of view it would pay to let the citizens of the State see their own beauty spots first. The amount of money spent in visiting Southern health resorts alone, if retained in the State, would go far towards recoupment of the amounts expended, and the opening up of these places would certainly attract people from other lands to linger in the State.



PLATE 121.—MUNDURBERRA SHIRE. LOW-LEVEL BRIDGE OVER THE BOYNE RIVER.
NATIONAL GRANT PROJECT.

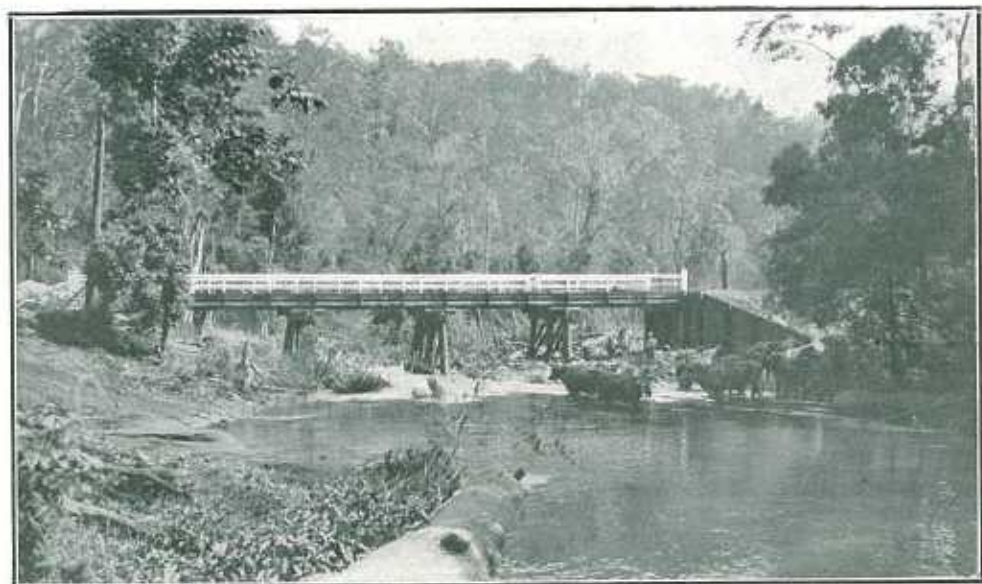


PLATE 122.—NERANG SHIRE. BRIDGE OVER LITTLE NERANG RIVER, ON THE MUDGERABA-
SPRINGBROOK ROAD. NATIONAL GRANT PROJECT.



PLATE 123.—BURRUM SHIRE. MARYBOROUGH-PIALBA ROAD.



PLATE 124.—GYMPIE ROAD, RECENTLY CONSTRUCTED. SECTION NEAR BALD HILLS.



PLATE 125.—CURVES ON THE KINGAROO-BARKER'S CREEK ROAD, KINGAROO SHIRE.



PLATE 126.—MURGOON-BARAMBAH ROAD, IN MURGOON SHIRE, LOOKING TOWARDS BARAMBAH.
ROLLING INCOMPLETE.



PLATE 127.—TIARO-BAUPLE-GOOTCHIE ROAD, IN TIARO SHIRE.



PLATE 128.—KOLAN SHIRE, GIN GIN-MIRIAM VALE ROAD, SHOWING A DEVIATION TO AVOID A STEEP GRADE.



PLATE 129.—GILDED ROSE DEVIATION. CLONCURRY-WINTON ROAD, CLONCURRY SHIRE.

DUSTING FOR AN IMPORTANT QUEENSLAND INSECT PEST.

The November number of the "Queensland Agricultural Journal" contained a brief note by the Chief Entomologist (Mr. Veitch) dealing with a small bug that has in recent weeks been responsible for very serious losses both in field crops and in orchards. The abnormal abundance of the insect in question (*Nysius* sp.*) afforded an opportunity for testing out certain dusts for the control of this pest under existing Queensland conditions, and decidedly promising results have been obtained by the use of calcium cyanide and nicotine dusts; these dusts will be used in further field trials.

Success in the control of a pest by either dusting or spraying depends on the following:—(1) The dust or spray employed must give a high percentage of mortality in the insects treated; (2) the cost of the material and the amount of labour employed must be such that the control measure is economically practicable; (3) the treatment adopted must have little or no injurious effect on the plants that are dusted or sprayed; (4) the dust or spray employed must be capable of being used with safety by the operator when due care is observed in its application. Complete success in control is obtained only when all these conditions are fulfilled by the dust or spray employed.

The Entomological Branch of the Department of Agriculture and Stock intends to carry out further field experimental work in connection with this very important pest, and in handling the question of control the practicability, safety, and efficiency of any new control measure will be constantly kept in view. Naturally, any new control measure must be subjected to repeated trial before it can be recommended for general adoption.

* This species is frequently referred to as the "Rutherglen Bug."—R.V.

OBITUARY.

SIR ALFRED COWLEY.

The late Sir Alfred Sandlings Cowley, whose death occurred at Brisbane on 1st December, was a prominent figure in the political and commercial life of the State, and held the portfolio of Secretary for Public Lands and Agriculture in the Mellwraith-Griffith Administration until 1893, when he entered upon a long and distinguished career as Speaker of the Legislative Assembly.

The late Sir Alfred was a Gloucestershire man, born at Fairford on 24th April, 1848. As a young man he went to South Africa, and in 1880 he married Miss Marie Campbell, daughter of Mr. William Campbell, of Natal, and sister of Dr. Campbell, a revered citizen of Durban, whose death occurred a few weeks ago. Lady Cowley, who survives Sir Alfred, is the aunt of Miss Campbell, who was known to many Australian Diggers of the A.I.F. as "The Angel of Durban."

Sir Alfred Cowley came to Queensland subsequently, and having been engaged in sugar planting in South Africa he went North, took up sugar lands, and became a prominent grower. For nearly twenty years he represented the Herbert electorate, his successor being the Hon. William Lennon, now Lieutenant-Governor of Queensland.

He was knighted in 1904. Seventeen years later, long after he had retired from active politics, and because of excellent work during the war, Sir Alfred was awarded the Order of the British Empire.

After leaving active politics Sir Alfred devoted his attention to several great commercial concerns with which he was associated. He was chairman of the local board of advice to the National Bank of Australia, and chairman of the Brisbane Board of Directors of the Australian Mutual Provident Society; and during the war he was chairman of the Queensland Patriotic Fund. At the time of his death he was one of the two trustees of the Royal National Association.

In the funeral cortege were many representatives of every section of citizens, including the Lieutenant-Governor, Parliament, the Judiciary, the Services, Commerce, Industry, and the Department of Agriculture and Stock, of which he was a former Ministerial chief.

THE FEEDING OF LIVE STOCK.

By J. K. MURRAY, B.A., B.Sc.Agr. (Sydney), N.D.D. (Scotland),
Principal, Queensland Agricultural High School and College.

The following is the first of a series of lectures broadcasted from the Radio Studio, of the Council of Agriculture through the Queensland Government Radio Station, 4QG:—

To understand just what we want to do helps greatly in doing it in an efficient, economic way. A good cow is a much more complicated and efficient piece of machinery than the largest factory in the Commonwealth. Let us try to follow just what we want to do when we feed a pregnant milking cow. This pregnant milking cow, of course, is doing all these jobs:—

Operating Machinery.—Running all her motor machinery; walking, feeding, pumping blood and other fluids, breathing, and operating a nervous system which is more complicated than an automatic telephone exchange.

Daily Repairs.—Making continuous repairs to all her machinery. Hoofs, skin, and hair are renewed, muscle and nerve fibres are repaired when worn, replacements are made of broken-down brain, heart, and kidney substance, of worn parts of lymphatic, thyroid, and milk glands, &c. Parts wear, but the cow is not periodically laid-up for adjustment and replacement of parts.

Calf Formation.—She is gradually building up the body of the foetus or young calf. From the time the ovum or egg in the womb is fertilised by the male sperm,

there is within the pregnant cow a being which requires more and more food from the cow's blood. The cow, in forming the calf, is as truly manufacturing a new piece of machinery as is a railway workshop which is making a new locomotive.

Milk Formation.—The cow is manufacturing milk. Milk is a most complex substance, and, with all the recent and wonderful progress of agricultural and dairying science, we are still not aware of just how some of the substances in milk are made or even of their exact composition.

We justly pride ourselves on our ability to manufacture indigo in chemical factories in place of obtaining it from the indigo plant. We are, however, far, far from being able to manufacture milk.

Putting on Condition.—Lastly the cow may be putting on fat. With beef cattle this is, of course, an important piece of work.

To summarise, the milking cow is operating all her machinery and repairing it; she may be making a future cow; she is producing milk, and, may-be, fat.

To operate her machinery the cow will need fuels to supply energy and heat. The common fuels used by animals are sugars and starches, and are called carbohydrates. To repair her machinery she will require repair materials. Most of her machinery is not composed of metals like a car, but of materials we call proteins; some of the cow's machinery is made of compounds of metals which are generally termed mineral ash. It follows that, for repairs to the cow's machinery, we must supply proteins and compounds of metals (mineral ash), just as we must supply various kinds of metallic material to repair an engine. Proteins and mineral ash are quite distinct from carbohydrates, and the proportions of these substances in common foodstuffs (like maize and lucerne) is greatly different.

To form the body of the calf we will need to feed materials to the cow from which she can construct it. These, again, are mainly proteins and mineral ash.

To form milk, which is designed by nature as a complete food from which the calf can develop its body and operate its machinery, obviously proteins, mineral ash, and fuel (sugars and starches) will be required.

Forming Fat.—Fat can be most economically formed, as a general rule, from starch-rich foods. Foodstuffs for animals generally contain a small quantity of fat or oil, which may be used as fuel for the formation of heat and energy; fat or oil have about twice the energy value of starches.

So far we have not considered one group of substances which are an essential part of a ration, but concerning which we know little except their value. These are the vitamins.

Vitamin A.—It was once believed that if an animal were fed on pure proteins, carbohydrates, fats, and mineral substances all its needs for life and growth would be met. We now know that there are substances called vitamins which are essential for life and growth. The required amount of each is small. One of them, which is called "A" is present in green plants, particularly lucerne. The minute amounts present in the plants are found collected in the milk fat. Butter is thus rich in this vitamin, and is a much more valuable food for children than margarine. This vitamin promotes growth, prevents certain bone diseases like rickets, and also an eye disease. A young animal ceases to grow if deprived of it, and eventually dies. Fortunately vitamin "A" is not injured by pasteurisation and most manufacturing treatments. Cod liver oil is rich in this vitamin, but the main source of our supply for human beings is milk. Colostrum, the small amount of butter-fat in separated milk, and green pickings seem to supply the necessary amount to calves and pigs. Some proprietary calf foods contain cod liver oil, the object being to supply the calf with the vitamin "A" removed from the milk in separating the butter-fat.

Vitamin "B" is present in most common foodstuffs, and, like "A," is resistant to heat and other processes. Pigeons deprived of it develop nerve-spasms, while human beings deprived of it or a closely associated vitamin get a disease called Beri Beri. In this connection it is interesting to note that Beri Beri is common among Chinese and others who are fed on a sole diet of polished rice, while those who receive unpolished rice are free from the disease. Vitamin "B" is present in the rice husk.

Vitamin "C" prevents scurvy. It is present in living plants, fresh milk, lime-juice, oranges, lemons, tomatoes, &c. Its value to domestic animals is somewhat uncertain, though its importance to human beings cannot be gainsaid. Animals apparently cannot form vitamins, but obtain them from plants. There may be some exceptions. It is unlikely that diseases due to vitamin deficiencies will trouble our domestic stock.

In the next lecture some information will be given about the substances (protein and mineral ash) animals use for forming young and repairing their bodies, and the other substances (carbohydrates) mainly used for energy.

TOMATO CULTURE—CALIFORNIAN METHODS.*

Except where following spinach or other winter crop, tomato land should be fall-ploughed as deeply as possible. In spring, before the surface gets hard and dry, the land should be disced to kill weeds and get the soil into fine condition. The method of preparing for the plants and method of transplanting depends upon the locality and the soil conditions. In most sections, when setting for the early crop, it is easy to set the plants without watering if the soil is handled properly. Under such conditions, the field is prepared level and marked off in both directions and the plants set at the intersections if they are set by hand. In setting large aerenges, however, much time and labour can be saved by the use of a horse-drawn transplanter. These machines, of which there are several types on the market, set the plants as well as they are usually set by hand, and can be used to water the plants if watering is necessary.

In dry sections and in most sections during dry seasons it is necessary to water the plants as they are transplanted. This is almost always necessary in setting the late crop. If irrigation water is available, the simplest plan is to mark the rows with a plough. The plants are set the proper distance apart on the edge of the furrow and a small stream of irrigation water is turned into each row as it is set. Cultivation must follow within a day or two, to prevent a hard crust forming around the roots. At this time the soil should be worked toward the plants, thus beginning the bed which should be gradually formed for each row.

Another way to set plants under dry conditions is to haul a number of barrels of water into the field, placing the barrels across the field at convenient intervals. As the plants are set, a little water is poured about the roots from a can.

In transplanting tomatoes, the plants should be set as deeply as possible, usually 4 or 5 inches deeper than the plants were in the plant bed. New roots develop along the stem, giving the plant a much larger and deeper root system than can be obtained when the plants are small and set shallow. Deep setting is, of course, more laborious than the customary shallow setting, but it encourages the plants to develop large, deep root systems, which enables plants to make use of the moisture in the lower soil. Deeper ploughing than usual for tomatoes aids in securing the same result. Plants with deep roots are most assured of an even moisture supply, do not require so frequent irrigations, and do not suffer from the sharp fluctuations of alternately having too much and not enough water. It seems that many of the troubles affecting tomato plants in California are connected with their shallow root systems.

Irrigation.

In some parts of the State, satisfactory tomato crops can be grown with little or no irrigation, if the plants are given a chance to develop deep root systems. However, in most sections some irrigation is necessary, the number and frequency of irrigations being determined mostly by local conditions. Enough water should be applied to keep the plants growing steadily. Over-irrigation favours excessive vine growth and sometimes causes the blossoms to drop without setting fruit. The best method is to open a furrow alongside each row of plants so that the moisture can seep down to the roots without wetting or compacting the surface soil (fig. 3). Cultivation should follow promptly, throwing the soil toward the plants. For each successive irrigation, the furrow is made farther from the plants, and by mid-season a broad, low bed has been formed, which is covered by the sprawling plants. Between the beds is the dead-furrow which may be used for later irrigations, allowing the water to seep down to the roots without wetting the surface on which vines and fruit are resting.

There are two periods at which water should not be applied—during the period when the first blossoms are open, and during the latter part of the fruit-ripening period. Irrigation at the earlier period will decrease the set of fruit, and at the

* From "Tomato Production in California"—J. T. Ross—Cir. 263, May 1923, Coll. of Agr., University of Cal.

later period will retard the maturing of the crop. However, in some sections where a late crop is grown for fall shipment, the practice is to irrigate just as the first cluster begins to bloom. This prevents the setting of early fruit and may encourage the development of a larger plant that will produce more late fruit.

Planting Distances.

The planting distance is determined by the variety, the soil, and the season at which the crop is grown. Early tomatoes grown under intensive culture, where the plants are staked and trained to a single stem, as in the Merced district, are set 15 in. by 3 ft. apart, this requiring about 12,000 plants per acre. Early varieties where not staked and pruned, are usually set about 3 by 4 ft., requiring about 3,600 plants per acre. The late shipping and canning crop, the varieties used for which generally make very vigorous vine growth, are set from 6 by 6 ft. to 8 by 8 ft. apart, depending on the locality and soil fertility. This crop then requires from 700 to 1,200 plants per acre.

The wider spacings are more economical of plants and labour than the closer plantings. Yet there is no reliable data available to indicate whether wide or close planting pays best. Certainly the rows must be wide enough to allow cultivation and irrigation, and to permit easy passage for the pickers without trampling upon the plants.

AGRICULTURE IN SOUTHERN QUEENSLAND

A. E. GIBSON, Instructor in Agriculture.*

From the viewpoint of the agriculturist and live stock owner the period under review will go down in the history of the State as one of the "lean" years, and whilst conditions have varied in different portions of the State it will be generally conceded that 1925-26 was well below the average year of prosperity associated with primary production as a whole.

Grain and Root Crops.

The wheat crop in its initial stages met with fairly satisfactory climatic conditions, but late frosts experienced during the critical stages of the wheat plant's life, at which a sudden lowering of temperature to frost readings is calculated to damage its ultimate grain production, had the effect of considerably lessening the expected yield of grain from a large area of the Darling Downs.

Later on when early harvesting was about to commence excessive moisture delayed operations. Late maturing crops, however, benefited to some extent by the rainfall experienced at that period.

Coincidentally these conditions affected the potato crops, causing a considerable amount of second growth to develop. Many crops were thus late in harvesting and were of inferior quality when placed on the market. Sound potatoes of good keeping quality were at a premium on the Brisbane market, and prices rose to £27 per ton for such.

The early months of the present year were remarkable for the low rainfall recorded, to such an extent that the so-called rainy season was noted entirely by its absence. Maize crops sown in the latter part of last year and depending on moisture during the tasselling stages were a failure, and as the result considerable areas of land devoted to this crop were grazed off. Although not a total loss in those dairying districts where cream supplies are considerably augmented for a period by dairy stock being given access to areas of more or less succulent material, at the same time a considerable decrease in the grain production of this State naturally results. Maize values have risen in sympathy, whilst at the same time importations of overseas-grown maize are at present being made by the Southern States.

* In the Annual Report of the Department of Agriculture and Stock.

Fodder Crops.

Many farmers, profiting by their former experiences, provided reservations of fodder, and considerable quantities of silage have been made in many of the dairying districts, particularly in those adjacent to the coastal line. At the same time it is a matter to be regretted that large areas of good, useful material suitable for conversion into ensilage were allowed to go practically to waste.

The attention which this Department has given to the establishment of fodder plots throughout the different areas of the State and the publication of results obtained is undoubtedly bearing fruit. Recent experiences have shown that considerable notice is being taken of articles appearing from time to time in the "Agricultural Journal" dealing with this subject, and several instances have been met where farmers have profited by the information made available and are extending operations in this direction.



PLATE 130.—MR. A. E. GIBSON, INSTRUCTOR IN AGRICULTURE.

It is worthy of note that in a certain district of the southern portion of this State where between some thirty and forty farms have been temporarily abandoned during the past few months (the occupiers thereof being absent with their stock on agistment in more favoured localities) among the few remaining farmers who have not had to purchase fodder or provide for their stock by agistment elsewhere is one who has profited by the information given to him on silage and fodder matters generally. This farmer voiced the opinion that if more attention were given to annually conserving fodder in the form of ensilage, and supplementing these supplies where possible by growing winter fodder crops, very little ill-effects would be felt by the average man on the land from periods of insufficient rainfall.

In furtherance of the Department's policy in this direction, fodder plot trials have again been established—on this occasion the Beaudesert and Canningra districts being chosen as suitable centres for the demonstrations, details of which are appended.

Plots which were established on the farm of Mr. T. Coleman, Toogoolawah, early in last year and sown on 31st March, 1925, were harvested for yields on 30th July, 1925, consequently each yield submitted represents four months' growth of fodder, and judged on this basis alone may be considered as highly satisfactory.

More vigorous growth was noticed in the case of Florence wheat with peas or tares and the skinless barley with similar mixtures, both of which were well out in ear and rapidly maturing. Rye had made a more vigorous growth, but only a few heads were in evidence. Owing to the balance of the plots (six) not having reached their maximum growth as green fodders, comparative cuttings were again made of these on the 26th August, 1925.

The primary cuttings gave the following computed yields:—

	Per Acre.			
	T.	C.	Qr.	Lb.
Cape barley and peas	9	11	1	0
Skinless barley and peas	10	15	1	12
Rye and peas	8	10	1	12
Algerian oats and peas	8	3	3	20
Canary seed and peas	11	8	0	24
Florence wheat and tares	7	4	2	16
Cape barley and tares	9	0	0	0
Skinless barley and tares	11	1	3	4
Rye and tares	12	13	3	20
Algerian oats and tares	10	15	1	12
Canary seed and tares	8	10	1	12

Secondary cuttings were made of the following on the 24th August, 1925:—

	Per Acre.			
	T.	C.	Qr.	Lb.
Algerian oats and peas	11	9	3	12
Rye and peas	8	13	2	8
Canary seed and peas	7	17	2	0
Rye and tares	9	9	2	16
Algerian oats and tares	13	19	2	16
Canary seed and tares	13	14	0	8

As will be seen, a further growing period of twenty-five days elapsed between the two consecutive cuttings, which resulted in the mixture of Algerian oats and peas yielding an increase of 3 tons 5 cwt. 3 qr. 20 lb. during that period, whilst in the case of the mixtures of Algerian oats and tares the increase amounted to 3 tons 4 cwt. 1 qr. 14 lb., the slight difference being in favour of the mixture of peas and Algerian oats. Owing to field peas maturing much earlier than tares, these figures no doubt would be reversed were further tests made when the tares were more fully matured, and would counteract the over-mature condition (as a green fodder) of the oats.

Compared with these figures are those of the remaining plots:—

—	Harvested 30th July, 1925.	Harvested 24th Aug., 1925.	Decrease.	Increase.
	Tons cwt. qr. lb.	Tons cwt. qr. lb.	Tons cwt. qr. lb.	Tons cwt. qr. lb.
Rye and peas	8 10 1 12	8 13 2 8	.. .. .	0 3 0 24
Canary seed and peas	11 8 0 24	7 17 2 0	3 10 2 24	.. .. .
Rye and tares	12 13 3 20	9 9 2 16	3 4 1 4	.. .. .
Canary seed and tares	8 10 1 12	13 14 0 8	.. .. .	5 3 2 24

The above results clearly show the loss which is sustained when fodder crops are allowed to become matured or are dealt with before they reach that stage.

Dairy Fodder Plots at Boat Mountain.

Arrangements were entered into with Mr. F. Barton, of Murgon, on 27th March, 1925, for the establishment of dairy fodder plots on his farm at Boat Mountain. These plots were ultimately sown on the 12th May, 1925, the delay being due to the fact that the amount of cultivation given in the first instance to the areas selected for the trials was deemed insufficient, and subsequent to this matter being

remedied insufficient soil moisture was present for the purpose of ensuring germination. This latter state of affairs remained unaltered until the 9th May, 1925, when a sufficiency of rainfall was experienced and the plots were sown under perfect conditions of tilth and soil moisture on the 12th May, 1925.

The following varieties were sown in plots of one-tenth of an acre each:—

Rye and tares	Rye and peas
Canary seed and tares	Canary seed and peas
Skinless barley and tares	Skinless barley and peas
Cape barley and tares	Cape barley and peas
Algerian oats and tares	Algerian oats and peas
Florence wheat and tares	Florence wheat and peas.

The majority of these plots were computed for yields on 14th October, or a period of 155 days after sowing.

Heavy growth on portion of the area was very noticeable, no doubt due to the fact that it had been fallowed during the early portion of the year.

In all the plots the field peas did remarkably well, making vigorous growth throughout, averaging 3 ft. 3 in. in height. Tares, on the other hand, gave rather poor results, due to their immaturity and slow growth. Rye was backward and had made very little progress, and for purposes of yield was regarded as of no value.

The following are the computed results:—

	T.	C.	Qt.	Lb.
Florence wheat and tares	3	12	1	8
Algerian oats and tares	Not harvested			
Cape barley and tares	5	6	0	18
Skinless barley and tares	4	13	0	24
Canary seed and tares	5	6	0	8
Rye and tares	Not harvested			
Florence wheat and peas	5	14	0	12
Algerian oats and peas	7	14	1	4
Cape barley and peas	5	2	3	12
Skinless barley and peas	6	2	0	16
Canary seed and peas	7	14	1	4
Rye and peas	Not harvested			

These results fall far short of those obtained from the Toogoolawah plots, and may be accounted for by the delay which occurred in connection with the initial preparation of the soil and lack of surface moisture, thereby delaying operations at a most favourable growing period.

Trial Plots at Beaudesert.

Pig and dairy fodder trial plots were arranged for early in the year with Messrs. F. W. Thiedeke, of Beaudesert, and Peel Caswell, of Wangalpong. But owing to the lack of sufficient soil moisture sowing operations were delayed until early in the present month—too late, unfortunately, to give full effect to the trials, but at the same time they will be of instructional value to the surrounding farmers who are interested in the dairying and pig keeping branches of general agriculture.

The following fodders are under trial plots of one-tenth of an acre, and in some instances one-thirteenth of an acre each:—

Pig Fodder Plots.

Thousand-headed kale	Elephant swede turnip
Dwarf Essex rape	Sugar beet
Yellow globe mangels	White Belgian carrot
Long red mangels	Large drumhead cabbage.
Purple-top swede turnips	

Dairy Fodder Plots.

Pilot wheat and peas	Skinless barley and tares
Pilot wheat and tares	Ruakura oats and peas
Florida wheat and peas	Ruakura oats and tares
Florida wheat and tares	Algerian oats and peas
Cape barley and peas	Algerian oats and tares
Cape barley and tares	Rye and peas
Skinless barley and peas	Rye and tares.

Sowing was carried out under ideal conditions of tilth and surface moisture, and given average climatic conditions a rapid growth should result therefrom.

Potato Trials at Toogoolawah.

Following on arrangements made to hold a series of potato trials and the initial preparation of $1\frac{1}{2}$ acre of alluvial land on Mr. T. Coleman's farm at Toogoolawah, twenty-eight varieties of potatoes were planted under ideal conditions on 22nd August, 1925, as follows:—

- | | |
|--------------------------------|--------------------------------|
| 1. Satisfaction | 15. Early Rose |
| 2. Carmen | 16. Factor |
| 3. Scottish Triumph | 17. Cambridge Kidney |
| 4. Up-to-date | 18. Batlow Cross |
| 5. Brownell's Beauty | 19. Dalhousie |
| 6. Coronation | 20. Short's Prolific |
| 7. Manhattan | 21. Gold Jungle |
| 8. Dakota Red | 22. Early Vermont |
| 9. Langworthy | 23. New Era (blight resistant) |
| 10. Premier (blight resistant) | 24. Beauty of Hebron |
| 11. Arran's Comrade | 25. Templar |
| 12. Austers Vermont | 26. Adirondack |
| 13. Redsmooth | 27. Bliss Triumph |
| 14. White Albino | 28. Cook's Favourite. |

The tubers were planted in drills spaced 3 feet 3 inches apart, the land having previously been well ploughed and cultivated, and owing to ample subsurface moisture being available a good germination resulted.

Tubers prior to planting were immersed for one and a-half hour in a solution of formalin 1 pint to 10 gallons.

Spraying was carried out between the 16th and 19th of October, Burgundy mixture being used at a strength of 6 lb. copper sulphate and 5 lb. of washing soda to 40 gallons of water. Frosts were experienced during the latter part of September, but little or no damage to the potatoes was apparent at the time of spraying.

Arrangements had been previously made for a trial of a new form of fungicide now placed on the market under the title of eucal, which is in reality a finely triturated powder consisting of copper sulphate and lime specially treated—the intention being to apply it in dust form, using for the purpose a Pope knapsack dusting machine. It is a Queensland patent, manufactured in Brisbane.

In order to take advantage of any dew or moisture adhering to the leaves of the potato plants, dusting was carried out before sunrise on the 17th of October, but, due to the lack of sufficient moisture, the results obtained from the first trial were not satisfactory.

On the following evening a storm worked up, finalising in a light shower, and advantage was taken of this to apply another dusting on the following morning. On this occasion all conditions were favourable, and a perfect and even application of the dust throughout the foliage of the plants was obtained.

The dusting machine works satisfactorily, is easy to operate, and mechanically is a machine from which a good deal of service could reasonably be expected. As with all forms of dust fungicides, the necessary moisture must be present on the foliage of the plants treated before reasonable results can be obtained. Given these conditions there is no doubt that the "duster" has much in its favour, eliminating as it does the heavy work of transporting the necessary amount of solution, only a portion of which is really effective.

Under dry conditions, however, the spraying of plants with liquids has a reviving effect upon them which is obviously absent in the dusting operation.

The rainfall recorded during the period between planting and harvesting was as follows:—

	Inches.
From 22nd August	0.14
September	0.49
October	0.52
November	3.88
December	3.03
To 12th January	5.01
Total	13.07

Due to the excessive rainfall during the months of December (when the plots should really have been harvested) and January, and to the second growth that resulted therefrom, the keeping qualities of the tubers were seriously impaired, apart

from which the actual work of harvesting the crop was made heavier by reason of the fact that the haulms had not died off, and consequently had to be cut and removed before the potatoes could be satisfactorily dealt with. Owing to the excessive rains the tubers were decidedly sappy and inclined to scald easily if exposed for a short space of time to the sun's rays.

The following weights are the results obtained from the main varieties, 1 cwt. of seed in each instance being planted:—

Main Commercial Varieties.	1st Grade.			2nd Grade.			Seed and Waste.			Total Weight.			Yield per Acre.			
	Cwt.	qr.	lb.	Cwt.	qr.	lb.	Cwt.	qr.	lb.	Cwt.	qr.	lb.	Tons	cwt.	qr.	lb.
Carmens ..	1	0	4	2	1	7	2	3	12	6	0	23	4	15	2	4
Satisfaction ..	1	3	0	0	3	9	2	0	24	4	3	5	2	18	1	2
Scottish Triumph ..	2	3	18	1	3	15	4	0	0	8	3	5	4	13	1	16
Up-to-date ..	3	0	3	3	1	6	4	1	9	10	12	18	3	15	0	26
Brownells ..	3	1	19	2	3	2	4	3	10	11	0	3	5	16	0	2
Coronation ..	0	3	4	2	2	16	3	2	7	8	0	7	4	4	3	26
Manhattan ..	0	3	6	2	0	22	3	2	16	6	3	16	3	10	2	12

The results obtained in the variety tests appear in some instances unduly high and will probably be accounted for by the restricted areas of the plots utilised, the results being confined to those obtained from the planting of three tubers only of each variety.

Variety.							Total Yield.	Yield per Acre.			
							Lb.	Tons.	cwt.	qr.	lb.
Dakota Red ..	..	..	..	..	..	..	21½	7	3	1	0
Langworthy ..	..	..	..	..	..	..	20	6	18	1	19
Premier ..	..	..	..	..	..	..	14½	5	15	2	10
Arras Comrade ..	..	..	..	..	..	..	16	6	4	0	25
Austers Vermont ..	..	..	..	..	..	..	19	6	3	3	8
Redsmooth ..	..	..	..	..	..	..	10	3	12	2	10
White Albino ..	..	..	..	..	..	..	16½	4	14	0	23
Early Rose ..	..	..	..	..	..	..	35	5	18	1	13
Factor ..	..	..	..	..	..	..	13½	4	3	0	14
Cambridge Kidney ..	..	..	..	..	..	..	33½	12	3	0	19
Batlow Cross ..	..	..	..	..	..	..	15½	4	19	1	0
Dalhousie ..	..	..	..	..	..	..	39	11	12	0	16
Short's Prolific ..	..	..	..	..	..	..	35	8	0	0	9
Gold Jungle ..	..	..	..	..	..	..	13	4	14	1	13
Early Vermont ..	..	..	..	..	..	..	17	4	1	0	18
New Era ..	..	..	..	..	..	..	2	0	14	2	2
Beauty of Hebron ..	..	..	..	..	..	..	22	4	13	3	26
Templar ..	..	..	..	..	..	..	24½	7	0	2	10
Adirondack ..	..	..	..	..	..	..	25	5	1	1	23
Bliss Triumph ..	..	..	..	..	..	..	13½	4	11	1	7
Cook's Favourite ..	..	..	..	..	..	..	24½	7	2	0	16

No traces of blight were in evidence in any of the potatoes harvested.

Seed reservations of 1 cwt. each of the main commercial varieties were made, but due to the sappy condition of the tubers, brought about by the excessive moisture experienced prior to harvesting, considerable depreciation took place before planting operations for the winter crop were concluded.

Seed was forced and again treated with formalin prior to planting. The area set aside for the winter crop plots had previously been sown with Algerian oats for hay, and the stubbles, together with a generous growth of herbage, were grazed off until the middle of January, when the area was ploughed and cultivated. Unfortunately lack of rainfall between the initial ploughing and the date of planting was not conducive to the conservation of moisture, although every effort had been made by surface cultivation to bring this about, and planting operations were carried out under somewhat unfavourable conditions. In view of the state of the seed, however, it was deemed advisable to take the chance of sufficient rainfall being experienced to carry the crop to maturity, consequently planting was finished by the first week in March.

The main commercial varieties were replanted with the exception of Satisfaction, the seed of which was deemed unsuitable. Similarly the variety trials were carried out under winter conditions, but two varieties (Early Rose and New Era) were omitted, being also deemed unsuitable.

Reports since received stated that in most of the varieties the plants were holding their own and small tubers were forming. Recent rains if unaccompanied by frosts should have a beneficial effect.

Wheat Trials in the Southern Burnett.

With the object of determining the suitability or otherwise of a number of new wheats bred at Roma State Farm, side by side with a few standard varieties, comparative trials both in the field and under experimental plot conditions were carried out by arrangement last season with Mr. F. Gustafson, of Murgon. The soil chosen was typical of the red volcanic friable loams of the district, and the farm prior to cultivation was partly forest and partly scrub country. Special attention was given in the preparation of the land to keeping the surface in a well worked condition, consequently when the wheat was sown on the 28th and 29th of May an excellent strike was obtained. Harvesting took place on the 1st and 2nd November, 157 days from date of planting.

Rainfall records were—June, 3.12 inches; July, 0.69 inches; August, 2.09 inches; September, 1.45 inches; October, nil. Total, 7.35 inches.

The commercial varieties of wheat used were—Amby, Bunge No. 1, Canberra, Gluyas, Pusa 4. Roma bred wheats—Waterman, Watchman, Redman, Red Chief, Ringer, Radio, Redskin, Amber, Florida, Warrior, Amberite, Marco, Beewar, Pinto, Cedric, Polo, Bindie, Ruby, Pilot, Three Seas, Pacific, Buffalo.

Three-acre propagation plots of Pilot and Florida were also planted. The other varieties planted by Mr. Gustafson were Gluyas 6 acres, Florence 6 acres, Currawa 3 acres, Roma Red 3 acres, Pusa No. 4, 3 acres.

As the conditions under which the wheats were grown proved favourable, the growth and development of individual varieties was exceptionally good, the straw ranging from 4 to 5 feet in height and carrying well-developed ears. The results from the field plots showed that when land is well prepared and suitable varieties chosen good yields in average seasons may be expected. Florence returned 40 bushels, Florida 37 bushels, Pilot 33½ bushels, Pusa No. 4 and Roma Red 18 bushels each, and Gluyas 15 bushels per acre respectively.

Although some of the yields were undoubtedly good, the clean, well-grown, and attractive-looking crops were most promising from a hay point of view. Obviously farmers in this part of the State might well turn their attention to a dual-purpose crop, invaluable in such an important dairying and mixed farming centre.

That past experience has impressed upon farmers the necessity of conserving fodder is emphasised by the amount of correspondence dealt with relative to the construction of silos, the manufacture of silage, and the class of crops recommended for fodder purposes under different soil and climatic conditions. It is regretted, however, that greater use is not made by dairy farmers generally of the facilities available within the Department in connection with the erection of silos and the making of ensilage.

A stack silage demonstration that was given on the Wunulla Estate, situated in the Kileoy district, attracted a considerable amount of local interest, and it is understood that as a result of this particular demonstration other stacks were built in the district shortly afterwards.

In furtherance of the scheme for the standardisation of wheat varieties in Queensland arrangements were made in conjunction with a member of the Wheat Board for pure seed propagation areas at Kaimkillenbun, Bell, and Jandowae, certain farms being specially selected for the sites of these pure seed areas.

Owing to the depredations of the banded pumpkin beetle in the Allora district having made the growing of pumpkins as a farm crop a matter of difficulty, if not an impossibility, a demonstration was arranged for on the farm of Mr. G. Black at Goomburra, and the method of control as suggested by this Department practically illustrated. Beyond the use of certain repellants in a few isolated instances, nothing had been attempted in the direction of insect destruction by either spraying, dusting, or any other means of distributing poisons, consequently the beetles had had uninterrupted opportunities for increasing their numbers.

Owing to the lateness of the season the methods advocated—the use of arsenical preparations in dust form—could not be generally adopted, but it is reasonable to suppose that combative means will be employed by growers of pumpkins in this district in respect to future crops.

AGRICULTURE IN NORTH QUEENSLAND.

By N. A. R. POLLOCK, Instructor in Agriculture.*

The year from 1st July, 1925, to 30th June, 1926, has been remarkable for the generally poor rainfall experienced in most districts of the Northern Division. An inspection of the monthly rain map shows that in six of the months the rainfall over the whole of the division was much under the average, while in the other six months only odd centres experienced slightly over an average fall, but almost the whole of the pastoral areas had much less than the average fall in every month of this year as well as in the last three months of last year. Except in the districts of heavy average rainfall, the conditions have been those of a severe drought such as have been characterised as the worst for at least forty years.

The pastoralists on the eastern coastal slopes with cattle have suffered much loss, but those with sheep on the Western rolling downs have felt the lack of rain and consequent shortage of pasturage most severely, their losses by death in many instances being heavy, while the expenditure in railing the sheep away to relief country, the cost of agistment and purchased feed either away or at home, has been so costly that in many instances it has exceeded the value of the sheep so far saved. Without relieving rains before the usual storms can be expected in November or December, these stockowners must be put to such a heavy expense in the purchase of feed as to seriously diminish their financial resources if not to run them heavily into debt.

While numbers of sheep are on grassed relief country in the Gulf districts, which is not expected to hold out for very long, others are depasturing on the eastern coast, and many are being fed on the sugar areas, notably the Lower Burdekin, by arrangement with cane-growers, who supply "chop chop" (chaffed cane tops or cane stalks) at a cost of £4 per ton delivered at the feeding troughs. The result of this feeding seems to be satisfactory, as the sheep appear to be more than holding their own.

On the holdings where the sheep are fed, maize and linseed oil cake are the feeds mainly used, for though hay in some cases was secured the congestion on the railway through the increased traffic in shifting starving sheep and in transporting fodder prevented the necessary prompt delivery of sufficient quantities of such a bulky food to render it popular. Some losses in sheep with symptoms of poisoning have occurred in odd cases where linseed oil cake only was fed. It is known that occasionally this product contains a hydrocyanic acid-yielding glucoside, so it is probable that sheep poisoned thereby have secured more of the feed than was intended.

Usually a daily allowance of from 6 to 9 oz. per sheep is made when feeding with either the oil cake, the balance of the ration being made up with the grass eaten.

Either maize or oil cake alone with the dry grass provides an unbalanced ration. The most economical feed with the material available would appear to be a mixture of one to two parts of oil cake to eight or ten parts of maize, especially as the landed cost of maize is less than that of oil cake.

As an aid against impaction, some of the experienced graziers are giving a lick made up mainly with linseed meal and salt. The hand-feeding of sheep represents a daily expenditure of from £4 to £5 at least per 1,000 head, consequent on which any prolonged period of hand-feeding, without allowing for deaths, must overtake, if not exceed, the present value of the animals. In addition to the heavy losses on the year's transactions by the death of sheep, and the expenditure in purchasing feed and transporting to other parts, the owners will experience a lower price for their wool clip, the quality of which will reflect the droughty season in which it was grown.

In strong contrast to the previous year, when cattle were fat in large numbers early in the season, and the meatworks had a long killing season, the supply of fats this year was very small, resulting in a short killing period of eight to ten weeks at three of the Northern meatworks, while the other two did not operate at all.

Fodder Conservation.

From time to time opportunity has been taken, both orally and by articles in the "Agricultural Journal" and the Press, to stress the necessity for the conservation of fodder as hay or silage in anticipation of a period of shortage that is bound to occur sooner or later. While some increase in that direction has been observed, chiefly amongst the smaller stockowners, the larger holders with few exceptions have studiously neglected the practice. It is needless to refer to the benefit that would have been experienced by stockowners had there been stores of conserved fodder on their holdings this year. All are fully seized of that fact, as they have been in other

*In the Annual Report of the Department of Agriculture and Stock.

recent periods of shortage, when many determined, as doubtless they are doing now, never to be caught again. Yet, it is safe to say, when good rains come and the country is covered with an abundant growth of valuable grasses the big majority will decide that there is going to be a run of good seasons, and there will be plenty of time in a year or two to build the haystacks and erect the silos.

A tour of the Rolling Downs convinces one that with the thousands of acres on every holding, large or small, on which hardly a stick or stone can be found to hinder harvesting operations, there is no reasonable excuse for the neglect to make hay. It is true that, owing to the tussocky nature of the "Downs Mitchell," the first cutting of the grass cannot be made as close to the ground as might be desired, equally true that no very great quantity can be cut off the average acre, yet it will be conceded that in ordinary seasons half a ton of hay to the acre can be obtained. To put up a stack of 100 tons consequently 200 acres must be cut, say an area of 40 chains by 50 chains. By placing the stack in the centre it will mean that the greatest distance the hay need be transported to the stack will be 25 chains. Using modern machinery, I am of opinion such a stack could be put up at a cost not exceeding 20s. per ton. Labour experienced in stack building and thatching is scarce, but will be available if the demand exists. Thatch for stacks is suggested in the bulrushes growing on so many bore drains, while cane grass in places is plentiful. Failing any natural grown material, a cultivated patch of sodan grass would provide abundance. In addition to hay from the natural grasses, large quantities of sodan grass or other species of the sorghum family could be grown under cultivation, the former for hay and the latter for ensiling, under the rainfall of an ordinary wet season, or, for that matter, under irrigation by bore water at another time.

Though the soil on these rolling downs is of a clayey nature, it is capable of being reduced to a fine tilth, and is just such a soil as would be very suitable for wheat if seasonal conditions would allow.

The storage of fodder as silage necessitates the erection of overground silos, since the depth of soil is insufficient and the rock underlying it too hard to permit of receptacles being excavated with economy. The general absence of sand is a drawback to the construction of reinforced concrete silos, but it is thought by pulverising the stone procurable in practically every holding a suitable aggregate could be secured. Pise, for which the soil appears remarkably suited, suggests itself as a possible material for cylindrical silo construction if the walls were reinforced and made sufficiently thick. Without practical experience in this direction, however, such material could not well be recommended.

Silage for Sheep.

Apart from the value of conserved fodder as hay or silage in periods of shortage, the value of such a succulent fodder as silage when fed to ewes and rams just prior to and at the time of mating, say during September, October, and November, when the pasture is usually very dry, will be evidenced in the increase of the lambing percentage and general wellbeing of the sheep.

While instruction in cultural matters and conservation of fodder, &c., is provided by the State, and a certain amount of propaganda work has been done, it is not thought that the results to be achieved by this means will ever be very satisfactory.

To overcome the natural inclination of people to follow the line of least resistance, it is suggested that some inducement might be held out to influence them to make provision for bad times. Compulsion is ever unpopular, and though conditions may be inserted in leases insisting on fodder conservation, it is thought that, as remarked in my last annual report, a provision for the remission of a portion of the rental, consequent on the annual storage of prescribed quantities of fodder, would be welcomed and result in the desired objective being attained.

Crops in General and Experimental Work.

As might be expected with the paucity of rainfall, agricultural production was reduced in many districts, notably in the Charters Towers and Gilbert River districts, where the crops were total failures except where irrigation was practised in odd instances in the former district. The coastal districts fared somewhat better, but production there was lower than usual even under irrigation, as in the Bowen and Lower Burdekin districts.

The district that stood out above all others in production was the Atherton Tableland, where the rainfall, above the average for January and lower for the other months, was all in favour of the maize and other summer crops.

Maize.

The Atherton Tableland, though the only district of the North producing a large quantity of maize, gains the record each year for the highest average yield per acre of any district in the State in which upwards of 10,000 acres are put under crop. Seasonal conditions this year were excellent, as there was sufficient rain during the growing period, with bright sunny days for the most part when the grain was filling and ripening in place of the continuous drizzling rain usual in the latter period. As a consequence, damage from fungus disease (moulds, &c.) was slight, the quality of the grain being absolutely prime. This year a larger acreage than usual was placed under crop, which, under the favourable seasonal conditions experienced, should enable the district to reach the million bushel output, not previously attained. The appearance of the crop and the results shown during the progress of the harvest point to an average in the vicinity of 50 bushels per acre being obtained over the whole district.

In the early part of the year, during which the harvest of last year's crop, grown under a heavy rainfall, was being concluded, much discussion took place regarding the inferior quality of the grain as well as the lower average yield being obtained, many holding that depletion of the elements of plant food in the soil was the cause of lower average yields as well as being a contributing cause of the prevalence of disease affecting the grain. An article, "Tableland Maize," published in the "Queensland Agricultural Journal" for October, explained that diminishing yields and poor quality in the grain were entirely due to the use of a variety or strain of several varieties that were not suited to withstand the excessively humid conditions prevalent during the period of ripening and drying off, and also to the lack of sufficient care in the selection of seed. Recent analyses of the soil from farms where maize has been an annual crop for many years, in one case for nearly thirty years, as well as the result of present crops, show that the elements of fertility have not been depleted even on the oldest cultivation to such an extent as to seriously interfere with production, while the prime quality of the grain in the present crop emphasises the conclusion that disease will be overcome by the use of a variety suited to the climate.

In this latter connection, satisfaction amongst growers is expressed at the Department's action in making arrangements for the propagation and supply of pure selected seed of a resistant variety.

Fertiliser Experiments on Maize.

Trials with various fertilisers have been carried out each year for several years past both on forest and scrub soils. But though the trials on the forest soil have consistently demonstrated the greatest profit to be obtainable from the use of superphosphate alone, those on the scrub soils have given no definite indication of the value of any one fertiliser or mixture of fertilisers, even where relatively large amounts have been applied. During the year three experiments were finalised on the previous year's crop, the results of which were published in the article "Tableland Maize." Owing to the favourable season, it was possible to record two of the three trials undertaken with this year's crop in time for inclusion in this report. In these trials the fertilisers were applied on land on which burnt lime at the rate of 10 cwt. to the acre had been broadcasted as well as on the land to which no lime had been applied.

Fertiliser applications were at the following rates per acre:—

Plot.	Superphosphate.	Meatworks.	Nauru Phosphate.	Sul. Pot.	Sulp. Am.	Filler.	Total and Cost per Acre.		
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	s.	d.
1	180	..	..	..	..	20	200	14	6
2	..	180	..	..	..	20	200	17	2
3	..	..	180	..	..	20	200	16	6
4	90	90	..	..	..	20	200	15	9
5	Control	No manure	..	..	..	..	200	20	3
6	..	180	..	20	..	..	200	19	6
7	..	..	180	20	..	..	200	26	0
8	..	180	..	20	30	20	250	25	3
9	..	..	180	20	30	20	250	31	4
10	120	120	..	30	30	..	300		

It may be noted that filler was used in order to facilitate an even application. The results expressed in acre yields were:—

Plot.	WITH LIME.				WITHOUT LIME.			
	Scrub Soil.		Forest Soil.		Scrub Soil.		Forest Soil.	
	Bus.	lb.	Bus.	lb.	Bus.	lb.	Bus.	lb.
1	53	0	71	54	41	6	64	50
2	55	24	60	34	54	34	59	36
3	59	12	62	8	45	24	57	34
4	57	32	59	20	34	50	53	18
5	48	52	53	52	40	2	54	40
6	50	16	55	14	43	30	58	30
7	49	12	56	20	40	32	63	34
8	49	42	57	10	36	44	64	18
9	48	34	57	10	40	16	67	12
10	50	16	57	40	37	32	63	28

Samples of the respective soils were analysed by the Agricultural Chemist, showing the scrub soil to contain slightly greater quantities of nitrogen as well as of available potash, phosphoric acid, and lime. According to the analyses, it was to be expected that the yields of the plots on the scrub soil should be equal to, if not greater than, those on the forest soil when grown under similar seasonal conditions. The scrub soil gives an alkaline reaction, while the forest soil gives an acid reaction, but any influence in this direction is discounted by the higher yield on the alkaline soil where lime was applied. Similar disparities in the yields from the plots this year on scrub soil occur in each of the trials made in previous years, viewing which, one is inclined to the belief that the very variable and indecisive results of all fertiliser applications so far on the scrub soils are due to some condition of the soil not revealed in the analysis, possibly in connection with bacterial action that does not obtain in the forest soil.

Maize Harvester.

The enterprise of the Faichney Brothers, Soldier Settlement, Kairi, is reflected in the importation of a maize picker and husker, which has since been doing very satisfactory work picking and husking the cobs at the rate of an acre per hour at a cost of 1s. 1d. for oil and fuel on maize crops at Kairi. The machine is a somewhat bulky implement, being about 12 feet wide, and weighs about 29 cwt., and is drawn by a tractor which also operates the machinery by power applied from the differential by a series of shafts connected by universal joints to the harvester. Provision is made also, in case the machine is horse-drawn, for power to be transmitted by chains from the large rear pair of wheels.

In operation the maize stalks are gathered between two jaws and guided by spiked endless chains called gatherers to two snapping rollers, between which the stalks pass until the cob is reached, when the latter is thrown off into an elevator which conveys it to the back of the machine, from which it drops into the husking rolls, against which the cobs are kept in position by moving guides until the husk is removed and carried through the rolls and dropped on the ground as the balance of the stalk is, after the cob has been removed, while the husked cob is dropped into another elevator and delivered into a wagon that can either be drawn by horses or by the tractor working the machine. Messrs. Faichney express themselves as well pleased with the work so far done with the machine.

Potatoes.

The publication of the results of the comparative trials of potato varieties carried out by the department in different centres on the Tableland and coastal districts last year has commanded much attention and resulted in a very much increased acreage being put under crop in the Northern Division during the year, both on the Tableland and coast. The lower prices realised last season for sugar-cane consequent on over-production directed the attention of many cane farmers to other crops which might be considered to return a good profit, and many have placed areas under potatoes. It is confidently expected that the acreage under potatoes this year in the North will be greater than in any previous year, and that each succeeding year will see a further increase.

In my last Annual Report the yields of ten varieties grown on the Tableland in two centres were recorded and mention was made therein of the seed from these trials being planted at Pentland and Woodstock respectively. The yields of these latter trials were, at per acre:—

Variety.	Pentland.		Woodstock.	
	T. cwt. qr. lb.	Small. Per cent.	T. cwt. qr. lb.	Small. Per cent.
Up-to-date	7 1 1 20	6	12 18 1 5	5
Scottish Triumph	6 8 1 26	6	11 4 3 26	7
Coronation	4 17 0 26	4	14 19 0 11	4
Carmen No. 1	3 7 3 2	12	8 10 0 17	5
Carmen No. 3	4 8 2 20	10	8 19 0 18	6
Clark's Main Crop	2 6 1 12	15	9 1 3 19	10
Manistee	2 15 3 26	11	8 2 3 23	4
Victory	3 12 2 20	8	5 17 3 22	6
Early Rose	1 11 2 14	19	2 5 3 19	14
Sussex Red	Failure		Failure	

These results must be regarded as very satisfactory, the yields at Woodstock, where the soil (alluvial from Major's Creek) was rich and season good, being exceptionally fine.

Seed from these plots was planted on the Tableland for the main crop grown there in the summer months, with Brownell seed from the coast replacing Sussex Red, and gave the following yields, at per acre:—

Variety.	Tolga.		Evelyn.	
	T. cwt. qr. lb.	Small. Per cent.	T. cwt. qr. lb.	Small. Per cent.
Up-to-date	4 16 1 0	22.4	4 0 2 4	10.7
Scottish Triumph	3 14 2 16	33.2	Failure	..
Coronation	4 10 1 2	9.4	3 15 2 14	14.5
Carmen No. 1	4 4 1 24	11.5	3 12 2 20	11.0
Carmen No. 3	5 8 0 4	7.2	3 18 2 8	12.5
Clark's Main Crop	4 19 0 22	27.0	3 8 3 0	20.0
Manistee	4 0 2 4	17.0	2 9 0 12	20.0
Victory	6 1 3 4	9.0	5 2 0 16	9.6
Early Rose	Failure	..	Failure	..
Brownell Beauty	3 4 3 8	27.2	2 1 1 0	28.1

These yields are not so satisfactory as those obtained in the case of Up-to-Dates and Carmens, grown alongside the plots, the seed for which was brought from Victoria. The percentage of small or unsaleable potatoes in many of the varieties is also unduly high. The adage "Plant potatoes grown in a colder climate rather than in a warmer" appears to be exemplified. Seed from these plots is being tried again on the coast this season, the result of which will not be available for some months to come. In comparison with previous trials, Up-to-Date and Carmen justify their reputation as consistently good yielders, while Victory and Coronation have done very well. Victory is a very promising variety for the Tablelands, the tubers produced there being of nice size and shape, while the quantity of small and unsaleable potatoes was lowest of all. Advantage was taken of an opportunity to secure small lots of seed of further varieties at the Brisbane Exhibition last year, which were planted on the Tableland, to secure seed for comparative trials. Being limited to a few plants of each variety, a comparison of yields was not considered of value, but the yield of several varieties gives an indication of their suitability for the North.

In addition to these varieties, numbering 59, a little seed of 9 other varieties was later secured from Tasmania, thus making 68 varieties, which have been planted in three different coastal and one inland district in quantities sufficient to give some comparison in yield and to provide seed for trials on the Tableland during the approaching summer.

The Tableland crops harvested during the year have given exceptionally good yields, which with the high price secured, £20-£24 per ton, have made them very remunerative. One grower who followed Departmental advice has netted in the neighbourhood of £1,000 from a crop of about 10 acres. It is very satisfactory to note that, especially amongst new growers, Departmental advice in regard to treatment of seed prior to planting and the spraying of the foliage during growth has been largely followed, in all cases with the result of clean crops.

Instances of the presence of potato moth in seed secured from the South have been reported from Proserpine and the Tableland, evincing the need for a more rigorous inspection at the points of entry into the State.

Rice.

Australia each year imports practically the whole of the rice consumed within its boundaries, and thereby sends to foreign countries much wealth that should be produced within the States, of which Queensland climatically is the most suitable. The Department has conducted trials over a good many years, chiefly on the Tableland, with encouraging results in yield and quality of grain. This year further trials were made both there and in several coastal districts. The crop on the Tableland failed owing to want of rain just prior to and after the flowering period, but in two of the coastal districts excellent results were secured with four Japanese Upland varieties which mature in four months, while failures resulted from want of sufficient rain with three Javanese varieties which require six months in which to mature. The following yields were recorded on the Departmental plots at Mr. M. Boyle's farm, Carruham, Cardwell district, and Mr. C. Daybell's farm, Waterson, Proserpine district. A bushel of paddy or rough rice is calculated at 48 lb.:-

Variety.	Mr. Boyle's Farm, Cardwell.				Mr. Daybell's Farm, Proserpine.			
	Per acre. Bush. lb.				Per acre. Bush. lb.			
Kirishima	50	20			50	4		
Sensho	57	14			55	0		
Owari	37	39			48	1		
Tamasari	48	6			48	1		
Si Rosaki	Failure				Failure			
Si Lading	Failure				Failure			
Gading Kaloewang	Failure				Failure			

Reports from other farmers who experimented with small lots at Clump Point, Nerada, and the Bloomfield River speak very encouragingly of the behaviour of the Japanese varieties under the adverse weather conditions, which on the Bloomfield River were described as the worst for forty years.

There are large areas suitable for rice culture in the coastal districts of high average rainfall, such as from Mackay to Proserpine and from Ingham to Cooktown.

Lowland rice, which requires to be grown in water that is slowly flowing or renewed every eight or ten days, yields a much heavier average crop than the Upland rice, and should be a staple crop in the North and other parts of Queensland where large areas of level country with a retentive subsoil capable of being irrigated occur, such as at Proserpine and Ingham, on the eastern coast, and on the Gregory River, in the Gulf district. It is regretted that, owing to want of facilities for flooding, small experimental trials of varieties of Lowland rice cannot be carried out, but the yields of these Upland varieties gives an indication as to the profit that might be derived from their cultivation, more especially if rice hulling and dressing machinery were available locally.

In addition to the profitable yield of grain, the Upland rice makes a palatable and nutritious hay which is relished by all kinds of stock.

Tomatoes.

The tomato crop, which is the most important one in the Bowen district, engaging as it does the attention of the majority of farmers there, with the now universal use of wilt-resistant varieties, in the past season again gave a very large yield, but owing to fewer boats calling at the port, and the railway strike when the crops were yielding the heaviest pickings, the recorded yield for the district will

be something like 100,000 cases (half-bushel) less than in the preceding year, which gave the record yield. The harvest of tomatoes in the Northern Coastal District commences in May and extends to October, the plants for the first pickings in May being set out in February, and from then onward for the later pickings until July, those for the main crop marketed from July onward being usually set out in May or early June.

Seasonal conditions for 1926 have not been very favourable at Bowen, as insufficient rain has fallen so far, but though the yield has been less the quality of the fruit has been excellent. A fall of a couple of inches of rain during the next month will assure the success of the main crop.

The success attendant on the introduction of the wilt-resistant varieties, especially of those Departmental productions Denisonia and Bowen Buckeye, has induced farmers in other districts to engage in the industry, especially in the Cardwell and Innisfail districts, where the crop has proved most successful.

The arrangement with Mr. J. T. Moore at Bowen to grow the stud plots under Departmental supervision on his farm for the purpose of pure seed supply by Mr. Moore is working admirably.

Comparative trials carried out last season (in which the plants were manured with a fertiliser made up by mixing 40 lb. superphosphate, 15 lb. sulphate of potash, 35 lb. sulphate of ammonia, and 10 lb. of filler (lime carbonate) to constitute 100 lb., at the rate of 195 lb. per acre, which gave the best return in fertiliser trials the previous year) gave the following yields. Ten plants in each variety were set apart, from which pickings were made between 27th June and 26th September:—

Variety.	Yield.	Average pounds per plant.	Pounds per acre.	Cases per acre estimated.
	Lb.			
Denisonia	644½	64.45	33,514	1,396
Bowen Buckeye	564½	56.45	29,354	1,223
Norton	417½	41.75	21,710	904
Norduke	373½	37.35	19,422	809
Roselawn Buckeye	371½	37.15	19,318	804
Columbia	318½	31.85	15,560	690

After the fifth picking one plant of the Roselawn Buckeye died, the pickings thereafter being from nine plants only.

The publication of these results in the "Queensland Agricultural Journal" has resulted in inquiries for seed from all over Australia, from New Zealand, Papua, Pacific Islands, North Borneo, Ceylon, South Africa, and the United States, thus showing an appreciation of Departmental work, which is gratifying.

Cigar Leaf.

The growth of cigar leaf in the North, which has been undertaken chiefly in the Bowen and Proserpine districts, has had a serious setback this year owing to the low prices received, together with the adverse remarks made on the quality of the leaf, when marketed between January and March of this year. All growers complain that when they marketed the first portion of the crop in August and September the prices obtained were satisfactory, while no adverse comment was made on its quality. Later in the year, when they marketed the remainder, which was harvested and cured at the same time as the first and was of exactly similar quality, the price was dropped to half of that given previously, while the quality, previously considered satisfactory, was condemned. They feel, consequently, that they have been unfairly treated, and have intimated that unless assured of better treatment they will not give further consideration to the crop.

The marketing of cigar leaf has ever been unsatisfactory to growers, since buyers appear to be unwilling to purchase except through one particular firm in Melbourne.

There is no doubt that cigar leaf of excellent quality can be grown and cured in North Queensland, and that its growth, if not manufacture, should be a profitable industry in many parts, but until concerted action is taken by growers, such as

is possible under the Pools Act, and assistance is rendered by the State in the appointment of a curing expert, whereby the whole of the output could be marketed in standard grades, the position will not be altered.

Cotton.

Interest in cotton as a crop has died out in most Northern districts. In the Bowen district one grower expressed satisfaction with his return from the crop; at Kennedy Creek, in the Cardwell district, two settlers are growing a little, but are not very enthusiastic. At Carbeen, on the driest area of the Tableland, two growers have areas of over 20 acres each under crop, the return from which they consider will be satisfactory, while next year a third grower will operate on a block of land he has purchased for that purpose.

Soil and climate at Carbeen are well suited to this crop, and there is a considerable area of Crown lands still available for settlement from there towards Parada and Mareeba.

At Charters Towers, as predicted in my last Annual Report, the cotton-growing company, who experienced great trouble in the harvesting of their crop, have gone out of business, and no attempt was made to grow the crop by anyone in that district this year.

At Gilbert River, one grower who had encouraging results in yield and quality of cotton last year reports a total loss of this year's crop owing to lack of rain.

Green Fodder Crops and Legumes.

Experimental and demonstration plots of green fodders were almost total failures throughout the year in all districts except those of the Atherton Tableland. Seed selection areas where planted have largely been failures, while in many cases sowings were held back waiting for the rain that did not come. A great deal of interest is maintained on the Tableland in the departmental plots, of which a series fronting the main road out from Atherton attracted much attention.

Though in some cases on the Tableland the growth on the plots of summer feeds was eaten down by caterpillars, the general yields were very fine throughout the year.

As in demonstration plots the farmers were encouraged to graze off and cut and feed in the early stages of growth, records of yields were not possible in many cases, and when made were necessarily at different stages of growth which, although not showing in all cases the maximum yield that could be obtained, provided much useful and interesting data.

CROPS FOR WINTER FEEDS.

District.	Yield per acre.				Sown.	Estimated.	
	T.	cwt.	qr.	lb.			
FLORENCE WHEAT.							
Atherton	..	..	4	16	1 20	3 May	5 Aug.
Atherton	..	..	2	17	3 12	12 June	13 Sept.
Pearamon	..	..	8	17	0 0	6 June	28 Aug.
Evelyn	..	..	3	7	2 0	18 June	31 Aug.
Evelyn	..	..	5	10	3 16	18 June	29 Sept.
Malanda	..	..	9	3	0 24	23 May	28 Aug.
THREE SEAS WHEAT.							
Atherton	..	..	6	8	2 8	3 May	5 Aug.
Atherton	..	..	3	4	1 4	9 June	8 Sept.
Atherton	..	..	2	14	2 16	12 June	13 Sept.
Kulara	..	..	5	18	3 20	6 June	28 Aug.
Malanda	..	..	5	2	3 12	20 June	16 Sept.
Pearamon	..	..	6	10	0 20	6 June	28 Aug.
SE X WS WHEAT.							
Atherton	..	..	4	16	1 20	3 May	5 Aug.
Atherton	..	..	2	14	2 16	9 June	8 Sept.
Atherton	..	..	2	11	1 20	15 June	8 Sept.
Pearamon	..	..	6	10	0 20	6 June	28 Aug.
Malanda	..	..	2	14	2 16	20 June	16 Sept.

CROP FOR WINTER FEEDS—continued.

District.	Yield per acre.				Sown.	Estimated.
	T.	cwt.	qr.	lb.		
SKINLESS BARLEY.						
Malanda	9	3	0	24	24 May	28 Aug.
Millaa Millaa	3	17	2	20	21 May	29 July
Millaa Millaa	4	13	0	24	21 May	8 Aug.
Evelyn	6	5	1	12	18 June	31 Aug.
Evelyn	7	1	1	20	18 June	29 Sept.

CAPE BARLEY.						
Atherton	2	17	3	12	15 June	8 Sept.

FIELD PEAS.						
Atherton—						
Dun	6	8	2	8	3 May	6 Aug.
Partridge	4	19	2	16	3 May	6 Aug.
Millaa Millaa—						
Partridge	10	2	2	0	12 May	29 Aug.

GOLDEN VETCHES.						
Millaa	6	15	0	0	12 May	29 Aug.

SKINLESS BARLEY, GOLDEN VETCHES, AND PARTRIDGE PEAS.						
Pearamon	5	6	3	5	7 May]	27 Aug.

SUMMER GREEN FEEDS.

PEARL MILLET.						
Tolga	19	5	2	23	17 Dec.	4 Feb.
Kulara	38	11	1	20	15 Dec.	17 Feb.
Malanda	19	9	0	0	15 Dec.	15 Feb.
Moregatta	10	2	2	0	16 Nov.	26 Jan.
Ravenshoe	22	7	0	0	23 Dec.	4 Mar.
Ravenshoe	23	11	0	0	23 Dec.	4 Mar.

TROSINTE.						
Millaa Millaa	16	12	0	0	2 Nov.	3 Mar.
Moregatta	14	5	0	0	16 Nov.	26 Jan.
Ravenshoe	16	0	0	0	23 Dec.	4 Mar.

SIBERIAN MILLET (White [†] Panicum).						
Kulara	20	14	2	16	15 Dec.	17 Feb.
Malanda	18	12	3	12	17 Dec.	15 Feb.
Millaa Millaa	15	5	0	0	2 Nov.	3 Mar.
Ravenshoe	13	8	0	0	23 Dec.	4 Mar.

HORSE GRAM.						
Millaa Millaa	9	15	0	0	2 Nov.	3 Mar.

COW PEA VARIETIES.						
Millaa Millaa—						
Groit	14	0	0	0	2 Nov.	3 Mar.
Brabham	14	12	0	0	2 Nov.	3 Mar.
Malanda—						
Groit	6	0	0	0	18 Dec.	10 Mar.
Brabham	6	9	2	16	18 Dec.	10 Mar.
Victor	7	5	1	12	18 Dec.	10 Mar.

VELVET BEANS.						
Millaa Millaa—						
E. Black	18	0	0	0	2 Nov.	3 Mar.
E. Georgia	14	9	0	0	2 Nov.	3 Mar.
Mauritius	11	5	0	0	2 Nov.	3 Mar.

The value of winter green feeds is well indicated in a report from Messrs. Lowry Bros., of Malanda, who had 5 acres under crop. The additional returns in butter from their herd of 50 cows, most of which were approaching the end of the lactation period, for the fifty days, from 14th August to 3rd October, during which they were fed from the plots, were equivalent to £46 5s. factory payment. The increased return was calculated as that above the average daily return for the first fourteen days of August, no allowance being made for what would have been a natural decrease had they been grazed on the pasturage alone. Writing on the 15th October, Messrs. Lowry state:

"We have since the 3rd October ceased to feed from the plots and have five fresh cows in. We have a tip-top paddock with three mixed grasses—viz., *paspalum*, couch, and *panicum* (*muticum*)—which has been sown for over six months, and the grass is 6 to 8 in. high all over the 75 acres. Since the 3rd October our cows have been running in this paddock; on the 5th October they dropped 15 gallons per day, and by the end of the week had dropped 25 gallons per day in their milk yield, despite the fact that five fresh cows had been added to the herd in milk."

Figures like these are illuminating, and it is a matter of regret that other dairy farmers do not make similar calculations.

The yields of summer green fodders as well as those for winter are very fine, and speak volumes for the fertility of the soil and the excellent seasonal conditions of the Tableland.

Some doubt was expressed as to the value of green feeds in summer when there was such a fine growth of *paspalum* and other grasses, but those who followed the advice to graze or cut and feed them off in the young stages of growth have been amazed at the increase in the milk flow. Pearl millet and Siberian millet (*white panicum*) have earned golden opinions, while teosinte has been found to be most useful and palatable to stock in this, the first year in which crops were obtained, owing to defective germination in the seed supplied during the previous years.

The legumes for summer growing show excellent results. Their value is very high, as at any stage of growth they may be fed to improve, by their admixture, the nutritive ratio of the pasturage or of other crops.

Honey Sorgho.

Since the first trial of this variety of saccharine or fodder sorghum in 1924, the yields have been consistently high, as the following records show:—

Year.		District.				Per Acre.			
						T.	cwt.	qr.	lb.
1924	..	Carbeen	..	..	..	25	5	2	24
1925	..	Carbeen	..	..	..	31	16	1	20
1925	..	Carbeen	..	..	..	33	15	2	24
1926	..	Atherton	..	..	..	25	0	0	0
1926	..	Proserpine	..	..	..	34	9	1	24

It is a variety, as its name indicates, with a high sugar content, very much relished by all kinds of stock, and is likely to exceed the saccharine variety in public favour.

Pasture Improvement.

In my last Annual Report some remarks were made on the subject of the resuscitation or renewal of *paspalum* pasturage that had become decadent after being laid down for a number of years, the opinion being expressed that a ploughing up of the pasture was at once the best and most economical means of overcoming the trouble, and that as far as the Atherton soils were concerned it was not thought, owing to their fertility, that the application of fertilisers would be followed with any economic result.

During the year, by arrangement with Messrs. Pink and Sons, a series of experiments were undertaken on 2 acres of a pasture that had been under *paspalum* for fourteen years. The area was divided into eight equal parts, half of which were ploughed and harrowed and half harrowed only with a heavy harrow.

Fertilisers were applied at the following rates per acre:—

Plot 1—Unmanured.

Plot 2—Carbonate of lime, 15 cwt.

Plot 3—Burnt lime, 10 cwt.

Plot 4—Nauru phosphate, 1 cwt.

Plot 5—Unmanured.

Plot 6—Nauru phosphate and superphosphate, 1½ cwt.

Plot 7—Nauru, 1 cwt.; sulphate of potash, ½ cwt.; nitrate of soda, ½ cwt.

Plot 8—Basic superphosphate, 1½ cwt.

There were thus eight plots on the area ploughed and eight plots on the area harrowed, allowing a comparison of the use of the same fertilisers on both ploughed and harrowed land.

The ploughing and harrowing of this area was done after the first heavy storm of the wet season in December, and the fertilisers applied immediately after and harrowed in. The first cut was made on 14th February and the second on 14th June, as little or no rain fell during April and May.

The weights of green grass cut from 1 square yard on each plot are:—

				<i>Ploughed Area.</i>	
Plot.				14th February.	14th June.
1	..	..	..	12 oz.	10 oz.
2	..	..	..	6 oz.	14 oz.
3	..	..	..	nil	19 oz.
4	..	..	..	nil	15 oz.
5	..	..	..	nil	32 oz.
6	..	..	..	nil	25½ oz.
7	..	..	..	nil	24 oz.
8	..	..	..	nil	17 oz.

				<i>Harrowed Area.</i>	
Plot.				14th February.	14th June.
1	..	..	..	5 oz.	4 oz.
2	..	..	..	52 oz.	12 oz.
3	..	..	..	48 oz.	12 oz.
4	..	..	..	16 oz.	12 oz.
5	..	..	..	35 oz.	13 oz.
6	..	..	..	17 oz.	10 oz.
7	..	..	..	53 oz.	14 oz.
8	..	..	..	29 oz.	14 oz.

The ploughing, owing to the matted nature of the roots and the hardness of the soil, was uneven, parts here and there being missed. Where the ground was all turned over most of the grass was killed, which accounts for the yield in Plots 1 and 2 only in the first cutting on 14th February.

So far, no indication is given of any benefit from the application of fertilisers.

On 13th June, the day before the last cutting was made, a thunderstorm giving upwards of an inch of rain fell.

The coming year should provide more useful data, as, owing to the season, no really definite conclusions can be arrived at just now.

PLANT DISEASES.

Maize.

The crops of maize on the Tableland have been subject every year, especially in those in which the rainfall was up to or above the average, to fungus diseases, chiefly species of *Diplodia*, *Mucor*, and *Penicillium*. In dry seasons loss from this cause is very greatly reduced, showing that the usual seasonal conditions adversely

affect the variety now grown, thus evincing the need for the introduction of a disease-resisting variety or varieties, as explained in an article, "Tableland Maize," published during the year.

On the Tableland during the past season the incidence of leaf stripe, *Helminthosporium turcicum*, was greater than in previous seasons, but that of head smut, *Sorosporium Reilianum*, was much less.

Potatoes.

All crops were remarkably free from fungus disease, largely due to the treatment of seed and the spraying of plants given, according to the advice of the Department.

Tomatoes.

While the trouble of the wilt disease, *Fusarium lycopersici*, has been overcome by the general use of the resistant varieties introduced by the Department, there are other diseases to which the tomato plant is subject that have caused some damage.

Towards the close of the picking season in September and October, at Bowen, when the weather was dry and daily temperatures high, practically the whole of the older plants died out or the leaves, except the newest at the tips of the branches, suddenly withered, remaining on the plant for some time in dried-up masses. This is considered to be due to a species of *Phytophthora*, which, unlike its congener *P. infestans*, is active only during the hot weather.

Cucumbers.

The whole of the cucumber crops in the Bowen district after July were attacked with disease, to their total loss. Specimens of fruit showing a peculiar spotted discolouration under the skin which caused it to be designated locally as the measles disease, with specimens of sections of the vines and stems, including the point of emergence from the soil, were submitted to the Vegetable Pathologist, who identified more than one specific fungus. Farmers of long experience at Bowen refer to a similar loss of the crop some twenty years previously.

As specimens, no matter how well packed, when sent through the post, necessarily take some time to reach Head Office, they cannot permit of such a satisfactory microscopical examination as would be possible if carried out on the spot. It is consequently suggested that provision might be made for a visit to the Bowen district by a pathologist should the disease mentioned recur this coming year.

INSECT PESTS.

Nematodes.

Trouble with nematodes is a frequent experience with many crops in the North, being most prevalent on a friable, easily worked soil such as a volcanic or sandy alluvial loam. A trial in control was made in tomato seedbeds at Bowen during the year with paradichlor., ehlorocide A, and ehlorocide B, with negative results for each. "Vaporite," which has been proved successful in this direction during past years, was unobtainable, but it is hoped that during the coming year further experiments, including this substance with those previously mentioned, will be carried out. Apart from nematodes, damage from other pests was not greater than in average years.

AGRICULTURE IN CENTRAL QUEENSLAND.

By G. B. BROOKS, Instructor in Agriculture.*

Conditions at the commencement of the year were most promising. The widespread rains that fell during June, 1925, approximately 5 inches, were sufficient to saturate and permit the breaking up of the soil for the early planting of summer crops. Very little rain fell in July, but useful showers were experienced throughout the subsequent months—August to December. Cotton and other crops made good headway during the early stages of growth, and in anticipation of the usual summer rains prospects for a heavy return looked very bright indeed. The rainy season unfortunately did not materialise, in consequence of which the maize crops were a comparative failure, while the cotton harvested was only about half the return expected.

*In the Annual Report of the Department of Agriculture and Stock.

In the northern portion of the Central district—extending from St. Lawrence to Bloomsbury—very little rain fell from June to December. Fairly heavy storms were, however, experienced during the latter end of December and of January, while scattered showers fell throughout February and March. From March to June conditions in this section have been very dry, the crops in many places showing the lack of bottom moisture. Fortunately feed for stock is in most places still plentiful.

The southern portion of the district, more particularly the area around Bundaberg, has suffered from the prevailing dry conditions. During the latter end of May a storm swept over this part of the State, the rainfall being exceedingly heavy, the registration in places giving from 14 to 18 inches. Miriam Vale shared to the extent of 5 inches; while Gladstone, being on the fringe of the disturbance, received 2 inches.

Conditions in the Western district are deplorable. Enormous quantities of fodder have been railed daily from the coast for starving stock.

ACTIVITIES.

A very comprehensive scheme of experimental and demonstration plot work was undertaken during the year under review. It is hopeless, however, with only one Field Assistant, to give requisite attention to field work conducted over an area embracing some 400 miles of coast line. Personal visits in connection with the giving of advice to settlers, silage making, fodder conservation, office duties, attention to visitors (many from other States in quest of information), necessarily take up a considerable amount of one's time.

The carrying out of trials with various crops requires the almost continuous attention of Field Assistant Straughan, who takes a very keen interest in this most important work.

The establishment of the power alcohol industry in the Central district necessitated much attention being given to the growing of starch-producing crops suitable for the manufacture of the spirit.

An exhibit of cassava products was prepared and displayed at the Royal National Show in Brisbane.

During the year I attended several agricultural shows in the capacity of judge.

POWER ALCOHOL.

A considerable amount of time has been given to the matter of raising and testing starch-producing crops for the production of power alcohol. So far the following three products have received special attention:—Cassava, arrowroot, and sweet potatoes.

Cassava.

As the result of the arrangements made while in Java, 750,000 feet of cassava sticks arrived in Queensland at intervals extending from July to January. A large portion of this material was secured from the Government Plant Breeding Station, Buitenzorg. Arrangements were made with the Plane Creek Sugar Mill Company to distribute the cuttings amongst their respective cane suppliers. Over 100 acres were planted in the area extending from Flaggy Rock to Baker's Creek.

Although conditions were most adverse when most of the plants were distributed, a satisfactory germination resulted. Subsequent growth was very rapid until April, some varieties attaining a height of 12 feet. Although practically no rain has fallen since, a steady growth was maintained until June, when several frosts were experienced, accompanied by heavy cold winds. The low temperatures—more particularly on the flats—affected the tops of the tender branches on one or two varieties. In Java the variation in temperature is only a matter of 2 to 3 degrees. The cassava plant, until acclimatised to Central Queensland conditions, will undoubtedly be affected by low temperature.

Arrowroot.

A ton of arrowroot bulbs were procured from Redland Bay and planted out in various parts of the Plane Creek district. There was little or no moisture in the soil when put in, and as no rain fell during the subsequent two months a crop failure was anticipated. When rain fell the germination was naturally somewhat patchy. The resultant crops will, however, provide sufficient material to plant out a fairly large area during the coming season.

Sweet Potatoes.

A number of varieties were introduced into the district, with the object of providing cuttings for the carrying out of comparative tests in conjunction with cassava and arrowroot.

Experiment Plots.

Two subsidy plots were arranged for—one on the farm of the Salter Estate at Koumala, the other at Sarina on the farm of P. C. Brooks, representing the southern and northern portion of Plane Creek sugar-growing area. Comparative tests are being carried out on those farms with eleven specially selected cassava varieties procured from the Plant Breeding Station in Java. The varieties embraced in the mixed unnamed commercial types, also obtained, will be segregated and tested in conjunction with the selected material, together with arrowroot and sweet potatoes.

Fodder Crops and their Conservation.

The raising and testing of crops suitable for the feeding of dairy stock and pigs is probably the most important activity associated with the work of the Instructional staff.

Arrangements were made with farmers in the various agricultural sections to co-operate with the Department in the raising of fodder crops in order to demonstrate the most suitable varieties to grow to maintain a continuous supply of succulent material for their cattle and pigs through the year.

In the matter of summer-maturing crops the suitability of sorghum, both as a standover winter feed and summer crop, has been consistently advocated by the field staff for many years.

It has been demonstrated that sorghum, if planted early, will give two cuttings during the season. The first, if desired, may be made into silage, while the second can be allowed to stand over and be used as required during the early part of the winter.

Sudan grass, a fine variety of sorghum, will also provide two cuttings, and has the advantage of being a crop that it is possible to handle with an ordinary binder. The first cutting can, should conditions be moist, be converted into silage, the following one dried and made into hay. Sudan grass has become a most popular fodder. In all probability 95 per cent. of the farmers in the Central division are now growing this useful crop.

The raising of sorghum is also largely on the increase, not only as a green fodder but as a grain-producing crop. Its value in the latter respect has not by any means been fully realised.

A number of farmers who were not engaged in cotton-growing planted their fodder crops early in the season, and were fortunate in securing heavy yields. The majority, however, delayed until January, and as the wet season did not eventuate most of the crops sown were complete failures.

Particulars in regard to trials carried out with sorghum are as follows:—

Grower and District.	Variety Grown.	Yield per Acre.	Planted Date.	Harvested Date.	RAINFALL.	
					During Growth.	Previous Month.
J. Jacobsen, Mount Larcom	Saccaline	Tons. 11.78	24-9-25	5-3-26	12.62	0.25
J. Coase, Mount Larcom ..	Red Kaffir	11	24-9-25	4-3-26	12.62	0.25
J. Coase, Mount Larcom ..	Red Kaffir	Bushels 94½	24-9-25	4-3-26	12.62	0.25
E. A. Russell, Thangool ..	D. Cream	49.6	10-11-25	25-2-26	..	..
A. E. G. Barnard, Deeford	Kaffir .. Feterita ..	23.32	7-11-25	18-3-26	9.28	Nil

Other growers in the Marlborough, Mount Larcom, Dawson Valley, and Rosedale districts also planted, but owing to dry weather the crops made insufficient growth for comparative purposes.

WINTER FODDERS.

The work carried out was on lines similar to those of previous years, being more in the nature of actual demonstration than experimental. The object in view is to show the dairy farmers the most suitable crops to grow in order to provide succulent feed for their stock over an extended period. These demonstrations are having a most beneficial effect. In the various dairying centres wheat, barley, and rape are now being grown for fodder purposes in increasing areas.

The results obtained from the plots established in the respective districts are as follows. In some localities the rainfall was not sufficient to bring the crops to their mature growth, therefore it was considered advisable to graze them off:—

Crops.	H. E. Wolff, Ambrose.	F. Huntley, Mt. Larcom.	J. Hales, Rockdale.	A. Barnard, Deeford.	Average.
	T. cwt. qr.	T. cwt. qr.	T. cwt. qr.	T. cwt. qr.	T. cwt. qr.
Florence wheat	9 16 0	2 0 0	6 6 2	6 14 3	5 14 4
Cape barley	8 16 3	4 0 0	..	7 2 1	6 13 0
Skinless barley	8 10 1	2 0 0	5 3 2	5 10 0	5 5 0
Algerian oats	11 14 3	Nil	Nil	7 1 2	9 8 0
Ruakura oats	12 4 1	Nil	Nil	6 8 2	9 6 1
Wheat and blue field peas ..	8 4 0	2 0 0	6 1 1	7 3 2	5 17 1
Wheat and dun peas ..	7 14 1	2 0 0	6 1 0	7 3 2	5 14 3
Planted	28 4 25	10 8 25	7 7 25	1 7 25	..
Harvested	17 9 25	0 11 25	2 12 25	14 10 25	..
Rainfall on crop	937 points	386 points	..	383 points	..
Previous month	Nil	25 points	..	420 points	..

F. Huntley's plot was grazed off, the yields given being only approximate.

Other growers were: F. Ferguson, The Caves; J. Houre, Alton Downs; A. Adams, Goovigen; A. Rake, Marlborough. Owing to dry weather these plots failed, growing only 6 inches high.

Fertiliser Tests.

These were conducted on the farm of Mr. A. J. Turner, Boyne Valley. The fertiliser and crops used were similar to those of previous years, and were applied to the same portion of land.

The results obtained were unsatisfactory through the cereals running into head during the very early stages of growth and before stooling had taken place, due in all probability to the mild nature of the weather prevailing at the time. The details are as follows:—

Manures, applied in Cwts. per Acre.	YIELDS—TONS PER ACRE.				Totals.
	Wheat.	Rye.	Barley.	Oats.	
2 dried blood	5.7	0.8	5.5	4.65	16.65
1 potash 2 basic super	5.85	0.8	5.85	4.1	16.6
1 dried blood 1 potash 2 basic super	5.45	0.8	5.65	4.35	16.25
$\frac{1}{2}$ dried blood $\frac{1}{2}$ potash 1 basic super	5.75	0.8	5.45	4.00	16.00
1 dried blood 2 basic super	5.35	0.8	5.45	4.3	15.9
1 potash	5.45	0.8	5.3	4.05	15.6
3 meatworks manure	5.2	0.8	5.05	14.15	15.2
1 dried blood 1 potash 2 super	5.3	0.8	5.25	3.75	15.1
Control—no manure	5.1	0.8	4.7	3.9	14.5
Control—no manure	4.9	0.8	4.8	3.7	14.2
2 basic super	4.5	0.8	4.85	4.05	14.2
2 super	5.1	0.8	4.7	3.55	14.15
Control—no manure	4.65	0.8	4.4	3.45	13.3

Arrangements have been made for the carrying out of a similar fertiliser test on the farm of A. E. G. Barnard, Wowan district.

Mr. Turner's plot will be planted under roots, onions, and soy beans, of the following varieties:—

Roots.—Broad leaf rape, green-top yellow Aberdeen turnip, Grandmaster and champion purple-top swedes, long red and yellow globe mangels.

Onions.—Early golden globe, early Barletta, Silver King, and brown Spanish, and the soy bean varieties Laredo, Biloxi, Tokio, and Mammoth yellow. The fertiliser for this plot has been applied and the seed recently planted.

ROOT CROP DEMONSTRATION PLOTS.

The making provision for a supply of material suitable for pig-raising purposes has by no means become a settled practice. It has been demonstrated that by adopting a system of early and thorough cultivation it is possible to grow heavy crops of roots—such as mangels, turnips, sugar beet, &c.

The results secured from the plots arranged for in the various districts are as follows:—

Crops.	J. A. Ross, Ambrose.	S. Larsen, Miriam Vale.	G. McRae, Biloela.	A. Rake, Marlborough.	Average.
	Tons cwt. qr.	Tons cwt. qr.	Tons cwt. qr.	Tons cwt. qr.	Tons cwt. qr.
Rape	18 7 1	10 16 1	5 1 1	6 0 0	10 1 0
Silver beet ..	15 2 2	Nil	5 12 0	4 0 0	8 5 0
Chow moulter ..	27 0 0	Nil	4 8 2	3 6 3	11 12 0
Purple-top turnip ..	32 9 0	25 1 0	} Attacked by aphids	} Attacked by aphids	28 15 0
Green-top turnip ..	21 12 3	26 0 0			23 16 2
Khol rabi ..	15 0 0	Nil	Nil	Nil	15 0 0
Field carrots ..	14 0 3	27 0 0	7 19 0	2 12 0	12 18 0
Sugar beet ..	30 5 0	16 0 0	Nil	Nil	23 2 2
Cabbage ..	27 0 0	17 5 3	6 0 0	Nil	16 15 1
Swede turnip ..	25 18 2	37 18 0	Nil	Nil	31 18 1
Long red mangel ..	38 19 2	25 18 2	Nil	18 3 0	20 15 1
Yellow globe mangel	31 6 2	29 3 2	18 3 0	9 1 2	21 18 2
Planted	1-7-25	27-6-25	22-6-25	28-6-25	..
Harvested ..	30-11-25	21-12-25	19-11-25	25-11-25	..
Rain on crop ..	627 points	Not recorded	559 points	Not recorded	..
Previous month..	473 points	Not recorded	106 points	Not recorded	..

Other growers were: F. Ferguson, The Caves; F. E. Sturm, Mount Lareom; H. Young, Wowan. Owing to the dry weather these plots did not sufficiently mature for the collection of data for comparative purposes. The growers, however, realised the advantages to be gained from growing these crops.

A further series of plots have been arranged for in the following districts:—

Callide Valley, G. F. McRae.
Wowan, J. W. Lindley.
Miriam Vale, S. Larsen.
Ambrose, J. A. A. Ross and G. Heinche.
Mount Lareom, J. C. E. Jacobsen and F. Huntley.
Marlborough, A. Rake.

OTHER CROPS.

Onions.

In the growing of onions the main obstacle to success has invariably been the lack of early preparation of the land. This is essential in order to conserve bottom moisture, and more particularly to get rid of surface weeds.

Four trial plots were arranged for to ascertain the most suitable varieties for Central Queensland. Owing to the dry conditions prevailing only one plot was planted. Germination being irregular reduced the yield per acre very considerably; but in regard to size and quality the crop was, on the whole, satisfactory.

The plot was planted on 14th July, 1925, and harvested 25th January, 1926, although immature. The total rainfall during growth was 321 points, and for the previous month was nil. The plot was on the farm of J. A. Adsett, Jambin. The yields were—

						T. cwt.	qr.	lb.
Early White Barletta	..	..	..	..	..	1	2	2 13
White Spanish	..	..	..	..	..	1	0	2 23
Extra Early Yellow Globe	..	..	..	..	..	1	0	0 26
Mammoth Silver King	..	..	..	..	..	0	19	1 18
Anderson's Selected Long-keeping Brown Spanish	..	..	..	..	..	0	15	1 19

The other growers were—

A. E. G. Barnard, Deeford.
Jones Bros., Tanby.

J. Sinclair, Ambrose.

Soy Beans.

The following varieties were planted out during November in the Dawson Valley, Boyne Valley, and Mount Lareom districts:—Tokio, Laredo, Mammoth, Yellow, and Biloxi.

Although a fair amount of moisture was present in the soil when sown, results on the whole were unsatisfactory. The plants made very poor growth, and the pods produced ripened over an extended period, making it impossible to economically harvest the crop. While the bottom portions of the plants were bearing pods, the upper portions were in flower. The pods invariably shed with the sun as soon as mature.

Arrangements were made to try the soy beans as a winter crop in the Mount Lareom, Biloxi, and Marlborough districts. The prevailing dry conditions have not so far permitted the planting of the seed.

Experiments of Ex-Season 1924-25.

Owing to the lateness of the season the following records were not completed before the compiling of the annual report for the previous year:—

SORGHUM PROPAGATION AREAS, 1924-25.

Grower and District.	Variety Grown.	Yield per Acre.	Date Planted.	Date Harvested.	RAINFALL.	
					On Crop.	Per month.
G. Ambrey, Marlborough	Brown Kaoliang	47.7 bus.	10-12-24	20-3-25	} Not recorded	
A. Skewes, Marlborough	Red Kafir ..	31.24 bus.	8-12-24	20-3-25		
T. Seirup, Gracemere ..	Dwarf Cream Kafir	10 bus. ..	..-1-25	5-4-25		
Pritchard and Wannop, Archer	White African	..	1-11-24	22-1-25		
A. S. Narracot, Dululu	Feterita ..	35.46 bus.	14-11-24	18-3-25	14.72	1.52
A. McDonald, Ambrose	White Yolo ..	14 bus. ..	21-2-25	13-6-25	17.11	5.84
C. King, Ambrose ..	Feterita ..	20.15 bus.	..-12-24	22-3-25	10.62	3.68
J. C. E. Jacobsen, Mount Lareom	Dwarf Cream Kafir	73.7 bus.	..-1-25	21-3-25	11.54	4.79
J. Coase, Mount Lareom	Early Amber Cane	..	10-1-25	24-5-25	12.68	4.79

Other crops were planted, but did not mature owing to dry weather.

Maize is not being grown to the same extent as in former years. When the scrub lands in the Dawson Valley and Barmoya were being opened up corn was invariably planted as a first crop, the cleared areas being then grassed with either Rhodes or paspalum. During the past few seasons cotton has taken the place of maize on scrub soils.

Cotton.

The bulk of the cotton crop has been harvested, and although high yields were not obtained this is practically the only product that has withstood the adverse climatic conditions and brought in some return to the farmer.

Potatoes.

The growing of English potatoes is to a large extent confined to localities where irrigation can be carried out. The principal potato areas are to be found along the Boyne River and in the Gracemere district.

Yields of from 4 to 6 tons per acre were generally secured, and the price obtained was in the vicinity of £18 per ton. As two crops are raised during the year, potato-growing under suitable conditions is a remunerative occupation.

Broom Millet.

Broom millet has received a good deal of attention, and it is anticipated that an increased area will be planted during the coming season.

Agricultural Expansion.

The establishment of the power alcohol industry at Plane Creek has now become an established fact.

Efforts are being made to establish a butter factory at Mackay. Extensive areas on the fringe of sugar lands are suitable for dairying. Quite a large number of high-grade stock have recently been introduced into the Mackay district. A good deal of development has taken place in the lands adjoining the railway line in course of construction from Rannes to Monto.

The following facts are of interest in showing the expansion that has taken place in the dairying industry in the Central Division—Port Curtis district—for the last five years:—

	1920.		1924.		Per cent. Increase.
No. of dairies ..	930	..	1,441	..	56.0
Total dairy cows ..	26,732	..	44,357	..	66.0
Butter made (lb.) ..	1,650,142	..	3,420,353	..	107.3

Five concrete silos have been erected in the Central district during the year.

FORESTRY.

By E. H. F. SWAIN, Chairman of the State Provisional Forestry Board.*

Without forests there scarcely could have been a history at all. The wooden arrow of the invader would not have pierced the eyeball of the Saxon Harold, and the Viking Coracles would not have turned the pages of history upon the seas of England. The timbers of the ship that carried Columbus formed the cradle of the United States of America; and the trees that made the "Endeavour" made the Commonwealth of Australia.

Upon the products of the trees depends very largely indeed the lives you lead, Mr. Swain emphasised. Whether sunk in the wooden armchair of ease or smiting a 300-yard drive over seven bankers and three water jumps, the result depends upon wood. Your industries, your commerce, your professions, and your amusements subsist upon trees.

To-day the forest has its triumphs in the wooden printed sheets which carry the news of the world, and the thoughts of men, and counter-attacking the rural interests which have decimated it in the past, it invades the commercial sphere with silk and wool manufactured by the direct route from the tree instead of via the silkworm and the sheep.

In the Days of Solomon.

The first really practical forest organisation recorded in history appears to be that of the King Solomon-King Hiram co-partnership in the mountains of Lebanon in Syria, where at an elevation of over 4,000 feet, among a succession of the hardest limestone crests and ridges, bristling with bare rock and crag and divided by grassy ravines, among purple rhododendrons, geraniums, isalets, and buttercups, the goodly cedars of Lebanon grew in scattered groves of gnarled and branch trees, 50 to 80 feet in height, with numerous large horizontal branches, trees which would be despised by our Australian bushmen, yet trees made glorious by the Scriptural poets as the excellent cedar, high and lifted up, its top among the thick boughs, its multiplied boughs, its long branches, and its shadowing shroud.

The Mount Lebanon forest in the time of Solomon and Hiram was a timber reserve. In the year 332 B.C. King Alexander the Great made forest history by declaring it to be the first State forest, and to-day the Mount Lebanon State forest still survives, with a hundred or so cedars yet remaining, where the Maronites and the mysterious Druses now hold sway and do battle against the Frank invader.

*From an address delivered recently at Brisbane.

Queensland Forests.

The Queensland Forest Service conception is as that of Solomon, to "make the cedars to be as sycamores in the vale for abundance." The need for wood is no less now than it has been throughout history. The world at large uses each year about 700 billion superficial feet of wood, of which half is for firewood. The per capita consumption is about 400 superficial feet per annum, of which 200 feet is firewood and 200 feet sawn timber. Of that 200 feet of sawn timber per capita per annum about 100 feet is hardwood and 100 feet is softwood. The Queensland consumption about equals the world's average, and this then is the basis of our calculations of Queensland's yearly need in wood. One hundred feet of sawn softwood and 100 feet of sawn hardwood each year for each unit of the population—this is the ration to be provided to the community by the Queensland Forest Service. The total requirements are easy to calculate, for our population number 800,000, and is multiplying at the rate of $2\frac{1}{2}$ per cent. per annum, so that in sixty years the population of Queensland will be around 3,000,000 souls, and their timber demands will be at that time 300,000,000 superficial feet of sawn softwood and 300,000,000 superficial feet of sawn hardwood each year.

But the position is that the 4,000,000 acres of State forests and timber reserves which we now hold are supplying only 50,000,000 superficial feet of sawn softwood per annum, and in thirty years will be providing only 10,000,000 superficial feet, because they are being cut at a greater rate than they are growing. During the period 1923-1955 we shall be short of normal requirements for our population to the extent of 2,700,000,000 superficial feet of sawn softwood, and this we shall have to import at a cost of about £40,000,000 which will go to America and Scandinavia. This cannot be helped and could only have been avoided if we had started wholesale planting 'way back in 1876. Could we rely upon imports for the future then the idea of reforestation in Queensland might be dismissed, but the situation is that the world at large is nearing a softwood famine, and the responsibility lies upon us of rendering ourselves self-sufficient in the matter of wood.

Planting New Forests.

The job before us is to grow crops of timber which maturing sixty years hence will supply at least 300,000,000 superficial feet of sawn softwood each year. Carrying the calculation further we must determine the rates of wood growth per acre in order to determine the acreage now to be put down. There are now extant in response to the approach of forest shortages a number of private forestry companies operating largely in New Zealand, and these companies have issued prospectuses in which are set forth statistics and figures of forest growth, a study of which proves interesting. One such company undertakes to plant 680 trees per acre, and calculates that 500 will reach maturity in twenty years with a tree content of 500 feet each, that is 250,000 superficial feet per acre of log timber or reduced to sawn timber allowing 25 per cent. waste in sawing, say 187,500 superficial feet of sawn product in twenty years, or 562,500 superficial feet in sixty years. Dividing this acreage result into our prospectus need of 300,000,000 superficial feet we find that 530 such acres would furnish our wants, so that presumably if we lay down 530 acres of plantation each year our provision would be ample. That, indeed, was the acreage of plantation laid down by the Queensland Forest Service last year in this State. We are, however, not satisfied with this accomplishment because we are not as successful in our estimates as private enterprise appears to be. Our calculations suggest that planting 680 trees per acre, as do the private forestation companies, we may expect each acre to put on wood at the rate of 1,000 feet per annum, which is perfectly satisfactory to us. In such case there would be 60,000 superficial feet on each acre at the end of sixty years, and 5,000 such acres would supply our requirements. We believe that 5,000 acres per annum of new plantation is much nearer the mark than the 535-acre proposal of the private prospectuses, and this figure we have accepted as the basis of our planting plans. That makes our 1926 provision perfectly inadequate. Next year, however, we expect to lay down 1,000 acres, and thereafter to increase as fast as possible until we attain the 5,000 acres—our minimum objective.

Applied Silviculture.

Believing, therefore, that it is its special function and responsibility to provide for and to safeguard the community's timber supply, the Queensland Forest Service proposes to proceed with its programme of logging and harvesting and marketing and milling the old wood crops and by applied silviculture to bring the forests of Queensland to such a state that future generations may be assured of a renewal of the forest bounties which the past generations have so carelessly wasted and despoiled.

SHEEP TRANSPORT BY MOTOR.

A remarkable experiment in the transport of sheep has been carried out by Mr. W. A. Russell, M.L.A., of Jimbour House, Dalby.

Mr. Russell purchased 10,000 full-woolled merino wethers from Listowel Downs, Blackall, and shifted them to his Nardoo property in the Cunnamulla district, a distance of 210 miles, by motor lorry. The country over which these sheep had to travel, at the time, was drought-stricken, and it would have been practically impossible to drive the sheep in the usual way. They had to be moved, and quickly, on to good feed, so, in order to do so, Mr. Russell entered into a contract for these sheep to be moved by motor lorry. It was the first time that such an experiment had been attempted with such a large mob of sheep, and considerable risk naturally attached to the venture.

The trailers were built by Mr. J. J. Lucy, of Toowoomba. The dimensions of the bodies were 25 ft. long, 8 ft. wide, and 6 ft. 6 in. high, with four floors, the upper three being movable. The wagon-backs were fitted with double gates, and the sheep were loaded in, one floor complement at a time. The trailers were mounted on two wheels and attached to the lorries on a turntable, so that there were six wheels in all.

When the transport of the sheep began, the first trip proved that the bodies of the lorries were not strong enough to carry the weight, so they were returned to Charleville for alteration. The bodies were strengthened, also the floors of the different compartments, for the sheep had proved to be heavier than expected, averaging 52 lb. in weight. On returning to Listowel, the lorries were loaded again and once more started out, the number of sheep in each lorry being cut down to 250 from 300, the top compartment being left empty. This time more success was met with, and the journey more than half accomplished, when the lorry bogged in a bad crossing of a bore drain, necessitating the unloading of the sheep. These were shepherded and fed on mulga while the vehicle was got clear of the bog.

Another accident occurred, when one of the lorries overturned completely, killing eighty of the sheep. Mr. Russell thereupon altered the design of the lorries, and in place of trailers had the bodies built on to the chassis. From then on there were no more mishaps, the trips were done in good time, and the sheep put on to good feed on their arrival at their destination.

Mr. Russell, in order to hasten the transport, had a third lorry built in Brisbane to his own design, which proved very strong and successful. It was fitted on to a $3\frac{1}{2}$ -ton truck, and carried 5 tons of sheep, the body itself weighing $1\frac{1}{2}$ ton. With the three lorries in use, the transport of the sheep continued. The runs were accomplished in from twelve to fifteen hours, and the sheep landed in good condition. Losses in transport and after-arrival were under 3 per cent., and Mr. Russell considers the undertaking a most successful one.

Rain in the Central West prevented the last 3,000 being shifted by motor lorry on account of the state of the roads, and these were sold at a good advance in price, sufficient to pay for the transport costs, which amounted to approximately 3s. 6d. per head.

The experiment was watched with great interest by many graziers, pastoralists, and pastoral companies, and the success of Mr. Russell's venture led to a contract for the removal of 10,000 sheep from Oakwood Station to Boatman Station, Wyandra. It was agreed to move these sheep for 1s. 1d. per 50 miles, one way only to count. The distance was 150 miles. Cancellation of contract meant one-third payment of total cost, if rain fell. Rain did fall, and the company concerned handed in its cheque for the amount agreed upon.

Another contract was accepted for the Portland sheep—6,000 head—but rain also caused the cancellation of this contract.

Mr. Russell considers that the success of his experiment was solely due to the position of the sheep in the lorries. They were packed in a sitting-down position, one close against another, with no room for them to stand, even had they been able to get upon their feet. By this means the sheep were not knocked about at all, and remained in the same position throughout the journey. The shelves on which the sheep were placed were 16 in. apart, which prevented the animals from standing up.

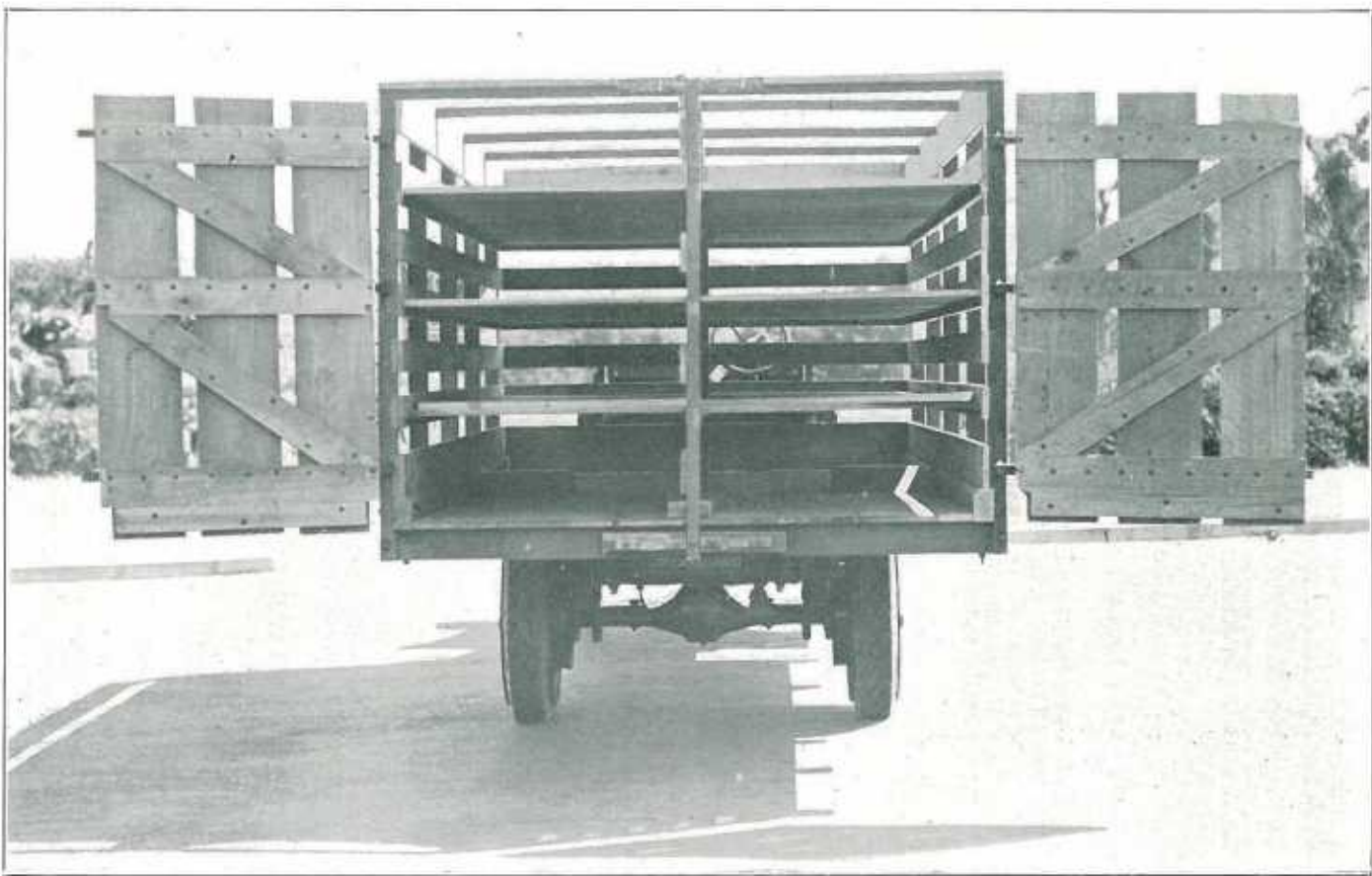


PLATE 131.—SHEEP TRANSPORT IN WESTERN QUEENSLAND.
Motor Truck showing details of the body specially designed for the purpose.

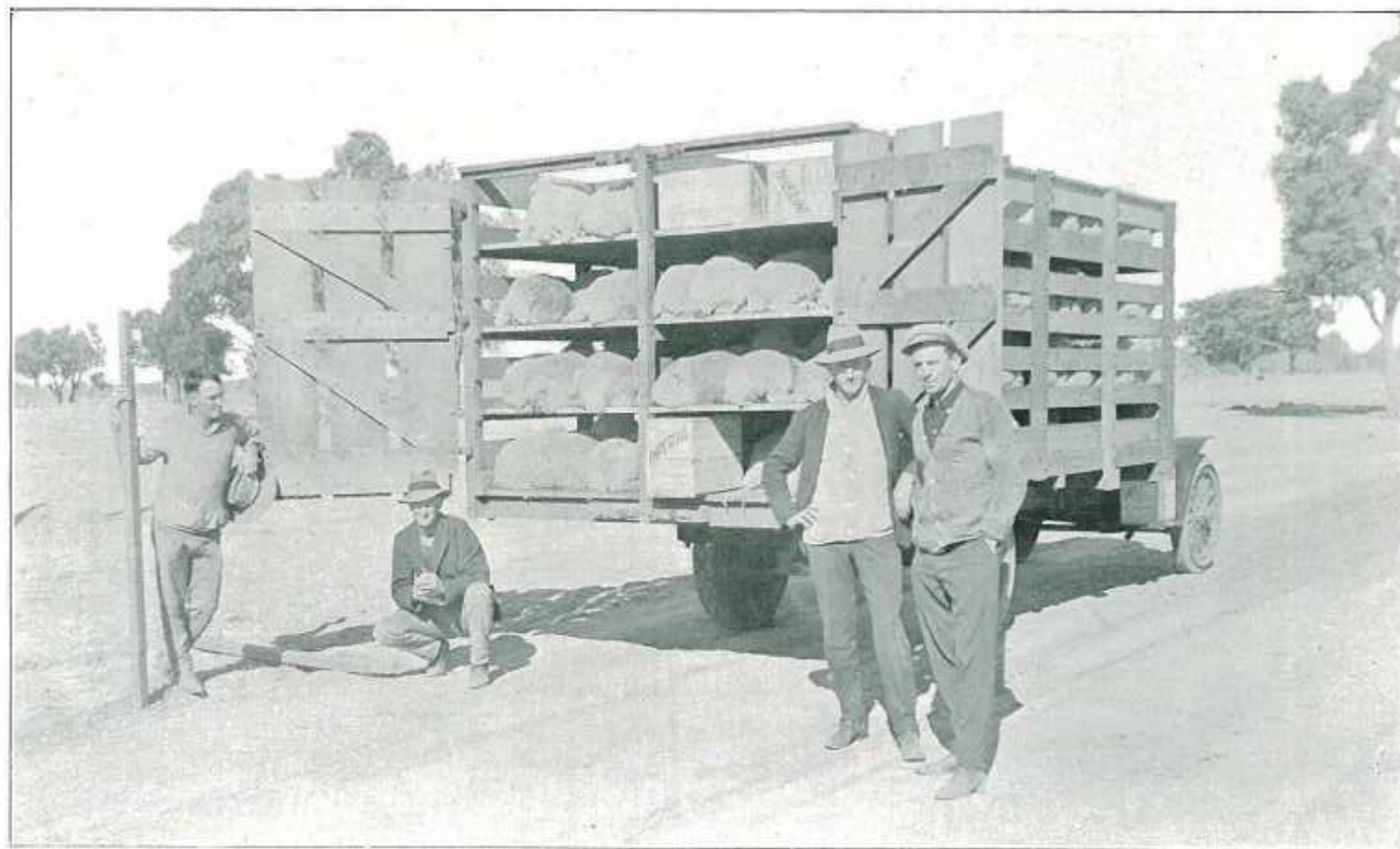


PLATE 132.—TRANSPORTING SHEEP TO RELIEF COUNTRY.—HOW THE ANIMALS WERE PACKED.



PLATE 133.—OFF TO GREEN PASTURES.

Employment of modern means of transport overcomes the problem of dried-out stock routes in Western Queensland.

ALCOHOL FROM SUGAR BEET.

Last January the British Minister of Agriculture appointed a committee to consider technical questions involved in the manufacture of alcohol from sugar beet for power purposes and to report upon (a) the probable cost of production of alcohol from sugar beet; (b) the value of alcohol for power purposes as compared with petrol and benzol and the comparative price at which it could be sold in competition with these fuels; and (c) the prospects of alcohol production by synthetic process. The committee's report has now been published, and the following is a summary of its findings:—

(a)—

(1) The cost of raw material, referred to a gallon of alcohol, after allowing for the value of residual products, should be taken as 5 per cent. of the price per ton of beet.

(2) Manufacturing cost, i.e., the total cost of conversion should be put at the rate of 9d. per gallon.

Thus, with sugar beet at £1 and £2 per ton respectively, the cost per gallon of 95 per cent. alcohol net naked at works would be 1s. 9d. and 2s. 9d. respectively.

(3) In addition, there are costs due to denaturation, packages, transport, and selling charges.

(b) For use in internal combustion engines of present design, one gallon of 95 per cent. alcohol is equivalent to less than three-quarters of a gallon of petrol. It is possible that if the situation is skilfully handled from the commercial point of view, a market for a moderate quantity of fuel alcohol at approximately the same price as petrol might be secured.

(c) The present position with regard to the production of alcohol by synthetic processes is obscure, but the effect of the development of such processes would undoubtedly be to exercise a restraining control on the price of petrol and other materials. It should be borne in mind that the production of other fuels, by synthetic or other means, suitable for use in internal combustion engines, will have a similar effect in controlling prices.

Neither for the production of synthetic alcohol nor for substitute hydrocarbon fuels can it be expected that a reliable statement as to costs will be available for a few years.

TON LITTER CONTESTS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The pig farmers of America are proud of the fact that they have on many occasions during recent years beaten all previous records in regard to the weight to which it is possible to successfully raise a litter of pigs in six months from date of birth—in fact, record-breaking litters are almost the order of the day, and it seems that there is apparently no actual limit to the weights being attained. The original purpose of the "ton" litter scheme was to see if it were possible by improved methods of feeding, breeding, and management to successfully raise a litter of pigs to the age of six months and at that age to have them weigh in all 2,000 lb. (called in Australia a "short" ton—2,240 lb. being the "long" ton or the ordinary ton weight). Mr. Shelton's notes on the subject are of exceptional interest.—Ed.

The contest was inaugurated by Professor James R. Wiley of the Purdue University, U.S.A. Most breeders refused at first to enter any litters in the contest, claiming that it was impossible to produce a single litter of pigs of that weight at six months of age. Data secured soon disproved this, with the result that there has been considerable interest in ton litter contests during the past two years. We have been slow to adopt this scheme in Australia, largely for the reason that most breeders here still seem to think it impossible to produce a ton of pork in six months in the manner indicated. It is hoped the publication of the figures referred to in this article and the illustrations thereto will create added interest and actually result in the scheme being initiated.

The Latest Record.

5,117 lb. on 17 pigs at 180 days old.

FACTS ABOUT THE WORLD'S CHAMPION LITTER.

- Pigs in litter (10 boars, 7 sows)—total, 17.
- Date of birth of these pigs—30th March, 1926.
- Average weight when weaned (8 weeks)—66 lb.
- Average daily gain per pig from weaning to final weight—1.89 lb.
- Average final weight per pig—301 lb.
- Final weight of litter, 27th September, 1926—5,117 lb.
- Feed, exclusive of pasture for 100 lb. gain—512 lb.
- Cost of 100 lb. gain, exclusive of pasture—6 dollars .07 cents—
- Equal to a cost here of £1 5s. 1d. per 100 lb. gain.*
- Breed of pigs—Poland-Chinas.
- Breeder—W. T. Rawleigh Co., Freeport, Illinois, U.S.A.
- Sire of young pigs—"Sun Ray," a noted sire.
- Dam of young pigs—"Miss Clausman Giantess 2nd."

* Dollar rate calculated on 4.84 dollars to £1 sterling.

In recording the details of this phenomenal performance in the "Poland-China Journal," Dr. G. H. Conn says "that with the final weighing on 27th September, 1926, of the litter of 17 purebred Poland-Chinas owned by the W. T. Rawleigh Company, and entered in the Illinois ton litter contest, a new world's record in pork production was established. This litter weighed 5,117 lb. at six months old.

This record, it is stated, does not come as a complete surprise to the swine producers of America, for this breeding herd established a world's record of 4,789 lb. in 1925 with a litter of 16, and a reserve world's record of 4,511 lb. with a litter of 15 the same year. In 1924 it established a new State record for Illinois with a litter of 17 that weighed 3,368 lb. This new world's record litter was weaned when eight weeks old. They then weighed an average of 66 lb., or a total of 1,122 lb. After weaning, the litter was placed on rape pasture; the ration was the grain mixture mentioned herein with buttermilk as a fluid food, with minerals and a home-made pig meal. Shelled corn was fed in a self-feeder. This litter consumed more than 200 gallons of buttermilk each week from weaning time to the conclusion of their record.

Some Facts about the Record.

There were 7 sows and 10 boars in this litter of 17 pigs. The heaviest one of the litter at the conclusion of the test weighed 361 lb. The entire litter averaged 301 lb. each. The litter weighed 2,015 lb. when eighty-eight days old, which was fourteen days earlier than any other litter had ever reached a weight of 1 ton. This litter produced 1 lb. of gain for each 5.12 lb. of feed consumed (less pasture), at a cost of 6 dollars .07 cents per 100 lb., not including cost of pasture. Pigs of this weight were selling on the market when this record was completed at 13 dollars 25 cents per cwt.

How this Litter was Fed.

The feeding of the litter was really begun before they were farrowed; the brood sows at the Rawleigh Ideal Farms are carefully fed that they may produce strong, vigorous young. For a month before their litters are farrowed they do not receive any corn, but the following grain mixture is used:—

	Lb.
Ground hulled oats	150
Wheat middlings	100
Wheat bran	100
Tankage (a grade of meat meal)	25
Oil meal	25

This mixture is made into a heavy slop with skim milk or buttermilk. Some ear corn is allowed to within a month of farrowing time.

When the pigs are four or five weeks old the sow is given some ear corn. The pigs are given some of the grain mixture above in a separate trough, placed in a creep or protected portion of the sty where the sows cannot get to it. They also ate with the sow.

The Advantage of Good Breeding Stock.

The breeders of these pigs are quite convinced that good breeding stock, well fed and cared for, pay handsome dividends. "Sun Ray," the sire of this litter is a large, active boar, weighing 1,000 lb. He was from a litter of 13 pigs that was a consistent winner at many shows in 1924. This litter (of which he was one) was first prize litter at the Illinois State Fair in 1924. A litter mate of "Sun Ray" was junior champion boar at Illinois the same year. "Miss Chasman Giantess 2nd," the dam of this litter, weighs 850 lb., and was bred by the Rawleigh Ideal Farms.

The average litter in the United States (the report continues) contains 5.3 pigs and weighs 1,030 lb. at six months old; the average litter (1926) at Rawleigh Ideal Farms was 9 pigs that weighed 1,800 lb. when six months old.

Other Record Litters.

In the 1925 ton litter contests in the United States there were five litters that weighed more than 4,000 lb. each, and up till 28th September, 1926, three additional litters have reported weights in excess of 4,000, or 2 tons, at six months of age.

The Herdsman.

As in the case of all classes of live stock, the enthusiasm, loyalty, and adaptability of the man on the job counts for much, so it has proved in the case of this world's record Poland-China litter, for this record, as well as the other records at this farm, was due to the untiring efforts of the herdsman, Amory C. Minear, who has been an employee of the Rawleigh Farms for five years.

A Former Pig Club Member.

Mr. Minear is a former pig club member, having been a prize-winning member in 1914. That year he won a trip to the Iowa State College at Ames for having the best pig among the pig club members in Benton County; he earned the money to take the short course in Animal Husbandry at Ames, where he graduated in 1918. Since that time he has been making Poland-China history for the breed. It is significant that this herd, of which he is the overseer, has in its eight years' existence established a number of records. It has held the State record for Illinois ton litters in 1924, 1925, and 1926, the world's record for 1925, and the world's record for 1926.

As far as is known, no other pig raiser in the world has bred and entered four litters in the ton litter contest that averaged 4,653 lb., with three of these litters weighing more than 4,500 lb. each. No other breeder has entered four litters in any ton litter contest averaging 16 pigs each. All of these four litters were sired by the boar "Sun Ray," and two of them were out of one sow.

Development of the Herd.

A few years ago the Poland-China breed was beginning to lose its popularity. Breeders said that they were not prolific enough; their litters were too small, often but four or five pigs. Since the W. T. Rawleigh Company intended establishing their herd to demonstrate practical and profitable pork production, it required skill and judgment in the selection of breeding animals. The founders of this herd selected for their breeding stock animals from large litters and from early maturing strains. With careful selection this herd now has an average of nine pigs per litter (saved) in the spring of 1926, while, as stated, the average for the United States in 1926 was less than six pigs per litter.

In the spring of 1925 eight sows from this herd farrowed an average of 17 pigs each. One sow from this herd farrowed a total of 70 pigs in four consecutive litters within a period of eighteen months. One of these litters was Illinois champion ton litter in 1924. The sow "Orphan Maid" was the dam of the litter of 15 in the 1925 contest that weighed 4,511 lb. and the litter of 16 that weighed 4,198 lb. on 16th September, 1926. She farrowed 47 pigs from 30th March, 1925, to 20th March, 1926.

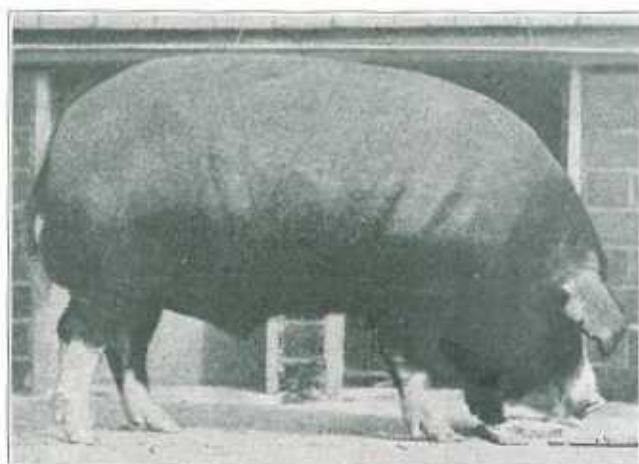


PLATE 134.—SUN RAY, WORLD CHAMPION SIRE.

Champion Litter to be Exhibited.

The W. T. Rawleigh Co. plans to exhibit the world's champion litter at the American Royal Live Stock Show, Kansas City, Mo., and the International Live Stock Exposition, Chicago, Ill. The plan is to exhibit this litter alongside a litter of six pigs weighing 1,050 lb., which is the average litter produced in the United States, and a litter of nine pigs weighing 1,800 lb., which is the average litter produced at Rawleigh Ideal Farms.

Comment.

The fact that these figures have had world-wide publicity through the medium of the "Poland-China Journal" (issue of 10th October, 1926) should be a guarantee as to their accuracy, though the Department of Agriculture and Stock can only vouch for them as they appeared in the journal referred to. Breeders here will probably doubt their accuracy, as up to the present we have no data bearing on the subject here to which reference could be made *re* Australian experience.

Appended are results of other contests as published in American stock journals.

Pig Club Boy Produces Second Top of Pork.

With his latest club experience still fresh in the minds of his neighbours, Oscar Keim, young farmer lad of Somerset county, has just enrolled in the agricultural school of Pennsylvania State college. Just before leaving for Pennsylvania State, Oscar saw his eight purebred Duroc-Jersey pigs tip the scales at 2,161 lb., more than enough to make him for the second time in three years a member of the famous Keystone Ton Litter Club.

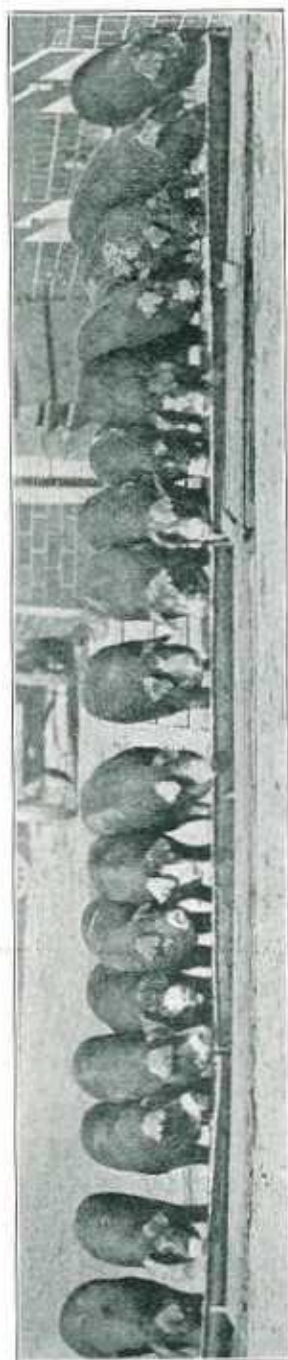


PLATE 135.—SUN RAY'S NEW WORLD'S CHAMPION TON LITTER WEIGHED 2,015 AT 88 DAYS AND 5,117 AT 180 DAYS.

Two years ago he fed nine pigs to weigh just a few pounds over a ton. This year he produced pork at the rate of a pound for every 2 lb. of feed. He used the ration recommended by the State College extension live stock specialists, and his pigs had a self-feeder, water, and pasture. He sold the eight for 13 cents a pound, making a profit of 175 dollars.

Young Keim became a club member in 1921. Since that time he has been in both pig feeding and baby beef clubs. He came into the agricultural limelight two years ago, when his efforts made him the youngest member of the Keystone Ton Litter Club. Last year he was awarded a 100 dollars scholarship by the Baltimore and Ohio railroad for being the best club worker in the seventeen counties traversed by that railway in Pennsylvania. He was also president of his local club in 1925.

Always eager to know and use the best practices in his work, Keim has been a frequent visitor at the office of County Agent C. C. McDowell in Somerset, and he has made several trips to State College to get the very latest information from the live stock specialists. He keenly appreciates the value of proper feeding because his records, always consistently kept, proved it to him.

This record is from the "Duroc Journal-Bulletin," an official organ dedicated to constructive Duroc promotion.

Here are some more records:—

Four Tons in Four Litters—Unusual Pork Production Record is made in Missouri.

Four tons of pork from as many sows in 180 days at a feed cost of 5.46 dollars a cwt. is the record of Ernest Heberling, of Lafayette County, Mo., in a pork-production demonstration conducted this summer in co-operation with the Missouri College of Agriculture. Practical methods of feeding and management were used in the operation. The pigs were farrowed in quarters that had been thoroughly scrubbed with boiling lye water and were kept on ground that was free from worm eggs and filth bacteria. Their ration consisted of corn, tankage, and shorts fed on good pasture.

The four sows, all that farrowed on the farm during February and March, produced two litters of 11 each, one litter of 10, and one of 6, a total of 38 pigs. The two litters of 11 and the litter of 10 were entered in the State ton litter contest. Two of the litters weighed above 2,300 at 180 days old, and the third litter of 11 pigs lacked only 120 lb. of weighing a ton when 164 days old. This they could easily gain in the remaining sixteen days.

At an average age of 179 days the four litters weighed 7,989 lb., or just 11 lb. short of the 4-ton mark when one day younger than the specified age limit.

The feed required in producing the four litters is reported by M. B. Ditty, county agent in Lafayette County, as follows:—Corn, 350 bus., 262.50 dollars; shorts, 2,000 lb., 38.00 dollars; tankage, 1,500 lb., 56.00 dollars; oats, 15 bus., 6.00 dollars; pasture, 25.65 dollars; feed for sows, 48.00 dollars; total feed cost, 436.15 dollars.

The amount of feed required to make 100 lb. of gain was as follows:—Corn, 8.2 bus.; shorts, 25 lb.; tankage, 19 lb.; and oats, 0.2 bus.

Earlier Records—Duroc-Jerseys.

In another report published in the "Duroc Journal-Bulletin" of a year or two ago, one of America's foremost swine journals, mention is made of a litter of Duroc-Jersey pigs that has broken another record for ton-litter pork production, setting a standard that is likely to stand for some years to come. The twelve pigs included in this litter weighed 3,898½ lb., or an average of 324.9 lb. for each pig at the end of a feeding test of 180 days. This is considered to be a remarkable record for tonnage of pork produced by one sow and for average weight of pig in the period.

The litter was officially weighed on 1st September last, under the supervision of A. L. Ward, swine specialist of the Texas A. and M. College, and officials of the McLennan County Farm Bureau.

The man responsible for this remarkable feat is Vic. Hill, of Chalk Bluff, McLennan County, Texas. Mr. Hill bred the litter and fed the pigs throughout the test. There were fourteen pigs in the litter farrowed on 5th March, 1923. At the end of the contest the pigs were three days less than six calendar months old. One pig was born dead and another was killed, as the sow was unable to suckle more than twelve pigs. The twelve remaining were all raised. When the contest ended the dam was exactly three weeks less than three years old.

Before weaning time the sow and pigs were given a ration consisting of corn, pig chow (a specially prepared pig meal), and skimmed milk. After being weaned, the pigs were started on a ration made up of 60 lb. of skim milk, 24 lb. of corn feed meal, and 6 lb. of pig chow. This was the daily allowance, and was increased as fast as the pigs would take the increase. They were fed twice a day, and given all they could clean up. During the whole period of 180 days the litter were allowed the run of an 18-acre succulent grass pasture, with a freshwater pond and some shade trees. During the test the litter consumed 16,616 lb. of feed, as follows:—

	Lb.
Corn feed meal	5,429
Skimmed milk	8,896
Pig chow	2,100
Corn	200

in addition to the pasture.

These figures show that it required only 4½ lb. of feed for each 1 lb. of gain. This in itself is a fine record. The value of the feed consumed, including pasture, was 229 dollars 84 cents, making the cost of each 100 lb. of gain only 5 dollars 89 cents. Included in the cost of production is a charge for the service fee of the boar. Each pig made an average daily gain of 1½ lb. avoirdupois. During the last twenty days the average daily gain was 3½ lb. avoirdupois for each pig.

It is doubtful whether the records made by this litter have ever been equalled for economy of production. When three months old the litter weighed 1,243 lb., at 131 days the weight was 2,325 lb., and at 160 days 3,117 lb.

On the day weighed the pigs were worth 9½ cents per lb. on the market. The cost of production, 229.84 dollars, deducted from the sale value, 370.35 dollars, leaves a net profit of 140.51 dollars. Mr. Hill realised considerably more for the litter, as nine of the pigs were registered as stud pigs, and after being shown were sold for breeding stock.

The litter comes from a long line of ancestors that has earned distinction for its show-ring conformation and quality. The dam was sired by "Ls. Pathfinder," the grand champion boar of the Texas State Fair, 1919. He was one of the largest boars ever in service in Texas, and was bred and shown by that veteran breeder, George P. Lillard. The litter was sired by a son of "Ls. Demonstrator," the champion junior yearling boar of Texas in 1920. This boar, also shown by George Lillard, was possessed of tremendous scale and length. His sire was the first prize senior yearling at the Nebraska State Fair some year ago. The unheard-of weight attained by this litter is a distinct triumph for big-type breeding. Pigs with size and length will excel in weight for age, which means profit in pork production.

In order to avoid any possibility of error and to be accurate on every point, the litter was earmarked when seven days old by a representative county agent in the presence of several responsible persons. The scales used to weigh the litter were tested and sealed by the city inspector of weights and measures.

Mr. Hill won 335.00 dollars in cash prizes for producing this world's record litter; 200.00 dollars of this premium money was offered by the National Duroc-Jersey Records Association, and the remainder by business houses of Texas.

Still another record performance:—

Ton of Pork from Eight Pigs—South Carolina Farmer Makes Good Record on Crossbred Litter.

Eight pigs entered in the State-wide ton litter contest by M. L. Hanes of Davidson County, N.C., on 4th March, 1926, weighed 2,073 lb. on 2nd September, according to C. A. Sheffield, county agent of Davidson County.

"Mr. Hanes has proven himself to be one of our best hog feeders," says Mr. Sheffield. "The eight pigs which he entered in the ton litter contest were a cross between the Berkshire and Poland-China breeds. They were fed according to methods advocated by the swine extension office at State College and were fed for 180 days. At the end of the period the eight animals weighed 2,073 lb., or an average of 259½ lb. each. They made an average daily gain of 1.44 lb. per day from the time of farrowing until six months of age. Mr. Hanes might have exceeded even this record had he not overfed for one period the amount of shorts called for in his schedule. The amount of fish meal was lower than the schedule called for, but was supplemented with skim-milk."

Mr. Sheffield states that there were three boars and five sows in the litter. The heaviest pig was a barrow weighing 303 lb., whilst the lightest was a sow weighing 206 lb. Each of the three barrows weighed much more than any one of the five sows. The total cost of the feed given the animals was 119.87 dollars, or a cost of 5.8 cents per lb. to produce the pork. On the day the contest closed Mr. Hanes could have sold his pigs for a little over 300 dollars. Deducting the cost of feed and 48 dollars for eight pigs six weeks old, Mr. Hanes still has left a profit of 132.33 dollars for his labour, in addition to the plant food left on the farm. This plant food is valued at about 30 dollars.

TICK PARALYSIS IN PIGS.

A correspondent informed us recently that he had a well-grown, three-months-old sow that had become suddenly very ill; she went off feed and lay down. On rolling her over, the owner found a whitish coloured tick (known as a dog tick), and he sought information as to suitable treatment for an animal so affected.

Another correspondent advised: "I have recently purchased three first-class Middle Yerk sows, three months old. They were in perfect condition when they arrived here, and have been well fed and cared for since, but two days ago I noticed that two of them were suffering from some ailment or other; they would not come up for their food, were very stiff and "dopey," and appeared to be getting worse. I am at a loss to know what is wrong or what to do . . ."

The following information was supplied:—The fact that the ailment suddenly manifested itself in the pigs suggests that it may be attributable either to bush-tick poisoning or to severe constipation. The common bush-tick fastens itself on the animal, usually about the head, ears, neck, or under the foreleg, and the poisonous effect of its bite causes a temporary paralysis of the hindquarters (particularly) and frequently severe constipation. These ticks (*Ixode holocyclus*) are comparatively common along the coastal districts of New South Wales and Queensland, and one species is found inland. They generally attack dogs, poultry, and pigs; but other animals are not by any means immune, nor even are human beings. After attaching itself to the animal the tick forces its feeding apparatus through the skin (it usually selects a thin-skinned portion of the body for its temporary abode) and commences to suck blood from the affected part. The tick gradually fills up, increases to two or three times its normal size, and at the same time apparently injects a certain amount of poison into the animal, the result being that the animal goes off its food, is disinclined to move from its bed, and when disturbed appears stiff, sickly, and paralysed, particularly in the hindquarters (later the forequarters may also be affected), breathing becomes laboured, and there may be a discharge from the nostrils; bowels are inactive and severe constipation follows; kidneys and bladder become inflamed and congested, and the urine is scanty and high coloured. If not attended to the animal gradually becomes worse, loses condition, and death occasionally results.

Careful search should be made for the ticks, and if found they should be cut off close to the skin with a sharp pair of scissors, or, better still, with a sharp razor. Do not attempt to pull the tick away. After cutting the tick off, rub the affected spot with antiseptic ointment, kerosene, or Stockholm tar.

Remove the pigs to a pen where they can be attended to regularly. Give each pig two tablespoonsful of castor oil in a half-cupful of warm milk as a drench immediately. About three hours after give each pig a mixture of one dessertspoonful of aromatic spirits of ammonia and ten drops of *mx vomica* (the chemist will make this up for you) in a small cupful of warm milk.

Compel the animals to take exercise; provide dry and warm, clean sleeping quarters, and treat the patients kindly for a few days. Give soft nourishing foods—milk, pollard, a bran mash, and similar foods.

Another remedy that has proved successful is as follows:—Give castor oil or olive oil as already advised, and an hour later give six drops of tincture of aconite each in a small quantity of warm water. Three hours later, if the patients have not recovered, give three drops of the same drug and repeat until four doses have been given; do not give more than four doses. Follow the instructions with regard to feeding and housing.

CONCRETE PIG TROUGH.

Concrete feeding troughs and concrete feeding floors for pigs have many advantages, though at first sight they may appear costly.

The concrete pig trough illustrated herein has recently been constructed at the Warren State Farm, *via* Rockhampton, and in forwarding particulars the manager, Mr. W. H. Beehtel, remarks:—

“A type of trough which has recently been constructed at this farm for use in the open for young stock is illustrated in the accompanying photograph.

“It will be noted that it features the combined trough and platform with outside filling, thus making for the ideal under open conditions.

“The trough itself is 14 ft. in length, with a width of 14 in. over all, having its sides of 2½ in. thickness reinforced with barb wire lengthways. It is 3½ in. deep at the top end with 4 in. at the lower end (inside measurement), with a width inside of 10 in., the sides on the outside being 6 in. above the platform.

“The platform is 2 ft. 6 in. in width, with a slight fall from the trough to the outside edge, being of from 3 in. to 4 in. in thickness.

“A protective flange all round of 3 in. by 1½ in. hardwood bolted together at the corners and at the centre makes for greater strength.”

Similar feeding troughs, but on a larger scale, are recommended for farmers having a number of pigs feeding from one trough, for breeders of stud pigs, and for farmers whose principal source of food is buttermilk or whey. Butchers who utilise soup and cooked meat will also find it to their advantage to provide concrete feeding floors and troughs on the lines indicated.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

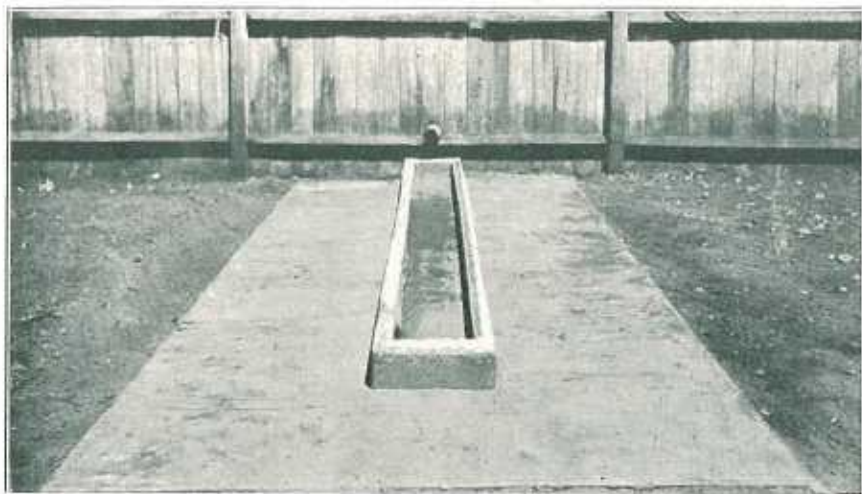


PLATE 136.—CONCRETE FEEDING TROUGH FOR PIGS AT THE STATE FARM, WARREN.

A SERVICEABLE BRUSH AND NETTING FENCE FOR PIGS.

The accompanying photograph will serve to illustrate a useful type of shelter and windbreak used in connection with the raising of pigs under paddock conditions at the Warren State Farm, Queensland. In appearance it is neat and attractive, and has proven economical and satisfactory in every way.

It will be noted that old netting is used, thus providing an economic use for this class of material.

The posts are placed 8 to 9 ft. apart, of 6-in. diameter, with holes bored 1 in. from the outside to admit of a top and middle No. 8 plain wire, with barb stapled on at ground line.

The netting is attached to the wires on both sides of the posts; and the space between is firmly filled with bush grass.

When completed, the fence requires no further attention other than an occasional fork of grass as the fence ages and the mass settles down; thus a useful and economical shelter brake is provided.



PLATE 137.—A USEFUL TYPE OF WINDBREAK AND SHELTER FOR DIVISION PIG RUNS AT THE STATE FARM, WARREN.

Fence is constructed with old 36 inch netting attached to 6 inch diameter posts placed 9 feet apart, top and middle wires 8, and barb at ground level; holes bored 1 inch from outsides of posts, thus making two rows of three wires. Bush hay is packed between the wires forming a dense firm fence.

"K" netting fences are both economical and serviceable, withal not unduly costly, but the brush and netting fence herein described certainly has many advantages. Pigs are not keen on forcing their way through a fence through which they cannot see; herein lies the special advantage of picket and paling fences; but if there is a crop of potatoes on the other side of the fence and but a "K" wire fence separating him from the "spuds" the pig will probably find his way through without much difficulty, "K" wire or no "K" wire. The netting and brush fence may be useful in this regard also.

It is at any rate a serviceable type of fence, and as suggested provides the means whereby netting—which might otherwise be discarded—can be put to economic use, even if only on the outside of the fence.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

PIG CRATES—CONVENIENT, ATTRACTIVE, AND SERVICEABLE.

The transport of stud pigs by horse-drawn or motor vehicle or by rail or steamer requires that they be comfortably accommodated in roomy crates, provided with ready means of entrance and exit and with a convenient food trough. The accompanying illustration serves to convey to the reader the care exercised and the provision made by Queensland State Farms and other Government institutions in the crating of stud pigs for transport purposes to all parts of the State. The illustrations are from Warren State Farm, where the manager (Mr. W. H. Beshtel) takes a special pride in providing for the comfort and speedy transport of stud stock *en route* to purchasers wherever they may be situated.

The excellent condition on arrival that is frequently specially mentioned by purchasers of stock from these farms, and the absence of any loss in transit is a testimony in itself to the methods adopted. It will be noted that large airy crates are built, fitted with sliding entrance door and roomy feed trough; the crate is covered with sound bagging protection for tropical conditions—a special feature where stock have often to remain in the open at wayside stations or be conveyed to the farm some miles distant.

It will also be noted that the crates are suitably stencilled with the particulars of the stock and the breeder's name and address, thus presenting a neat and attractive consignment which in itself cannot fail to attract attention.



PLATE 138.—A STACK OF PIG CRATES READY FOR DESPATCH AT THE STATE FARM, WARREN, Q.

Attention to all matters of detail counts much for success in matters associated with the breeding and sale of stud stock. The successful men are the ones to whom all this detail is a pleasure as well as a business. Nothing pleases a buyer more than to have his purchases arrive in an attractive condition, for the arrival of fresh stud stock invariably creates considerable interest among the farming community. The farmer who receives a stud boar or sow in good order and condition in a neat, attractive, stencilled crate, and who can take the pig's pedigree from his pocket-book and exhibit it for the benefit of his neighbours, is certainly doing not only himself but his district a good turn, for much depends upon the success of such purchases. If they are a success good business results; if they are a failure the stud pig business receives a rather hard bump.

It is up to breeders, therefore, to see to it that their stud stock go out to buyers in convenient, roomy utility crates—crates that can be made use of for other purposes than for the mere transport of pigs from station to station or from farm to farm.

Full details as to the size of crates, their approximate cost, &c., can be supplied on application to the Department of Agriculture and Stock, Brisbane, or the manager of the State Farm at Warren, *via* Rockhampton, or Kairi, on the Atherton Tableland.
—E. J. SHELTON, H.D.A., Instructor in Pig Raising.

THE MOTOR-CAR AS A PEST DISTRIBUTOR.

According to Dr. A. H. Clark, of the Smithsonian Institution, there are more than 600,000 different kinds of insects known and at least 3,000,000 more varieties unknown.

Insects make use of the motor-car as a means of annihilating distance, he points out. Just to the extent that insects are taking advantage of modern ways of transportation there is a corresponding danger to farm crops and ultimately the food supply of the country, he declares. The one-crop farmer, too, is ranked along with the motor-car as an agent in assisting in the spread and multiplication of insects—that is, insects find an unlimited supply of the right kind of food on a given acreage, and they thrive in an insect paradise.

"We live in a world replete with other forms of life competing with us for our food supply, and even striving to consume the very substance of our bodies," stated Dr. Clark, warning of the impending struggle between mankind and his natural foes. He further declared—

"Our chief competitors are the insects of which more than 600,000 kinds are known, and vastly more remain to be made known. In growing the crop and stock by which we live our farmers spend their lives in constant costly warfare with the insects. The number of people who could be fed by the wheat or maize or other grain destroyed by insects or clothed by the cotton or wool lost every year through insect depredations is a vast one.

"The vast improvement in the means of transportation, especially by automobiles, has in recent years greatly increased our danger from the insects through providing them with an easy means of travelling from one place to another quite unnoticed, hidden in produce or in merchandise. Besides this, the common practice of planting large areas with a single kind of crop year after year greatly assists the insects in their efforts to destroy it. They now find an immense supply of just the right kind of food provided for them, and are enabled to increase accordingly. By far the worst enemies of any insect are other insects of predaceous or parasitic types.

"To indicate the extreme complexity of the insects' war upon each other, Dr. Clark points out that the parasites that destroy a certain caterpillar are themselves preyed upon within the bodies of the caterpillars by other parasites which by destroying them serve to protect and to perpetuate the harmful sorts.

"A study of entomology is a vast web of interwoven facts full of incongruities and apparent contradiction almost too vast for human comprehension," states Dr. Clark. To illustrate this he cites the case of the cabbage butterflies, which as caterpillars feed wholly upon large and ferocious ants. Ants are perhaps the most inveterate destroyers of the eggs and very young of nearly all the butterflies, yet no ant will ever hurt the eggs of any of the kinds of butterflies that feed on them.

FIELD PEAS AND COW PEAS AS PIG FOOD.

Illustration (Fig. No. 1) is of a heavy crop of cowpeas and Fig. 2 of a handy method of conveying the vine hay to the pig runs for feed purposes. Both field peas and cowpeas provide a useful class of food for pigs of all ages, the field pea for preference where both pods and vines are to be used, and the cowpea for grain, as pigs are not as partial to cowpea hay as they are to that resulting from field peas.

The illustrations are from Warren State Farm, the manager (Mr. W. H. Bechtel) remarking that these crops have provided excellent grazing and also, where grown in distant paddocks, supply an excellent hay and grain food for the pigs.

The method of utilising the vines as illustrated in fig. 2 appeals to one, as it illustrates a very convenient method of conveying the vine hay to the pigs in their runs, the slide providing for convenient loading and also permitting of the pigs doing their own unloading, the slide being left in the paddock till next day, when it will be found to be ready for a refill. By using several of these slides where a number of stock in different paddocks are kept, rapid feeding is carried out and the labour in handling same considerably lightened.

It is labour-saving appliances of this description that enable one man to handle a very much larger number of pigs than would be possible under other circumstances, and incidentally the stock are all the better for having to work for their living in doing part of the harvesting.—E. J. SHELTON, H.D.A., Instructor in Pig Raising.



PLATE 139 (Fig. 1).—A HEAVY CROP OF COW PEAS AT THE STATE FARM, WARREN, QUEENSLAND.



PLATE 140 (FIG. 2).—HANDY METHOD OF FEEDING OUT COW PEAS TO THE PIGS.

AGRICULTURAL ORGANISATION.**NEW MEASURE PROCLAIMED.**

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) stated recently that the Governor in Council had approved of the Proclamation fixing the 1st December, 1926, as the day on which the Primary Producers' Organisation and Marketing Act, which was passed in the late session of Parliament, should come into operation. As an outcome of this, the Primary Producers' Organisation Acts are automatically repealed, and further consequences arising out of the repeal of those Acts are—

The Council of Agriculture and District Councils constituted under the old Acts are dissolved; all the assets and liabilities of the old Council and District Councils are transferred to the new Council of Agriculture constituted under the Primary Producers' Organisation and Marketing Act of 1926.

In order to provide the necessary machinery for the transfer, regulations have been issued, and these provide—

The final meeting of all District Councils and of the Atherton Tableland Agricultural Advisory Board should be held not later than the 30th November, 1926.

Each District Council of Agriculture and the Atherton Tableland Agricultural Advisory Board must prepare a statement of its income and expenditure up to the 30th November, 1926, and lodge same with the Council of Agriculture, Brisbane, not later than the 31st December, 1926, together with any money that they may have to their credit. The District Councils shall not disburse any money in their possession on the 30th November 1926, after that date.

The accounts of the District Councils shall all be audited by the Auditor-General.

In order to permit of the winding-up of the affairs of the different bodies, the secretary of each of them shall be retained as an officer of the Council of Agriculture until the 31st December, 1926. Books and correspondence belonging to the dissolved District Councils shall be handed over to the Council of Agriculture. All the money handed over by the District Councils shall be placed to the credit of the Queensland Producers' Fund.

The new Council of Agriculture shall consist of thirteen members, and on the 11th December, 1926, there shall be convened meetings of the following commodity boards:—Wheat Board, Queensland Cane Growers' Council, Committee of Direction, Cheese Board, Butter Board, Egg Board, Cotton Board, Peanut Board, Canary Seed Board, Atherton Tableland Maize Board, Northern Pig Board, Arrowroot Board, and the Broom Millet Board. At each of these meetings in question, elected representatives of the primary producers only shall be eligible for nomination and to vote on the election of a representative to the Council of Agriculture when a new commodity board is elected. The persons elected by the commodity boards to sit on the Council of Agriculture shall hold office for the period of the tenure of the office of the commodity board which elected them. The representative of that board to the Council of Agriculture shall be considered as having vacated his office, and it shall be the duty of the newly elected board to at once elect a representative to the Council of Agriculture. The retiring member shall be eligible for re-election.

The first meeting of the Council of Agriculture shall be held at the chambers of the Council of Agriculture, Brisbane, on Wednesday morning, the 15th December, 1926.

The existing levy regulations under the Primary Producers' Organisation Acts shall remain in force until the 31st December, 1926, even if the moneys in respect of the primary produce so sold or supplied are not available on the 31st December. Levies due for the period ended the 31st December, 1926, shall be collected by means of stamps, which have to be purchased not later than the 15th January, 1927. Every person authorised to sell levy stamps or collect levies must, not later than the 31st January, 1927, lodge with the Council a full statement of stamp transactions, together with money due thereon and unsold stamps on hand. The accounts shall be examined by the Auditor-General, and the unsold stamps shall be disposed of as directed by the Auditor-General.

The particular levies made for the purpose of the sugar industry shall remain in force until the 31st December, 1926.

Time is given to the 28th February, 1927, to permit of the winding-up of the affairs of the Queensland Producers' Association Fund, established under the old Acts. Provision is made for the establishment of a new Queensland Producers' Association Fund under the new Act.

Answers to Correspondents.

Fertilising of Pineapples.

C.E.W. (Wamuran)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises that the application of 6½ cwt. of fertiliser mixture should be a liberal supply for a year, which, of course, depends entirely on the growth the pines make. In favourable seasons and good cultivation, a yearly application of about 6 cwt. per acre should be found profitable.

Sulphate of potash and meatworks fertiliser can be kept mixed for years, and actually improves on keeping, and keep just as well as unmixed, as long as they are kept dry under shelter.

Sugar Banana Stalks—Their Stock Food Value.

R.L. (Gympie)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises that banana stalks, chopped up, are a very valuable feed for dairy stock. Molasses may be sprinkled on the "chop chop" before feeding. Some concentrates like bran, cotton-seed meal, &c., may also be added to make food more nutritious.

BOTANY.

African Box Thorn.

"INQUIRER" (Coomera)—

The African Box Thorn is a shrub of 6 to 8 feet, of rather irregular growth; the leaves are somewhat fleshy, small, and light green. The flowers are small bell-shaped, white, with a few lavender streaks or dots. The fruits are bright scarlet berries about the size of a large pea. The plant is very abundant as a naturalised weed around some inland and Darling Downs towns such as Warwick, Roma, &c., but is rarely seen on the coast. So far as Mr. White knows, the plant is not growing in the Coomera district, but there may be a stray plant or two in old gardens. It was introduced originally as a hedge plant.

Plants Identified.

J.L.T. (Atherton)—

The tree with large leaves and yellow flowers is *Diplanthera tetraphylla*, a native of North Queensland and the open forest country of Papua. It is fairly common, but Mr. White has never heard a local name applied to it. The shrub with small, narrow leaves is *Siebertia valida*, of the family *Umbellifera*. We have not heard a common name applied to it. Another species of *Siebertia* is common on Fraser Island, where it is known as Carrot Bush. Horses are said to be very fond of it. Other specimens were very fragmentary. As far as the material allows, determinations are as follows:—

A. *Evodia accedens*? Mr. White thinks that this is one of the trees recorded in the "Queensland Flora" as *E. accedens*, but it is thought that several species have previously been included under this name. All our material was sent to Kew for revision recently.

B. *Ficus Watkissiana*? Would like to see a twig with ripe fruits attached to verify. The fruit you send is immature.

C. Could you not send leaves and a few more fruits?

D. *Acacia Baileyana*. The cause of non-flowering is climatic. The tree flowers splendidly on the Downs, and is a wonderful sight in flower, but about Brisbane and on the coast generally the flowers fall off in bud. The species does best in a fairly cold, dry climate. For purposes of determination, it is much more necessary to have good material of Northern trees than of Southern, as the latter are so much better known.

Cassia ("Yellow Pea.")

"INQUIRER" (Brisbane)—

The specimen forwarded from Roma is *Cassia neurophylla*, a shrub very common this time of the year in parts of the Maranoa and Warrego districts. It also occurs in Western New South Wales, and a form slightly different is found in parts of Western Australia. The only popular name we have ever heard applied to it is "Yellow Pea," a name given to several similar plants in Australia. It is, practically speaking, never touched by stock, and its properties are not known. It belongs to the same genus as the "Sennas" (senna-leaves), and from this and from feeding tests with allied plants one would suppose it to act as a purgative if eaten by stock.

"Russian Knap Weed," or "Hard Heads."

A.B.C. (Clifton)—

The specimen proved to be *Centaurea pteris*, the "Russian Knap Weed" or "Hard Heads." This plant has for some years past been naturalised as a weed in New South Wales and Victoria, and now and again appears on the Darling Downs, probably being brought in by imported fodder. It has proved to be difficult of eradication in cultivation paddocks. It is not known to possess any particular properties harmful or otherwise.

"Quinine" or "Native Cinchona."

C.O. (Yarraman Creek)—

The specimen is the so-called "Quinine" or "Native Cinchona." It suckers very freely from the base, and on this account is regarded as a weed in some places. The bark is a valuable tonic and is official in the British Pharmacopoeia, but the price is very low and the demand limited. A decoction is used sometimes as a tick wash. Further particulars about the tree will be found in the reprint from this Journal which has been forwarded.

THE EXPORT BUTTER MARKET.

In their thirty-second annual review of the imported dairy produce trade Messrs. W. Weddel and Co., Limited, in reporting upon the year ended 30th June, 1926, state that, although the average prices of the various descriptions of butter were mostly lower than in 1924-25, they were still 60 per cent. above the pre-war level. As regards cheese, it is estimated that nearly 30,000 tons, or 45 per cent. of the season's make of New Zealand cheese, was sold forward at prices which averaged the equivalent of 100s. c.i.f., whereas the market value of the goods after arrival, except in the first few weeks, was well under 100s. c.i.f.

The total importations of butter into the United Kingdom were less than the record figures of the previous year, owing to a reduction in the Australian and New Zealand outputs. Denmark and Argentina sent slightly more. Russia sent 14,148 tons, or 4,000 tons less, due to diversion to temporarily high European markets. The total Empire arrivals were 99,884 tons, total foreign 157,077 tons, grand total 256,961 tons, as against 277,898 tons in 1925.

Cheese.—Canada, with 61,863 tons, showed 5,000 increase, as against the 5,000 decrease for New Zealand, which sent 66,953 tons. Total British cheese consignments were 131,691 tons, foreign 19,829 tons, grand total 151,520 tons, as against 149,362 tons in 1925.

The following table of annual average prices for butter, which appears in Messrs. Weddel's review, are instructive:—

AVERAGE WHOLESALE LONDON TOP PRICES OF CHOICEST SALT BUTTER, PER CWT.

For Year ending 30th June.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Danish	207 8	.. ..	.. ..	.. ..	290 5	214 3	291 10	198 11	214 5	197 10
New Zealand ..	200 4	252 0	248 5	271 11	289 5	190 4	191 10	186 0	189 7	187 8
Australia	197 10	.. ..	.. ..	.. ..	285 8	175 9	184 11	177 3	180 8	182 2
Argentine (unsalted)	.. ..	.. ..	.. ..	.. ..	.. ..	160 3	181 1	166 10	182 0	170 2
Russian .. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	165 8

Speaking of Argentine butter production, Messrs. Weddel says: "Although last year's shipments were heavier than in the preceding year, the actual production of butter in the Argentine Republic showed a distinct shrinkage, which is very difficult to account for, in view of the fact that climatic conditions during the whole year were entirely favourable for production. It is estimated that the local consumption of butter last year was reduced by about 30 per cent., partly due to the increased use of edible oils, the importation of which was encouraged by legislation. Another factor which may have had some bearing upon the reduced production of butter is the higher prices ruling for beef cattle during the past year or so. While cattle prices were low a large number of people turned over from beef fattening to dairy farming; but now that cattle-raising has again become profitable, no doubt many of the farmers have abandoned their attempts at dairy farming in order to resume the business they understand so well."

HANDLING AND MARKETING OF EGGS.

By P. RUMBALL, Poultry Instructor.

Improvement in the laying characteristics of poultry, correct methods of feeding, and general efficient management are features necessary for the profitable production of eggs, and they are features to which a great number of producers give attention. However, if poultry raisers do not follow up economic production with economic marketing, their efforts are to a large extent wasted. The perishable nature of eggs demands attention by both producer and merchant. This attention is frequently not shown by either party, and this negligence is definitely responsible for the wide range of prices between eggs of similar size. It is also one of the principal reasons for the establishment of extensive co-operative agencies for the sale of eggs not only in Australia, but throughout the world. In order to market eggs in the best of condition, individual as well as collective effort is required—individual effort in the direction of producing an article desired by the buying public, and collective effort in the direction of shipment, storage, and general marketing. In the following pages Mr. Rumball has elaborated these points very interestingly and informatively, and his useful contribution will be welcomed by our poultry-raising readers.—Ed.

The greatest enemy of the poultry industry is the rotten egg. It has been with the industry since fowls were domesticated, and will remain to a limited degree always, but a great improvement is possible. Many producers recognise the importance of quality, but there is a large body of producers who, if they think of the subject at all, give it little or no attention. The importance of quality should be effectively and forcefully illustrated by the disparity in the returns received by various growers. When first quality eggs are realising 3s. per dozen, it is possible to obtain inferior eggs of the same size for 2s. or under, and again in the warmer months when prices are not so high, there is a range of 10d. to 1s. 6d. for eggs of the same size. These eggs when laid had the same quality, but by errors or mismanagement on the part of the producer or country storekeeper or merchant were reduced to two-thirds of their original value, and in some cases even less.

Egg Standards.

In fixing any standard in respect to the size and quality of egg content, the consumer must play an important part, and producers should strive to fulfil his requirements. We have definite knowledge that overseas markets require an egg of about 2 oz., the minimum weight being shipped from Queensland at present being 1½ oz.; but are eggs of this weight packed for local sales? Some poultry raisers do grade their eggs with this minimum, but others again put in as many small eggs as possible in their first pack. No definite buying or selling grades exist for Queensland at present, but, as the development of the poultry industry is dependent upon overseas markets, by reason of the fact that this is the only avenue available for the lifting of our surpluses, the minimum weights of eggs being exported could be taken as a standard for our first local grade. The following grades are therefore suggested as a guide to producers:—

First grade—Eggs 1½ oz. and over; clean, sound, free from blood clots, rings, rots, &c., and air space no larger than $\frac{3}{16}$ of an inch.

Second grade—Eggs 1½ to 1¾ oz.; content same as above.

Pullet eggs—All under 1½ oz.; content same as above.

Third grade—Any stale egg—that is, eggs having an enlarged air space, but free from germ development, rots, &c.

It will be seen that the breeder has two particular features to continually bear in mind—namely, size and quality of egg content.

Size of Egg.—The size of egg is chiefly controlled by selection of the breeding stock. Pullets at the beginning of their laying period produce small eggs, but as the birds age the egg improves in size. Size of egg being an inherited feature, the breeder should only use eggs for incubation purposes which conform to the standard of the first grade, and only use cockerels that are the progeny of parents (particularly the dam) which come from layers of large eggs. In fact, in selection for size of egg it would be better to select future breeding stock for this quality during

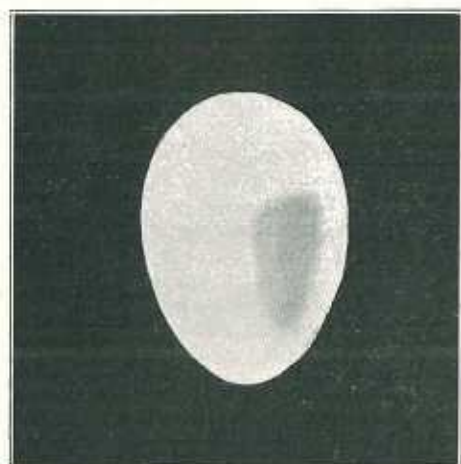


PLATE 141 (Fig. 1).—A NEW LAID EGG.

This should be nearly transparent only showing a slight cloudiness, the outline of the yolk, and a very minute air cell.



PLATE 142 (Fig 2).—A STALE EGG.

Here the large air cell is noticed, as is also the cloudiness caused by the yolk.

their pullet year, and enhance the possibility of having stock that will lay a standard size egg early in their pullet life, and so bring the production of small eggs down to a minimum.

Colour and Quality of Eggshell.—Colour of shell is of little account in Queensland. Some countries are credited with likes and dislikes, but, as the great majority of our produce has to be sold on the local market, no consideration need be given the feature of colour. We are, however, concerned with the cleanliness and quality of eggshell.

Dirty Eggs.—There are three principal causes for these—(1) adherence of excreta and dirt from the feet of the birds; (2) stains from damp straw or grass in the nests; and (3) eggs which become smeared with the egg content from eggs broken in transit.

Eggs to which excreta adheres or which are soiled by the feet of the birds on a well-conducted farm are not serious, and if cleaned daily after collecting very little damage to the egg content is caused. In the cleaning process, however, do not soak the eggs in water. The washing of the egg not only removes the natural glossy appearance, but opens up the pores of the shell, making entrance for bacteria easy. Gently wipe them with a clean cloth, and if numerous market them as washed eggs.

The farmer is to blame for eggs which become stained from damp nesting or packing material, and for reasons that will be given later should carefully guard against this condition.

Thin-shelled eggs are liable to crack in handling or become broken in transit, with the result that the egg content soils the adjoining eggs and fillers and so detracts from their appearance and causes the growth of bacteria, &c., when they are retained in the egg case for any time. Overfat hens and the lack of eggshell forming material in the form of shell grit are the two principal causes of thin-shelled eggs, and the remedy is evident. There are, however, birds which consistently lay thin-shelled eggs, and when it is possible to trace them they should be disposed of. The shape of the egg is not of major importance, but a uniform product is desirable, consequently uniform shaped eggs should be used for incubation.

Quality of Egg Content.—Freshness is a desirable quality. It is generally conceded that eggs which are perfectly fresh and the produce of well-fed hens are of the finest flavour. The age of an egg, however, is only one factor that affects quality. Under proper methods of cold storage eggs can be kept for many months, and it would be impossible for the consumer to distinguish them from new-laid eggs by taste. The objectionable changes in quality that do take place are principally the partial development of the embryo, its death and ultimate decay, to rot caused by development of bacteria or mould in the albumen, absorption of odours, blood clots, and evaporation of egg content, &c.

In order to determine the internal quality of the egg, the process of candling is necessary. This is a simple process and one that could be practised by the average farmer with advantage to himself and the industry in general. The process of candling is a simple one, the operator becoming more efficient with practice. All eggs exported overseas are subjected to the process, and it is due to these conditions that Queensland eggs in England are being viewed with favour and are commanding a price equal to the Danish egg.

Candling may be done during the day, using the sun as a light, or at night with the aid of a kerosene lamp. The majority of farmers would find it most convenient, however, to do the work during the evening. Many devices may be made to facilitate the work, such as the cutting out of the top and bottom of a kerosene tin, making a hole in its side about the size and shape of an egg, placing it over a lamp so that the hole is on about the same level as the flame of the lamp. A more simple method is to have a piece of cardboard about 6 in. square with an egg-shaped hole in the middle, and a lamp. This cardboard is then held between the egg and the lamp, the egg touching all round the hole in the cardboard. The light will then show the transparency or otherwise of the egg and the size of the air cell.

Fig. 1 shows a new-laid egg. This is practically transparent, the yolk being hardly visible and the air cell practically imperceptible. As the egg increases in age, the air cell becomes enlarged and the yolk very pronounced.

Fig. 2 illustrates a stale egg; the size of the air cell and the cloudy yolk are very pronounced. The yolk of this egg when it is broken for frying or poaching is very flat, while that of the egg illustrated in fig. 1 stands up well.



PLATE 143 (Fig. 3).—A ROTTEN EGG.

Caused probably by the partial development of the embryo, its death and ultimate decay.



PLATE 144 (Fig. 4).—A TYPICAL CASE OF ROT CAUSED BY THE GROWTH OF A MOULD.

Stained eggs, where the stain has been caused through damp nests, packing material, &c., even if unfertile, are frequently found to be in this condition.

Fig. 3 illustrates an extremely bad egg, but one which unfortunately frequently finds its way to market. In this egg the air cell has broken, and the content readily flows from one end to the other.

Fig. 4 is a typical case of rot caused through the growth of bacteria or mould in the white of the egg. Dirty nests and poultry houses and damp packing material are largely responsible.

Packing and Storing.

Although producers give every attention to the production of good eggs, their efforts can largely be undermined by improper packing for market and storage on the farm.

Packing.—This needs to be of the most simple kind, and this is supplied when strawboard fillers and cases are used as illustrated in fig. 5. This case, it will be noted, is partitioned into two sections, there being five layers of fillers, each containing six dozen eggs or three dozen each side of the partition. On the bottom of the case a cushion of wood wool is placed, similar to that shown lying on the lid, and



PLATE 145 (Fig. 5).—AN ILLUSTRATION OF A 30-DOZEN EGG CASE.

another pad is placed in the middle of the case. This packing makes the cases firm and prevents to a large extent severe jars, but at the same time additional safeguard is provided by the placing at each end of the case a cleat of wood to facilitate handling. Even although the case is specially built for the transport of eggs, the ends have been bound by a narrow strip of hoop iron as a protection against the timber splitting and the natural consequence.

In Queensland kerosene and petrol cases are largely used on account of the ease with which they may be obtained. Kerosene cases should be avoided on account of odour of kerosene hanging to the case and the case with which eggs acquire foreign odours. Petrol cases, however, are excellent for the purpose of packing eggs, being free from objectionable odours and much stronger than the kerosene case. These cases should have a small cleat nailed at each end to facilitate handling and to guard against breakages.

Storing.—Eggs have to be held for several days on the farm, and they should be kept in a cool place, free from an excessive air circulation, but the air supply should be at the same time sweet and pure. They should not be stored with any provender having a decided odour, such as onions, kerosene, vegetables, &c., and even though a cool place is desirable to prevent the evaporation of the egg content, yet evaporation is more desirable than foreign flavours.

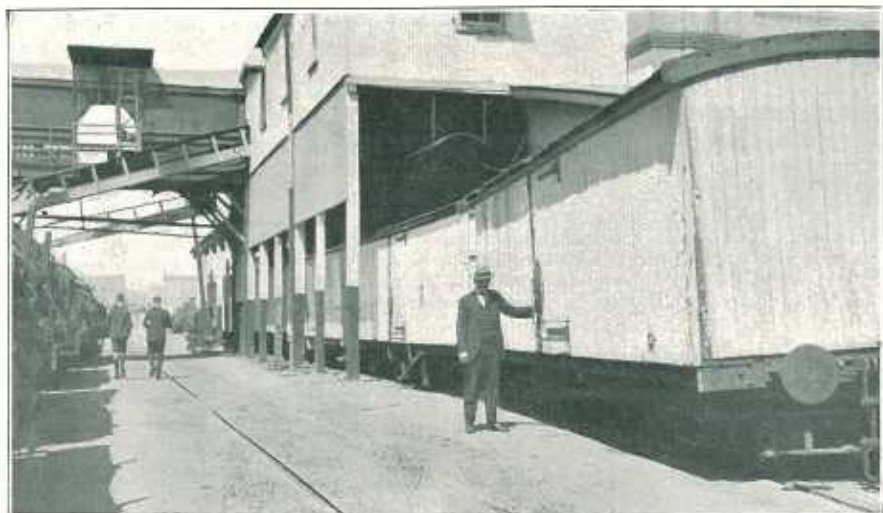


PLATE 146 (Fig. 6).—TRAIN OF SPECIALLY INSULATED TRUCKS LOADED WITH EGGS AT COLD STORE FOR DESPATCH BY S.S. "JERVIS BAY."

This consignment was packed by the Queensland Egg Board under Government supervision.



PLATE 147 (Fig. 7).—EGGS BEING TRANSFERRED FROM TRAIN TO SHIP. These eggs were packed under Government supervision by the Queensland Egg Board.

Regular Marketing Essential.—In winter producers should forward their eggs to market at least once a week, and during the warm months at least twice, although more frequent shipments are preferred.

On farms where poultry are kept as an adjunct to general farming operations, the number of eggs gathered in two or three days is generally insufficient to fill a case, with the result that they are allowed to accumulate for a week or more, with the consequent loss in quality, or they are traded to the local storekeeper for groceries, who invariably keeps them for another week, thus lowering the quality of the egg to a greater extent.

Many people are inclined to blame the storekeeper for the low price they receive for their eggs. They, as a general rule, are accustomed to handle eggs of doubtful quality and cannot afford to take the risk of paying good prices. The way out is in the hands of the producers. They should combine together for the purpose of collectively forwarding their eggs at regular intervals. The usual procedure is to form an egg circle or an association.

Egg circles are not new. They have been in operation in Queensland for many years, and producers in various districts are experiencing their advantages and would not go back to the old system of individual shipment to market or trading their eggs with the local storekeeper for groceries.

It costs nothing to form a circle. Neighbours merely combine for the purpose of collective marketing, and even if you are not enamoured with the idea, give it a trial and compare the resulting prices received under this system with the prices you have received at other similar periods. The writer feels confident that when once a circle has been established it will be continued.

The Results of the Correct Handling of Eggs.—During the glut season the Queensland Egg Board has been able to export 2,268,000 eggs overseas and many thousand dozen interstate. This is only possible when eggs have been handled correctly by the farmer. This has opened up a market which will absorb more than we can produce, but they have to be eggs of quality; and while we maintain this feature not only will overseas and interstate markets be available, but the increased confidence of the buying public will increase the demand locally. Fig. 6 shows a special trainload of eggs leaving the cold stores for the wharf, while fig. 7 shows the same eggs being transferred from train to boat.

Essential Features to Remember to Ensure the Satisfactory Marketing of Eggs.—

1. Breed from hens that produce not only a goodly number of eggs, but eggs of moderately large size (weighing 2 oz. each on an average).
2. Good housing, regular feeding and watering, and, above all, clean, dry nests.
3. Daily gathering of eggs, and, when the temperature is above 80 degrees, gathering twice a day.
4. The confining of all broody hens as soon as discovered.
5. The rejection as doubtful of all eggs found in a nest that was not visited the previous day. Such eggs should be used at home, where each may be broken separately.
6. The placing of all summer eggs, as soon as gathered, in the coolest place available.
7. The prevention at all times of moisture in any form coming in contact with the eggshells.
8. The disposal of young cockerels before they begin to annoy the hens. Also the selling or confining of old male birds from the time hatching is over until cool weather in fall.
9. The using of cracked and dirty as well as small eggs at home. Such eggs, if consumed when fresh, are perfectly wholesome, but when marketed are discriminated against and are likely to become an entire loss.
10. The marketing of all eggs at least once a week, and oftener when convenience allows.
11. Keeping eggs as cool and dry as possible while on the way to town and while in country stores.
12. Keeping eggs away from musty cellars or bad odours.
13. The use of strong, clean cases and good fillers.
14. The shipping of eggs to the final market at least once a week and as much oftener as possible.

General Notes.

A Central Queensland Sanctuary.

Toorilla Plains, the property of Messrs. Rogers and Sons, in the Rockhampton district, has been declared a sanctuary for animals and birds.

Sheep Pest Nomenclature.

Regulation 47 under the Diseases in Stock Act with reference to sheep tick has been cancelled, and in lieu thereof a new regulation has been approved declaring that "sheep louse" means the louse known as *Trichodectes sphacrocephalus*, *Linognathus setosus*, or any other sheep louse, and "sheep tick" means the insect (tick) known as

The Committee of Direction of Fruit Marketing.

The Minister for Agriculture and Stock, the Hon. W. Forgan Smith, has received a petition asking that a referendum be conducted to decide upon the continuance or otherwise of the Committee of Direction after 31st December, 1926.

Staff Changes and Appointments.

Department of Agriculture and Stock,
Brisbane, 11th November, 1926.

Mr. C. M. Rogers, of Stanage Bay, Toorilla Plains, Rockhampton, has been appointed an Officer under and for the purposes of the Animals and Birds Acts.

Mr. J. C. Pryde has been appointed Slaughtering Inspector, Warwick, as from the 13th December to the 8th January, 1927.

Messrs. L. E. Andersen, D. F. Keith, and H. L. Pentecost, Herd Testers, have been appointed also Inspectors under the Dairy Produce Act.

Mr. H. A. O'Donnell, of the Customs and Excise Office, Maryborough, has been appointed Inspector, Diseases in Plants Acts, vice Mr. K. H. Ingham, transferred.

Mr. Thos. Toms, of The Nest, Maryvale, via Warwick, has been appointed an Acting Inspector of Stock.

Importation of Cotton Seed.

The Minister for Agriculture and Stock (Hon. W. Forgan Smith) has informed the Press that his attention had been called to a reference made in the daily Press to the importation of cotton seed into Queensland and to the possible risk of introduction by this means of insect pests.

The Minister stated that the cotton seed imported was subject to the provisions of the Quarantine Act (Plants) administered by the Federal Government. The cotton seed was imported on behalf of the British Australian Cotton Association from Africa, and was inspected upon arrival at Pinkenba. The preliminary examination at the wharf revealed that the cotton seed was clean, and apparently free from disease, and consequently permission was given to the Association to hold the seed in bond for the purpose of its being removed to Whinstanes for treatment there for the purpose of extracting the oil and the manufacture of cotton seed meal. The imported seed is not to be mixed with other cotton seed at Whinstanes, and the processes to which the seed is subjected in the recovery of the oil and the manufacture of cotton seed meal are such as will remove all possibilities of insect or germ life surviving. The cotton seed arrived in sacks, and the sack containers are being treated by heat before being allowed to be again used. These safeguards and a general compliance with the requirements of the Quarantine Act and Regulations are considered to be ample to fully protect the cotton industry in this State.

The imported cotton seed will not be allowed, under any circumstances, to be used for planting purposes. All cotton seed intended for plant purposes is under the control of the Department of Agriculture, and by virtue of the provisions of the Cotton Industry Acts Amendment Act of the present session all seed cotton is subjected to treatment under the supervision of officers of this Department. The treatment to which the cotton seed is subjected removes all possibility of the seed being a medium for the distribution of disease or pests to the farms where cotton is grown.

The Journal Appreciated.

We desire to acknowledge the many letters of appreciation which we have received from different parts of Queensland, other States, and from overseas. The Journal's circulation is extending, and our aim is to produce a publication of all-round usefulness to the man on the land. While we do not mind a pat on the back occasionally—it helps to oil the wheels of this old workaday world—we also welcome, just as cordially, practical suggestions and constructive criticism from our farmer readers.

The Royal Society of Queensland.

At the last ordinary monthly meeting of the Society at the University the President, Dr. J. V. Duhig, M.B., was in the chair.

Mr. J. Legg, B.Sc., M.R.C.V.S., and Rev. W. P. H. Hubbard were proposed as ordinary members.

The reports of the Society's delegates (Mr. E. W. Bick and Dr. F. W. Whitehouse) to the Perth meeting of the Australasian Association for the Advancement of Science were submitted. On the motion of Prof. Richards, seconded by Dr. E. O. Marks, a vote of thanks to the delegates was passed, and it was suggested that an account of the organisation of the Perth meeting might be helpful in making arrangements for the Brisbane meeting.

Prof. H. C. Richards exhibited a sample of fossil wood from the Petrified Forest, California, presented to the Geology Department of the University by His Grace Archbishop Duhig.

Mr. H. A. Longman exhibited photographs of aboriginal rock carvings on the flat sandstone bed of a creek about 62 miles from Hughenden. The photographs were presented to the Queensland Museum by Mr. J. R. Trundle, of Hughenden.

A paper by Mr. James Groves entitled "A New Species of *Nitella* from South Queensland" was communicated by Mr. C. T. White. *Nitella phauloteles*, the new species, is described. It was collected in the neighbourhood of Brisbane by Mr. E. W. Buhot.

Mr. C. T. White read a paper by himself and Mr. W. D. Francis entitled "Plants Collected in Papua by C. E. Lane-Poole." Mr. White outlined some of the general features of the flora of Papua. In the paper the following new species are described:—*Cyathacalyx polycarpum*, *Albizzia fulca*, *Plindersia macrocarpa*, *Dysoxylum fissum*, *Aglais obliqua*, *Elaeocarpus comatus*, *Columbia aequilateralis*, *Pterocymbium stipitatum*, *Wormia quercifolia*, *Saurauja plurilocularis*, *Saurauja callium*, *Saurauja Poolei*, *Terminalia foveolata*, *Terminalia catappoides*, *Poikilogyne setosa*, *Sideroxylon anteridiferum*, *Achradotyphus benefici*, *Symplocos aggregata*, *Gmelina seastilis*, and *Olearia veranoides*. Messrs. D. A. Herbert and J. E. Young commented upon the paper.

Fruit Fly—Poison Spray as a Means of Control.

While the regular collection and destruction of infested fruit must be regarded as the chief means of checking fruit fly, in an extensive field trial carried out by the Entomological Branch of the New South Wales Department of Agriculture last season the use of a poison spray resulted in a very appreciable reduction in fly-infested fruit. The trials will have to be continued over several seasons before it can be definitely stated how useful this poison bait should prove in assisting in the control of fruit fly, but growers are recommended to give it a trial.

The formula of the spray recommended is as follows:—Juice of one dozen oranges or eighteen peaches (rejects), 4 lb. molasses, 8 oz. arsenate of lead paste or 5 oz. of arsenate of lead powder; water sufficient to make up to 4 gallons.

The spray is usually applied to the foliage, at the rate of 3 or 4 oz. only per tree, by some suitable spray apparatus or syringe, not spraying the whole tree but just applying the mixture in patches, care being taken, especially with peaches, to avoid the fruit, to which the spray is likely to adhere and on which it is likely to show. The earlier the spraying is commenced before the fruit ripens the better; that is, it is better to commence seven or eight weeks before the fruit is pulled, but spraying four or five weeks before ripening is valuable. A fresh application should be made every seven days. This means, therefore, at least four applications, but preferably six, and if rain occurs after the spray has been applied a fresh application will have to be made.

In recommending a trial of this bait it is not in any way suggested that the regular collection and destruction of infested fruit should cease. This will remain the chief method of reducing the infestation of fruit fly. It is hoped, however, that baiting will prove a good auxiliary method.

Concentrated Orange Juice.

One of the aids to the disposal of the Californian citrus crop is the preparation and sale of pure concentrated orange juice. This is put up by the California Fruit Growers' Exchange, and is sold under the name of "Califorange." This concentrate is claimed by the manufacturers to be entirely free from artificial preservative or colouring matter, and is said to be in great demand not only by the manufacturers of soft drinks and the catering trade, but also by those interested in medical institutions. The product is said to be extremely well regarded in America, and on account of its high vitamin potency and its food value, is being supplied to a number of hospitals in that country and in Europe. After the extraction of the juice from the oranges it is passed immediately into specially designed glass-enamelled vacuum pans, where it is concentrated at a temperature of 98 deg. Fahr., or just about the normal temperature of the human body. In this way it is claimed to be able to carry the concentration to a point, about 7 to 1 by volume, where the juice is preserved in its own natural sugar, without injury to flavour or vitamin content. The concentrate is then drawn off direct from the vacuum pans into carefully

SUBSCRIPTIONS TO THE JOURNAL.

Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.

To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.

Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

sterilised glass jars which are immediately closed with a sterilised cork and cap. During concentration all traces of orange oil, derived from the peel in the process of extraction of the juice, is removed. In order to standardise the sweetness of the orange juice pure sugar is sometimes added. One Imperial gallon of the concentrated juice is said to contain the juice of about 750 oranges and is equivalent to about seven gallons of raw juice. It is claimed by the manufacturers that independent experiment and research by well-known authorities, both in the United States and elsewhere, have established the fact that the well-known vitamin potency of orange juice is not effected by the process of concentration.

It has been suggested that a food product made from Australian oranges might find a ready market in the outback districts of Australia where ordinary antiscorbutic food is not easily procurable. It is believed that the American manufacturers are investigating the possibilities of the Australian market for their product. The other by-products of the American citrus industry are oil of sweet orange, lemon oil, citric acid, pectin, &c.

Some Notes on Wine-making.

Wine-making was such a complex and scientific subject, confessed Mr. Audrey H. Wilkinson at a recent conference of the New South Wales Agricultural Bureau, that he would only attempt to outline it on such an occasion. The last twenty years had seen remarkable progress in the manufacture and maturing and general treatment of Australian wines.

To begin with, a yeast culture should be made by picking ripe grapes which were as nearly perfect as possible, crushing them (minus the stalks) into a perfectly clean, sterilised, wooden tub or small vat and allowing them to ferment. If this was done a few days before vintage started the culture should be fermenting vigorously by the time it was required to start fermentation in the first vat, and could then be carried on from vat to vat throughout the vintage. In many grapes the varying sugar content at the time of picking was responsible for producing different types of wines. For instance, the Hermitage or Black Shiraz grape, picked with 18 to 21 per cent. of sugar by Keen's saccharometer, would make a light claret; with 22 to 25 per cent. of sugar a Burgundy; and with 26 per cent. or more of sugar the wine would be fortified and made into a port.

Absolute cleanliness by daily sterilising of all utensils was essential. Also, the control of fermentation was of vital importance, as when a vat became over-heated lactic acid was likely to appear, in which case the wine would be only fit for distillation. Up to date wine-makers used a thermometer on each vat at least once daily. When the temperature reached 90 degrees Fahrenheit and showed signs of rising higher the fermentation should be checked by the addition of metabisulphite of potassium in the proportion of 1 oz. to 100 gallons of must, until the maximum dose of 4 oz. per 100 gallons was reached. When fermentation was almost completed in dry wines the must was racked into casks, and then followed the maturing processes of further rackings, blending, fining, and finally bottling, when it was ready for the consumer. Sweet wines were racked into casks when ready to fortify, and then went through similar treatment to dry wines. It was in these finishing operations that extra skill and experience were required.

Regarding the keeping qualities of wines, it seemed a curious fact that hock, which was one of the lightest wines, was credited by French authorities with keeping in sound condition for 200 years, whereas fifty years was stated to be the limit for claret.

Liquid Manure.

The use of liquid manure is of special importance in gardens, especially the section devoted to vegetable growing, and every gardener should know how to prepare and apply it. A natural and very effective liquid manure consists of the draining of cattle sheds, stables, dung heaps, &c. Such drainings should, however, be diluted, according to strength, before application.

Liquid manure has special advantages in relation to garden crops, its stimulating effect on which is very noticeable, the fertilising ingredients of manure in a liquid form being more readily available to the plant. Manure in a solid state can be applied to the soil before the seeds are sown or seedlings planted, but subsequently it cannot be dug into the soil without some interference with the roots of the growing crop, even in the case of well-established plants. It is partly on this account that liquid manure is so valuable.

On pot plants and flower beds liquid manure has very beneficial effects. The solid manure originally applied to the soil gets in time exhausted by the growing plant, and it is at this stage that more nourishment is required, the soil becoming poor and incapable of maintaining the plant in a healthy and vigorous state. Liquid manure, which is easily applied, comes to the rescue and remedies the defect. In short, all flower plants, vegetable crops of a quick-growing nature, and pot plants of all kinds require treatment with liquid manure to ensure the best results.

To make liquid manure, soak a sugar-bag of fresh poultry, cow, or pig manure for a week in a cask with the head knocked in—one holding 40 to 50 gallons is the most handy. Use the resulting solution at the rate of one part to three parts of fresh water. Fill the cask again, and when the manure has soaked for a week use the solution at the rate of one part to one part of fresh water. The cask may then be filled up a third time, and after the liquid has been allowed to stand for a week it may be used neat. This form of liquid manure is safe, and if it is applied weekly at the rate of 4 gallons to every 18 feet of a running row no further stimulant is necessary for most growing crops.

Many crops, such as lettuce, cabbage, and silver beet, will be more tender for being forced by applications of liquid manure.

Do not apply liquid manure to plants if the soil is at all dry. Dry soil should first be watered.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, both in the Brisbane and Coominya districts, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into tight boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry much beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quantity and even colour, in a case and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

- (1) That the fruit must be fully developed, but yet quite firm when gathered.
- (2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.
- (3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.
- (4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening

pip fruits; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvae that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

Farm and Garden Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphoe, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstances being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved

in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

KITCHEN GARDEN.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zine label—*never pull them up by hand*, as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Fox-hunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

WANTED! THE SPIRIT OF SERVICE.

Universities once were the seats of learning. Now they have become little more than glorified technical colleges, where men and women qualify for the more lucrative professions. It is safe to say that fully 90 per cent. of those who attend universities in Australia do so merely because they wish to become lawyers, or doctors, or engineers, or school teachers, and not because they have any deep-seated thirst for learning and intellectual development for their own sake. That is where our great universities fail—they turn out many journeymen, but few intellectuals. That fact is evidenced by the exceedingly small number of university graduates who play a part in guiding public opinion and who take their share of public service. The utilitarian aspect of all the courses at the universities leaves no room whatever for the inculcation of that spirit of service which Australia badly needs amongst the rising generations. There is a crying need for the development of a spirit of service throughout the community.—Melbourne "Leader."

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

1926.	NOVEMBER.		DECEMBER.		NOV.	DEC.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5:3	6:9	4:50	6:32	2:42	2:16
2	5:2	6:10	4:50	6:32	3:14	2:47
3	5:1	6:11	4:50	6:23	3:45	3:21
4	5:0	6:11	4:50	6:34	4:17	3:54
5	5:0	6:12	4:50	6:25	4:49	4:40
6	4:59	6:13	4:50	6:35	5:24	5:26
7	4:58	6:13	4:50	6:36	6:2	6:18
8	4:57	6:14	4:50	6:37	6:43	7:16
9	4:57	6:15	4:50	6:37	7:31	8:16
10	4:56	6:15	4:51	6:38	8:25	9:21
11	4:56	6:16	4:51	6:39	9:23	10:25
12	4:55	6:17	4:51	6:40	10:24	11:29
13	4:55	6:18	4:51	6:40	11:28	12:32
14	4:54	6:18	4:52	6:41	p.m.	1:33
15	4:54	6:19	4:52	6:41	12:33	2:35
16	4:53	6:20	4:52	6:42	1:37	3:37
17	4:53	6:21	4:52	6:43	2:40	4:41
18	4:53	6:21	4:53	6:43	3:45	5:53
19	4:52	6:22	4:53	6:44	4:48	6:43
20	4:52	6:23	4:54	6:44	5:52	7:40
21	4:51	6:24	4:54	6:45	6:57	8:33
22	4:51	6:25	4:55	6:46	7:59	9:20
23	4:51	6:26	4:55	6:46	8:58	10:1
24	4:51	6:27	4:56	6:47	9:53	10:38
25	4:51	6:28	4:56	6:47	10:44	11:13
26	4:50	6:29	4:57	6:47	11:28	11:45
27	4:50	6:29	4:57	6:48	a.m.	nil
28	4:50	6:30	4:58	6:48	12:6	12:15
29	4:50	6:31	4:59	6:48	12:42	12:47
30	4:50	6:31	5:0	6:49	1:14	1:19
31	...	...	5:0	6:49	1:46	1:54

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

6 November	● New Moon	12 34 a.m.
13 "	☾ First Quarter	9 1 a.m.
20 "	☾ Full Moon	2 22 a.m.
27 "	☾ Last Quarter	5 15 p.m.

Mars will be in opposition to the Sun on 4th November—that is, on the opposite side of the sky—in the east when the sun is setting, in the west when it is rising, and in a favourable position for observation. Mercury will be at its greatest elongation, 23 degrees east, on the 5th—that is, about 23 degrees below the horizon when the Sun rises, and about the same distance when it sets; it is therefore in a favourable position for observation on or near that date. It will rapidly draw nearer to the Sun, which it will pass on the 20th, becoming of course invisible.

Venus will be in superior conjunction on the 21st—that is, in that part of its orbit which is almost directly behind the Sun; it will therefore be invisible during this month. Saturn will also be in conjunction with the Sun on this date—that is, almost in a direct line behind it. Mercury will be in conjunction with Venus on the 25th, therefore there will be an apparent grouping of these three planets near the sun on or near that date.

The Moon will pass over and occult Epsilon Tauri on the 20th, a little before 9 p.m.

Zeta Tauri, another star of Taurus, will be occulted between 1 and 2 o'clock in the morning on the 22nd. These can be observed throughout Queensland.

An occultation of Eta Leonis will occur on the 27th in the north-west, about 3 a.m., lasting about twelve minutes.

5 December	● New Moon	4 11 p.m.
12 "	☾ First Quarter	4 47 p.m.
19 "	☾ Full Moon	4 7 p.m.
27 "	☾ Last Quarter	2 59 p.m.

Jupiter will be in conjunction with the Moon on 10th December, at 5.4 p.m.; both will be visible in the west after sunset.

Mercury will be at its greatest elongation, 21 degrees 13 minutes west, on the 14th, and will therefore be visible in the eastern sky before sunrise, with Saturn apparently in remarkably close proximity.

Mars will be in conjunction with the moon at 6.18 p.m. on the 15th, and when visible soon after sunset will be rather more than the length of the Southern Cross from the Moon.

The Sun will arrive at its greatest declination south about half an hour after midnight on 22nd December, when the Australian summer solstice will occur. On and near this date, at midday, it will be noticeable that the Sun will cast the least amount of shadow of any time during the year.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noting the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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