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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Utilisation of Sugar By-Products.

ONE of the most useful debates in the current Parliamentary session was the recent discussion on the profitable utilisation of all the products of sugar-cane, initiated by Mr. Swayne, the member for Mirani. Good service was done for our main agricultural industry by stimulating public interest in its economic possibilities other than the manufacture of sugar. At the Plane Creek Mill may be seen samples of building board made out of megass, and other commercial commodities, and its management is very keen on exploring the further possibilities of the industry and has collected a fund of information on the subject. As a base for stock food in which molasses and maize are prime ingredients the utility of dessicated megass has long been known, and it is claimed that a nutritious concentrated ration can be marketed at quite a reasonable price. Mr. Snowden's recent announcement in the House of Commons influenced Mr. Swayne in bringing the matter forward and his utterance was a timely one, for the British Chancellor in making clear his intention of removing all food duties mentioned sugar specifically, and with the removal of those duties all preferences must naturally go with them. As everybody already knows, if that intention is carried out it will affect very seriously all Dominion-grown sugar. Anticipating the situation likely to arise as a consequence, Parliament was asked to consider other ways in which the sugar industry may be safeguarded, and commercial utilisation of its other products offers some solution of the serious difficulty with which it may be faced. We have exported, since 1924, sugar to the value of £9,700,000, so it can be realised what the loss of that amount, or perhaps more, in the next five years would mean to the industry in this State and which even now is not as prosperous as many people seem to think. That nine or ten millions sterling as a factor in our trade

balance cannot be ignored either. Taking the long view we must consider every possible means of, if not improving, at least preserving the present conditions in the industry. Industrial alcohol, building board, and stock food—each of which has already been demonstrated commercially—provide at least three commodities on which attention might be concentrated to a much greater degree. The commercial possibilities of each are patent, and it is due to our own spirit of enterprise to explore those possibilities to the limit. Take motor spirit—Australia requires something like 200,000,000 gallons every year, and, if locally produced power alcohol can be diluted with it to the extent of 15 per cent., which is said to be the practicable limit, that would bring large quantities of molasses into industrial use. To convert it into power alcohol we would need at least thirty distilleries of the capacity of the present plant at Sarina. Our present output of molasses is, however, 17,000,000 gallons, of which nearly half is already required by distillers or for stock food. The rest, with the exception of about 3,000,000 gallons which is allowed to run to waste, is put to other more or less economic uses, such as for fuel and fertiliser. The questions raised by Mr. Swayne are: Can we utilise profitably more cane products for the production of motor spirit? Is it possible to profitably treat for the same purpose the sugar which we now export? It is all a matter of the same old thing, the cost of production, and that is obviously a subject for chemical and economical inquiry. The outstanding present facts are that from sugar products we can make commercially power alcohol, building board, and nutritious stock foods, and they at least constitute a basis for further research and possibly more profitable exploitation.

Field Efficiency in Queensland.

AMONG recent visitors to Queensland was Mr. L. D. Larsen, of Kileneua Sugar Plantation, Hawaii. He has been making a general survey of the industry in the course of a four months' tour which took in Formosa, the Philippines and Java, and Queensland. His visit to Queensland he declared to be the most profitable, particularly on the economic side. Here the cost of production had made it necessary to use modern machinery and all sorts of labour-saving devices. The points in labour economy that impressed him most were the general practice of machine planting; the development of new and original cultivation; the use of machines for applying fertilisers; the development of machines for weeding in the cane row; and harvesting machines. He complimented Queensland canegrowers on their progressiveness and originality along those lines. Two of the implements he saw—the roto-cultivator and spinwheel-weeder—he regarded as distinctly original types. The cane-planter, a Queensland product, he said was decidedly simpler and more efficient than the machine occasionally used in Hawaii. Mr. Larsen also paid a high compliment to the Queensland canecutter and other field hands, who impressed him strongly as possessing a high degree of intelligence and interest in their job and the sugar industry as a whole.

He added—"Conditions in Queensland are unique in the sugar world on account of the high wages paid for field labour, and the use of white labour. However, I believe the situation is being met intelligently by employers as well as employees. I did not find the tendency on the part of labour to shirk and hold back the job that is evidenced in some other highly-organised labour communities. I studied men employed at task labour and at day labour, and believe their application and efficiency is decidedly superior to that of our labour in Hawaii or the other sugar countries visited. The relations between the plantation manager and his employees seemed decidedly pleasant in the cases I had opportunity to notice, and I believe the plantation managers are to be commended for the way they have met and adapted themselves to conditions of labour and to Government regulations that at best must be arduous and irritating. Impossible as these conditions seem to one accustomed to the use of coloured labour, they are taken in Queensland as part of the business, much as we in other countries look upon taxes and unfavourable weather."

The Call of the North.

EVERY year there is a steady increase in the number of Southern visitors who follow the sun to the North and enjoy the geniality of Queensland's wonderful winter. One direct advantage to the sugar industry of their coming is that they are able to get personal impressions of its economic and social value to the Commonwealth. This winter many more distinguished people than usual joined in the annual migration, and it so happened that their advent synchronised with one of the periodical revivals of the Southern agitation against the sugar embargo. It is all to the good that they shall on their return—and there is already evidence that they will not remain silent on the subject—help to remove many of the misconceptions of the industry that cloud the minds of members of the Victorian Housewives' Association and other busy people below the Border and beyond the Murray. There is some truth in the suggestion of one visiting Federal Parliamentarian that more propaganda is necessary, especially among the consumers on the basic wage who are naturally susceptible to the publicity of opposing interests, and to whom the facts of the industry are not always adequately presented, if at all. The Town and Country Union of Victoria, which is apparently an association of uncompromising fiscal "wee-frees," is the latest body to enter the lists in the appeal to Southern prejudice, and though their efforts towards the removal of the embargo have been countered by the prompt answer of the Premier, Mr. Moore, their activities show the necessity of continual and ever-increasing vigilance on the part of cane-growing organisations and others concerned, and of constant and appropriate propaganda. Fortunately, the tourist attractions of North Queensland are bringing every year more people who count in legislative and commercial circles in the South, and their knowledge of the industry gained on the spot will add to their favourable influence in places where it is most needed.

Empire Sugar.

PREFACING a recent report on the sugar position, the Chairman of the Empire Sugar Federation, Sir Benjamin Morgan, made a strong appeal for more consideration of the production of the Dominions and Colonies, which used principally British machinery and supplies of every description. The report shows that in 1928 Great Britain imported 215,323 tons of refined sugar from foreign countries and only 6,424 tons from Empire sources. The imports of unrefined sugar from foreign sources in that year amounted to 1,153,861 tons, as compared with 556,313 tons from British countries. Australia is already the largest producing unit in the British Empire with the exception of India, which is out of the reckoning as a supplier of the British market. The report states that Britain's position as a large buyer of sugar, and her almost solitary tendency to bow down to the doctrines of free import, has made her at once the object of hope to heavily protected foreign countries, and of anxiety to her own natural suppliers. Some realisation of the need to ensure an Empire supply of sugar, and thus to escape the very imminent danger of permanent high prices which foreign domination of the market would make inevitable, impelled the tentative preferences in the Budget of 1920, which have since been stabilised at a money value. It is now of the highest importance for the guaranteeing of supplies that the preference should be extended on a more ample scale. The Empire countries producing sugar may roughly be divided into three: the Dominions (Australia and South Africa), where the protected home market is satisfied before export; the dependent Colonies, where the whole of the production is exported; and India, the inadequate producer of less than 3,000,000 tons of inferior sugar and still an importer of the product of a plant indigenous within her borders. Leaving India necessarily aside, Britain must depend for her supplies on the Dominion and Colonial groups, and it is essential that there should be, between these three, entire agreement as to the policy which can best promote and increase production for the needs of this market.

PLATE 127.—THE HON. ARTHUR E. MOORE,
Premier of Queensland and a Noted Agriculturist.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received from Mr. Edmund Jarvis, Entomologist, at Meringa, near Cairns, the following report for the period of August to September, 1929:—

Effect of Low Temperatures on Parasitic Insects.

Certain insects are able to resist excessive cold or heat better than others, although many species are killed when the thermometer registers several degrees below freezing point. The activities, for instance, of some species of locusts (grasshoppers) are greatly influenced by changes of temperature, such insects becoming practically dormant under conditions varying from 25 to 40 deg. Fahr., and succumbing to an exposure lasting about twelve hours to 17 deg. Fahr.

An exposure of only about ten minutes to a temperature of 130 deg. Fahr. has been proved to be equally fatal to grasshoppers, while, on the other hand, the greatest degree of activity in such orthopterous insects occurs between temperatures of 70 deg. and 100 deg. Fahr.

High Temperatures Prove Fatal to Cane Beetles.

Our greyback cockchafer (*Lepidoderma albohirtum* Waterh.) is unable to survive maximum shade temperatures of 95 to 98 deg. Fahr., when such conditions chance to last for about thirty-six hours and are accompanied by a warm land breeze. Although resting by day in their feeding trees in a more or less shaded situation, these beetles, after enduring such heat for a few hours, become strangely agitated, and after vain endeavours to obtain cooler situations by congregating on the shady side of large tree trunks soon release their hold of the bark and tumble helplessly to the ground before expiring.

Reverting again to the effect of cold on species of the class Insecta, an interesting instance of this occurred at our Experiment Station at Meringa on 12th September in connection with the breeding of Tachinid flies, when the temperature registered by our outside minimum thermometer was found to be 38 deg. Fahr. It so happened that a consignment of these parasites was wanted that morning for an Innisfail grower, but at 7.30 a.m., when they should have been collected for transmission on the early train, nearly all of the specimens were seen lying motionless on the floorboards of the breeding cage. Most of the flies were on their backs, and although some were just able to feebly move a leg or two, others appeared upon first inspection to be dead. Such, however, was not the case, as when some of these latter were transferred to a warm place they soon made a complete recovery and became strong enough to take to wing as usual. By 10.30 a.m. (three hours later), after the sun had warmed the air somewhat, the majority of specimens were resting on the sides of the cage or on cane sticks. At 3 p.m. of the same day only four of these parasites could be found on the floor, two of them (males) being dead, while the other two appeared to be dying.

Judging by past weather records, the occurrence of 38 deg. Fahr. at about the middle of September is very unusual.

In 1923 and 1925, however, the lowest shade minimum temperature for that month was 37 deg. Fahr., while during 1925 the lowest shade minimum temperature for the four months (1st June to 30th September) was only 41.75 deg. Fahr., and the mean shade minimum 50 deg. Fahr.

In this connection it will be of interest to briefly consider the effect likely to be produced upon the economy of the Tachinid *Ceromasia sphenophori*, which at present is breeding in our canefields, this being a point that has not, so far as I am aware, been raised before. Under caged conditions such dipterous parasites were benumbed in the manner described above have only themselves to look to, but in the event of their being rendered helpless in this way and obliged to lie fully exposed upon the surface soil between cane rows they would certainly run a great risk of falling an easy prey to ants and other predaceous enemies.

In all probability, however, these parasitic flies ,when living under natural field conditions, might be able instinctively to sense the approach of exceptionally cold nights and accordingly seek to take advantage of well-sheltered places behind dry leaf-sheaths situated near the basal portions of cane sticks, where they would not have to face a chilling wind and would be afforded a chance of keeping away from the bare ground or exposed situations.

Outbreak of "Army Worm" Caterpillars.

Early this month (September) an urgent 'phone message was received from the Tully district calling attention to an outbreak of *Cirphis unipuncta* Haw. on a plantation situated about two miles north of the mill. Prompt attention was accordingly taken to combat the ravages of this pest, and Mr. W. A. McDougall, who was sent to carry out this work, reported briefly as follows:—"The cane damaged is a mixture of first and second ratoon Badila. The caterpillars commenced operations near the scrub side of the farm, on the land, and advanced towards the higher land near the road. On Monday—*i.e.*, after a fortnight's feeding—the midribs only of about two and a-half acres of second ratoon were left. A band (just in front of attack) 5 to 8 yards wide across 200 to 250 yards was sprayed with lead arsenate."

During the five evenings preceding the day on which this spraying was done the owner had collected about half a kerosene tin full of caterpillars.

The strength of sprays used against various leaf-eating caterpillars and beetles is generally about 2 lb. in 50 gallons of water; but when considered necessary as much as 3 lb. of the arsenate can be safely employed to the 50 gallons without risk of injuring the leaves.

In the present instance ½ lb. lead arsenate in 9 gallons of water was found sufficient to do the work required.

The spray pump used was a Knapsack Auto Spray No. 1, of 3 gallons capacity, 12 feet high by 7 inches diameter, weighing about 7 lb., and costing approximately £3 15s.

This pump is constructed of brass, which will not corrode with strong solutions, and will last indefinitely, and is designed to discharge the spraying material under high compression. Particulars as to where these spray pumps can be obtained will be furnished on application to the Meringa Station or the Bureau of Sugar Experiment Stations, Brisbane.

The following extracts have been taken from a report (3rd September, 1929) to the Director of Sugar Experiment Stations (Mr. H. T. Easterby) by Mr. Edmund Jarvis, Entomologist at Meringa, for the period July to August.

The Grub Problem.

By the beginning of August portions of the cane areas in the Mulgrave and Highleigh districts, which were believed to have escaped grub injury, had suddenly shown unmistakable evidence of attack. Several such cases were noticed by the Mulgrave Cane Inspector, Mr. M. J. Hoare, who attributes these belated signs of infestation to the occurrence of unusually favourable weather during June and July, which, he thinks, has enabled grub-affected stools to make enough additional root growth to keep the leaves from yellowing.

Outlook for Next Season.

Without wishing to be unduly optimistic, it may be of interest to state that conditions up to the present point to a possibility of our grub pest receiving a climatological check next season. Such good fortune would certainly be very welcome in view of the chances that in the event of August to October proving favourable to the pupal and early beetle conditions in the soil, we may expect a more general and serious outbreak of this cane pest than that experienced last season (1928-29).

The Present Position.

During the past few years I have not seen any reason to alter the opinion given in my annual report for 1924-25, regarding the most effective means of controlling the grubs of our "greyback" cockchafer (*Lepidoderma albohirtum* Waterh.).

After fifteen years of experience and considerable experimentation against the various life-cycle stages of this beetle, it appears that fumigation of grub-infested soil offers the best chance of ultimate control. At the same time we should not forget that the winged or beetle condition presents important possibilities in this direction; since, by collecting, trapping, or otherwise destroying these cockchafers through the fortnight preceding oviposition, it is possible to prevent deposition of the eggs.

The most promising of such remedial methods is probably that of luring great quantities of the beetles into suitable traps by the use of attractive aromas (see Bulletins Nos. 17, 18, 19, Division of Entomology). In future years, when the relation of bio-chemistry to the chemotropic reaction of insects has been more deeply studied, this fascinating phase of beetle control should prove an all powerful weapon in the hands of economic entomologists.

Notes on Fumigation.

Just now, when there is much discussion as to the respective merits of para-dichlorobenzene and carbon bisulphide as soil fumigants, it seems to me advisable to make it clear to our growers that the success obtained in other countries with the former chemical (paradichlor) against grubs of cockchafer beetles similar to our own greyback in habits, appearance, and general economy, must not—as some would have us believe—be attributed to the fact that it was obtained in some country other than Australia, and that this being so, such success could not be duplicated under the climatic conditions obtaining in Queensland.

Now, the efficiency of paradichlor. does not depend materially upon the nature of the soil, the flora, or the topography of any particular State or Kingdom in which it may happen to be used, but is influenced by temperature, moisture, and other factors. Similar conditions of temperature occur, of course, during some part of the year over areas of land situated in both the tropical and temperate zones; a fact which has made it possible to use this chemical successfully against subterranean grubs and insects in such widely separated countries as France, America, Queensland, and other intermediate lands. It should be needless to state that its toxic properties remain the same in any part of the world, despite erroneous impressions to the contrary apparently entertained by some cane farmers.

The fumes of paradichlor. are volatilised under temperatures of from 55 to 85 deg. Fahr.; the value and range of this fumigant being largely due and much enhanced by the possession of such wide and convenient latitude of volatility. We find, therefore, that satisfactory results can be secured with small doses ($\frac{1}{2}$ to $\frac{1}{4}$ oz.) of the crystalline nodules of this chemical over practically any terrestrial portion of the earth's surface, lying within an immense area embracing about 20 deg. north and 20 deg. south of the equator.

Regarding the use of this fumigant in temperate climates, it is usually during the warm months that injurious insects prove most troublesome, viz., at a time when the temperature of the ground becomes warm enough to ensure effective vapourisation of the crystals.

Control Work against the Weevil Borer.

Early in the month (August) seventy specimens of the Tachinid fly were liberated by Mr. W. A. McDougall on borer-infested areas in the South Johnstone district, where a brief inspection was also made with a view to the discovery of any other insect pests of cane.

It is interesting to record that abundant evidence was found of the establishment of this useful fly parasite amongst cane at the South Johnstone Sugar Experiment Station. Mr. McDougall also noticed that on the various farms visited the poor or unhealthy canes seemed to be the ones most damaged by weevil-borers, and that sticks with spindle top were all heavily infested by this insect.

Growers troubled with "Army Worms" should use an arsenate of lead spray, and are advised to consult the Monthly Hints published in the September numbers of the "Queensland Agricultural Journal" and the "Australian Sugar Journal."

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

By EDMUND JARVIS.

"Glossy Scrub-Chafer" Emerging.

The dark-purplish or brownish-red beetle, which during normal seasons usually appears on the wing in September and October, is noticeably larger than French's cane-beetle, which is lighter in colour, more slender, and does not fly until a month or two later. The former cockchafer, as its common name implies, occurs chiefly in canefields situated close to, or in the immediate vicinity of, scrub lands, being plentiful at times near Babinda and on farms lying near the foot of the Bellenden-Ker ranges and other mountainous land supporting a dense scrub vegetation.

The grubs of this chafer beetle (*Lepidiota caudata*) are often responsible for damage to cane roots believed by farmers to have been caused by grubs of the commoner "greyback" beetle. Such a mistake is not to be wondered at, seeing that the larvæ of both these species resemble each other very closely in size and general appearance. As a rule, the "glossy scrub-chafer" does not cause serious injury to cane.

"Forewarned is Forearmed."

Growers are again reminded that now is the time to prepare for fighting such insect pests as may chance to make their appearance later on in the warm weather. The purchase of a good spray-pump would never be regretted, and no up-to-date cane farm should be without so useful an appliance, since for an initial outlay of less than £5 a grower can obtain, ready to hand for immediate use if required, the means of saving his young cane from being destroyed or seriously checked in growth by such insects as army worms, grass caterpillars, plant-eating beetles, locusts, or aphides, &c., all of which occasionally devour or damage leaves of sugar-cane. The Auto Spray Pump No. 3A is well adapted for use on most cane farms. This pump has an 8-gallon brass tank, and is equipped with a powerful agitator, 8 feet of high-pressure hose, 8 feet of iron extensions, and a Vermorel nozzle. It is moved about in the field by means of a broad-tyred wheel, and is fitted with iron handles, while the stray is delivered under high pressure.

The agents for these Auto Spray Pumps are Buzacott and Company, Limited, of Adelaide street, Brisbane.

Do not forget to have a few pounds of lead arsenate paste always on hand. This can be procured from Taylor and Elliott Limited, of Charlotte street, Brisbane, in stoneware jars holding 1 lb., costing about 2s. It is a good plan to cover the top of the cork of such jars with a layer of sealing wax, as then the paste will remain moist for years. A pound or two of Paris green should also be purchased as a stand-by, in case it should become necessary at any time to lay down poison bait for cutworms or other caterpillar pests.

Supplies of paradichlorobenzene or carbon bisulphide for fumigating grub-infested soil should be ordered without further delay by communicating with the various secretaries of pest destruction funds, from whom all information regarding such soil fumigants can be obtained at any time.

BULLETIN NO. 2.

A KEY FOR THE FIELD IDENTIFICATION OF SUGAR-CANE DISEASES.

This Bulletin, by Mr. Arthur F. Bell, the Pathologist to the Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, has been the subject of favourable comment from sugar-cane countries in all parts of the world. Amongst many letters received by the Bureau the following may be quoted:—

Dr. Lyon, Consulting Pathologist, Experiment Station, Hawaii, says—

> "I wish to thank you most sincerely for copy of Bulletin. It is well arranged, very concise and accurate, and certainly constitutes the best manual of the diseases of sugar-cane now in existence."

Dr. H. V. Koningsberger, Director, Department of Agriculture, Sugar Experiment Station, Java, says—

> "I have been very much impressed by reading the recent Bulletin by Mr. Bell, and I want to congratulate you on the important papers published by your Bureau. Mr. Bell especially deserves the gratitude of all canegrowing countries for this valuable 'key.'"

Dr. E. W. Brandes, Principal Pathologist in Charge, Sugar-cane Plants, United States Department of Agriculture, says—

> "Without any question this is the most up-to-date and valuable summary of cane diseases that has yet appeared, and will be of service to the sugar-cane industry everywhere."

HINTS TO SOUTHERN CANEGROWERS.

The Director of the Bureau of Sugar Experiment Stations has received the following Hints to Canegrowers (Southern Districts) from the Assistant Entomologist Bundaberg Sugar Experiment Station, Mr. R. W. Mungomery:—

Clean Up when Ratooning.

In most cases it is customary for growers, after having cut their cane green, to leave the trash for a week or more to dry thoroughly and then to fire it. In this way thousands of eggs of leaf hoppers and moths, &c., are destroyed, which if left would have been potential sources of trouble to the young ratoons, and the field is left in a thoroughly clean condition as far as surface pests are concerned. By the term surface pests this is meant to embrace all those pests that attack the cane plant above the surface of the ground.

Do not leave Trash on Ratoons.

Instead of burning, some growers follow the practice of leaving the trash to rot on the surface of the ground, and allow the cane to volunteer through. From the viewpoint of pests, this is often a harbour and encouragement for them, since certain moths show a decided preference for laying their eggs in such situations, with the result that when the caterpillars hatch from these eggs they straightway commence to feed on the young cane.

The futility of such a practice has often been seen, but especially was this noticeable on a farm that was under observation last year. Part of the trash on a harvested field was burnt, whilst another portion of the same field was left with the trash saved, and it was rather remarkable that the cane in the burnt portion was undamaged at the same time when the volunteer ratoons were almost stripped of leaves by army worms. Such crops affected by army worms usually recover, but it is absolutely unnecessary to subject them to these severe checks when weather conditions in the spring are often so unfavourable for vigorous growth.

Where Caterpillars Develop.

As stated above, certain moths instinctively lay their eggs in places where the resulting caterpillars find excellent conditions for their development, and in this respect trash left on young ratoons provides them with conditions almost approaching ideal. Briefly the habits of these insects are as follows:—The young caterpillars on hatching from the eggs commence to feed on the young green cane leaves. This feeding is more general during the night time, and when daylight appears they retire under the trash and other debris or, as frequently happens, they crawl between the curled leaves of the central spindle. In this way they effectively conceal themselves, only the jagged edges of the leaves and a few pellets of grass betraying their presence, and they remain out of sight from insectivorous birds which would otherwise make a meal of them and help to keep them in check. However, they go on feeding in this manner, and when they are a little more than half-grown their food requirements increase enormously. If they are in large numbers they cause great damage to the young cane, often stripping the shoots quite bare, and when their food-plants become scarce they often migrate in search of more, and this habit of travelling en masse has earned for them the name of army worms.

During this season, when much cane has been burnt on account of the damage by frost, the amount of trash remaining on the ground will probably be not so great as in former years, but, at the same time, growers will be well advised to rake up and burn all waste material such as partly-burnt cane tops which lie scattered about the fields, for, as previously pointed out, pests seek shelter under this débris.

When to Conserve Trash.

The above warnings concerning the danger of volunteer ratoons is not meant to discourage the practice of trash conservation, which practice in some of our drier areas has much to commend it. Trash conservation, however, is usually done in connection with the last crop of cane harvested, and the cane is cut green, the cane later ploughed out, and the trash ploughed under. In general, as far as surface insects affecting cane are concerned, this practice has in many cases the same ultimate effect as the system of burning. By turning the trash under, many eggs

are buried, and if the young larvæ succeed in hatching out, they are unable to penetrate through the thick covering of soil and they soon die. If the few that are not completely covered with soil succeed in hatching out, they find that there is none of their food-plant growing near at hand, and since these tiny caterpillars cannot migrate without food to any great distances they likewise perish unless they happen to find an isolated green shoot. In any case, the number that would actually survive under such conditions represents a very small proportion of the total number of eggs deposited, and therefore the system is quite sound in so far as the destruction of army worms and similar pests is concerned.

CANE PESTS AND DISEASES.

The Assistant Entomologist at the Mackay Sugar Experiment Station has submitted to the Director of the Bureau of Sugar Experiment Stations the following report for the month ended 12th September, 1929:—

Pupae of Greyback Beetle (*Lepidoderma albohirtum* Waterh.) and other Small Scarabaeid Grubs.

Following a request made by a grower at Sarina, who was preparing ground for planting, an inspection was carried out on his farm, and it was found that numbers of pupae of the greyback beetle and a great many small scarabaeid grubs were being ploughed up.

The chief object was to determine the identity of the latter, as the grower intended planting cane in the block that he was ploughing, and the presence of large numbers of small grubs naturally caused him anxiety as to whether it would be wise to plant there or not. These small grubs, which were less than ¾ inch in length in the curved position, were very numerous amongst the roots of old stools, but they had apparently not caused any injury to the roots. They were in the third stage, so would very possibly pupate either this month or next, therefore planting would be quite safe in any case.

They were identified as belonging to either the genus Heteronyx or Haplonycha; the grubs of beetles belonging to these genera are grass root or humus feeders, and have so far not been recorded from sugar-cane roots. Grubs of these genera are frequently very plentiful in grass paddocks, where they subsist on very fine grass roots and soil. They usually feed only a couple of inches below the surface.

The greyback pupae that were ploughed up were all situated at depths varying from about 6 inches to 1 foot or more; the ground was loose and fairly moist, and the ploughing was very deep. All the pupae examined were well advanced, and from appearances the beetles would be fully developed before the end of this month. That does not necessarily mean that they will emerge from the ground immediately after emergence from the pupal shells; they will remain in their old pupal cells for several weeks for their bodies to harden, also for the advent of warmer weather combined with good soaking rains.

If the first good rains of early summer should fall at the latter part of October or early in November, in all probability the beetle flight will be early this summer—that is, judging by the advanced state of the pupae at the present time. On the other hand, if the dry weather should continue for a further two months or more, the ground may become so hard and consolidated that many of these beetles may be unable to leave their cells and therefore perish in them.

Growers who were troubled with grubs during the past season will be well advised to clear away from the immediate vicinities of their canelands all feeding trees of the beetles, more particularly those growing on the windward side of the cane. Many farmers desire to leave a few of these trees from which to collect the beetles; if any are left for this purpose, they should be small trees which are easily shaken, and even then it is not advisable to leave any that are close to cane. Much tall grass growing near cane at the flighting time of the beetles is also bad, as it serves to attract them to that particular area. They appear to be invariably attracted to the highest cane or grass, and even though the grass may be taller than the young cane and be the source of attraction, yet the grass itself may not be subsequently attacked by grubs whilst the cane suffers. This is due to the fact that grassy headlands are usually uncultivated and the ground is hard and consolidated, which deters the beetles from entering to lay their eggs, consequently they may enter the cultivated ground where the cane is growing, and thus grubs will later attack the cane.

Occurrence of Unknown Beetle Larvae amongst Cane Roots (*Lampyridae* sp.).

Following on inquiry made by a farmer at Pinnacle, who had ploughed up great numbers of small active yellowish grubs whilst ratooning, a visit was subsequently paid to the farm in question to ascertain whether the grubs under notice were causing injury to the cane roots or not.

Inspection revealed the presence of these grubs in almost countless numbers, each one being enclosed within a small oval cell. This would appear to indicate that they had ceased feeding and were preparing to pupate. Several stools were dug up and the earth removed from amongst the roots, but there were no signs whatever indicating that the roots had been damaged.

A similar occurrence of small beetle larvae (and very probably the same species as this will prove to be) occurring very plentifully amongst cane stools was brought under notice by Mr. G. Bates (Assistant Entomologist) several years ago from a farm in the Proserpine district. They were identified when bred through to the beetle stage as *Telephorus* sp., one of the "Soldier Beetles."

The beetles belonging to this family are all more or less elongate insects which fly freely during the daytime, usually amongst timbered country. They have a rather soft integument, not hard and chitinous as in cane beetles, and they are usually some shade of black, dark olive, and brown. In many species of the family the antennae or feelers are long and pectinate or semi-pectinate (feathery).

The usual food of their grubs is recorded as being variable, but many forms are carnivorous or predatory, with a tendency towards cannibalism. There is no doubt, therefore, that cane roots are quite immune from their attacks.

Should any other growers note the occurrence of such like larvæ amongst their cane during ratooning or ploughing operations, it may be well to give a brief description of these larvae in order to avoid undue concern.

The colour, including the head, is creamy yellow; body soft and tapering towards both extremities; segments very clearly defined; length, including head, 19-20 millimetres (about 8/10ths inch). The whole body and even the head is slightly flattened. On each of the first, second. and third segments ventrally is a pair of rather large legs, which are the same colour as the body. These grubs are able to move fairly rapidly when dug or ploughed up, but if touched will curl themselves up and remain motionless until the danger is passed.

The disturbing of the ground during cultural operations would tend to be responsible for the destruction of many of these larvae, because on the farm inspected many were being attacked and eaten by two different species of ants—namely, the common "Green Head" (*Chalcoponera matallica* Sm.) and the introduced small brown ant (*Pheidole megacepha.a*). The latter species has major and minor forms of the worker, the first form have enormous heads which are quite out of all proportion to the sizes of their bodies; these are particularly destructive to other insects.

Wallabies and Cane.

During recent inspections made in the Habana district indications of damage to cane by wallabies were noted in several blocks of plant cane; in one instance the damage was fairly severe. This particular patch of cane was bordered on two sides by open forest land, the fences on those sides being a considerable distance from the cane.

Damage by these animals may occur to either young or mature cane; in the latter case it may be fairly readily distinguished from rat injury, which it resembles by the gnawings into the sticks being uniformly higher from the ground, whereas rat injury is usually more irregular. Sometimes in canefields the "playgrounds" of these animals may be seen, quite a cleared space with the ground almost bare, in amongst the cane.

Wallabies appear to attack cane more readily during dry weather than at other times of the year, no doubt owing to the scarcity of native grasses, &c., during the dry season.

THE JOURNAL APPRECIATED.

A Carleen farmer writes (3rd September, 1929):—" . . . We much appreciate your good efforts for the betterment of the man on the land through the 'Queensland Agricultural Journal.' "

QUEENSLAND SUGAR-CANE SOILS.

Report on Queensland Sugar-cane Soils, Planting, and Tillage, prepared for the Committee of the International Society of Sugar-cane Technologists by the Bureau of Sugar Experiment Stations.

Owing to the larger part of the cane soils of Queensland being alluvial in character, there is some difficulty in recognising soil types.

In the Cairns district the alluvial soils of the Mossman, Hambledon, and Mulgrave areas may be classed together. They vary in colour from light grey to dark red, but do not show very marked analytical differences. They all belong to the Permo-Carboniferous age.

The following is an analysis of a composite sample from these areas:—

Moisture	1.72
Volatile matter	6.03
Insol. residue	74.65
Chlorine	0.003
Phosphoric acid	0.14
Iron oxide	4.12
Aluminium oxide	8.94
Lime	0.27
Magnesium oxide	0.43
Potash	0.48
Soda	0.18

Soluble in 1 per cent. citric acid—	Per cent.
Phosphoric acid	0.0037
Lime	0.0843
Potash	0.0142

The high percentage of magnesia in comparison to lime is typical of these soils.

The alluvial soils of Innisfail and Mourilyan show great similarity in analyses, except that the former has better P_2O_5 content. Geological age undetermined.

Soils from the Halifax, Ripple Creek, and Ingham sub-districts belong to the Recent and Post Tertiary geological age. They analyse somewhat similar to those from Innisfail and Mourilyan, but have a much lower iron and aluminium content.

The Mulgrave and Innisfail red soils are of volcanic origin and are termed "Bastard Red Soils" owing to their indefinite nature. The former, as will be seen from the average analyses, are a much better type.

MULGRAVE (RED).

Moisture	1.98
Insol. residue	70.43
Volatile matter	7.15
Phosphoric acid	0.22
Chlorine	0.002
Iron oxide	7.18
Aluminium oxide	12.13
Lime	0.32
Magnesium oxide	0.34
Potash	0.40
Soda	0.17

INNISFAIL (RED).

Moisture	4.23
Insol. residue	42.05
Volatile matter	15.78
Phosphoric acid	0.27
Chlorine	0.005
Iron oxide	16.52
Aluminium oxide	20.47
Lime	0.08
Magnesium oxide	0.20
Potash	0.17
Soda	0.20

In the Mackay or Central District, with the exception of Farleigh soils, all are of Recent and Post Tertiary geological age, and all are alluvial.

Farleigh area falls in the Lower Bowen (Freshwater-Marine-Volcanic) series of Permo-Carboniferous age.

In comparison with the Northern or Cairns division, the greater content of CaO and the excess of CaO to MgO is very noticeable. As will be seen from the analysis of composite samples from the Mackay and Proserpine areas and the average of Burdekin soils, very little difference is evident over a wide area:—

MACKAY AND PROSERPINE.

Moisture	2.35
Volatile matter	6.76
Insol. residue	79.01
Chlorine	0.004
Phosphoric acid	0.17
Iron oxide	3.97
Aluminium oxide	5.93
Lime	0.75
Magnesium oxide	0.52
Potash	0.20
Soda	0.21

BURDEKIN.

Moisture	2.33
Volatile matter	6.14
Insol. residue	80.44
Chlorine	0.004
Phosphoric acid	0.19
Iron oxide	3.41
Aluminium oxide	5.17
Lime	0.96
Magnesium oxide	0.73
Potash	0.35
Soda	0.14

With regard to the Bundaberg or Southern division, the soils immediately around Bundaberg are of Basaltic origin.

Planting.

Only minor differences exist in planting, the methods being practically the same throughout. Less cane is used per acre in the Southern or subtropical cane areas.

Fowler steam ploughs are used on a few plantations, but as the greater part of the cane is grown by small farmers in Queensland, whose average acreage under cane is 36, the bulk of preparation is done by tractor and horse tillage. The tractors principally used are the Fordson, McCormack, Deering, Hart Parr, Holt, Ruston Hornsby, Cletrac, Renault, Fiat, Twin City, Austin, and British Wallis.

Planting is done on well-prepared cultivable land, three to four ploughings in drills varying from 4 feet 6 inches for thin erect canes to 6 feet for thicker canes. Space between plants varies from continuous planting (very little of this is done) to 18 inches apart. The greater part of the cane planting is in 5-feet rows and 6 inches apart. Practically the whole of the cane is used cut up into three or four eye plants, in furrows or drills about 10 inches deep.

In many districts a cane planting machine is used. Cane plants receive about 2 inches of covering where soil is moist, and 3 to 4 inches were dry.

In what is known as new scrub land the cane plants are deposited in holes. The holes are usually made 14 by 9 by 9 inches. The number of holes varies from 2,500 to 3,000 per acre.

Planting in the subtropical areas is usually done from December to April and from August to October. The first period is known as "early" planting and the second as "late." In the north (tropical) areas cane planting is carried out as "early" in March and April and "late" in July to October.

Tillage is generally done with shallow cultivating implements, such as the Planet Junior or else with a Cotton King disc harrow—mostly horse drawn, though

some implements are tractor drawn. In wet areas, ploughs are often used to plough away and plough to the young cane where a heavy growth of weeds has taken place, but this practice is not regarded with favour.

In the subtropical districts, up to third ratoons are frequently grown; in the Central district, up to second ratoons; and in the North, generally only one ratoon is grown. Trash is generally burnt, and after this is done the following methods are practised:—

(*a*) Trash burnt and four furrows to 9 inches ploughed between cane rows. Land levelled down by use of tyne harrows or cultivator.

(*b*) Trash burnt, procedure same as above, but only three furrows ploughed between rows.

(*c*) Trash burnt and ground cut up first with disc harrows crossways. Then use of plough between rows followed by tyne harrows crossways.

(*d*) Trash burnt, four furrows ploughed between rows and skeleton plough used in furrows next to cane.

(*e*) Trash burnt and land treated with spring-tooth cultivator or a grubber instead of being ploughed.

(*f*) Trash left and rolled in each alternate interspace. Every other interspace well cultivated with the plough. In this way each row of cane has one side cultivated, and one side uncultivated but covered with trash.

(*g*) Trash left and cane allowed to volunteer without any cultivation at all. This method is sometimes advantageous in a droughty season, but is not to be recommended as a regular thing.

(*h*) Thoroughly stirring the land between the cane stools to a depth of 16 inches with the plough and sub-soiler.

All these methods are in use, or some variation of them. In the writer's opinion the best cultivated ratoons (other things being equal) give the highest yields, but it is often a question of cost.

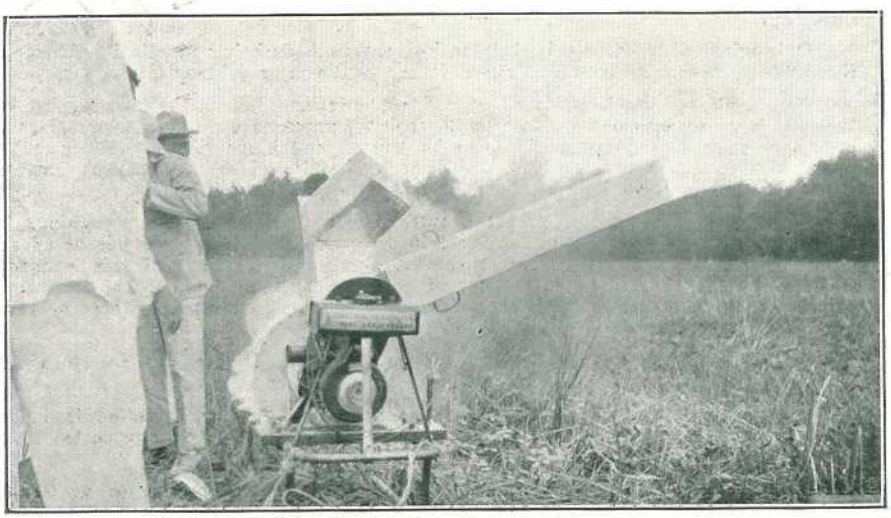

Plate 128.—Blowing Machine for Spreading Insecticides over Cane Fields under Trial in Java.

COB ROT OF MAIZE.

By R. B. MORWOOD, M.Sc., Assistant Plant Pathologist.

Cob rot of maize is a general complaint in the maizegrowing areas of the United States of America and South Africa. It was reported from Australia in 1918 by Dr. Darnell Smith, who stated that it was a serious disease which appeared to be spreading. Henry Tryon recorded the disease in Southern Queensland in 1919, and then in 1925 wrote of it as seriously affecting the quality of maize throughout the Atherton Tableland with, in places, a heavy percentage of damaged cobs. During the past season cob rot has appeared in a number of centres in the South as well as on the Tableland, and as many of the growers are unfamiliar with the nature of this disease a short description of it is given below.

Symptoms.

The cobs which are badly affected with the rot can be distinguished externally by their light weight and by a feeling of compactness. The husks tend to cling together and are more difficult to remove. The disease is caused by a fungus, the presence of which can usually be readily discerned on removing the husks. It appears as a light grey mould like growth lying between and around the grains and sometimes extending to the husks, which may become firmly matted together. (Plate 129.) The mould is commonly more abundant at one or the other end of the cob corresponding to the region first invaded. In most cases, except those of light infection, the grains are discoloured, often of a duller appearance, and their contents are of a more crumbly nature.

Cause.

Cob rot can be brought about by several fungi, of which the most serious causal agent, both in Queensland and elsewhere, is *Diplodia zeae* Lév., which is the one discussed in these notes. A second parasitic fungus—*Fusarium moniliforme* Sheld.—is also a cause of cob rot in Queensland. This form can usually, but not always, be distinguished by a pink tinge given to the affected portion of the cob. Saprophytic fungi—*i.e.*, fungi which live on dead and rotting matter, are often found associated with cob rot when the cobs are exposed to the entrance of such organisms by the previous attack of corn ear worm or by excessively wet conditions.

The fungus *Diplodia zeae* is able to grow on all parts of the maize plant. Under the ground it can cause a root rot condition. On leaves and stem it produces reddish or purple spots. On the cobs it gives the symptoms noted above. The mould growth mentioned consists of a mass of fine interlaced threads of mycelium of the fungus. The vegetative stage in the life history of the fungus is followed when conditions are suitable by the reproductive stage. This appears to the naked eye as small black dots which, under the microscope, are seen to be hollow globular receptacles, known scientifically as pycnidia, containing numerous minute brown two-celled spores. (Plates 130 and 131.)* These spores are blown about by the wind and frequently lodge between the leaf sheath and stem or on the shank or tip of the cob of a maize plant. In these situations they often find sufficient moisture to germinate, and on doing so infect the plant. The effect on the stalk and leaves is rarely of a serious nature, but on the cob all stages from barely perceptible infection to complete destruction may result.

* Plate 131 is reproduced from Henry Tryon's "Ear Rot of Maize" and represents drawings of material prepared by that author.

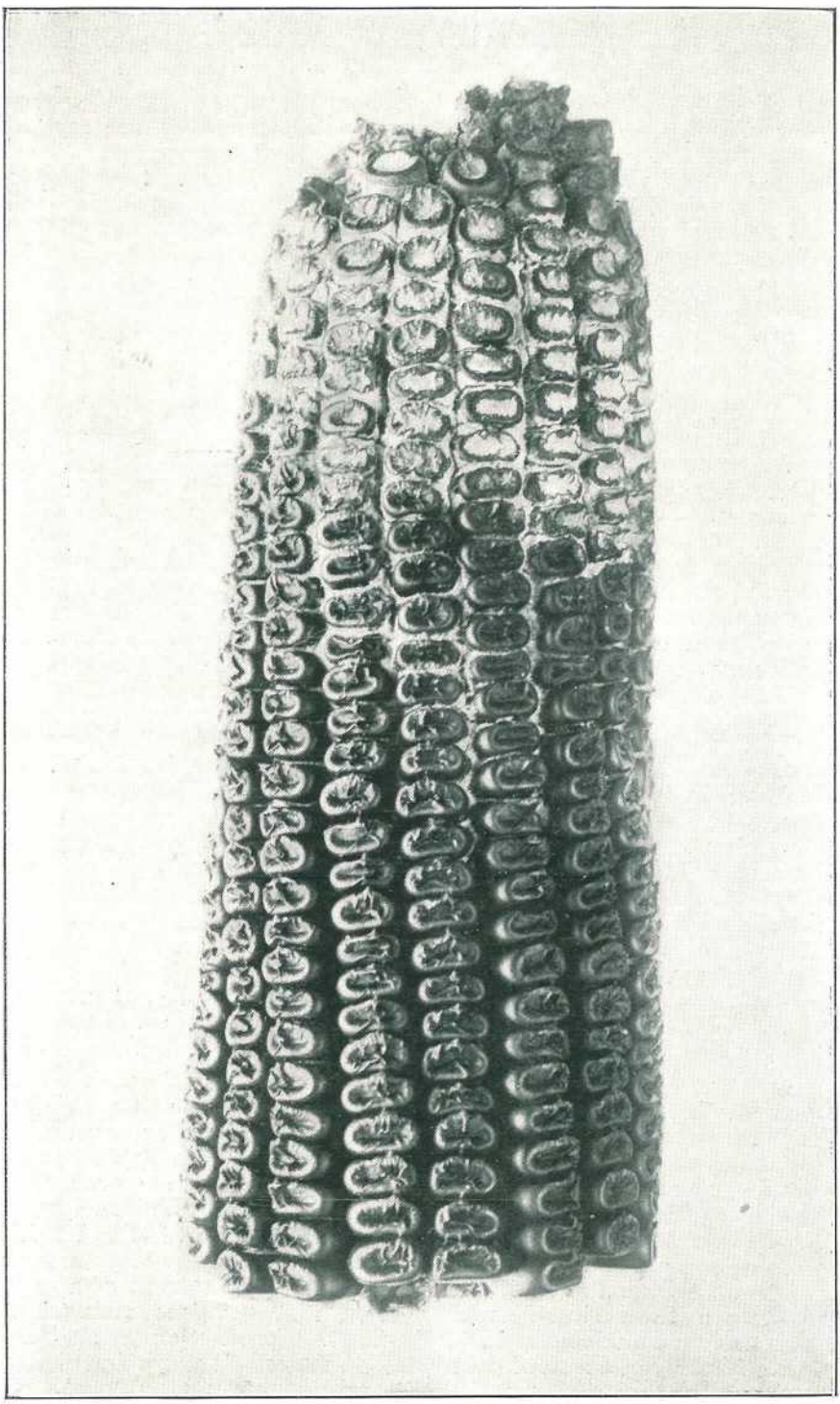

Plate 129.—Cob Rot of Maize—*Diplodia zeae*.
Showing mould arising from infection at the tip of the cob.

Plate 130.—Cob Rot of Maize—*Diplodia zeae.*
Pycnidia of the fungus on the husks of an affected cob (slightly enlarged).

The point of infection is usually one or other end of the cob, and from there the fungus spreads between the grains and also penetrating them breaks down their contents to a soft, crumbly mass. If conditions are sufficiently moist the small black pycnidia appear on the mycelium at the base of the grain. They are also produced on the husks, the core of the cob, and on the leaves and stem. (Plate 130.)

Source of Infection.

The most serious source of infection is the quantity of old broken stalks, &c., remaining in the ground from a previously affected crop. It has been shown that maize grown on land which has not been cropped to maize for three years and which is isolated from sources of wind-borne infection from neighbouring crops does not usually develop the cob rot symptoms.

Seed from a diseased crop is often dead as a result of the fungus invasion and fails to germinate. It may, however, if lightly infected, produce weak seedlings which grow into stunted plants often affected with root rot. As the fungus grows inside the seed, treatment with bluestone or fungicidal dusts does not eradicate it. Hence it is necessary to obtain seed which is not infected. This cannot be done with certainty by taking apparently good cobs from a field in which the disease is present. One method of making certain that a cob is fit for seed is to take grains from various parts of it and germinate them. Only cobs whose seeds produce clean, strong seedlings can be pronounced free. The best plan is to obtain seed from a crop in which careful examination has failed to show the presence of cob rot.

Contributing Conditions.

The disease develops to a greater extent under warm, moist conditions. This means that other things being equal it will be worse with the moister conditions obtaining in a thick crop than in one which is thinner. Also, under good weather conditions in which the crop dries off rapidly after reaching maturity, the fungus does not get the opportunity to do so much damage as it otherwise would. Further, if the crop is taken off and placed in shelter as soon as it is mature and quite dry, the possibility of it again getting wet and thereby allowing the fungus to spread further will be prevented.

Control.

The following control measures for the disease are recommended:—

(1) Burn all remains of the crop after harvesting. In order to minimise the spread of the fungus this should be carried out as early as practicable.
(2) Rotate maize land with other crops.
(3) Use sound seed preferably selected from a crop which is known to be free from the disease.
(4) Harvest the crop as soon as it is dry.

It is inadvisable to use damaged grain as fodder. Experiments conducted in South Africa have shown that maize containing *Diplodia zeae* when ingested in considerable quantities is poisonous to cattle and sheep. With respect to horses and pigs, the matter is still in doubt, though it can be taken that there is no cause for alarm over the consumption of a small amount along with wholesome food. Owing to the possibility of the spores passing through an animal uninjured, the feeding of diseased material may help to spread the disease, and is also on that account better avoided.

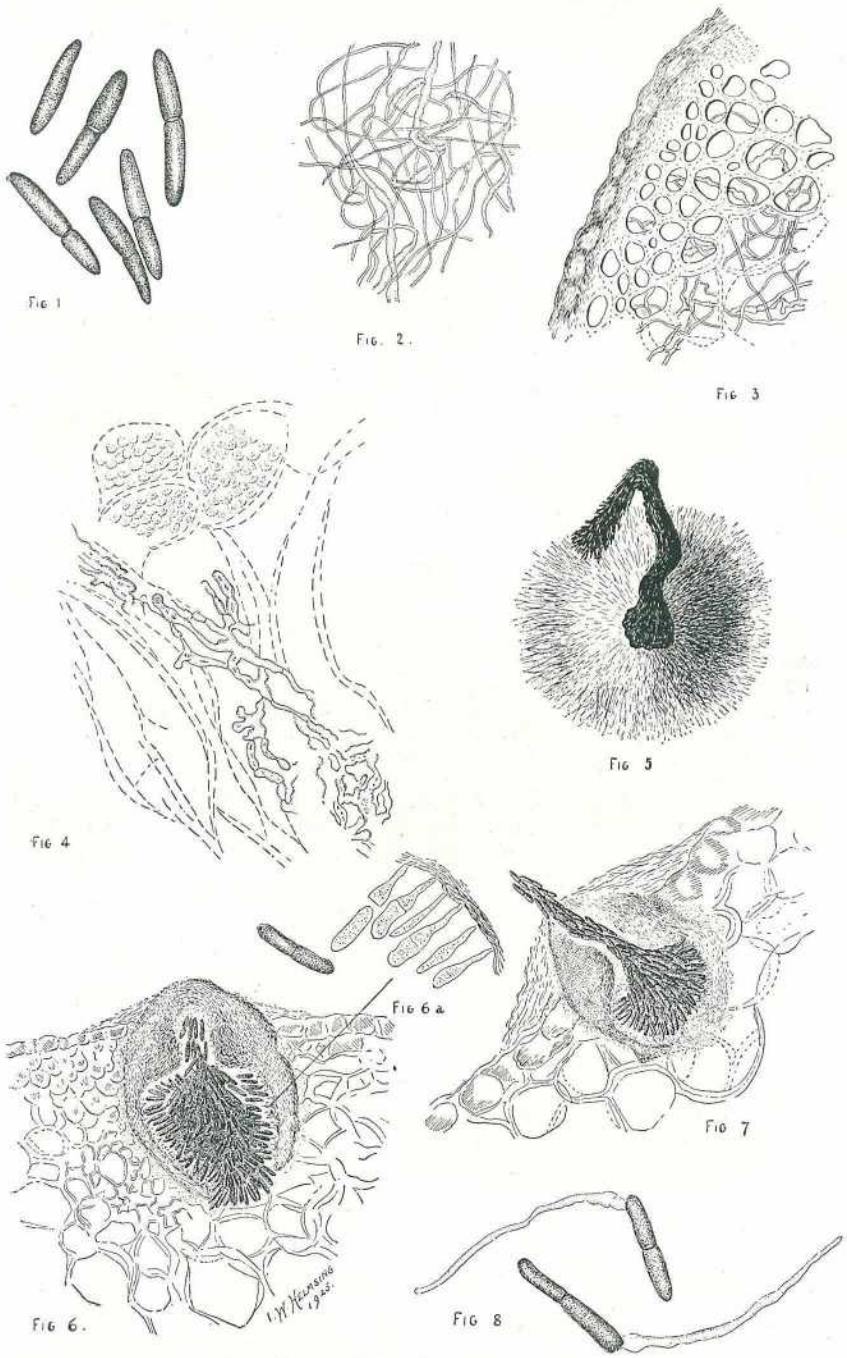

Plate 131.—Diplodia zeae.

A. Infective agent: Fig. 1, Spores. B. Vegetative growth: Fig. 2, Mycelial threads; Fig. 3, Mycelium traversing tissue cells of husk; Fig. 4, Mycelium in tissue of seed germ. C. Reproductive growth: Fig. 5, Surface view of pycnidium extruding spore filament; Figs. 6 and 7, Longitudinal section of pycnidia in position; Fig. 6a, Enlarged view of inner wall of pycnidium, showing spore formation; Fig. 8, Spore germination and formation of germ tube. (All highly magnified).

DISEASES OF PINEAPPLES.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

The pathological problems to which reference will now be made are the following:—Wilt, base rot, Thielaviopsis fruit rot, fruitlet core rot, top rot, and tangle root. Before discussing these problems a brief reference must, however, be made to certain features in the growth habits of the pineapple.

The pineapple belongs to a family of plants many of whose members live on trees and rocks, where they have become adapted to more or less of an air-dwelling habit. Although itself a soil-inhabiting species, the pineapple resembles these plants to a certain extent in structural features, and possibly as a correlated character exhibits a marked intolerance of conditions leading to bad soil aeration.

The pineapple is also a heavy feeder, and judicious fertilising is necessary on any but good soils. Poor drainage and lack of the necessary soil nutriments constitute the primary cause for much of the so-called disease met with in Queensland. There are, however, several specific diseases of a parasitic nature which will be found included below.

Wilt.

The presence of pineapple wilt in a field is indicated by the appearance of certain areas in which the plants exhibit a general unthrifty condition, together with a stunting of the plants and any fruit which may be produced. The leaves assume a reddish-yellow colouration in marked contrast to the normal healthy green. They commence to turn brown and dry out from the tip, giving rise to the appearance suggesting the common name of wilt. Examination of the affected plants will show that, corresponding to the outward manifestations of disease, the root system will present various stages of decay. Even before external symptoms become visible the younger rootlets may be found to have perished.

CAUSE.

This disease was investigated and reported on by Tryon as early as 1893. A further full account of these researches was published in the "Queensland Agricultural Journal," vol. xv., 1904. Tryon found that there was a definite fungus associated with the decay of the roots. This organism, however, was unable to infect plants unless they were previously subjected to some unfavourable growing conditions which impaired their vitality. He was able to show, by extensive field observations and by the elimination of other possible factors, that the contributing condition was to be found in the nature of the soil and its drainage. Wilt makes its appearance when the crop is grown on soil of shallow depth with a stiff subsoil. The pineapple is a plant which is able to grow well under quite moist conditions, provided drainage is adequate, but it is unable to resist the ill-effects of standing water.

From a consideration of the past history of the disease it was shown that a contributing cause was the occurrence of periods of unusually cold weather at the time when the plants were subjected to heavy rainfall.

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* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables" by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane, 1929.

Control.

In order to avoid having trouble of this nature, growers should not plant on shallow, poorly drained land. If for any reason such land has to be used, a system of artificial drainage will be found beneficial.

On poor land "wilt" symptoms may also arise as the result of some deficiency in plant food. The remedy for this would naturally lie in improving the growing conditions by judicious manuring.

Base Rot.

There are two characteristic diseases induced in the pineapple by the fungus *Thielaviopsis paradoxa*. One is the decay of the stem known as base rot, the other is a soft rot of the fruit which will be dealt with subsequently.

Symptoms.

Pineapple suckers sometimes fail to develop normally after planting out. Such plants remain more or less at a standstill and cease to produce new growth. Later a yellowing and withering of the leaves commences and the sucker eventually dies. The plants exhibiting these symptoms will be found to be loose in the ground, and closer examination will disclose a black area of rot invading the base of the stem. (Plate 132, fig 1.) The rot gradually extends until the whole of the lower part of the sucker, together with some of the lower leaf-bases, may be involved. The plant is then liable to break off at ground-level.

Older plants are sometimes affected with this trouble, the symptoms being very similar to those described above.

A loss of as many as 80 per cent. of the suckers from one planting has been reported during a wet season. The average is, however, considerably less than this.

Cause.

This rot is caused by a fungus (*Thielaviopsis paradoxa*) which may infect the plant through wounds, or under favourable conditions even through the uninjured surface. Within the invaded area there is set up a soft rot which is at first brown but later changes to an almost sooty black colour owing to the development, from the fungal threads or mycelium within the tissue, of very numerous dark-brown oval spores. These spores are liberated by the complete decay of the affected part and then serve to further spread the disease.

Control.

1. After pulling, and if necessary stripping the suckers ready for planting, dry in the sun for a few days.

2. Avoid planting during very wet weather.

3. As a further precaution the stripped suckers may be dipped in strong Bordeaux mixture before drying. Dipping alone cannot be relied on to give satisfactory control.

4. All diseased suckers, &c., should be removed and burnt. Otherwise the spores of which the rotting tissue is full will be liberated into the soil, where they will be available to produce further infection in new plants.

Thielaviopsis Fruit Rot.

The same fungus (*Thielaviopsis paradoxa*) as that implicated in base rot is the cause of a rot of the ripening fruit, especially when this has become bruised or otherwise injured by rough handling. On the

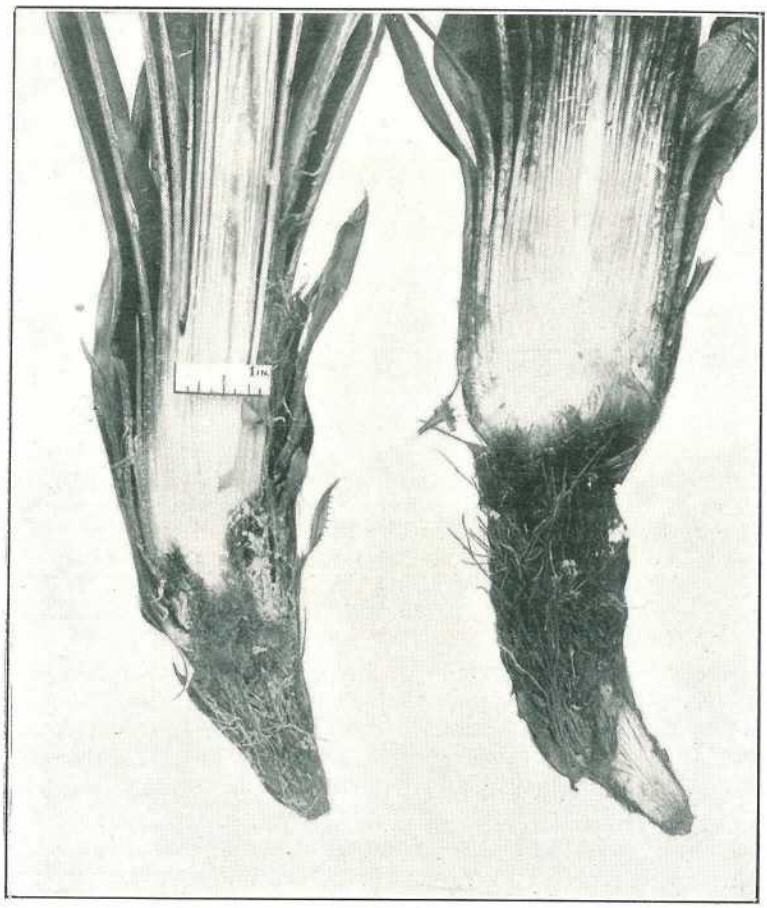


Fig. 1.—Base Rot of Pineapple Suckers.

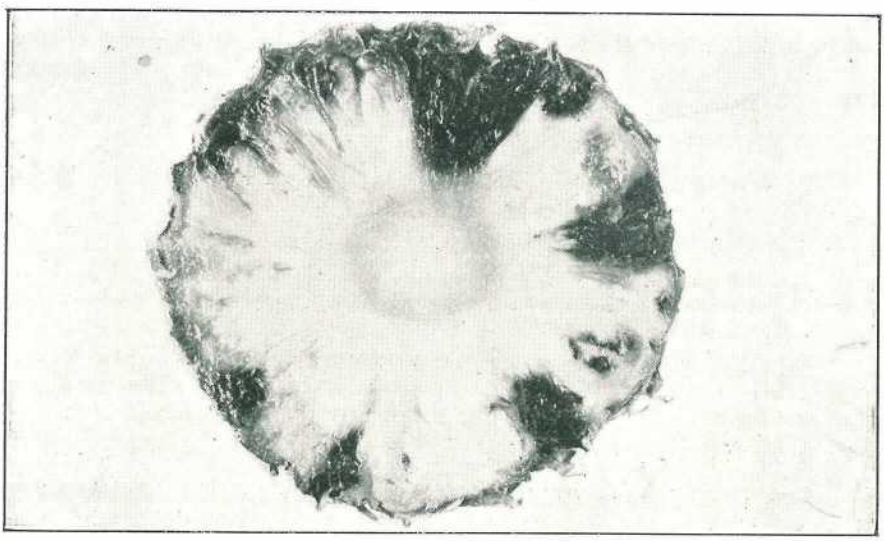


Fig 2.—Fruitlet Core Rot.
Plate 132.

fruit the rot will be indicated externally by the presence of a dark somewhat sunken area on the skin. Internally the affected region is at first watery and yellow, but later turns black as the macrospores of the fungus commence to be developed.

Occasionally the leaf of the pineapple is attacked, giving rise to light-yellow or straw-coloured spots of fairly regular outline surrounded by a narrow brown margin. These spots are usually developed in connection with scratches caused by the spines of contiguous leaves. While not in sufficient numbers to have any deleterious effect on the plant, these lesions may serve as one means for the perpetuation of the fungus in the field.

To avoid Thielaviopsis fruit rot care must be given to handling and packing in order to avoid any injury which might aid the fungus in its attack. The farm must be kept free from rotting fruit and other pineapple refuse, as this may cause the accumulation of the fungus spores, which will contaminate the air in which marketable fruit has to lie.

Fruitlet Core Rot.

This disease is one found more commonly in connection with the winter crop of pines at a time when loss can be ill afforded on account of the high prices then obtainable.

Symptoms.

The first symptoms may appear as the fruit approaches maturity, in the form of a failure of an isolated fruitlet or group of fruitlets to mature in conformity with the rest of the fruit. The affected portion retains a greenish colour while the rest is undergoing the normal yellowing. In other cases an affected fruit may exhibit no apparent external symptoms of the decay which may be present within. On cutting through one of these affected fruitlets there will be found a more or less extensive area of brown decay extending inwards from the base of the floral chamber. (Plate 132, fig. 2.) The extent to which the rot will extend depends on the number of fruitlets affected in the first place, and the conditions to which the fruit has been subjected favouring spread through the tissue. In some cases a considerable portion of the fruit may be involved, while in others there is little interference with the edible qualities.

Cause.

Fruitlet core rot was first investigated in Queensland by Tryon in 1898, and the results of his work published in the "Agricultural Journal" of that year. He considered a mite (*Tarsonemus ananas* Tryon) to be the primary cause of the trouble so far as the Ripley Queen variety of pines was concerned. This mite is found in the cavity enclosed by the fleshy floral organs of the fruitlets, and in pursuance of its feeding habits pierces the softer tissue at the base of this floral chamber. A fungus (*?Monilia sp.*) which commonly occurs in the cavity is able to extend by means of these injuries and set up the rotting condition characteristic of the disease. The same author considered a similar disease affecting the smooth-leaf pine to be of a somewhat different character, since the fungus associated with it belonged to the genus *Penicillium*. Lately isolations made in separate instances from Ripley pines have yielded a *Penicillium* and a *Fusarium* apparently unassociated with other organisms, suggesting their possible causal relation to the rot.

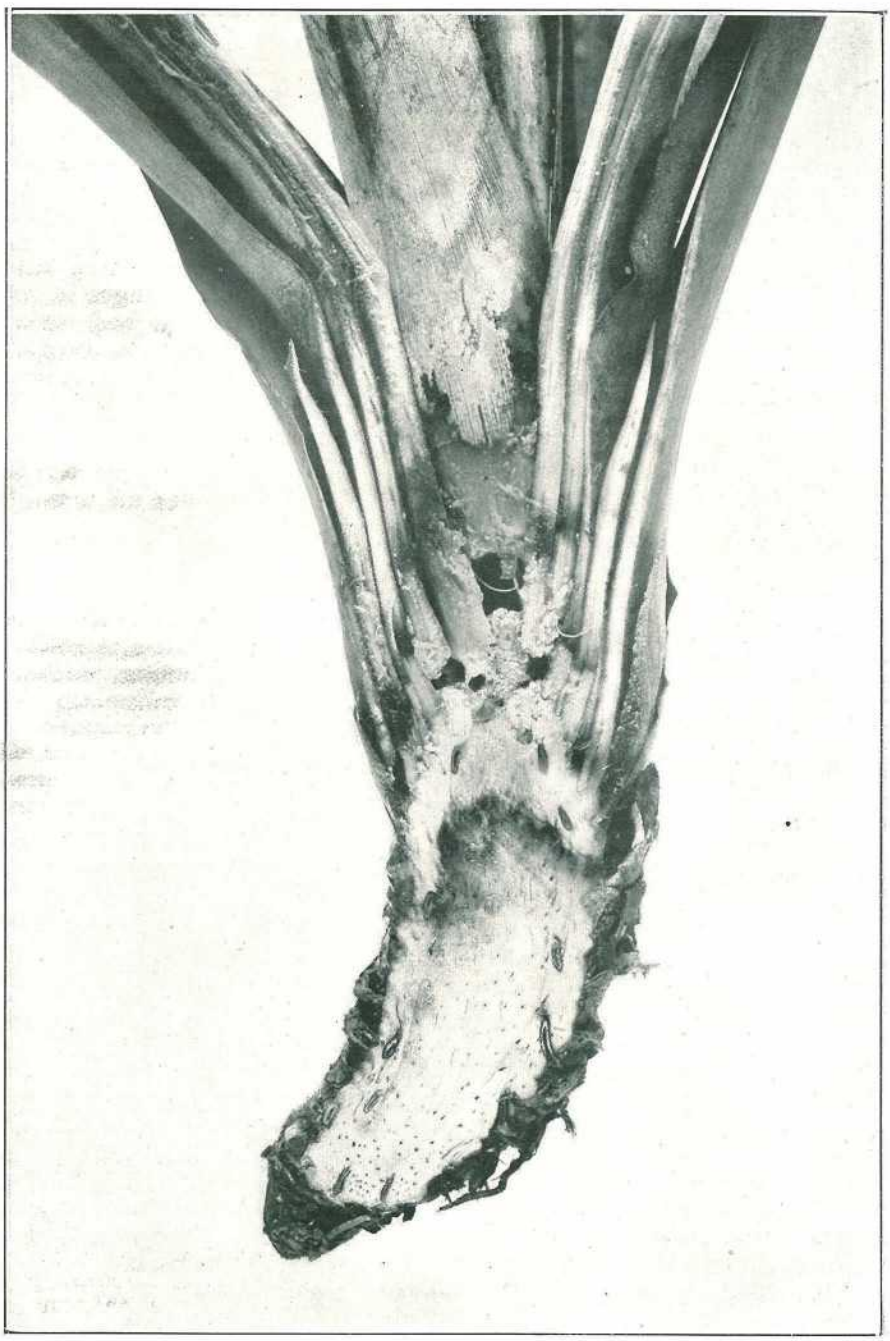


PLATE 133.—LONGITUDINAL SECTION OF PINEAPPLE AFFECTED WITH TOP ROT.

Control.

Before definite control measures can be recommended, further research will have to be undertaken into the general biology of the pineapple flower and the various fungi associated with rots of this type, giving special attention to their mode of transmission, infection, &c.

It has been noted that the extent of rotting is aggravated by tight packing, and care in this respect may help to alleviate the damage caused by this disease.

Top Rot.

Top rot is a disease which is rather sporadic in its distribution and for this reason may be unknown to many. It is only recently that this trouble has received attention, and many points have to be cleared up before definite control measures can be advocated. However, since a number of growers are concerned regarding this disease, a short note dealing with it is included here.

Symptoms.

The general appearance of a plant affected with top rot is not unlike the condition commonly known as "wilt." There is usually a certain amount of stunting and yellowing of the plant as a whole, and the leaves, especially the younger more upstanding ones, die back and shrivel from their tips. Finally the leaves fall flat and the plant breaks off about ground-level, when the upper portion of the stem will be found to be completely rotten. In the early stages of the disease, in order to determine whether top rot, rather than other causes of "wilt" symptoms, is present, it is necessary to attempt to pull out the terminal crown of leaves. If the plant is affected this will come away easily, and the leaves will be found to exhibit a light or somewhat mud-coloured rot at their base.

Infection appears to commence at the top of the stem. A longitudinal section of an affected plant will show an area of rotting tissue, flat-white in colour, near the apex. This may be of a fairly firm nature, but commonly invasion of soft-rot organisms produces a foul-smelling soft rot. (Plate 133.) The rot extends through the stem, working up through the leaf-bases as these are reached. The leaves are not usually invaded for more than half an inch up except towards the top of the stem, where more may be included and even the whole of the young terminal shoot affected. The advancing edge of rot in the leaves is defined by a somewhat irregular water-soaked band, while in the stem and older leaf-bases there is a definite dark-brown border. Top rot may affect scattered plants, but it is more common to find certain areas of the plantation exhibiting a fairly high percentage of infection while the rest is practically free. A loss of from 60 to 70 per cent. has been noted in such places. This localisation does not appear to be dependent on special soil factors.

The disease may be found affecting all the common commercial varieties of pineapple, though possibly the Ripley variety has shown the highest infection. Plants grown with and without paper mulch may be attacked. Loss from top rot occurs in new plantings before the first fruit are thrown; older plants appear to be rarely attacked.

Top rot makes its appearance about the middle of winter, and from then onwards until early summer plants may be found showing the disease in various stages. Apparently the disease reaches serious

proportions only after seasons when the summer and autumn rains have been exceptionally heavy.

Control.

A fungus (*Phytophthora sp.*) has been isolated in several instances from the margin of invasion into young leaves. Although it is considered possible that this organism is causally related to the disease, a definite conclusion will have to await the results of inoculating this fungus into healthy pines. In the meantime it may be assumed that the disease is of a parasitic nature. There is also evidence that spread of the disease takes place by means of spores formed in connection with the decaying leaf-bases. The water lodging round the bases of the leaves forms an excellent situation in which spore production and also infection may take place.

It is therefore recommended that affected plants be carefully removed and burnt as soon as they are detected; in this way spread of the disease may be considerably checked. Some growers have been in the habit of leaving the old butt in the ground, since a shoot will often appear from below the rotted region and a healthy plant result. This is unwise, as the remains of the previously rotted portion may serve to spread the disease to other plants later.

Tangle Root.

Tangle root is not a disease of a parasitic nature, but is due to a combination of certain unfavourable meteorological and soil conditions.

Symptoms.

Tangle root appears usually in a newly planted field. Certain of the young plants fail to keep pace with their companions, and commence to assume a reddish-yellow colouration of the leaves, which gradually die back from the tips. The number of affected plants varies considerably, and these are usually scattered indiscriminately along the rows.

Cause.

The aboveground symptoms somewhat resemble wilt, but on pulling up a plant the difference will become apparent. It will be found that the roots, in place of radiating evenly from the base of the sucker, are wound tightly round the stem beneath the persistent leaf-bases. (Plate 134.) The roots in this condition are unable to perform their normal function of nourishing and sustaining the growth of the plant.

The trouble arises from planting suckers during dry weather in badly worked or stiff soil. Under these conditions the lower leaves do not rot off, and the roots developing from dormant buds lying beneath them are forced to circumnavigate the stem in their efforts to find a way out of the soil. Daughter suckers on older plants may sometimes exhibit the same trouble and fail to root, when, as is usually the case, they bend over to the ground, thus leaving the fruit less well nourished.

Control.

1. Tangle root may be easily prevented by stripping off a few of the lower leaves of the suckers, which should then be dried for a few days in the sun in order to lessen the chance of subsequent rotting by *Thielaviopsis*.

2. Plant only in well-worked land that is not in an excessively dry condition. See that good cultivation is afterwards maintained.

Other Pineapple Diseases.

Certain other diseases of the pineapple, such as black heart and water blister, are more or less of seasonal occurrence, and are possibly of physiological rather than parasitic origin. Little is known regarding these maladies, and investigation of these and other pineapple diseases is being prosecuted as opportunity permits.

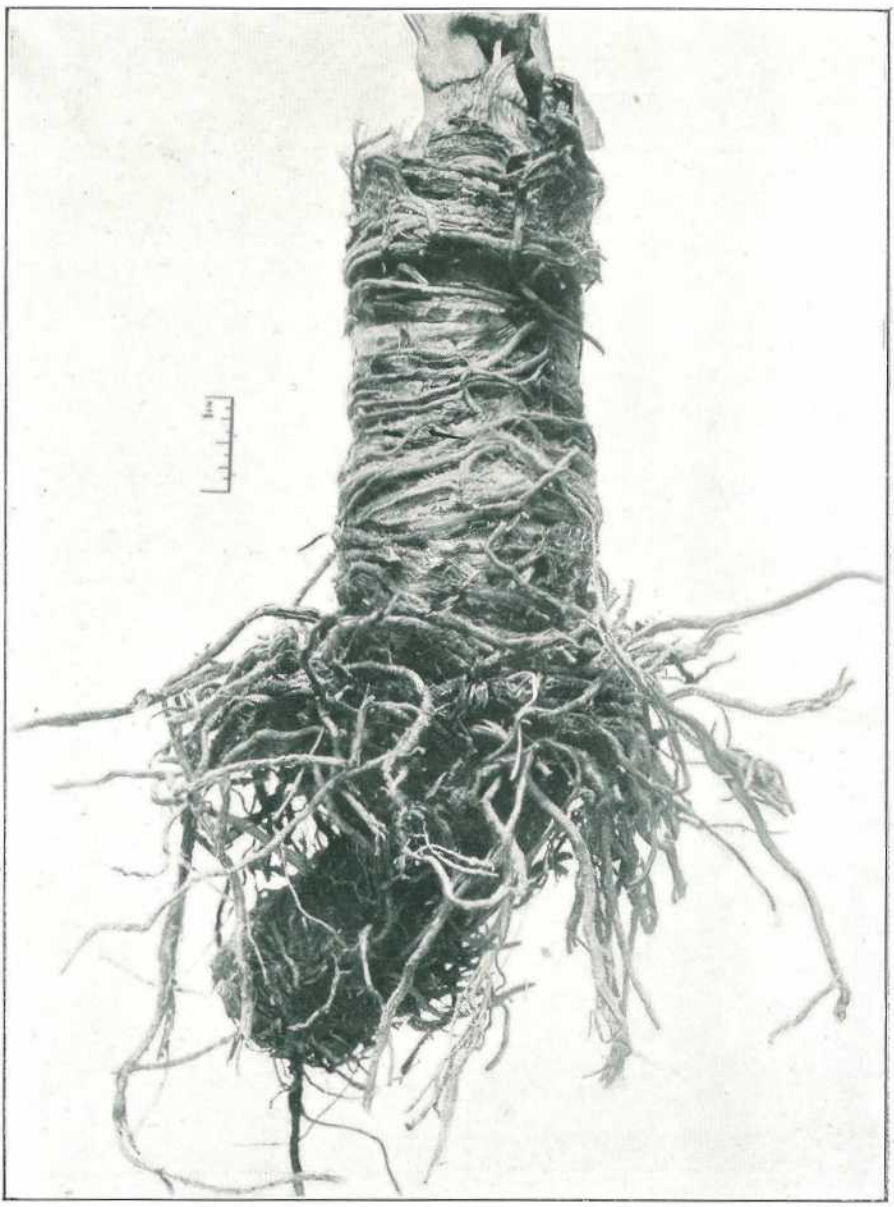


Plate 134.—Pineapple Plant with Leaf-bases removed to show Tangle Root condition.

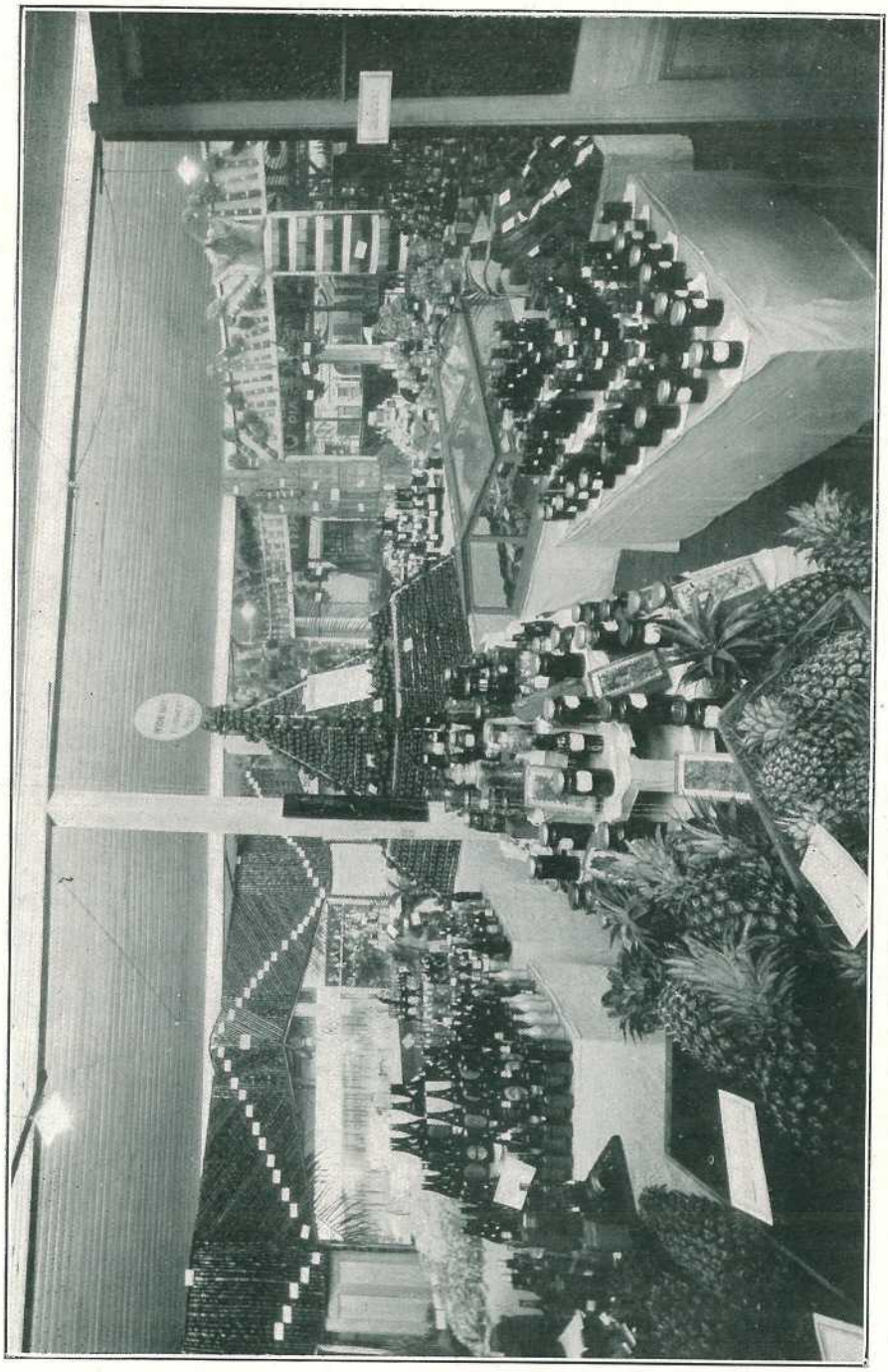


Plate 135.—Wide Bay and Burnett District Exhibit, 1st in A Grade. Royal National Show, Brisbane, 1929.

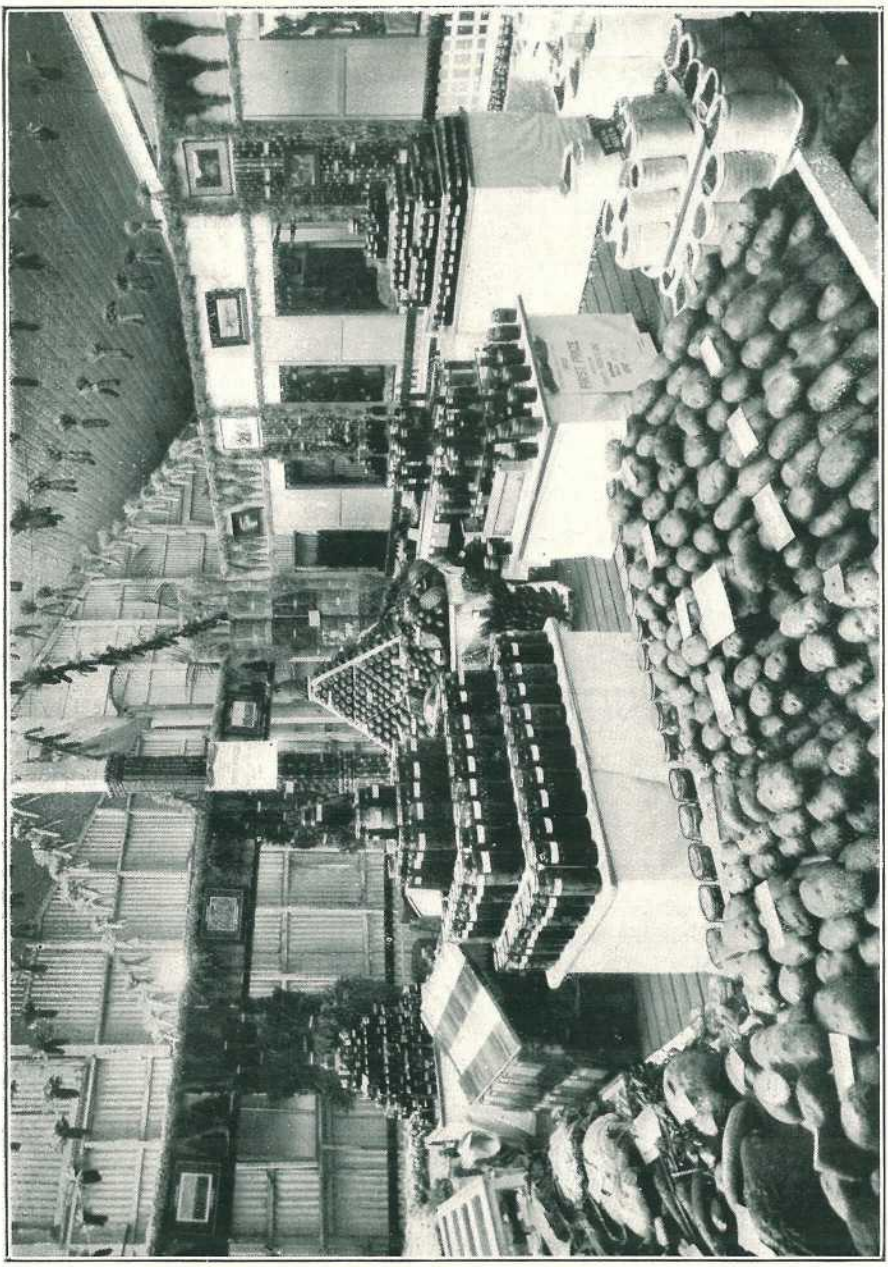


Plate 136.—Brisbane Valley District Exhibit, 1st in B Grade. Royal National Show, 1929.
The great and varied resources of the valley of the Brisbane River were well illustrated at the recent Exhibition.

AGRICULTURAL BANK ACT.

MINISTER'S SPEECH ON AMENDING MEASURE.

A BILL to amend the Agricultural Bank Act was introduced to the Legislative Assembly on 5th September by the Minister for Agriculture and Stock, Hon. Harry F. Walker. In the course of his initiatory speech, which is taken from "Hansard," Mr. Walker said:—

This is a very small Bill, which the Government have considered desirable to introduce as a result of experience during the last few months. One of the objects of this Bill is to provide for the granting of relief to necessitous clients of the Agricultural Bank in the payment of their instalments of interest and redemption. Usually borrowers are in a position to fulfil their obligations, but occasions arise when it is desirable to be in a position to extend as much leniency as possible. At the present time relief can only be afforded by the making of a fresh advance involving the execution of further securities, and always a certain amount of expense. This Bill will obviate this unsatisfactory position.

When the original Agricultural Bank Act was passed in 1901, the intention was that the Crown, as usual, should have priority over all other creditors; but, following on the passing of the Agricultural Bank Act of 1923, it was found that a purchaser buying a foreclosed property from the Agricultural Bank became liable for all arrears of rates thereon. This Bill will give the Crown's debt its usual priority over all other charges, assessments, etc., that may have been levied by various authorities. It provides, also, that local authority rates and other dues shall not be recoverable from the bank or the person who buys the foreclosed property from the bank. However, where sufficient moneys are realised on the sale of the assets, the bank may liquidate such rates, &c., out of the surplus. That is the principal clause of the Bill, and the only one which you can say is of any great importance in it. This amendment arises from a decision given in a recent law case.

There is another small clause giving the manager of the Agricultural Bank or any officer of that bank the right to become an auctioneer to sell properties disposed of by the bank.

Mr. W. Forgan Smith: Those are properties where the bank is in possession?

The SECRETARY FOR AGRICULTURE: That is so—properties of which the bank is in posesssion and which are about to be sold. This clause will place the manager or an officer of the bank on the same footing and possessing the same power as is held by an officer of the Public Curator. That is the sum total of the Bill, which is quite a small one.

The limit of the advance is 16s. in the £1; but in some cases applicants are advanced the full amount required. This Bill will not affect the advances made by the bank.

Financing New Settlers.

I realise the hardship imposed on new settlers so far as finance is concerned on account of the tightness of the money market; but their lot has been eased somewhat by the smoothness of the working of the administration, although the advances specified in the Act at the present time cannot be altered because of the present position of the money market. I think the main objection with regard to the Agricultural Bank is due to the fact that the whole of its administration is from Brisbane, and its clients extend as far as the Atherton Tableland and even further north. Consequently, certain delays have taken place. I hope that, as time goes on and more capital is obtained, the bank will have more money at its disposal. That will enable applications for loans to be expedited, and obviate the delay arising in connection with making advances to clients.

MR. WALKER'S SECOND READING SPEECH.

Subjoined is the "Hansard" report of Mr. Walker's second reading speech on the measure:—

The SECRETARY FOR AGRICULTURE (Hon. H. F. Walker, *Cooroora*): I have very little to add to what I said when introducing this measure beyond stating that, when the original Agricultural Bank Act was put on the statute-book in 1901, it was intended that moneys advanced under the Act should be secured to the Crown in priority to all other charges, liens, or encumbrances, and, further, that the bank's security should be prevented from being disturbed by any means whatsoever, including any sale under a judgment, execution, or any process of law. Hence, in the Act

and subsequent legislation dealing with the making of advances by the Crown, it is provided that no judgment, order, or decree of any court of law shall in any way interfere with the security for any advances made.

In view of counsel's opinion obtained in 1924, it has been contended by the Crown since that date that section 25 of "*The Agricultural Bank Act of* 1923" provides that, from and after the execution of any mortgage in favour of the bank, any rates levied by and payable to any local authority in respect of a property mortgaged to the bank were not protected, and that the bank was not liable for the payment of rates, and that a purchaser from the bank obtained a title free from arrears of rates. That is the principal clause in the Bill; the others, which are of a minor character, have been dealt with minutely. . . .

The Bank's Liability.

. . . . Recently, a local authority sued a purchaser from the bank, as the duly constituted agent for the Secretary for Public Lands, of a property mortgaged to the Secretary for Public Lands to secure the repayment of certain advances under the provisions of the Discharged Soldiers' Settlement Acts, which Acts are read and construed as one with "*The Agricultural Bank Act of* 1923," for rates which had accrued prior to the date of sale, and succeeded. The then Government authorised the bank to appeal against the decision; but the Full Court of Queensland dismissed the appeal. The effect of the Full Court's decision is that, in the event of any sale by the bank as mortgagee in possession, or as agent for the Secretary for Public Lands, the purchaser may be liable for the payment of arrears of rates. As a matter of fact, the judgment went a great deal further. The bank to-day is not only responsible for the arrears of rates, but is also responsible for such items as the Leader of the Opposition mentioned just a few moments ago. It also makes the bank responsible for the clearing of noxious weeds on behalf of local authorities, and is also responsible under the Fencing Act. The Agricultural Bank was established for the one purpose of helping people on the land in poor circumstances, and should never be liable for any of those matters to which I have referred. Of course, some people think the Agricultural Bank should be put on the same footing as a private bank.

Mr. W. Forgan Smith: It could not be.

The Secretary for Agriculture: The Leader of the Opposition, who administered this Act for some considerable time, knows that that could not be, for the simple reason that it is purely a bank to help the small selector to get a start in life.

Mr. W. Forgan Smith: In addition to that, you pay interest on all money you use, and do not have the same margin to work on as an ordinary trading bank.

The Secretary for Agriculture: A private bank charges a great deal more interest. Private banks also get better customers, and they also have power to judge as to the character of an individual, and so on, whereas the Agricultural Bank has to take an applicant on his face value—that is, on the report as to whether the work can be done, and whether the security is sufficient to cover the loan.

Mr. W. Forgan Smith: They take into consideration the individual applicant, too.

The Secretary for Agriculture: We thought the Agricultural Bank was secured in such a way that the bank could carry on; but since this judgment of the Full Court, we find the bank is liable for thousands of pounds, which may be called in at a moment's notice. Naturally no bank could stand that. The ordinary bank, when making an advance, can secure itself in many ways. First of all, it is a bank of profit; secondly, it can take into account the character of the individual; and, thirdly, private banks have establishments all over Queensland in sufficient numbers to give quick administration. What is more, the bank's managers have power to advance small amounts without any further authority. Of course, all questions of large advances are referred to the head office; but the Agricultural Bank is in quite a different position. It would never do for the Agricultural Bank to be administered in any other way than it is to-day in regard to the protection of the advances made from time to time. During the previous stage of the Bill certain criticisms were levelled at the bank in regard to delays in making advances, and especially in regard to sympathetic administration and the need for decentralisation in many cases. References were also made to the fact that to-day the bank had no power to do these things. Since then I have taken the trouble to go into the matter, and I find that all these things can be done without any further amendment of the Act. . . . As times goes on, we see the need of these things. I have hopes of seeing the Act administered in such a way that it will give satisfaction to those who come under the scope of its lending powers.

The Efficiency of the Bank.

The inspection staff at the present time is very small, and does not cover the amount of work which takes place from time to time. When a man makes application for a loan on the initiation of a new farm, the property has to be reported on. The inspector may have to go 50 miles, inspect the property, and then send his report to Brisbane. Consequently, there is a certain delay; but, notwithstanding the alleged delay which takes place, I was astonished to see the efficiency with which the work was carried out. It must not be thought that, because I am administering the affairs of the bank, I am unduly eulogising the members of the staff. The work with regard to inspection is carried out as expeditiously as possible, but in some cases the inspectors are very far apart, and it may be necessary to put on more inspectors from time to time with a view to getting the work done more quickly. It may be thought wise later on to establish a branch up north with greater authority. That is a phase of the question which struck me very forcibly while I was in the North. I really think that part of the State is too far away to get effective and quick administration. A man may apply for an advance of £100 to fell scrub. After the application is made the inspector has to go along and see that the scrub has been felled before the money is granted. That is another delay, showing conclusively that there is a lot in the argument for greater authority being exercised up north. If the inspection, for instance, cost 30s. per day, it would mean a considerable amount, because an inspector may have to make a dozen visits before the borrower's requirements are met. It will, therefore, be seen that the inspection of these properties is a very big item to the bank. When I mention that last year the inspection fees showed a loss of £7,801, and that the loss for eight or ten years past has been approximately the same, it shows what an expensive item it is. It also shows that, to get these inspections made rapidly, it would cost a great deal more. That is a phase of the question we have to take into consideration with regard to the expense of working the bank.

It is rather a peculiar position to be in; but I want hon. members to realise the position, so that they will not be harsh in their criticism of the Bill, because I am satisfied that matters can be greatly improved by decentralisation to a certain extent and putting on more inspectors, which we have power to do. As I have pointed out, the advances made by the bank are for the purpose of assisting primary production, and not for helping the man who has a really good security.

Risks that are Run.

At the present time the bank runs many risks. One of the faults we find is that the bank at times has lent too much. It has a very liberal margin—£1,700 is the maximum amount of advance now—but in many cases the bank has lent too much to individuals in order to secure the business; and that is the reason why local authorities have experienced a great deal of trouble in collecting their rates. In view of the very liberal advances made by the bank originally, no margin of security remains if there should be a depreciation of improvements and mortgaged properties have been abandoned. Anyone who goes on the land knows perfectly well that, if you do not get a good fall, you may get a heavy growth of noxious weeds the first year, and if you leave it till the second year it is worse than it was before the original falling of the scrub. You may have a large growth of noxious weeds and foreign grasses, which will depreciate the value of the security, showing the risk which the bank runs at the present time.

Local Authorities Protected.

The question then comes up whether the bank has played the game with local authorities. I think that the bank has done remarkably well, and has protected local authorities in every case where it was possible to do so. Of course, if they have overloaded the security or made too great an advance above the actual value of the security, the bank is unable to give the local authorities anything at all; but the bank has helped them in every way, and, if the bank is to be held responsible for all the rates owing on properties in its hands, then hon. members will understand that some local authorities may be inclined to use the bank to collect their rates. Such local authorities may say, "These properties have the bank behind them. We will whip a bill into the bank and collect the rates from it." I have a case in point. There was a proposal in respect of a certain drainage area which I put before the Premier. In that district the local authorities would not father the scheme because they said that the bank to a certain extent would interfere with them in collecting the rates from the holders of mortgaged lands in the district. I had a complete return of the lands in respect of that area, and I found that the outstanding rates owing to that

local authority were greater on properties other than those in the hands of the bank than they were on the bank's properties. In other words, there was negligence on the part of the shire council in carrying out its work of collecting the rates. So hon. members will see what a grave danger would be created if the amendment were not made in the Act as the Bill proposes. In this connection hon. members must bear in mind that the Agricultural Bank helps local authorities in many ways. It requires new applicants to pay rates before receiving loans; it requires borrowers to pay accruing rates on advice from local authorities that rates are unpaid; it includes in the reserve price of properties being disposed of for default a sum sufficient to pay rates up to date; and it pays local authorities rates from the proceeds of the sale of such properties where such proceeds are sufficient to enable it to do so. I think hon. members will agree that local authorities get every protection from the Agricultural Bank; but, after all, the rates are really nothing in comparison with the other items for which the bank might be held responsible accordng to the judgment of the court, without the right of appeal to any court of law. It was generally thought that the power I now propose to take was in the original Act, and it was only through the case to which I have referred that the discovery was made as to the far-reaching effect of the burden which might be placed upon the bank.

Minor Matters.

The other clauses in the Bill are of minor importance. One of them deals with the appointment of the manager of the bank or other officer as a licensed auctioneer for the purpose of conducting sales at public auction, wherever possible, whilst the other is designed to grant relief from the payment of redemption instalments in necessitous cases. At present fresh securities have to be registered, which in some cases costs a considerable sum, and it is proposed by this Bill to do away with that procedure, and thus expedite the business of the bank and save the applicants further trouble and expense.

I do not think I can add anything more to what I said on the initiation of the Bill in Committee. I have given hon. members some idea of the principal clauses, and I have very much pleasure in moving—

"That the Bill be now read a second time."

THE SIMAR ROTOTILLER.

An interested gathering of farmers and experts followed the movements of a motor-driven implement, novel to most of them, which was demonstrated recently at the dairy farm of Mr. Stewart Conochie, on the Sherwood road, Oxley Creek. As long ago as 1924, Mr. A. C. Elphinstone, while on a visit to the Wembley Exhibition, was so much attracted by what he saw of this implement that he took occasion to run across to the Continent for the purpose of visiting the factory in Switzerland where it was being manufactured. He has now secured for Elphinstones Limited the sole distributing rights in Queensland. The machine domonstrated was what is known as the 10 h.p. size. Essentially it consists of an engine which can be worked either on petrol or kerosene, carried on a pair of broad-tyred wheels and directed by means of a suitable pair of handles controlled by the operator who walks behind. The engine drives a shaft or "miller" on which are mounted suitable tines revolving at a rapid rate, and which in their impact upon the soil tear the apparatus forward at a pace practically as fast as the man can walk. Three types of tine are supplied suitable to different classes of work. The engine power can also be made available for any class of work within its h.p. capacity.

The land on which the demonstration was given was old paspalum pasture, dry, and hard-trampled by stock. The matted growth was easily torn up by the rototiller. Work was shown also on cultivated land, dry and lumpy, in which the machine prepared an excellent seedbed at a single operation. Experienced farmers considered that it would be excellent for renovating either pastures or old lucerne fields, loosening the soil without destroying the roots, and that it would be most useful for working in orchards or market gardens. The fact that the controller of the machine would have to walk was regarded by some as an obstacle in the way of using it in cane cultivation, but by others it was thought that it would prove exceedingly useful in working up and down the cane rows in the earlier stages, loosening the soil and eradicating weeds.

Plate 137.—First Prize One Farm Display, Exhibited by W. D. Ponton, Tuggerah, Royal National Show, 1929.

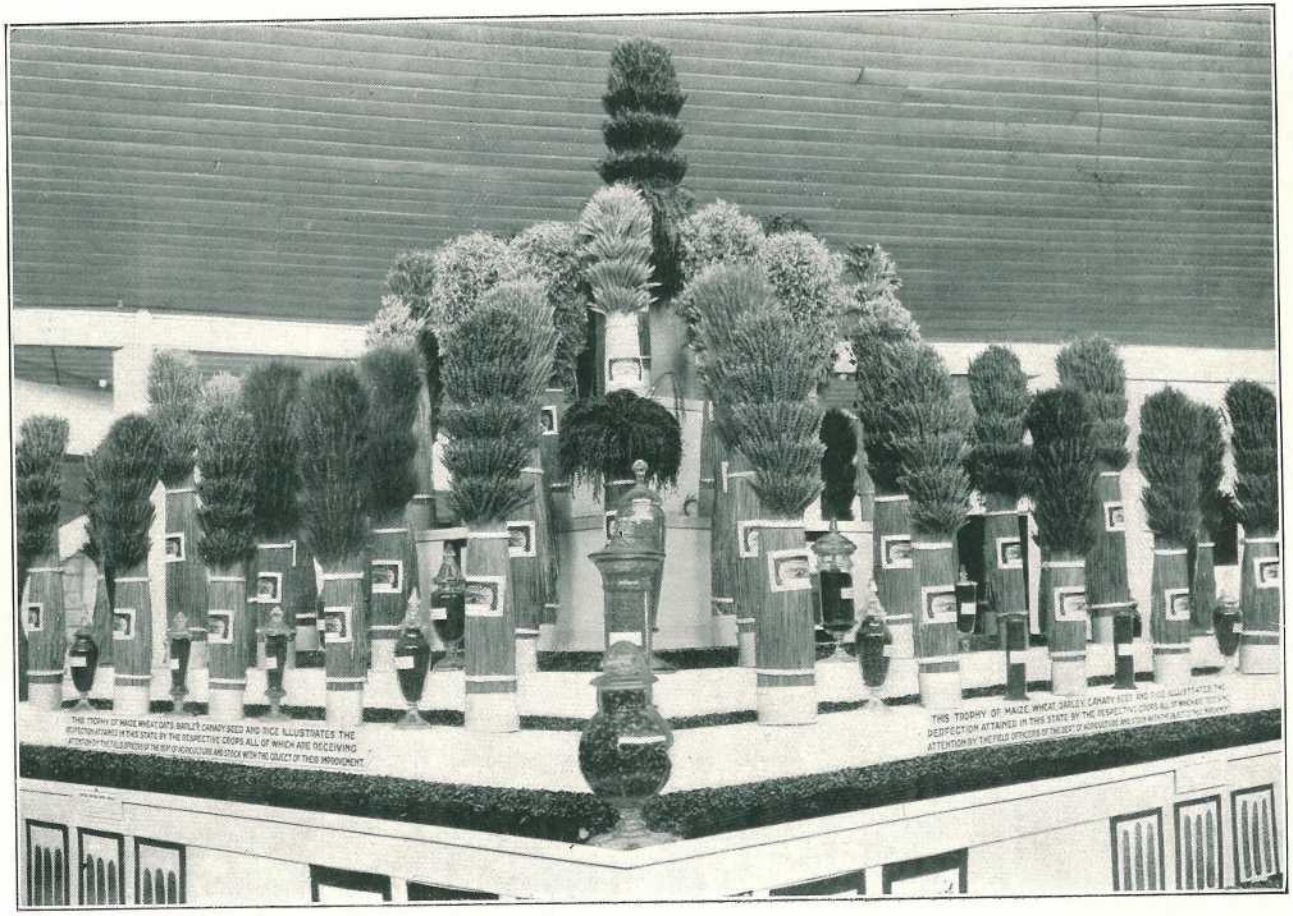


PLATE 138.—SCIENCE ASSISTS IN THE EVOLUTION OF NEW CEREALS.

The highly technical work of wheat-breeding for Queensland conditions of Summer rainfall was well illustrated by this trophy at the Brisbane Exhibition.

IN MEMORIAM—HENRI A. TARDENT.

By the death on Thursday, 5th September, at his home, "Ormonts," Wynnum, of Henry A. Tardent, Queensland lost a citizen of the best and most patriotic type. Born in Switzerland seventy-seven years ago, the late H. A. Tardent, though practically self-educated, proved himself a brilliant scholar, with a special gift for languages. At the age of sixteen he went to Poland as a teacher of French. Later he went to Russia, and graduated at Odessa University as Professor of the French and German languages. In 1887 he migrated to Queensland. For some years he was at Roma, where he entered into wine-making and general farming. Later he became the first manager of the Westbrook and Biggenden State farms. Afterwards and almost until the end he followed up journalism and literature, serving for some years on the staff of the Brisbane "Daily Standard," and contributing numerous articles to "The Worker" as well as to other papers. He was the author of many treatises, biographies, and essays. Besides his contributions to Australian papers, he was this country's correspondent to the Paris "L'Illustration," the "Revue," of Geneva, and the "Gazette de Lausanne." His published works (some of them prize essays) include biographies of Richard John Randall (Queensland artist), George Essex Evans (Queensland poet), and Mrs. Ellis Rowan, whose paintings of Australian wild flowers are of the highest order of artistic excellence. He also wrote "Reflections on an Australian Literature," "The "Influence of Poetry on Modern Life," "Art and Its Value as a National Asset," "The Functions of the State in Relation to its Commercial Life," "Arbitration v. War for the Settlement of International Disputes," "The Future Development of Western Queensland," "Science as Applied to Agriculture," and "Australia's Contribution to the World War," besides numerous works in French on various phases of Australian life and its development. He was some time contributor to this Journal. His writings in French and Swiss publications, marked as they were by a high literary tone, did much to bring Australia, and particularly Queensland, before the eyes of large and new audiences in Europe, with results wholly beneficial to the country's reputation that are difficult to appraise. An article by him on "The Birth of Canberra," starred in the Paris "L'Illustration" with appropriate photographs, was a brilliant example of the best in high-class journalism, and probably proved one of the most effective advertisements the Commonwealth has received in any country outside of Britain itself. As a crowning and fitting climax to his numerous contributions to French papers, work regarding which but few Australians had any knowledge, he was awarded in March by the French Government the distinction of O.A. (Officier d' Academie) for services rendered to literature, science, and art.

The funeral to Bulimba Cemetery was largely attended, those present including the Consuls of Switzerland and France, and representatives of the Authors and Artists' Association, Royal Geographical Society, Alliance Francaise of Brisbane, various Labour organisations, different departments of the public service, and other bodies.

Among those gathered around the graveside were many—men of culture from our universities, men of science, men of letters, and men of affairs—who knew that the sad ceremony in which they were taking part was no ordinary one, but that the casket being committed to the earth in their presence contained the remains of a good Australian—one whose work and worth, recognised during his life by an ever-growing circle, will be appreciated more and more as the future unfolds. For Australian culture, still in its formative stage, owes a debt to Henri Tardent—its sponsor and champion, its guide, philosopher, and friend. When it is rightly understood, when Australian art, letters, science, music, and all the various forms of national self-expression in their highest come into their own, Henri Tardent will be accorded a place in the history of its development that his pioneering labours on its behalf and his unbounded faith in its future have earned for him.

With his possession of high intellectual qualities, wide scholarship, and culture in many branches of study, Henri Tardent was one of those rare souls who, by his sunny nature and overflowing good will, endeared himself to those fortunate enough to be numbered among his intimates.

CLIMATOLOGICAL TABLE—AUGUST, 1929.

Supplied by the Commonwealth of Australia, Meteorological Bureau, Brisbane.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means.		Shade Temperature. Extremes.				Rainfall.	
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·05	80	69	83	14, 24	59	25, 2	43	7
Herberton	..	73	51	82	23	34	25	6	1
Rockhampton	30·14	77	54	87	22	42	25	5	3
Brisbane	30·17	72	51	83	22	42	3	95	4
Darling Downs.									
Dalby	30·17	73	41	83	30	30	7, 8	29	5
Stanthorpe	..	62	34	74	16	24	3, 7	113	7
Toowoomba	..	66	42	78	16	26	8	69	5
Mid-interior.									
Georgetown	30·02	85	53	90	13, 14	40	2	0	..
Longreach	30·10	81	48	93	22	36	25	0	..
Mitchell	30·15	72	41	86	15	26	1	39	3
Western.									
Burketown	30·04	83	58	91	23	49	3, 4	0	..
Boulia	30·08	80	51	93	14	40	8	0	..
Thargomindah	30·13	71	46	90	15	33	12	10	2

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of August in the Agricultural Districts, together with Total Rainfall during August, 1929, and 1928, for Comparison.

Divisions and Stations.	Average Rainfall. Aug.	Average Rainfall. No. of Years' Records.	Total Rainfall. Aug., 1929.	Total Rainfall. Aug., 1928.
North Coast.	In.		In.	In.
Atherton	0·84	28	0·26	1·08
Cairns	1·74	47	0·84	0·59
Cardwell	1·30	57	0·24	0·98
Cooktown	1·29	53	0·43	0·02
Herberton	0·64	42	0·06	0·12
Ingham	1·51	37	0·47	0·67
Innisfail	5·10	48	1·85	3·78
Mossman	1·29	16	0·33	0·14
Townsville	0·53	58	0	0
Central Coast.				
Ayr	0·61	42	0	0
Bowen	0·67	58	0·27	0
Charters Towers ..	0·58	47	0	0
Mackay	1·08	58	0·19	0·17
Proserpine	1·39	26	0·74	0·70
St. Lawrence	0·87	58	0	0·12
South Coast.				
Biggenden	1·07	30	1·42	0·35
Bundaberg	1·30	46	0·39	0·25
Brisbane		78	0·95	1·05
Caboolture	1·56	42	1·00	0·98
Childers	1·22	34	0·82	0·28
Crohamhurst ..	2·22	36	1·25	1·07
Esk	1·54	42	1·43	0·70
Gayndah	1·18	58	0·69	0
Gympie	1·76	59	1·21	0·49
Kilkivan	1·45	50	1·80	0·30
Maryborough ..	1·68	57	0·70	0·42

Divisions and Stations.	Average Rainfall. Aug.	Average Rainfall. No. of Years' Records.	Total Rainfall. Aug., 1929.	Total Rainfall. Aug., 1928.
South Coast—continued :				
Nambour	1·89	33	0·07	1·05
Nanango	1·35	47	0·32	0
Rockhampton ..	0·98	42	0·05	0·05
Woodford	1·75	42	1·06	0·73
Darling Downs.				
Dalby	1·22	59	0·29	0
Emu Vale	1·18	33	0·77	0·21
Jimbour	1·21	41	0·64	0
Miles	1·17	44	0·44	0
Stanthorpe	1·82	56	1·13	0·37
Toowoomba ..	1·71	57	0·69	0·90
Warwick	1·53	64	0·68	0·23
Maranoa.				
Roma .. .	0·97	55	0·21	0
State Farms, &c.				
Bungeworgorai ..	0·90	15	0·19	0
Gatton College ..	1·19	30	0·02	0·63
Gindie	0·71	30	0·15	0
Hermitage	1·33	23	..	0·35
Kairi	0·95	15	..	1·11
Mackay Sugar Experiment Station ..	0·95	32	0·24	0·05
Warren	0·91	14	..	..

GEORGE G. BOND, Divisional Meteorologist.

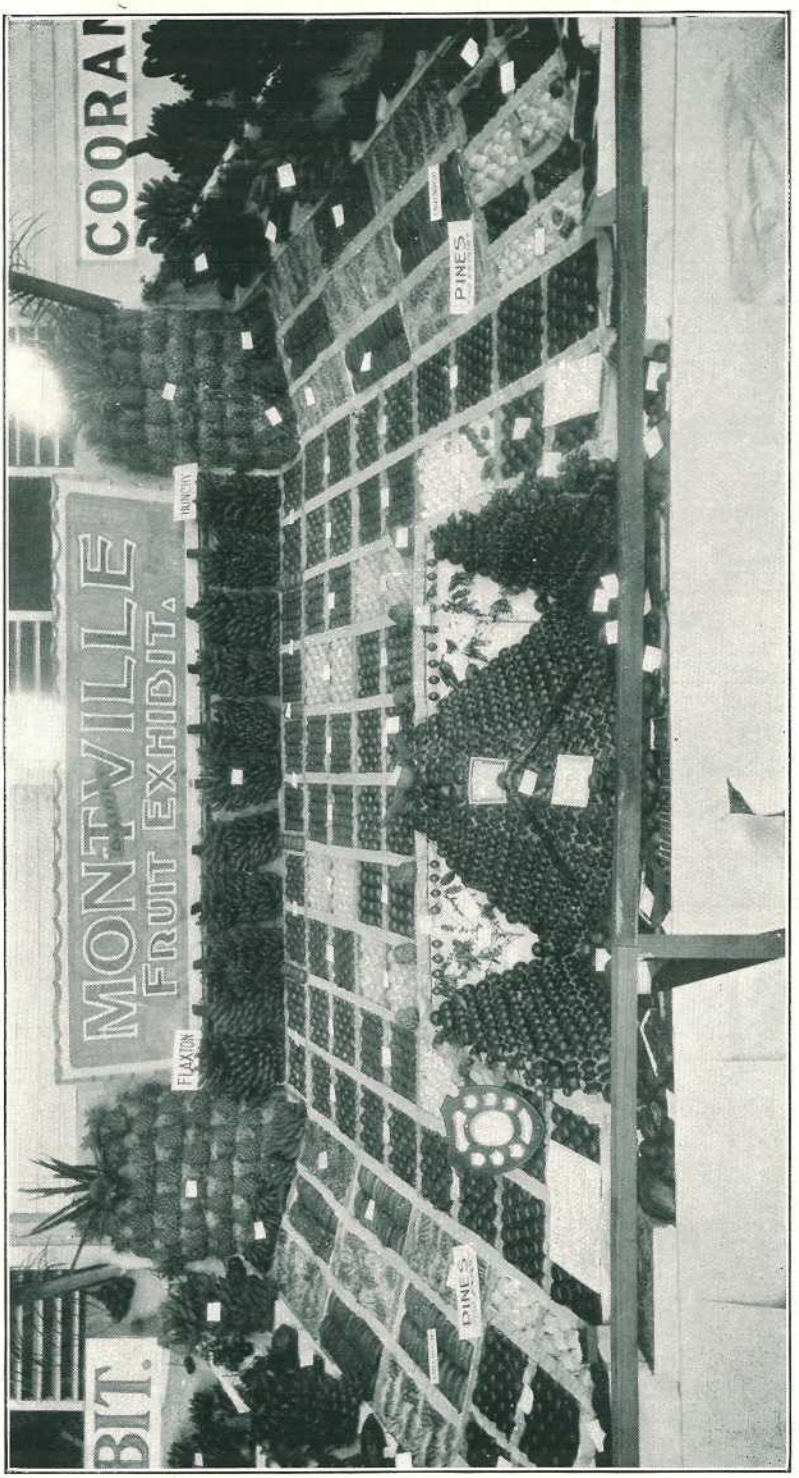


PLATE 139.—CITRUS AND OTHER FRUITS FROM THE BLACKALL RANGE. MONTVILLE DISTRICT FRUIT EXHIBIT AT THE BRISBANE SHOW, 1929.

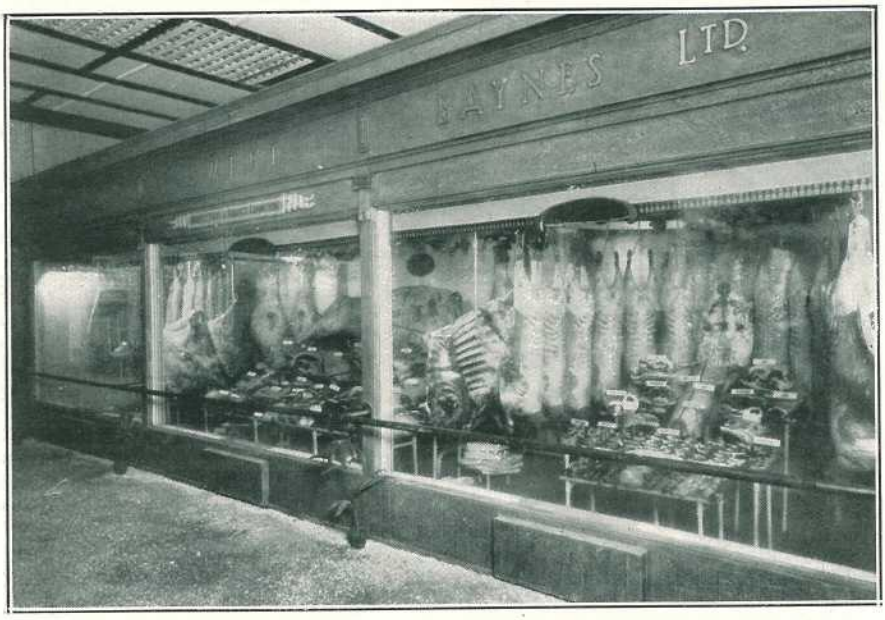


Plate 140.—Food for the Million.
A section of the Meat Industry Exhibit, Brisbane Show, 1929.

Plate 141.—By-Products of the Meat Industry illustrated impressively the Interlocking of Primary and Secondary Industry at the recent Brisbane Show.

RURAL LIFE IN OTHER LANDS—V.

By the EDITOR.*

JOURNEYINGS IN GERMANY.

Our first halt across the Border was at Aix-la-Chapelle—called Aachen by the Germans—Charlemagne's old headquarters and a city of ancient historical importance centred in a fertile basin surrounded by gently sloping hills. Though retaining its mediæval features it is now quite a modern city with fine, broad streets and attractive shops. Manufacturing is its main supporting industry and, significantly enough, smoke was pouring in dense volumes from every factory chimney. From there the way went on past the Castle of Frankenberg, through the Nurmer tunnel and the Reichsbusch Wood out into a picturesque district of busy industry based on iron and coal. Then came Eschweiler, set in a pretty valley, and then Duren, another very active centre. The line from there ran out on to a fertile plain studded with farmhouses and factories. The twin spires of the great Cathedral of Cologne, the square tower and tapering spire of St. Martin's, and the tower of the Town Hall soon topped the horizon, and before long we were rumbling over the Rhine getting our first sight of one of Europe's most famous waterways.

Cologne and its Cathedral.

Cologne is a great city with treasures of art, monuments of beauty, quaint houses, and large modern stores. The interior beauty of its wonderful cathedral, the largest Gothic church in Northern Europe, covering an area of 91,000 square feet and accommodating 24,000 persons, left an ineffaceable impression. Its massive spires merging into one huge mountain of fretted stone make an historic landmark around which the traditions of more than six centuries have gathered, and which is still a centre of tender sentiment to the people of the Rhine. This great cathedral, like that of Amiens, dominated its subject city in the days of old and it still presides over Cologne, remaining a marvel of ancient architecture among many modern structures of far less grace and charm.

While the citizens of other days set themselves the task of translating stone into terms of spiritual beauty, those of the present age are busy building for comfort, pleasure, and illusion. In principle and effect their efforts differ diametrically—the difference of the spiritually beautiful and the materially excellent.

In Cologne, as elsewhere in Germany at that time, though militarism and war had been revealed in all their stark insanity, one encountered in every public place the forbidding frown of an arrogant imperialism expressed in grotesquely graven monuments, and now happily submerging rapidly in the rising tide of an educated and disillusioned democracy.

Further down the Rhine towards the Border of Holland is Dusseldorf, with its beautiful public gardens, fountains, and boulevards. It calls itself the city of arts and the muses. We knew it as the birthplace of Heine. Thackeray and Bulwer Lytton had already made us familiar with Rhineland celebrated in a hundred romances; around every rock and rise legends have gathered making it classic ground.

Co-operation in Germany.

The success or otherwise of agricultural co-operation in Germany was one of the main subjects of our inquiry, and we will forget history and scenery for awhile and consider some post-war developments in this connection. In the year of my visit there was an unprecedented increase of new co-operative societies, a total of 3,421 being reached, showing, if one omits those established in areas removed from German jurisdiction under the Peace Treaty, a net increase of 676 societies on the previous year's figures. The total number of agricultural co-operative societies had reached the imposing total of 31,521—that is to say, 81 per cent. of the total registered co-operative societies. More than four-fifths then of German co-operative societies were agricultural co-operative organisations. These figures show the enormous grip the co-operative idea has on the minds of the progressive German farmer. Their membership, estimated on the basis of the averages supplied by the statistics of the National Federation, was at least 3,000,000. Agricultural co-operation thus represents a form of rural organisation far superior to any other in Germany. As compared with the total population, there was one agricultural co-operative society for every 1,868 inhabitants, and as compared with the total productive area, one co-operative society for every, say, 2,000 acres of land. Of these societies 97.4 per cent. were affiliated to co-operative federations, and of these 66 per cent. belonged to the National Federation of German Co-operative Societies and the balance was divided among other federations. The number of central co-operative societies (central banks and central co-operative societies for purchase and sale) was eighty-six.

* In a radio address from 4QG.

The co-operative banks, on figures, were very successful—figures which, in view of currency depreciation at the time of my inquiry, there would be no use now in quoting.

The co-operative societies I have mentioned included organisations for the purchase of agricultural requisites (fertilisers, stock foods, seeds, and machines, and other commodities).

The state of the exchange and the consequent difficulties of commercial relations with other countries, together with trading restrictions, industrial troubles, and transport difficulties, had, of course, a depreciating influence on the volume of business done. The economic situation during the war had given a marked impetus to co-operative selling, and also in the years after the war, in comparison with the pre-war period.

In the year I was there many new rural banks were established, 69 were dissolved, and 1,621 alienated as a consequence of the Treaty. Of these banks, 90.4 per cent. were on the basis of unlimited liability and the balance on more or less limited liability. Financially, however, the balance-sheets of these concerns showed large losses, which were put down to the great fall in the value of the securities held resulting from the fall in the war loan quotations. There were, possibly, other contributing causes.

Of the co-operative societies for purchase and sale of farm requisites and produce, 84 showed neither profit nor loss, 2,166 registered profits, and 240 showed a loss. Measured in marks the net profit was immense.

Of the co-operative dairy societies, 292 had neither profits nor losses, 1,189 showed a profit, and 191 losses. Of the other co-operative societies, most of these, according to the nature of their service, are on a limited liability basis, but on account of the currency and economic difficulties then prevailing it was difficult to judge their exact position.

Losses occurred in the case of co-operative societies for distilling, motor services, brick and some other manufacturing enterprises. Dehydration societies, livestock selling agencies, fish-selling businesses, ploughing and thrashing societies and similar organisations showed varying results. It must be remembered, of course, that these observations apply only to a year when industrial chaos was a normal European condition.

Another Rural Exodus.

According to latest official reports on the economic situation in Germany, agriculture, however, in spite of all the economic devices to improve the lot of the man on the land, is, as in every other agricultural country in the world, far from satisfactory. The unbalanced economic position in South-West Germany particularly had led to a situation under which farmers, in many instances, were unable to make a living. The result had been a large emigration of farmers, limited only by the immigration restrictions of the countries in which they sought domicile. In 1871 the rural population of Germany was 64 per cent. of the whole population, while the present percentage is said to be only 35. These figures go to show that the rural exodus is common to every agricultural country. The remedy lies to some extent in making country life more payable and attractive.

National Influence of Co-operative Societies.

In Germany the co-operative movement has been successful, to some extent, in stemming the tide of the general cityward trek. They certainly have been a great influence for the national wellbeing. To them must be credited much of the progress in the economic welfare of the country people of Germany in recent years, and their general influence on the improvement of rural conditions has been on every hand sound, instructive, and constructive. To the German farmer it has been a source of support, guidance, and enlightenment, and so he appreciates its value accordingly.

A FARMER'S OPINION OF THE JOURNAL.

A Gayndah farmer writes (7th *September*, 1929):—*I take this opportunity of expressing my high opinion of the "Queensland Agricultural Journal." It provides valuable and expert information which no intelligent producer can fail to enjoy and profit by."*

Plate 142.—Rosie 4th of Greyleigh, Champion Butter Fat Test Cow. Royal National Show, 1929.

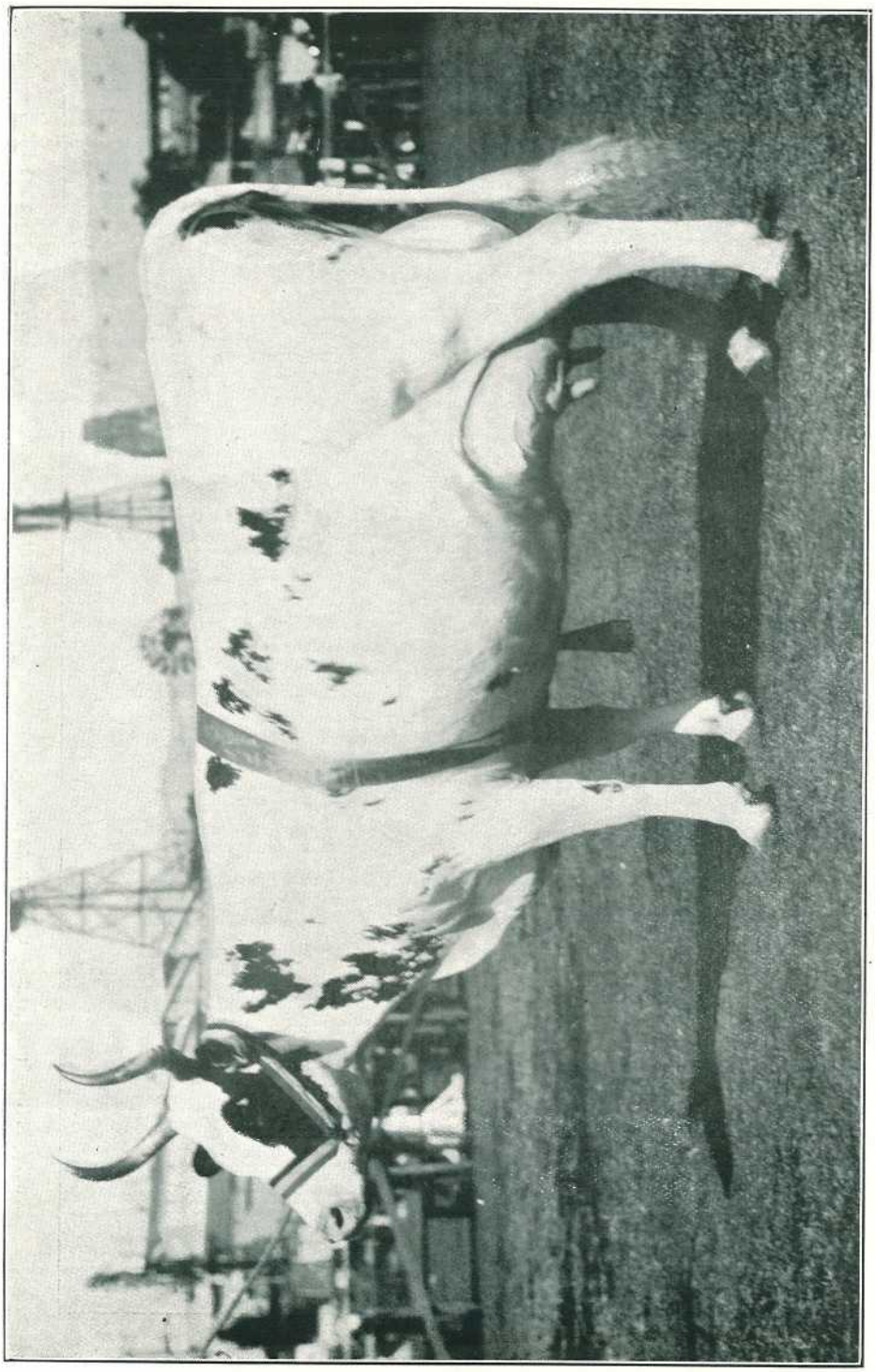


Plate 143.—"Beryl's Pride of Crescent Farm" (J. C. Mann), Champion Ayrshire Cow. Royal National Show, 1929.

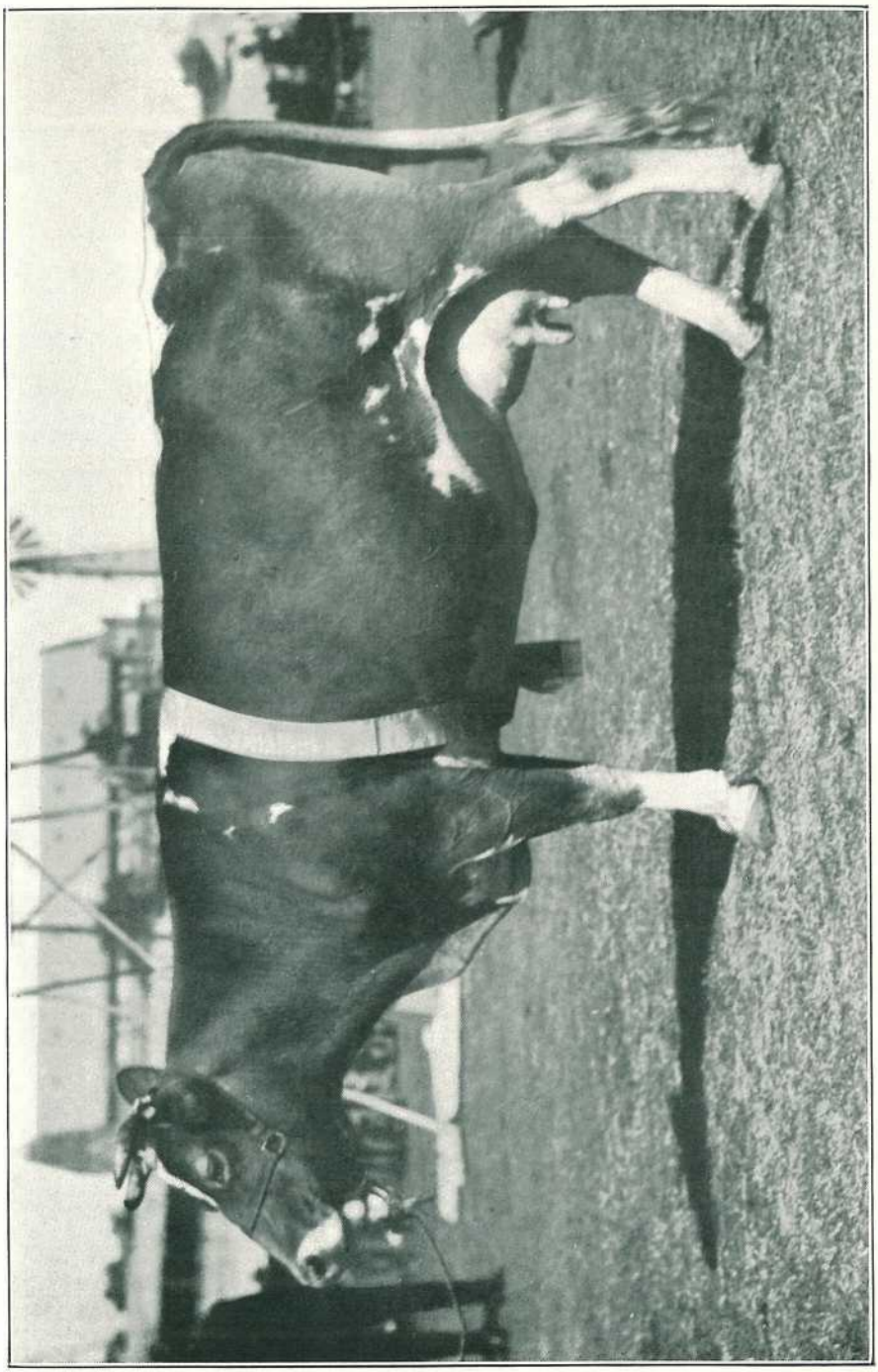


Plate 144.—Minnamurra Cherubine (A. S. Cook), Champion Guernsey Cow. Royal National Show, 1929.

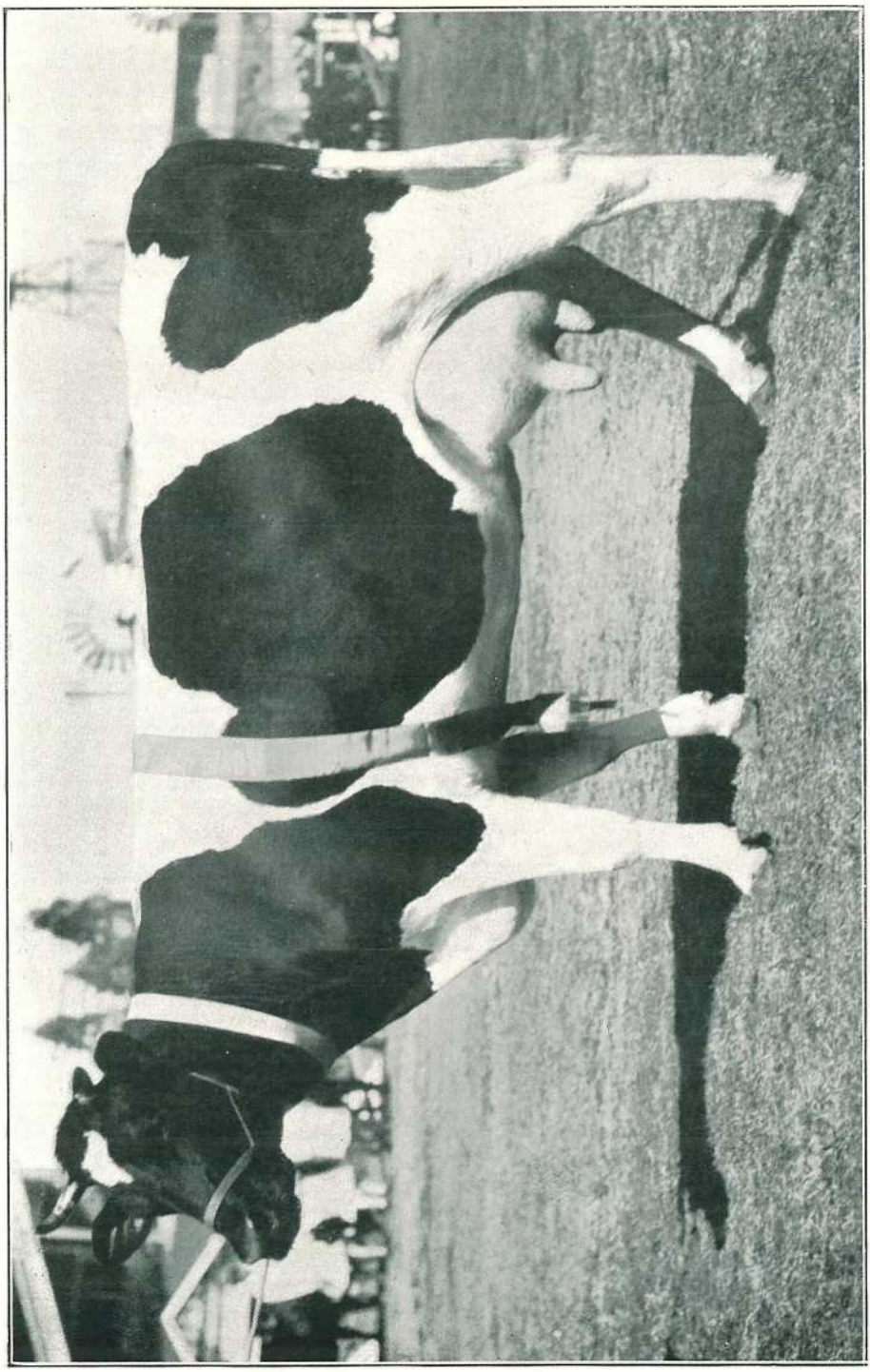


Plate 145.—College Princess Pontiac (Hickey and Son), Champion Friesian Cow, Royal National Show, 1929.

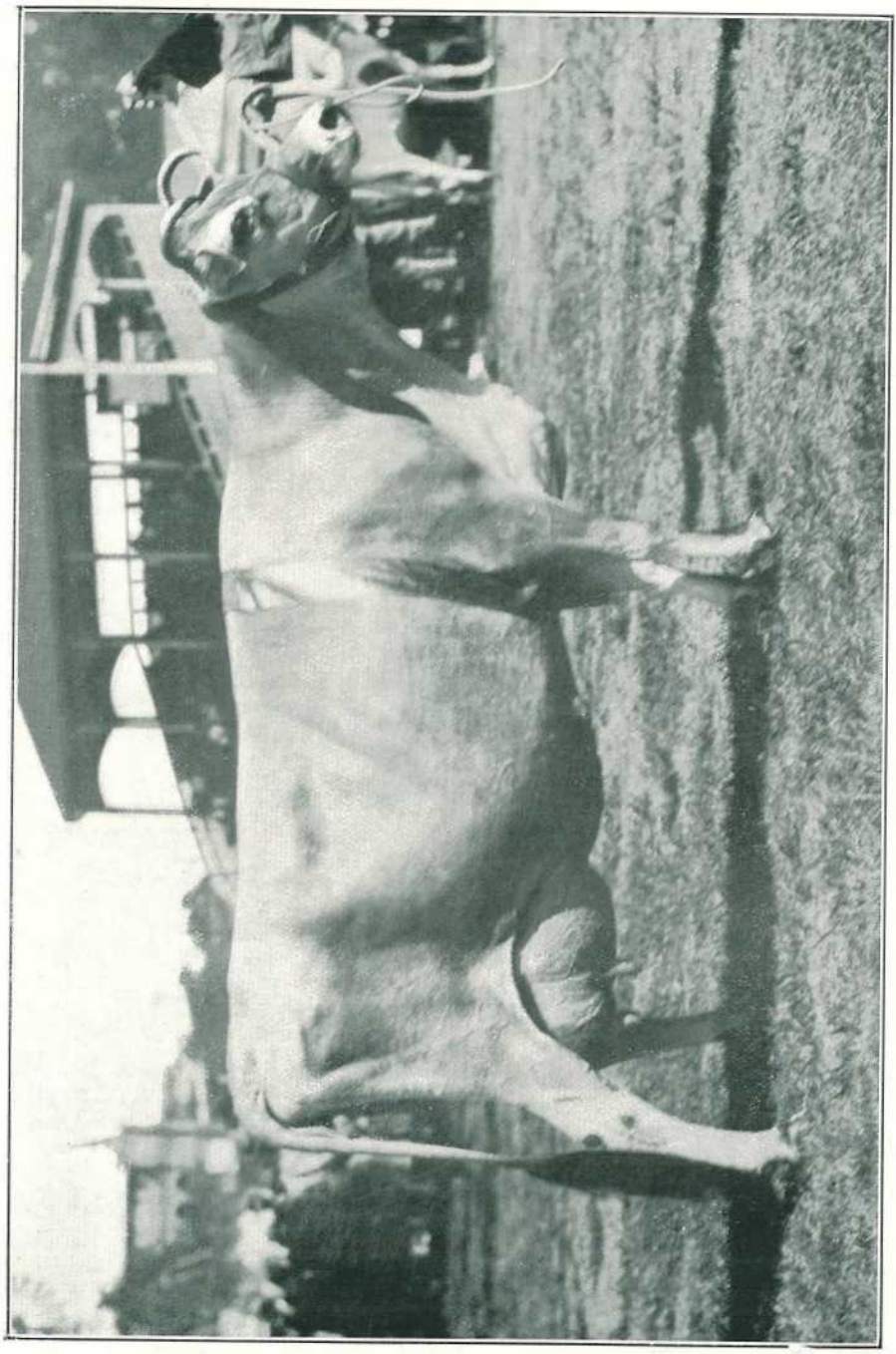


PLATE 146.—"OXFORD GOLDEN BUTTERCUP" (BURTON & SONS), CHAMPION JERSEY COW, ROYAL NATIONAL SHOW, 1929.

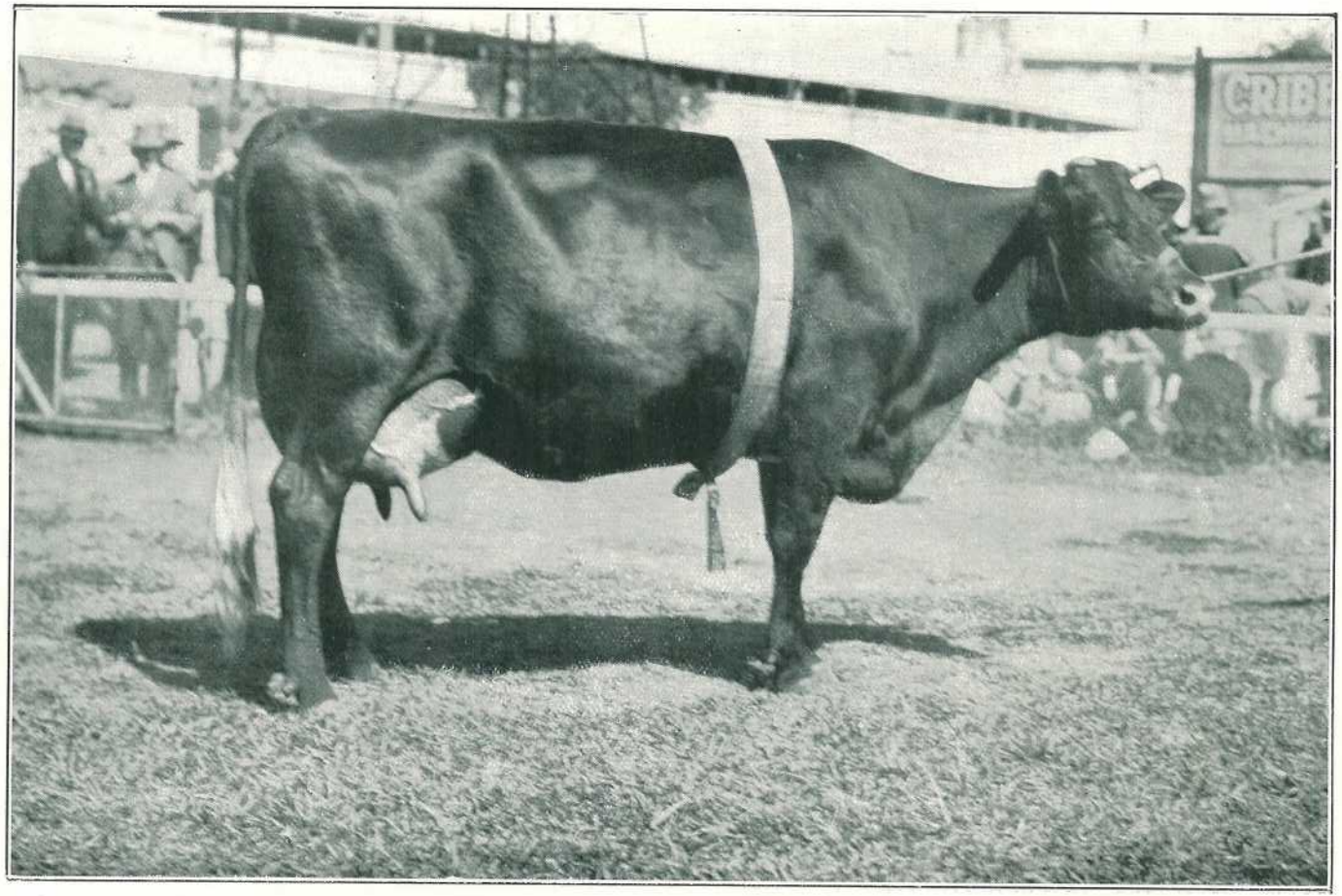


Plate 147.—"Favourite II. of Railway View" (A. T. Waters), Champion I.M.S. Cow, Royal National Show, 1929.

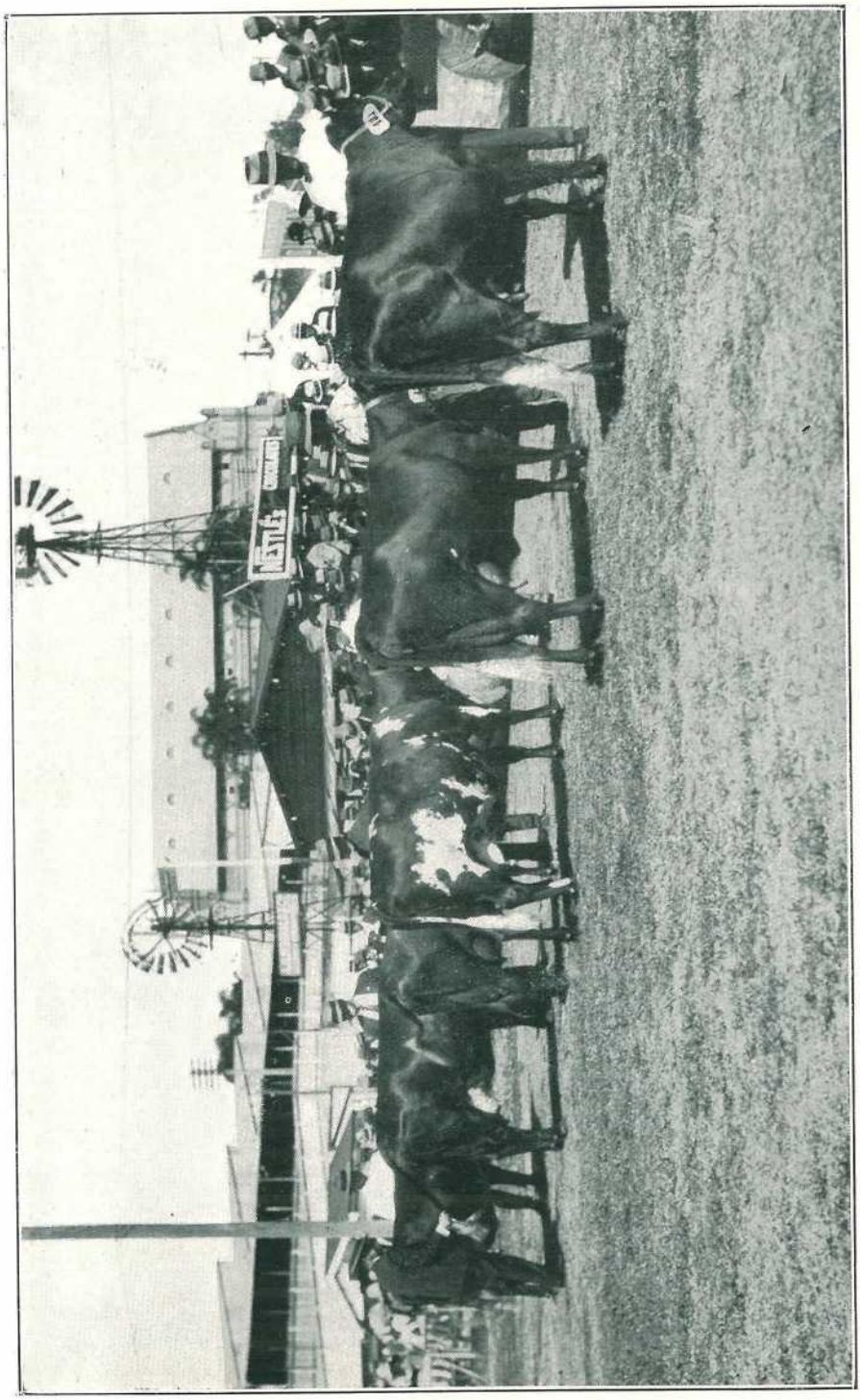


Plate 148.—Illawarra Milking Shorthorns Paraded for Judgment, Royal National Show, 1929.

ABSTRACTS AND REVIEWS.

Pig Breeders' Annual for 1929-30.

(Year Book of the National Pig Breeders' Association, vol. 9. N.P.B.A., London. 3s. 6d. post free).

The current issue of the Pig Breeders' Annual is as informative and as comprehensive in its survey of pig breeding, feeding, and management in all parts of the world as the eight previous issues of this publication; in fact, volume 9 is even more informative. It is well illustrated, and is a useful publication for Australian pig farmers.

In a breezily written foreword, Viscount Folkestone, Vice-chairman of the British Pig Industry Council, stresses the importance of the work undertaken by the National Pig Breeders' Association of England, under whose auspices the Annual is issued, and emphasises that an organisation of the nature of the N.P.B.A., though primarily a pedigree pig society, covers a much wider field in its activities by taking the lead in investigating those wider questions of organisation, marketing, and scientific research the value of which is even greater to the non-pedigree commercial producer than it is to the pedigree breeder.

Lord Folkestone informs readers of many of the difficulties through which the British pig farmer has been passing during the past two years, a period characterised by unprofitable and unsatisfactory prices. He is, however, optimistic enough to believe that the unprofitable period is giving way to a profitable one, and it seems time, he thinks, to get the various organisations on a sound footing so that pig breeders shall be in a position when a lean time comes again to counter to some extent the forces that work against them.

Contributors.

Mr. John Hammond, M.A., of the School of Agriculture, Cambridge, has an informative article on "Fertility in Pigs" which breeders everywhere would do well to study carefully. This article deals in detail with the whole subject of reproduction and indicates ways by means of which larger and better litters may be obtained and the general fertility of the herd improved. "Pig Testing and Litter Recording in Sweden" is dealt with in an interesting way by Sigfrid Larsson, a prominent authority in that country, where pig raising is coming to the fore in quite a remarkable way. An interesting survey of the "By-Products of the Pig Industry" is contributed by Mr. F. W. Jackson, A.C.G.I., B.Sc., A.I.C., in which detailed reference is made to both the edible and inedible products of the pigs. Principal Charles Crowther, M.A., contributes a breezy report of the "Work of the Harper Adams Pig Experimental Station" and informs readers of the various experiments in progress at the institution. "Mendelism" is dealt with by M. S. Pease, M.A., of the Small Animal Breeding Institute at the Cambridge University, while "Pig Production in America" covers a wider field and is contributed by Grady Sellars, B.S. Agri., a field agent of the Kentucky Agricultural Experiment Station.

A very important article on "Tuberculosis in Swine" by Major C. J. Saunders, D.S.O., B.V.Sc., M.R.C.V.S., will be read with intense interest by farmers, for this is a subject on which every stockman needs to be fully informed.

An article dealing with "Characteristics of the Berkshire Breed" by Mr. John R. Baker, M.A., D.Phil., will be of especial interest to Berkshire fanciers, while all pig raisers will be interested in Mr. R. McG. Carshaw's review of "Profits and Losses on Mixed Arable Farms." "Fruit Culture and the Pig" touches on another aspect of pig raising, and is dealt with by the Horticultural Superintendent of the Norfolk County Council. K. D. Downham's article on "Some External Parasites of Swine" is of interest, as also is A. N. Duckham's review of the "Interpretation of Pig Recording Results." Mr. Duckham is associated with the Animal Nutrition Institute of Cambridge, where much useful work is being carried out.

To Australian Pig Raisers, Mr. E. J. Shelton's review of "Breeds of Pigs in Australia" is of especial interest. This article is illustrated with photographs of a number of championship winners, and deals with the several breeds in this country. "Rate of Production in Pork and Bacon" by James Wilson, M.A., B.Sc., gives much interesting information, and this section carries some excellent illustrations of prominent prizewinning animals in Great Britain. "Pig Breeding in Poland" informs breeders of the progress of the industry in that country, while from the trade point of view the British pig industry is discussed in an article, "Prices, Distribution, and the Pig Industry," by Montague Fordham, the Secretary of the Rural Reconstruction Association. "Pig Breeding in the Soviet Union" indicates that there are many countries throughout the world where farmers are awakening

to the possibilities of this industry, and indicates that we need to be on the move if we hope to obtain a permanent footing in the markets of the world with our pork products. Much tabular information and excellent illustrations complete the best 3s. 6d. worth offering to the man who is interested in pigs for profit.

The secretary of the National Pig Breeders' Association, Mr. Alec Hobson, 92 Gower street, London, W.C. 1, will be pleased to communicate with breeders in any part of the world and to supply any further information required. Copies may be ordered through Mr. E. J. Shelton, Senior Instructor in Pig Raising.

"Sugar-Cane and its Culture (1928)."

(F. S. EARLE, Chapman and Hall, Covent Garden, London, W.C.2, and John Wiley and Sons, Inc., New York. 22s. 6d. net.)

This book was the final effort of the recently deceased F. S. Earle, for many years the recognised leader of the West Indian school of scientific sugar-cane agriculturists, and probably the world authority on sugar-cane varieties.

Earle was an eminently practical man, and the book is written in a simple direct style which should appeal to all practical agriculturists. As he remarks in the preface, "Frankly the atmosphere of the book is that of the canefield rather than that of the research laboratory."

The book is divided into two parts. Part I. deals with the history of sugar-cane: its propagation, structure, pests, and diseases; while Part II. deals with the cultivation of sugar-cane. The chapters on the diseases and insect pests are very wide in their scope, and in the case of the chapter on diseases the attached bibliography is very comprehensive and valuable. Unfortunately, the descriptions of the symptoms of the diseases are not as full as they should be. Mosaic disease and the root rot complex are given particular attention, and the essays on these two subjects are particularly informative, though there are some inaccuracies in dealing with those varieties and diseases which are more or less confined to Australasia. Part I. also contains a key for the identification of all the important present-day varieties of cane, together with a description of each variety and its agricultural characteristics.

In the section devoted to the cultivation of sugar-cane, one chapter deals with the classification of soils in a very general way, and chapters are devoted to the preparation of the land and systems of planting. These subjects are discussed from the practical rather than the scientific viewpoint, and should prove very useful to planters in the West Indies.

There are two appendices. Appendix I. contains an annotated list of all the varieties which have been recorded up to the present time, while Appendix II. gives a brief summary of the main features of the sugar-cane industry in the more important sugar-producing countries.

The book will, no doubt, become a standard reference book on the subject of sugar-cane varieties, and the treatment of this subject is its outstanding feature. It is a work that can be well recommended to both the farmer and scientific agriculturist. Our copy is from the publishers.—A.F.B.

PIONEER DROVERS.

Mr. W. H. Rudd, junior, of Kingsborough, Aramac, Queensland, in a letter to the editor of the "Pastoral Review" (September) comments as follows on an article entitled "Pioneer Drovers" in the July issue of the "Review," and which was reprinted in this journal:—

"In July issue Mr. S. E. Pearson, whose writings I enjoy each month, is not right when he says, under "Pioneer Drovers," that Walter Rose has been keeping a hotel in Cloncurry. That is about the last job he would tackle. Latest news I heard of him this year was superintending a bangtail muster on Avon Downs—the sort of job he knows. The "Bed of Roses" in Cloncurry is kept in order by Walter Rose, a nephew of old Walter.

"Mr. Pearson has also confused Blake Miller, of Undilla, with the late Jack Miller. It was Kidman and Miller, of Austral, but "Johnnycake" Jack Miller (who passed away a couple of years ago in Urandangie)—not Blake.

"Blake was on the Murranji track, and they married two sisters, Misses McCaw, of Urandangie—also were both with Kidman—so it is an easy mistake."

NOTES ON THE SHEEP BLOWFLY.

By J. CAREW, Senior Instructor in Sheep and Wool.

When investigating the blowfly trouble in the Central District recently, I found that most of the graziers were relying on crutching and dressing, or shearing the sheep in order that they would be in a more suitable state to resist the fly.

The fly is usually attracted to the sheep by moisture, and by shearing or crutching the moist or dirty wool is removed, therefore the sheep are not so attractive to the pest.

In many cases, however, it was found that from one to three weeks after crutching the sheep were blown to the extent of from 10 to 20 per cent. of given mobs. It would therefore appear that crutching did not give the amount of protection desired. Shearing is an advantage, as the maggots do not get all the protection they require; still, cases were met with where three weeks after shearing the flies were again attacking the sheep.

Those who were in charge of large flocks and depended on jetting as a protection for the sheep were the men who were emphatic about the advantages gained by this method.

In dealing with the fly, the most effective method should be adopted, for, whatever the treatment, it is a cumbersome and costly business.

Cases were met with where those in charge expressed themselves as being quite confident that jetting is the best means of coping with the trouble; in fact, the opinion is widely held that it is the only means that could be relied on to protect large flocks. This is also the opinion of the Committee of Investigators who conducted the experiments under the Council of Science and Industry at Dalmally; and they considered that jetting with a solution consisting of 7 lb. arsenic with an equal quantity of carbonate of soda to 100 gallons of water gave 90 per cent. protection for three months.

Weather is an important factor, but it is regarded that the quantity of arsenic in the solution jetted into the breach is the ingredient giving the protection. Many dip mixtures are on the market, those containing arsenic being the most suitable.

All who are getting satisfactory results from jetting are satisfied that the secret of success is that the mixture must be sufficiently strong to kill the maggots, and that it must be properly jetted with sufficient force to penetrate to the skin in sufficient spread around the breach and tail, as mostly all attacks are confined to these parts.

The pressure necessary varies according to the length of wool, from 160 lb. per square inch for ten months' growth to 60 lb. per square inch for crutched or shorn sheep. The longer the wool, the greater the amount of solution retained, thus giving a greater amount of protection to the sheep.

For a small flock of 500 sheep up to 5,000, a hand-pressure pump may be used, but for larger numbers the power plant is the most suitable. Among those who had experience with all methods and now consider the jetting as giving the greatest amount of protection is Mr. B. Barton, manager, Baratria Station, Chorregon, Winton line, who states that, provided the jetting mixture is correct and properly applied, he has every confidence in its being the best means of protecting large flocks of sheep.

There are erected on Baratria Station three elevated races, which are the cheapest and simplest I have seen in use, allowing for quick handling with a minimum of labour, and quite as efficient as any other style for thorough application. It consists of an elevated race 3 feet 6 inches above ground at the highest point, just ahead of where the jetting takes place. It is fitted with two sliding and one swinging gate. The swing gate forms part of the race. When the sheep to be jetted passes this swinging gate the sliding gate is pushed across the race to hold it while being jetted. The man feeding the jetter draws the swing gate across the race by means of a rope attached to the top of the gate and led back along the race through a pulley at the opposite side. When the sheep is jetted the operator opens the sliding gate by means of a long lever, and also the swing gate; in this way the jetted sheep is followed by its successor, the sliding gate holding it in position.

The race is 16 inches wide, and is floored with 3 inches by 1¼ inch battens spaced ¾ inch apart. The uprights may be of bush timber, but 3 inch by 2 inch sawn timber is most convenient for working, and can also be used to carry the cross battens in the runway. The race is 50 feet in length, including the ramp, which is 14 feet in length and tapers from 6 feet in the yard to 16 inches at the entrance of runway.

While I was present Mr. Barton jetted 180 sheep in twenty-five minutes, using 50 gallons of mixture. Four men were keeping the sheep up to him.

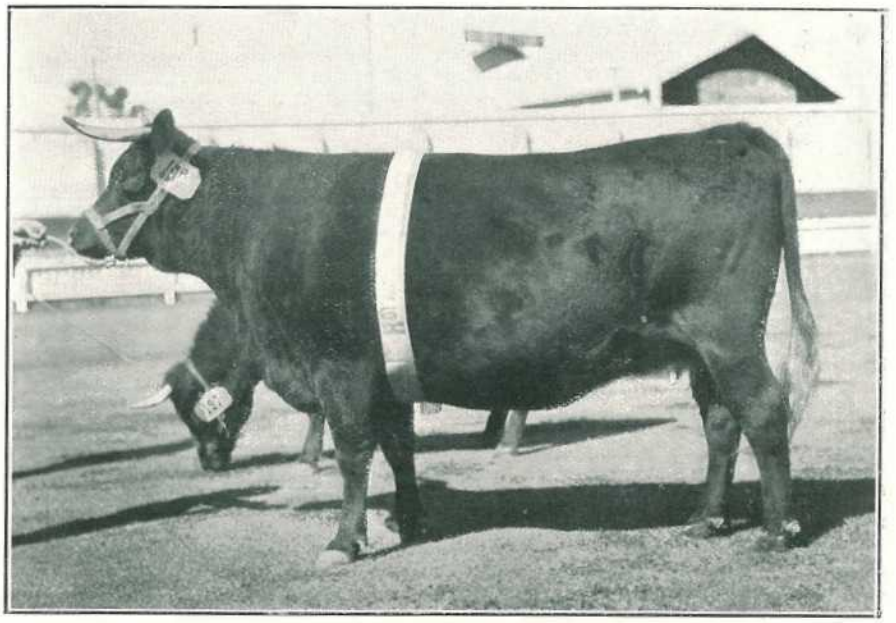


PLATE 149.—GYPSY COUNTESS 44TH (R. A. HOWELL), CHAMPION DEVON COW. ROYAL NATIONAL SHOW, 1929.

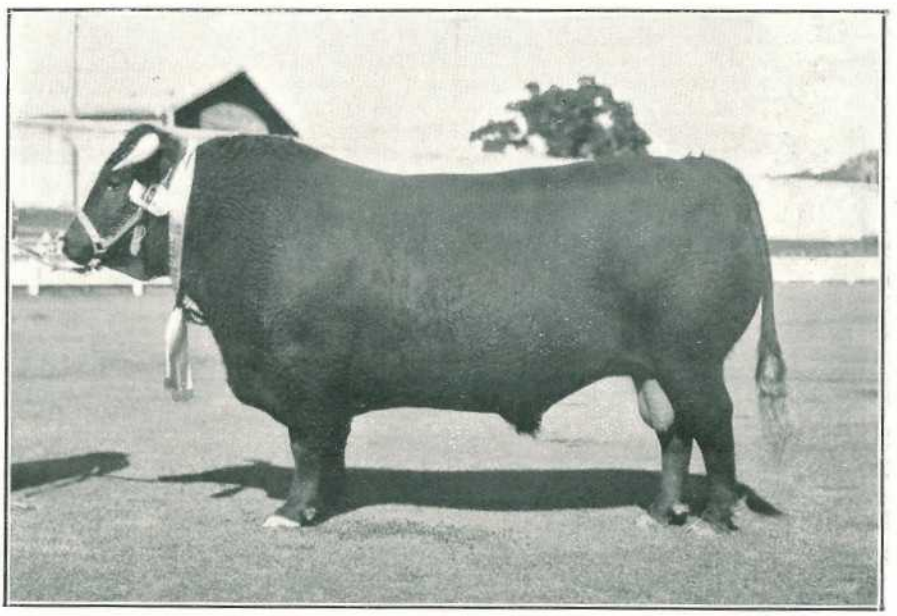


PLATE 150.—BARONET (R. A. HOWELL), CHAMPION DEVON BULL. ROYAL NATIONAL SHOW, 1929.

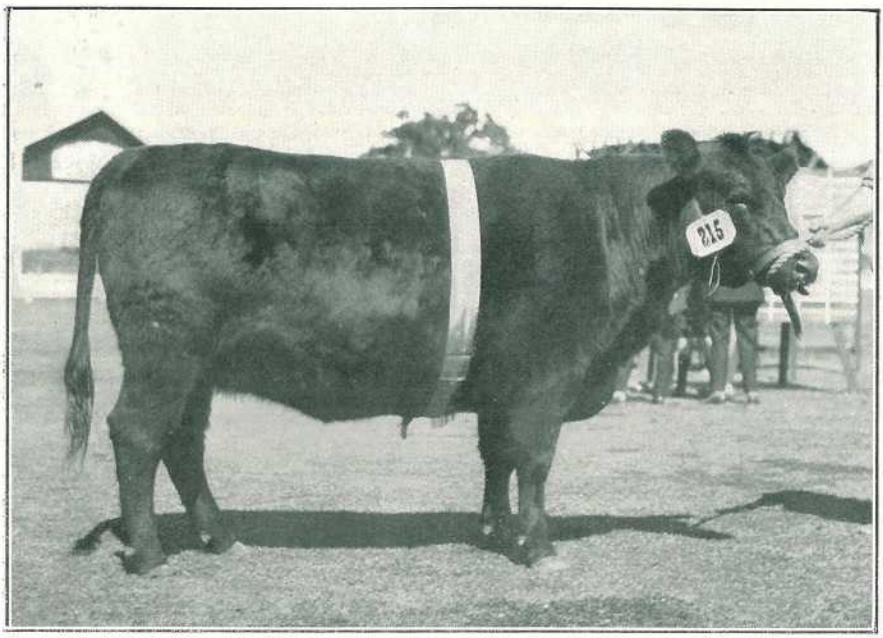


Plate 151.—Highland Maid of Talgai (G. C. Clark), Champion Poled Angus Cow. Royal National Show, 1929.

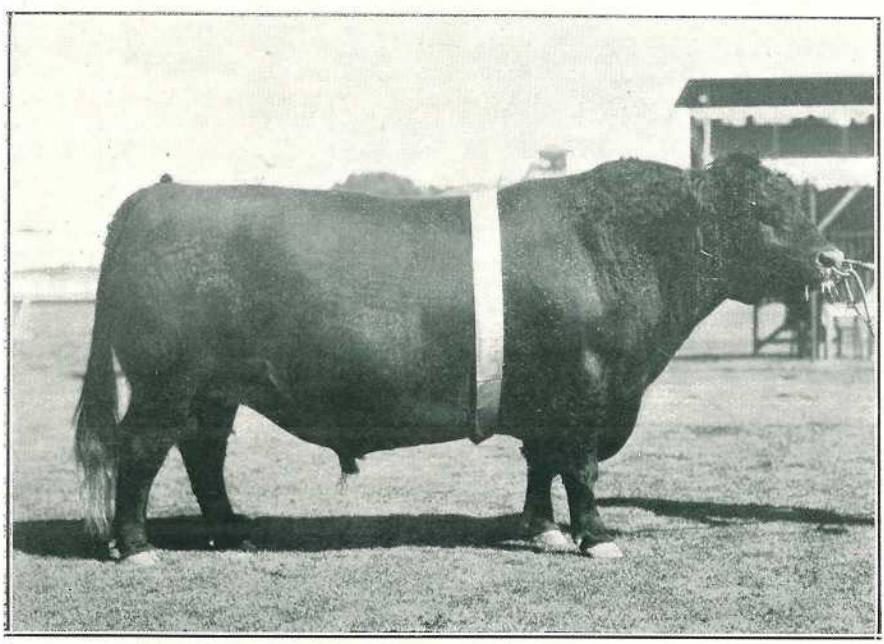


Plate 152.—Trooper Burgess (I. M. Newman), Champion Poled Angus Bull. Royal National Show, 1929.

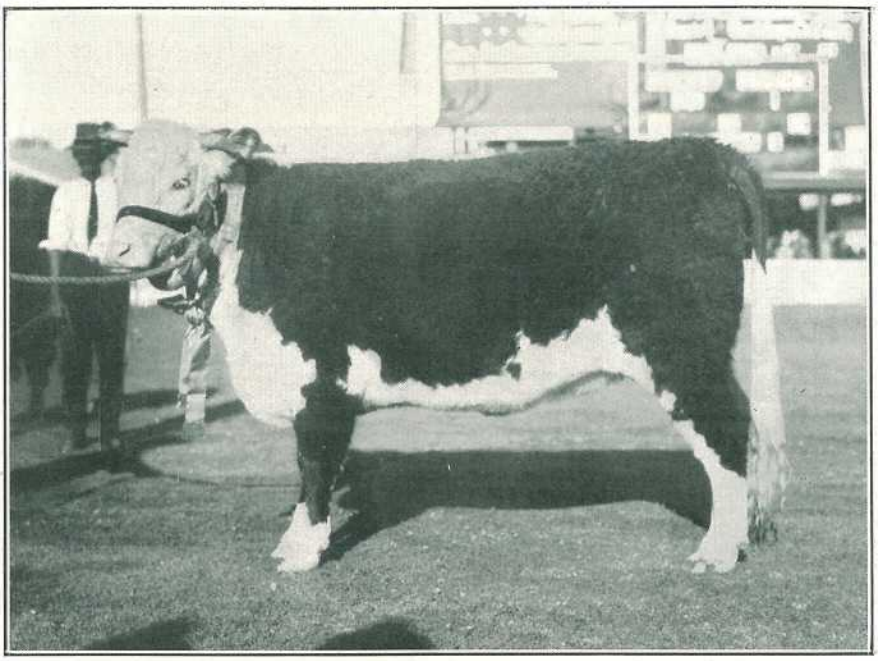


Plate 153.—Princess Mary (Morris and Reynolds), Champion Hereford Cow. Royal National Show, 1929.

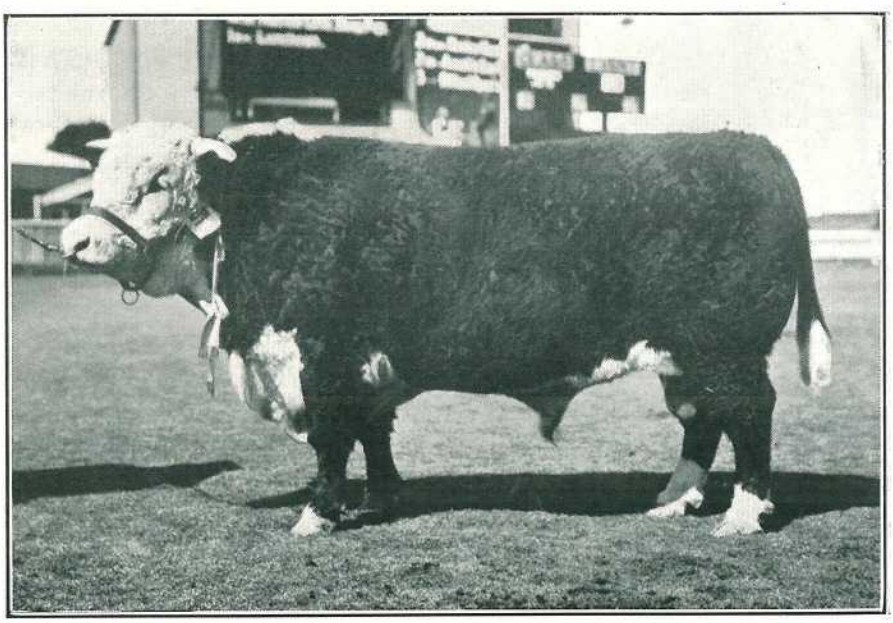


Plate 154.—Hobartville Forest King (S. N. Innes), Champion Hereford Bull. Royal National Show, 1929.

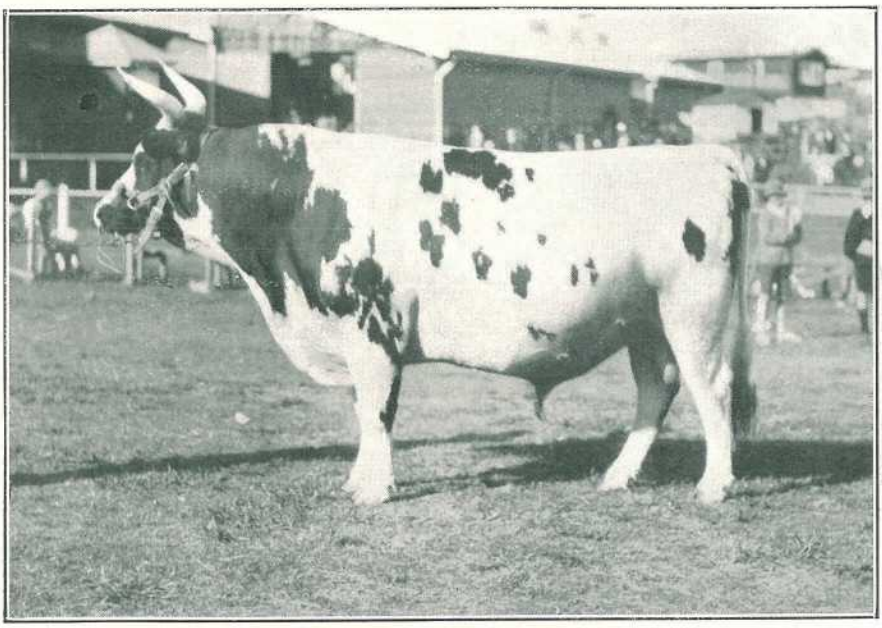


Plate 155.—Claredale Billy, Champion Ayrshire Bull. Royal National Show, 1929.

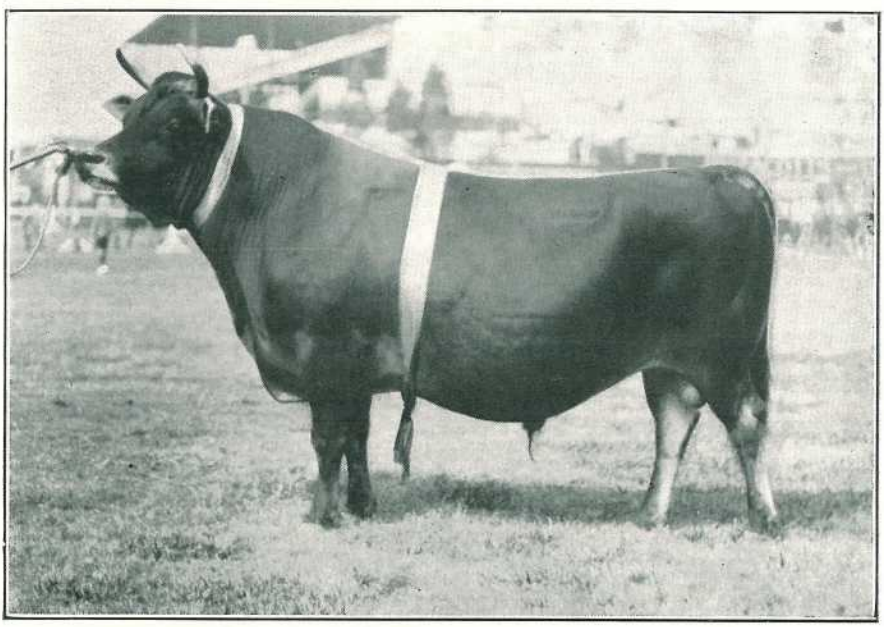


Plate 156.—Trinity Darby, Champion Jersey Bull. Royal National Show, 1929.

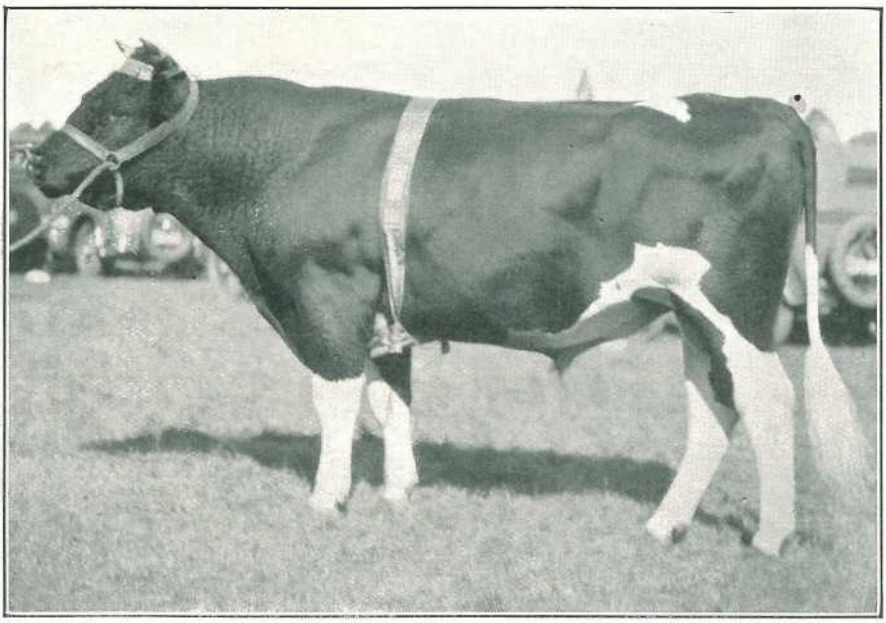


PLATE 157.—ST. ATHAN ACTUARY, CHAMPION FRIESIAN BULL. ROYAL NATIONAL SHOW, 1929.

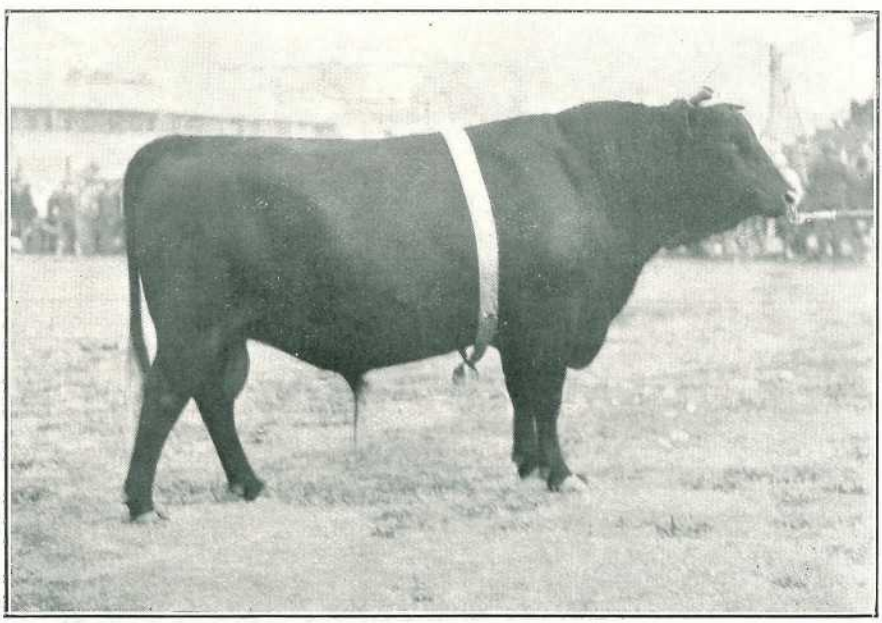


PLATE 158.—LORD KITCHENER, CHAMPION I.M.S. BULL. ROYAL NATIONAL SHOW, 1929.

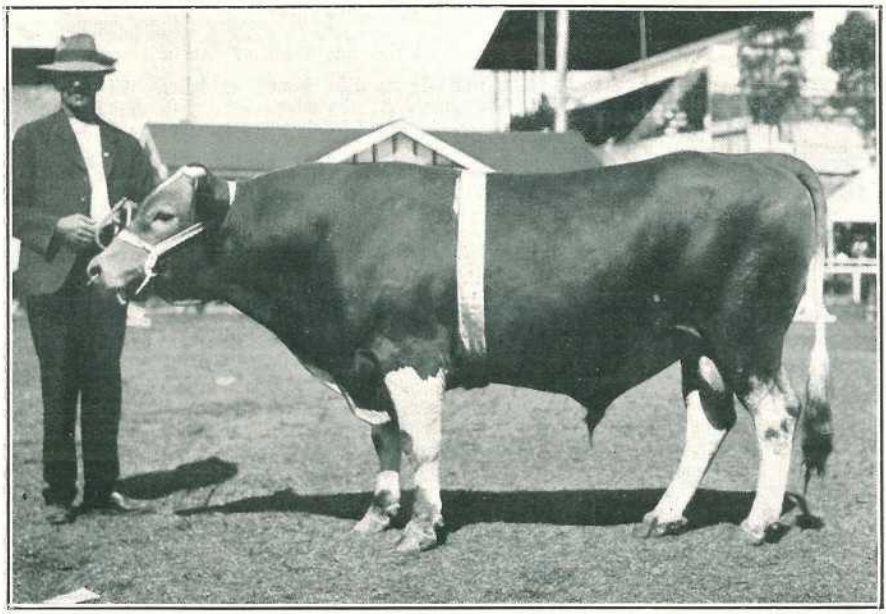


Plate 159.—Wollongbar Monarch (A. E. Gillespie), Champion Guernsey Bull. Royal National Show, 1929.

Plate 160.—The Entrance to the "Valley of the Giants," Brisbane Show, 1929.

This realistic replica of a section of Satinay Forest on Fraser Island was one of the most interesting pavilion displays at the recent Royal Exhibition.

LUNG WORMS IN CALVES.

By A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

This affection is known as verminous bronchitis, hoose, or husk. The worms found in the lungs are the *Strongylus micruris* and *Strongylus pulmonaris*. The former are the larger, being about 1 to 3 in. long; whilst the latter is only $\frac{3}{8}$ to $1\frac{1}{2}$ in. in length. This disease has been known since the year 1744, when Ruysch discovered worms living in the air passages of calves. Nicholls also refers to the same disease in 1756, when it assumed an epizootic form in England.

Symptoms.

If the worms are not very numerous, one notices an occasional husky cough; and, if the animals are driven or excited, the breathing may appear short and hurried. The disease gradually spreads from animal to animal until the majority exhibit this peculiar cough or hoose. After a few weeks, the cough becomes more frequent, and appears to be suffocating the animals—in some cases suffocation actually takes place. A frothy liquid sometimes streaked with blood is discharged from the nostrils. This discharge contains eggs, also embryo and mature worms. The movements of the worms are easily recognised, particularly when placed in a little warm water. The calf loses condition and strength; the mucous membranes of the eyes and mouth become very pale in colour; eyes sunken; skin hidebound, dry, and scurfy; the hair staring; and occasional diarrhœa. The animal wanders away from the others, and is found lying down apparently listless and poverty-stricken. The duration of the disease varies according to the number of worms present and the general condition and constitution of the animal. Some cases only last two or three weeks, whilst others survive for several months.

Upon *post-mortem* examination the worms can be found in the air tubes, the lining of which is inflamed; and the lungs frequently have a somewhat mottled or patchy appearance.

Prevention.

Healthy calves should be kept from paddocks where infested animals have been, but horses and sheep can be turned into them with safety. The land, if damp or boggy, should be drained; waterholes are a great source of infection, and should be avoided, if possible; buckets or troughs are better, as these can be frequently cleansed and disinfected. Keep up the strength of the animal by giving good nutritious food, and allow constant access to salt, because salt destroys the young worms as they are taken into the animal's body. Animals dying from this affection should be thoroughly burned or buried deeply.

Treatment.

The quickest and most reliable treatment is to inject a solution directly into the trachea (windpipe). Various solutions have been used; but the following is recommended, and is the dose for a calf:—

Oil of turpentine	1 drachm.
Carbolic acid	10 minims.
Chloroform	½ drachm.
Glycerine	1 drachm.

To be thoroughly mixed together before using each dose; then slowly injected by means of a syringe into the windpipe.

The needle of the syringe is inserted between the rings of the trachea (windpipe) about half-way down the neck. Some people advocate making a small incision in the skin with a clean knife before inserting the needle; but, if the needle is fairly thick and carefully handled when being pushed through the skin, it will be found unnecessary to incise the skin. This injection causes considerable distress to the animal by setting up paroxysms of coughing; but it passes off without setting up serious irritation, and is effective in destroying the worms.

In bad cases it is advisable to repeat the injection on two or three occasions, allowing some three days' interval between the injections; but in many cases one injection will be found sufficient.

If it is impossible to procure a syringe, a drench composed as follows can be given, but its action is not so effective:—

Oil of turpentine	½ oz.
Creosote	½ drachm.
Tincture of camphor	½ oz.
Milk or linseed oil	4 to 6 oz.

This drench should be given once or twice weekly for some three or four weeks.

Sheep, and particularly lambs up to twelve months of age, are similarly affected with worms in the lungs, although not the same worms as found in calves. The treatment described in these notes will be found just as effective, except that the dose of medicine given is considerably smaller—viz., about one-quarter to one-half of the above doses.

THE QUEENSLAND CHEESE INDUSTRY.

A SCIENTIFIC INVESTIGATION.

A scientific investigation is to be made in Queensland into the manufacture of cheese with a view to the permanent maintenance of the output at the highest grades, and for this purpose a special committee consisting of Professor J. K. Murray, B.Sc. (chairman), and Mr. C. McGrath (Chief Government Dairy Expert) has been appointed.

This action has been taken at the instance of the Minister for Agriculture and Stock (Mr. H. F. Walker), who announced recently that the terms of reference to the committee would include the following requests:—

(1) To investigate the circumstances connected with the reduction in the percentage of gradings of cheese as choice and first grade, commencing from the month of October, 1928, and continuing to April, 1929.

(2) To watch any developments in the 1929-30 summer of a similar character.

(3) To ascertain the causes thereof, and to suggest remedies therefor.

(4) To make any other suggestion which would tend to the improvement of cheese manufacture in Queensland.

Mr. Walker said that he was desirous of affording every possible encouragement to that important section of the dairying industry which was concerned in the manufacture of cheese. Queensland produced more cheese than any other State of the Commonwealth. The figures for the year ended on 30th June, 1928, showed that the Australian production was approximately 30,000,000 lb., of which Queensland produced about one-half. Queensland was responsible for the Commonwealth's export of cheese. A good reputation had been established for Queensland cheese on the world's market, although improvement had been shown to be possible in certain directions. In recent years efforts had been made to stimulate the consumption of cheese in Australia, which at 3½ lb. per capita was considerably less than that in many other countries; for instance, in the United States of America the consumption per capita was approximately 5 lb., and in the United Kingdom it was 9¾ lb.

His attention had been drawn to the fact that last summer the grading of cheese showed a tendency for choicest and first qualities to be reduced in percentage in certain months, and for the quality again to improve after the new year. As some difficulty was being occasioned manufacturers in this connection he had decided to assist by instituting a scientific investigation. A special committee had, therefore, been constituted of Professor J. K. Murray, B.Sc. (chairman), and Mr. C. McGrath, Chief Dairy Expert, with power to add to their number, and co-opt the assistance of any persons considered advisable.

He hoped that the committee of investigation would be successful in locating the cause of the trouble, and that generally its investigations would be of benefit to the industry. He had asked the Cheese Board and the Cheese Manufacturers' Association to co-operate with the committee in making all necessary information available, and he felt sure that this co-operation would be forthcoming.

GRAIN EXPERIMENT PLOTS ON THE DOWNS.

Mr. H. F. Walker, Secretary for Agriculture and Stock, has received the following report (29th August, 1929) from the Director of Agriculture, Mr. H. C. Quodling:—

In company with Mr. C. S. Clydesdale, Agricultural Instructor, an inspection was made in the last week of August of several Departmental wheat, barley, and oat experiment plots in different parts of the Darling Downs.

Flag Smut.

In consequence of the occurrence of Flag Smut in last year's wheat crop in practically every district, a fact confirmed by officers of the Field Staff of the Department deputed at the time to carry out the necessary inspection, experiments were designed this year by the Plant Pathologist to determine the susceptibility or otherwise of the more commonly-grown varieties to the disease, plots for this purpose being established at Roma State Farm and at Allora. Although the wheat in the plots is not very advanced, the disease has already appeared as a result of the artificial infection of the seed, indicating its rather serious nature. Last year the Department supplied practically all wheatgrowers with information concerning the disease, and the methods recommended to keep it in check. At the present early stage of growth of this year's wheat crop, it would be difficult to readily detect the presence of the disease even if it were present. However, it is rather improbable that crops will be quite free from Flag Smut this season, as its presence was noted late in August in the Allora district in a rather promising, well-grown, forward crop.

This Season's Wheat Crop.

Observation was also made over the section of country traversed of the general condition of this season's wheat crop, which, generally speaking, is looking remarkably well, the early-sown areas being particularly promising as a result of two light, but very opportune, falls of rain in the course of the month. The area cropped this season appears to be fully equal to that of last year, and, if satisfactory growing conditions continue, a good harvest seems assured. At the present time, crops which give the best promise are those planted on early and well-prepared land, which had been summer-fallowed.

Plenty of sub-soil moisture, as a result of this practice, was found in the areas systematically prepared and cultivated, affording unmistakable evidence of the value of good cultivation to trap and conserve moisture; the shallow working of the rich, heavy black soils of the Darling Downs proving a very satisfactory method of tillage.

Wheat and Sheep.

Judging by the inquiries made at the Department by graziers on the Downs, some of which were recently followed up by personal visits, there is every indication that several sheepowners intend breaking up and cropping a portion of their holdings, with a view to providing green fodder for ewes and lambs; also for fattening sheep for the market. Obviously, there is almost unlimited scope on the Darling Downs for expansion in this direction, and if the practice were universally followed it would undoubtedly assist in stabilising the sheep-raising industry in this favoured portion of the State.

EFFECT OF METALS ON MILK.

An interesting and important paper on the effect of various metals on milk and milk products by Professor Hunziker was read in the course of the recent World's Dairy Congress week in London.

The investigations involved a study of the resistance to corrosion of nineteen different metals—plated metals and metallic alloys—to the action of sweet and sour milk and cream; of the individual organic acid contained in milk and cream; of numerous washing-powders and chemical sterilisers; and of sodium and calcium brine. The investigation included the effect of these metals on the flavour and physical properties of the milk and milk products. The following conclusions have been arrived at as a result of the investigations:—

1. Zinc, iron, galvanised iron, and copper proved utterly unsuitable metals for dairy factory equipment. They not only corroded profusely, but developed in the milk product objectionable flavours with unfailing regularity. These off-flavours were chiefly of the metallic flavour character. These tests emphasise the fact that much of the metallic cream that arrives at the creameries is due to rusty cream cans, and that the preservation of the tin coating on the inside of the can is an exceedingly important factor in controlling the quality of the cream.

2. Nickel silver, Monel metal, and poorly-tinned iron also injured the flavour of the milk, though the flavour defect was not so pronounced, and the loss in weight due to corrosion, while considerable, was not as great as in the case of the metals under Group 1. These metals are unsafe for use in the construction of milk plant and creamery equipment. Monel metal proved somewhat more resistant to corrosion and less damaging to the milk product than nickel silver.

3. The ordinary chromium steels, such as Ascoloy and Enduro, and also aluminum and aluminum manganese alloy, proved quite resistant to corrosion, and in most cases harmless to the milk product. Ascoloy and Enduro, however, while resistant under most conditions up to a certain point, pitted and rusted freely under severe conditions. Enduro showed somewhat greater resistance than Ascoloy. This suggests that these ordinary chromium steels are not safe alloys to use in dairy factory equipment.

Pure aluminum had no appreciable effect on any of the milk products excepting very sour milk, such as acidophilus milk, in which it developed a slightly metallic flavour. Likewise, its resistance to corrosion, excepting in the presence of alkalies, was generally good. The greatest weakness of aluminum is its high corrosiveness in contact with alkalies, such as are contained in the washing-powders and in alkaline brine. In the case of sodium carbonate and sodium brine, the resistance of aluminum may be very greatly augmented by the addition of a small amount of sodium silicate. Aluminum is being used advantageously in European factories for milk storage tanks and milk shipping cans.

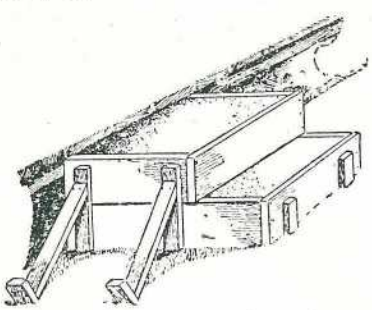
4. Nickel, tin, and properly tinned copper carried no noticeable off-flavour in the milk product, and their loss in weight due to corrosion was comparatively small. These metals, while also slightly soluble in lactic acid, may be considered safe metals for use in milk plant and creamery equipment as far as their effect on the flavour of the milk product is concerned. The tin proved more nearly completely inert than the nickel, which tarnished readily and caused a slight off-flavour in acidophilus milk.

5. Allegheny metal, which is a special chromium-nickel-steel alloy, proved superior to any of the other metals studied. It had no effect on the flavour of any and all milk products, and it suffered no loss in weight, and showed no visible signs of corrosion in organic acids, sweet and sour milk and cream, alkaline washing-powders, and brines. This alloy promises to play an important role in the construction of our future dairy equipment.

6. The presence of two or more metals in the same piece of dairy equipment is fundamentally undesirable. Most metals used may differ in their electrical potentials, and this in turn invites corrosion and impairment of flavour by electrolysis. For similar reasons impurities in metals, as for instance, impure aluminum, such as cast aluminum, also copper alloys and imperfectly tinned iron and copper, are equally unsatisfactory.

CONCRETE STEP FORM.

Concrete is far superior to any other material for making steps to the house and outbuildings. Wood steps soon decay and settle out of shape. In making concrete steps only a very simple form is required. The sketch shows clearly just how to make a good form with a small amount of material. One inch material is used in making the form, which is braced and staked as shown to prevent bulging when the concrete is poured in.



This type of form can be used for any number of steps, as it is really a series of separate forms one upon the other, each form being shorter than the one below to give the desired tread.

IMPORTATION OF STUD STOCK.

Extract from Commonwealth "Hansard," August, 1929:—

Mr. Josiah Francis (Queensland) asked the Minister for Markets and Transport, upon notice—

(1) Is there now any prohibition of the importation of stud stock into Australia from Great Britain and Ireland owing to foot and mouth disease?

(2) What are the details of the assistance offered by the Government to the primary producers of Australia to facilitate the importation of approved stock for stud purposes?

Mr. Paterson: The answers to the honourable member's questions are—

(1) The importation of stud stock into Australia is, for the present, permitted subject to certain quarantine conditions.

(2) The following are the main points of the Government's proposals regarding the importation of pedigree stock from Great Britain and Ireland:—

(*a*) The shipping companies, with one exception, have agreed to carry such stock freight free.

(*b*) All other incidental expenses connected with the transport of the stock from the port of export in Great Britain to the port of importation in Australia to be borne as follows:—

(i.) One-third by the purchaser;

(ii.) One-third by the Commonwealth and State Governments concerned in equal proportions;

(iii.) One-third by the Empire Marketing Board.

(*c*) Any breeder who receives financial assistance under the scheme must not dispose of the stock within two years of the date of its importation. Should he sell during that period he must refund the amount of any assistance granted to him.

(*d*) The scheme will operate for a period of two years.

GROUP OF EXHIBITORS, OFFICIALS, AND ENTHUSIASTS AT THE PIG SECTION AT THE BRISBANE EXHIBITION, 1929.

See Plate 181.

Front Row (left to right)—W. F. Kajewski (Glencoe); B. V. Neale (Cambooya); C. W. Krause (Marburg); H. H. Sellars (Tabooba); G. F. Davidson (North Arm); H. Franke (Cawdor); D. Wells (Kureelpa); Mr. ———— with Shepperson, of Kin Kin; W. Elton, junr. (Cambooya); C. W. B. Young (Lagoon Pocket).

Second Row (left to right)—W. W. Elton (Cambooya); R. G. Watson (Kingston); C. G. Dale (Lagoon Pocket); T. Price (Goodna); E. J. Shelton, H.D.A. (Department of Agriculture and Stock, Brisbane); J. P. Bottomley (Chief Steward, Pig Section); H. J. Keevers (Burra Burra, N.S.W.); C. C. Low (North Arm); Mrs. Dalton (Birkale); Mrs. and Mr. A. Alford (Traveston); H. Severns (Gatton College); S. Whittaker (Casino, N.S.W.).

Third Row (left to right)—L. A. Downey, H.D.A. (Department of Agriculture and Stock, Brisbane); F. W. Martin (Stock Agents Ltd., Brisbane); J. J. Slack (Ipswich); T. M. Wallace (Dinmore); W. Kennedy (Kingston); A. Wells (Kureelpa); G. H. Naumann (Pinkenba); W. Walker (Lamingtou); J. T. Griffiths (Kingaroy); R. Turpin (Manly); A. F. Conochie (Tingoora); Geo. White (Steward, Pig Section).

Two Back Rows (left to right)—E. L. Melville (Prior's Pocket); M. Porter (Wondai); P. V. Campbell (Lamington); Mr. Scarabelloti (Nashua, N.S.W.); Assistant to A. F. Conochie; Mr. Buckley, junr. (Beaudesert); D. R. Laws (Chermside); Arthur Brown (Toogoolawah). *At back*)—A. V. Shepperson (Kin Kin); H. A. Proposch (Maclagan); W. Koehler (Yamsion); T. J. Handley (Murphy's Creek); L. Skerman (Kaimkillenbun).

PLATE 161.—GROUP OF EXHIBITORS, OFFICIALS. AND ENTHUSIASTS AT THE PIG SECTION AT THE BRISBANE EXHIBITION, 1929.
(For list of names, see page 440.)

SOME EXTERNAL PARASITES OF THE PIG.

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

In an interesting article on "Some External Parasites of Swine" in the "Pig Breeders' Annual, 1929-1930," and from the pen of Mr. K. D. Downham, Adviser in Veterinary Science at the University of Liverpool, emphasis is laid on the fact that lice cause considerable loss to pig breeders. It has been estimated that 2 to 6 per cent. of the market value of a pig is lost, due to the presence of these parasites. Each time a louse feeds it punctures the skin of the pig and withdraws its blood and lymph. The irritation is severe, particularly if the animal is heavily infested, and in addition to the loss of blood, the fact that the animal's rest is constantly disturbed is prejudicial to growth and fattening. Mr. Downham states that swine which are attacked by lice in large numbers become unthrifty, suffer from lowered vitality, and thus become more susceptible to diseases and attacks by other parasites.

All this is borne out in Australian experience where lice are just as plentiful and as active as they are in countries overesas. In fact, it is quite possible lice cause more trouble here, for pigs are kept in the open much more than overseas and they usually receive considerably less attention, though this latter fact is to be regretted, as neglect and carelessness are responsible also for very severe losses.

Describing some of the parasites, Mr. Downham states that the hog louse (*Hæmatopinus adventicus*) is a blood-sucking parasite one-sixth to one-fourth of an inch in size (this parasite is also known as *H. suis*); the female is larger than the male and can be distinguished from it by the absence of a dark line on the underside of the abdomen, along the middle of the last three segments, which is a feature of the male. Lice possess six legs, and their feet are adapted for clasping the hairs or bristles of the pig. The female lays about 100 eggs during her life, these being deposited on the hair close to the skin and firmly adhere to the hair or bristles by a glue-like substance. The eggs hatch in about a fortnight and the young lice soon find the tender parts of the skin for feeding, a favourite site being the under surface of the ear, particularly in cold weather. Maturity is reached when the young lice are ten days old, and the young females commence to lay eggs at twelve days old. The whole life cycle is passed on the pig. Infestation occurs from contact of infected animals with clean animals. The parasites do not live more than a day or two off their hosts. The hygiene of the pig and its habitation should receive attention. The ears should be cleaned out with a mixture of pine tar, two parts, and cotton-seed oil, one part, or crude petroleum. Swabs soaked with the liquid should be used for the ears, the under surface of the body, and between the thighs. The side and back of the animal should be sprayed with crude petroleum by means of a watering can or a can with a flattened spout. Large herds heavily infected should be dipped; any of the preparations recommended for sheep scab may be used for this purpose. Dipping should be done in warm weather. It is a good plan to have an ear inspection once a month during the winter to keep down these parasites.

Mange Mites.

Mites belonging to two genera cause mange in swine, *Sarcoptes scabiei suis* and *Demodex folliculorum suis*. These parasites spend their entire life on the host and live on the blood and tissues of the animal they attack.

The body of the Sarcoptic mite is rounded above and flat below. Its size is about one-fiftieth to one-sixtieth of an inch. The thoracic and abdominal regions are more or less united, the epidermis is transversely striated, and bristles are present on the back. The mandibles are shaped like a crab's claw. They possess four pairs of short thick legs. In the male the hind legs are equal in length, suckers being present on the first two pairs of legs. The males are smaller than the females. If the mites are placed on a dark background they are just visible to the naked eye, but a lens or the low power of a microscope is necessary for identification.

The female mange mites burrow into the skin and lay eggs in the burrows. In from three to ten days the eggs hatch and the young mites, after moulting several times, begin to lay eggs in ten or twelve days. By this time they are near the surface, due to the normal shedding of the epidermis and to the rubbing of the infested animal. The young mites then maks fresh burrows in the under surface of the skin and repeat the process. The irritation is severe, and the sensitive areas become inflamed and swollen. The swollen areas are larger than pinheads and have dried serum adhering to them. As the number of mange mites increase the raised areas become closer together, the hairs fall out, scabs are formed which rub off, and the serum oozes out and often a raw surface is left. Later the skin is corrugated, and in chronic cases wrinkles are left. If badly affected the animals become emaciated, and if left untreated will die.

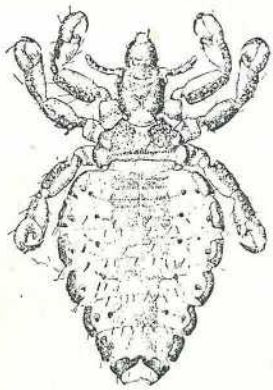


Fig. 1. The Pig Louse (Female).
(From "A Text Book of Entomology." W. S. Patton and F. W. Cragg, 1913.)

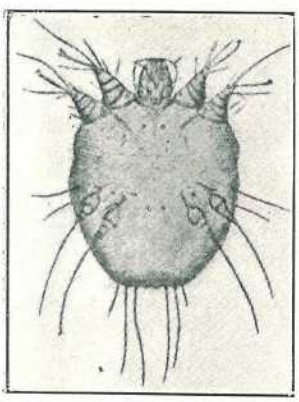


Fig. 2. *Sarcoptes major var. Suis. S. Sarcoptes squamiferus.* Female. Abdomen. Magnif. 75.

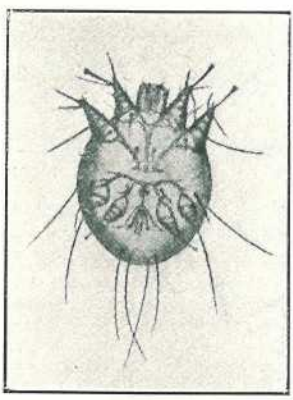


Fig. 3. *Sarcoptes major var. Suis.* Male. Abdomen. Magnif. 75.

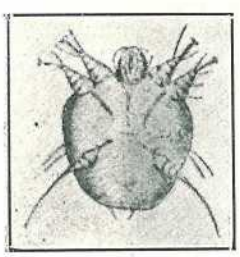


Fig. 4. *Sarcoptes major var. Suis.* Nympha. Magnif. 75

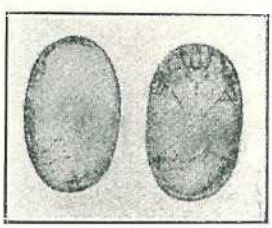


Fig. 5. *Sarcoptes major var. Suis.* Eggs, the contour of the embryo showing. Magnif. 75.

(Figs. 2, 3, 4, and 5 from Hutyra & Marek's "Special Pathology and Therapeutics of the Diseases of Domestic Animals.")

Plate 162.—External Parasites in Swine.

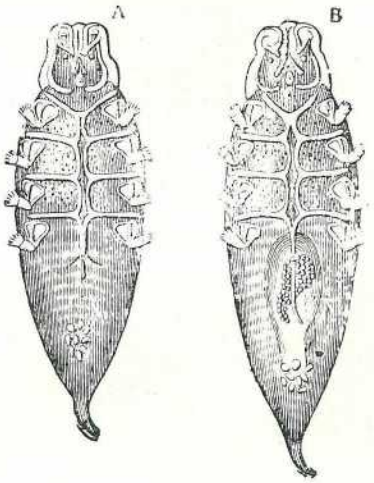


Fig. 6. Demodex of the Pig, seen on the ventral surface; magnified 250 diameters.—Csokor.

A, male; B, female, with an ovum visible in the abdomen.

(Reproduced from Neumann's "Parasites," by permission of the publishers.)

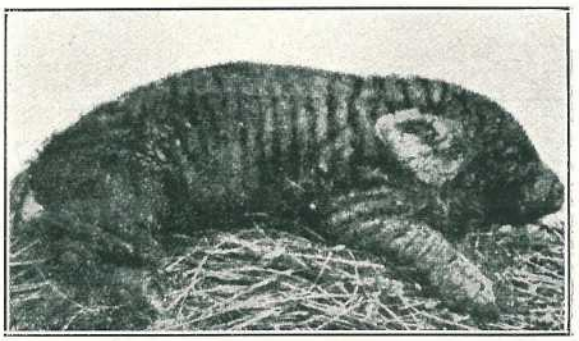


Fig. 7. *Sarcoptic scab* in the pig.

Plate 163.—External Parasites in Swine.

Diagnosis consists in finding the mites by means of scraping the affected parts of the skin with a blunt-edged knife and examining the scrapings under a magnifying glass or by treating the scrapings with a hot 10 per cent. solution of caustic potash and examining under a microscope.

Sarcoptic mange is contagious and is generally spread directly by contact of one infested animal with another. Man may become infected and extreme irritation results for about thirty days, but the mites will not live much longer than that on another host. Crowding and unclean conditions predispose to the rapid spread of the disease. Weak, unthrifty animals are more prone to mange than healthy ones, and pigs fed upon a vitamin-deficient ration are very apt to suffer from this and many other diseases. The mites do not multiply after leaving an animal, but remain alive for two or three weeks or longer, and their eggs can survive for nearly as long under suitable conditions.

Pigs suffering from Sarcoptic mange should be treated with (1) crude petroleum, (2) cotton-seed oil and kerosene in equal parts, or (3) kerosene and lard, 1 half-pint of the oil to 1 lb. of the lard. These preparations may be applied with a brush or cloth and rubbed well in. Freshly treated pigs should not be allowed to become chilled, should not be moved rapidly, or subjected to strong sunshine. All litter should be destroyed by burning and the sty thoroughly disinfected before using for healthy pigs.

Demodectic or Follicular Mange.

This is caused by a very small mite, *Demodex folliculorum suis*. It is wormlike in shape; the cephalo-thorax is followed by a transversely striated abdomen which gradually tapers towards the end. It is about one-hundredth of an inch in length; the male is smaller than the female. These parasites are found in the hair follicles and sebaceous glands of the skin, where the whole of the life cycle is completed. The parts of the pig's body most favoured by the parasites are the under parts of the head, neck, and abdomen and inside the thighs. The lesions often commence round the snout and the eyes and spread to the surrounding parts. The parasites are generally found in clusters and cause pustules, which often run together and form cavities and scales. If badly affected, pigs will become unthrifty, and septic sores and scabs on the animal appear and give an opportunity for bacteria to gain an entrance to the skin. The condition is not a very common one in swine, and is more serious in the dog; other animals affected may be cattle, goats, and man. The best method of treatment for pigs affected by these parasites is the regular application of crude petroleum to the affected parts.

WHAT EVERYBODY WANTS.

A TALK TO PIG FARMERS.

In an interesting and informative set of booklets published by the National Pig Breeders' Association of England, dealing with several of the most prominent of the British breeds of pigs, an introductory paragraph calls attention to the requirements of each individual section of the pig industry under the caption of "What Everybody Wants."

We reproduce the story here with the permission of the association, of which Mr. E. J. Shelton, the Senior Instructor in Pig Raising in Queensland, is an honorary member.

What the Breeder Wants.

The pig breeder wants hardy, long-lived animals with such good constitutions that he rarely has to open his medicine chest or call in the veterinarian. They must be active, contented foragers, willing to eut down the food bills by picking up a good proportion of their keep from the pasture. (This is important too, especially here in Queensland where pig raising is an adjunct to other branches of farming.)

Both boar and sows must be prolific and ready breeders, the litters must be large, and each pigling a strong and quick grower (slow growers and unprofitable sorts are all too common and are distinctly unprofitable and should not be tolerated.) Both stores and breeding animals must have the right conformation of good butchers' pigs in order to command the highest possible prices. They must be of firmly established

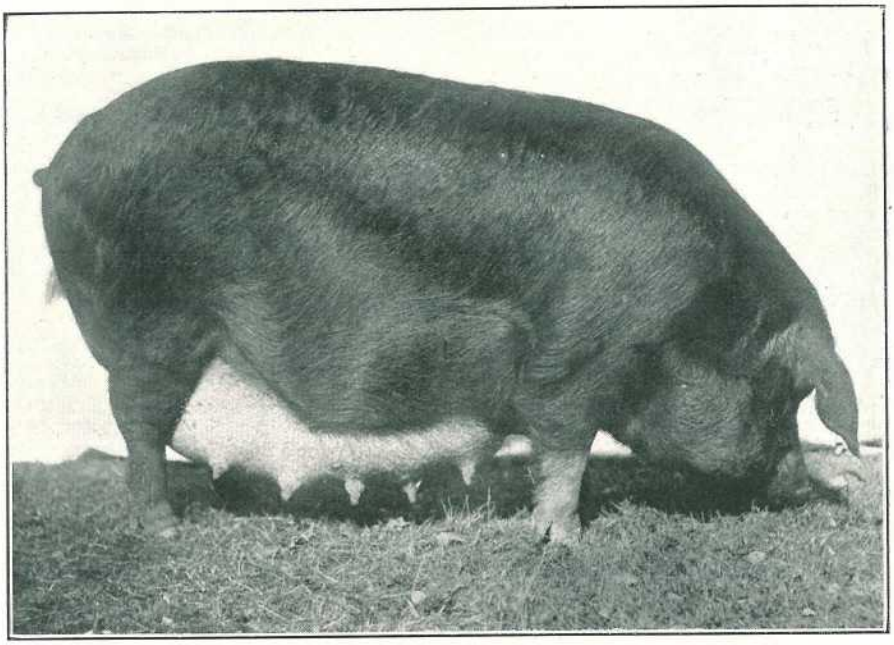


PLATE 164.—"YAMSION FLOWER," CHAMPION DUROC-JERSEY SOW, ROYAL NATIONAL SHOW, 1929.

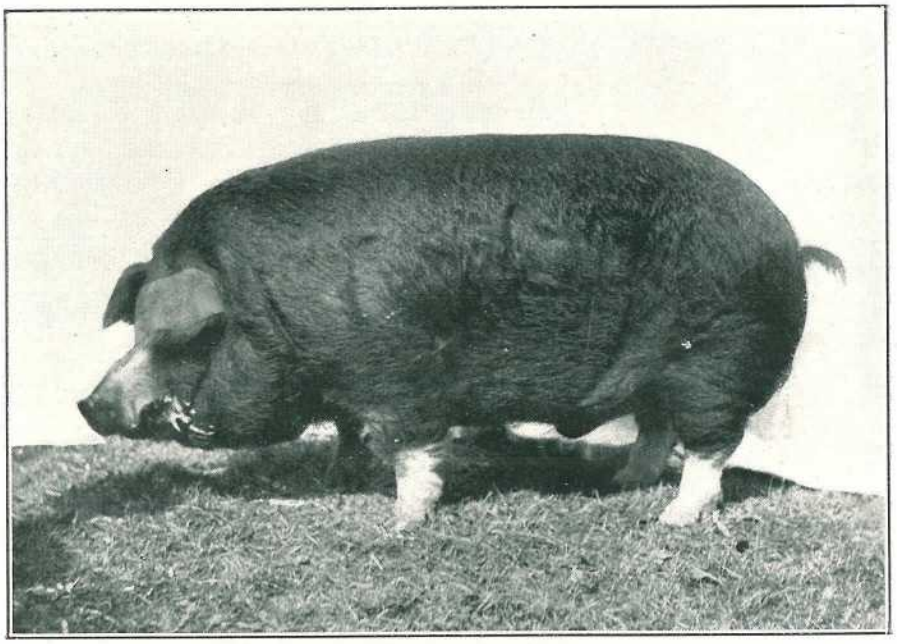


PLATE 165.—"HOMEVILLE TELLER," CHAMPION POLAND-CHINA BOAR, ROYAL NATIONAL SHOW, 1929.

type, so that a litter shows uniformity in all points (all very desirable features here as well as in England). We have a long way to go in Queensland before we can claim to have a maximum of the very best types, but there has been a vast improvement in recent years, and the improvement still goes on. The distribution of stud pigs from stud sales like those held annually at Brisbane Exhibition is a special feature and one well worth all the encouragement breeders can focus on them.

What the Feeder Wants.

Continuing the story, the N.P.B.A. states that the feeder wants only pigs in hard (or as we call it, growthy) condition and with keen appetites (a pig with a poor appetite is a poor pig indeed).

They must have been weaned in strong-growing condition and be able to go straight on to pasture or into yards until it is convenient for him to put them in sties for a quick finish. (The Departmental pamphlets, "Weaning the Pig" and "Flushing the Breeding Sow" deal with these features, and should be in the hands of every farmer.) These feeder pigs must stand sty feeding well and eat without fads or fancies or aches and pains. Above all, they must be able to put on weight quickly and in the proper parts (a study of the results obtained by members of the Queensland Boy and Girl Pig Clubs indicates that many junior farmers are obtaining results even better than those obtained by many of the senior farmers along these lines). The feeder is always on the lookout for pigs light in the front, with fine shoulders, a straight level back and a good back end (or loin and hams, as we refer to them in Queensland, where also the demand is constant and improving for the correct type of pork and bacon pig, and where top prices may always be obtained, provided the pigs are of correct weight and in good marketable condition).

What the Pork Butcher Wants.

The N.P.B.A. booklets state the maximum live weight for a porker is 120 lb., the minimum, say, 80 lb., a good average being 90-100 lb. (As porkers these average live weights are O.K. for Queensland conditions, where it is usual to consider around 30 per cent. a fair deduction from live weight at trucking station in country districts —often far removed from the slaughtering establishments—to dressed and "cooled off" weight at the factory.) The London pork market, which takes approximately a million carcasses a year, prefers the smaller weights (as also is the case in Queensland) and pays the best prices for them. The pigs must be long, well-proportioned, broad and full along the back, with the tail well up. The cheap parts of the carcass, particularly at the fore end, have to be light, and the more expensive joints well developed with fair length of loin. The fat must be white and firm and in moderate proportions to the lean, so that the necessity of trimming is avoided. (Queensland pork buyers like these pigs too, as also do bacon curers, and would willingly pay top prices for more of them if they were available continuously all the year round.)

The small porker must be quick growing in order to be plump, neat, light, and full of meat, but not too fat. Porkers with fine hair, thin skins, and absence of wrinkles sell better than coarse, rougher-looking pigs in all markets. (This is so in Queensland also, where we are certainly becoming more particular every year.

What the Bacon Curer Wants.

The N.P.B.A. indicate that the British bacon curer wants pigs between 160 and 210 lb. that kill well and with a small percentage of offal. (For Queensland markets these weights are far too heavy. The pamphlets, "Pig Raising in Queensland—Some Economic Phases" and "Trade Classification of Pigs" deal with Queensland conditions, and to these pamphlets our readers are specially referred.) The bacon curer dislikes paunchy baconers, because they kill wastefully. The pigs must be long in the back, so that the sides cut up with deep, heavy "middles." (Sides of bacon are not a trade line in Queensland, but the remarks apply with full force to the cuts popular here, viz., flitches, middles, and hams.) The carcass must show a high proportion of lean to fat with full, thick, firm underline. The meat must be in the right place—that is, mostly behind the spare rib, the forequarter being proportionately light. A heavy jowl and broad coarse shoulders are wasteful and lose money(the heavy-shouldered pigs are equally undesirable here). The ham must be long and wide, with meat right down to the hocks. A fine skin, free from coarse wrinkles and with long straight hair is considered to indicate in the live pig plenty of lean flesh and fine but hard bone. (There is a good demand in Queensland for pigs carrying all the good points referred to herein.)

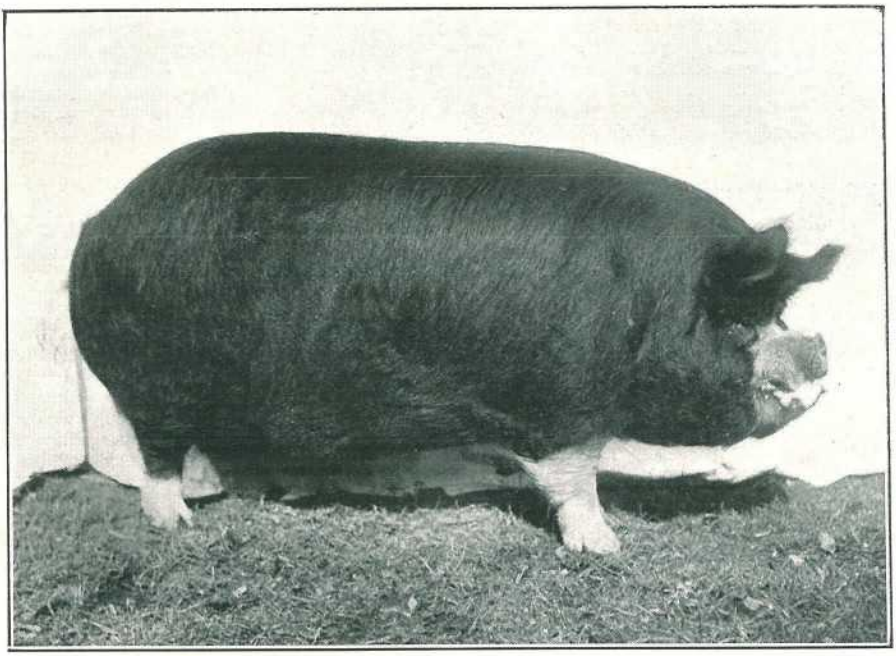


PLATE 166.—"GLENBURRA DUKE," CHAMPION BERKSHIRE BOAR, ROYAL NATIONAL SHOW, 1929.

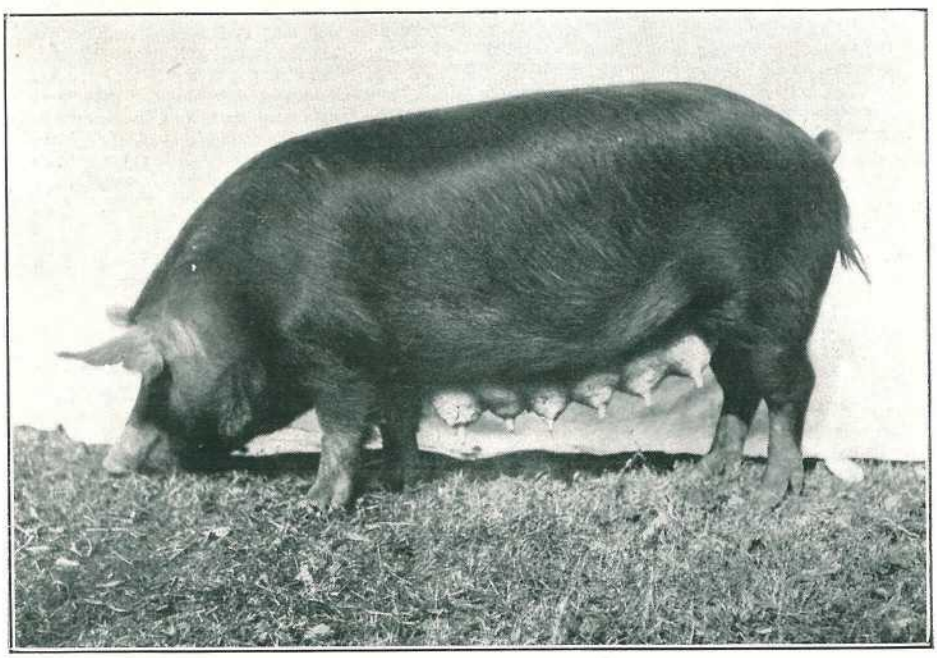


PLATE 167.—MONDURE QUEEN, RESERVE CHAMPION TAMWORTH SOW (A. ALFORD, TRAVESTON), ROYAL NATIONAL SHOW, 1929.

What the Housewife Wants.

As in Great Britain, so in Australia, the housewife dislikes too much fat in pork, bacon, and ham, because it is wasteful and she cannot find a use for it all. What fat there is must be firm, and never soft or oily. The lean must be well interlaid with fat, and must be moderately hard, yet never tough, while full of flavour.

When she pays for "best streaky" she expects to get it, and therefore her grocer demands good "middles" to be able to supply her.

Queensland housewives like good bacon too and more would be eaten and sales of fresh pork would increase if we could supply the housewife with exactly what she requires at a reasonable price and attractively prepared and placed before her. Just as in England the National Pig Breeders' Association is working along lines suggesting an all-round improvement in matters associated with the pig industry, so in Australia the Australian Stud Pig Breeders' Society, and in Queensland and the other States, the State branches of this organisation are doing likewise. Good work is also being done by the Australian Pig Industry Council, linked up with the State committees and the various Bacon Curers' Associations. With them the Departments of Agriculture and Stock are also working in the hope of paving the way for a more prosperous and lucrative pig industry.

Readers desirous of obtaining copies of the booklets referred to above are advised to communicate with Mr. Alec Hobson, Secretary, National Pig Breeders' Association, 92 Gower street, London, W.C. 1, England.

WHEAT PROSPECTS IN THE ROMA DISTRICT.

The Secretary for Agriculture and Stock (Mr. H. F. Walker) has received the following report from the Director of Agriculture, Mr. H. C. Quodling:—

An inspection was made in the second week of September of the crops growing at the Roma State Farm, and it was satisfactory to note that excellent progress had been made by the new crossbred wheats, specially bred and selected by the manager, Mr. R. E. Soutter, to meet requirements in Queensland. Although several inches of rain fell in April, less than 70 points had been registered in the last four and a-half months. Notwithstanding this extraordinarily dry period the growth and development of the wheat, oats, and barley in the breeding and propagation plots was good, the better-grown crops invariably being found on the fallowed land, pointing unmistakably to the fact that soil moisture conservation by systematic cultural methods is the principal factor in crop production.

The Value of Systematic Cultivation.

Elsewhere in the district and in other parts of the wheat-growing belt, a remarkable contrast in the growth and development of crops was observed, due in the generality of cases to a loss of soil moisture by evaporation, principally through late ploughing or failure to maintain a soil mulch on the cultivated lands, such loss being sufficient to account for the change from a payable to a non-payable crop. Obviously, in a season like the present one, those who systematically directed efforts to the early working of their land and to the trapping and storing of moisture will reap the benefit thereof.

On Roma Downs.

On the invitation of Mr. R. H. McGeoch, a visit was made in company with the manager of the State Farm to Roma Downs Station where Mr. McGeoch has over 200 acres on a deep, sandy loam soil under cultivation with wheat and lucerne, the latter crop being subsequently planted for fattening-off sheep. Several varieties of wheat bred at the State Farm were included in the number being grown under field conditions. The wheats generally were even and well grown, and the manner in which they had developed on such a limited rainfall proved a valuable object-lesson of what can be done by carefully planned farming operations. The crops grown on land broken up about twelve months ago on which the surface had since been kept in a cleanly, well-worked condition, were from 3 feet to 3 feet 6 inches in height and well out in head. In many instances less than half an inch of rain had fallen since planting time, and none of the crops had had more than three-quarters of an inch during the last four and a-half months.

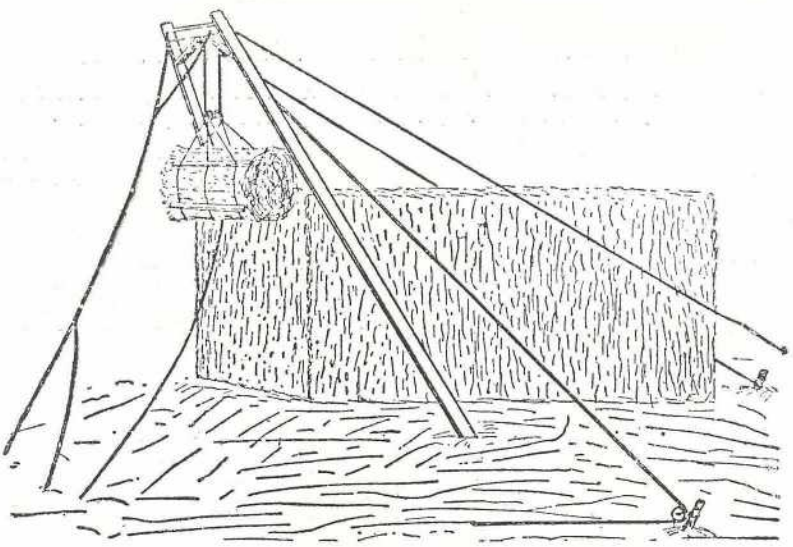
Last year between 300 and 400 tons of wheat were cut for hay and stored in vermin-proof sheds, as a dry time reserve. The quality of the hay was found to be exceptionally good. Although the type of soil being farmed is lighter and of a more sandy nature than that usually chosen for lucerne, this crop is doing well. Only a limited quantity of seed, about 3 lb. per acre, is usually sown, thin planting being observed to permit of more root-feeding space for individual plant development with a view to making the best use of the limited rainfall. Mr. McGeoch is having another 400 or 500 acres cleared to extend his wheat and lucerne cultivation scheme.

Flag Smut Experiments.

The Flag Smut experiments at the Roma State Farm are showing excellent promise. One well-known fungicide has so far afforded almost complete protection to the plants grown from spore-infected seed. It is expected that valuable data will be forthcoming when the Plant Pathologist concludes this and the other series of Flag Smut experiments at Allora.

EASILY BUILT AND OPERATED STACKER.

An inquirer asks us to publish a diagram of a "stacker" which one could use with a hay-fork to transfer hay from the load to the stack conveniently and economically.



The accompanying drawing shows a stacker similar to the one referred to. This stacker is called a two-pole, swinging stacker, and is very convenient in the construction of medium sized stacks. It is a good outfit for the man with not more than 30 or 40 tons of hay to stack. Trunks of trees of sufficient length to allow the bundles to clear the desired height of stack may be used for the poles. These poles should not be less than about 5 inches in diameter at the small end, and the cross-beam and its braces should be about "half-lapped" into the poles and bolted. The poles are raised and guyed so that they have the desired amount of swing, the guy ropes of one side being tight, while those of the other are loose. When a bundle is being taken off the load the poles are leaning toward the load; one end of the draw rope is fastened to the cross-tree at the top, while the other is run through the pulley on the fork or slings, after which it is run through a pulley, at the top of the derrick; then, to the team after passing through an anchored block at the ground. The anchor must be so situated that when the bundle has reached the cross-beam the poles will be pulled back so as to carry the bundle over or past the centre of the stack. The construction and operation of this stacker are simple, and are made clear by the drawing.—The "New Zealand Farmer."

THE FARM TRACTOR.

STARTING TROUBLES.

As you know, the tractor starts on motor spirit and is later switched over to kerosene when the engine becomes hot and vaporiser sufficiently heated to vaporise the heavier fuel As the ignition is the most likely cause of trouble, test this first in the following way:—Remove one of the plugs from the cylinder head, attach it to its connecting wire and lay it on the cylinder block so that the skirt of the plug is touching the block, but so that the points and the connection end are not in contact; then turn the engine over by hand and see that the spark is getting to the points. If no spark appears, examine the plug carefully for carbon formation on the electrode, which may be causing a short circuit of the current, prohibiting the spark from jumping the points. Being assured that the plug is all right, examine the connection wire for short circuits, and, having eliminated this, give your attention to the magneto. The most common cause of trouble in this little machine is the contact breaker. If, through wear on the cam, the points are not breaking no spark can be formed. If the points are roughened, burned, or dirty, the result will be the same. If this is so, use a small nail file or magneto file to trim the platinum points. See also that there is no oil on the points. When examining wiring connections from magneto to plugs, look for loose connections, broken wire inside the insulation, or worn insulation, which would result in a short circuit to some portion of the engine against which the wire is lying. If a spark is occurring at the plug points it may be too weak or too small to fire the charge. A bluish-white, fat spark is the most efficient, a dull-red spark being generally ineffective. The correct gap for plug points is 1/32 inch.

Causes of Weak Compression.

If the ignition is all right, replace the plug and try the motor for compression. If this is weak, it will be due to one of three factors:—

(1) Leaking piston rings;
(2) Badly seated or pitted valves;
(3) Sticking valves.

With (1) and (2) the trouble can only be corrected by dismantling the engine, but with (3) the valves can be freed by removing the valve cover and squirting the sticking stems with a little kerosene until the valve is free and then thoroughly lubricating the stem with cylinder oil.

If the compression is good, the next likely cause of trouble is the fuel system. See that the petrol line from fuel tank to carburettor is free and that petrol is gaining entrance to the float-chamber. Examine the jet to see that this is quite clear and look for water in the float-chamber. Any of these causes would result in the fuel not getting into the combustion chambers of the cylinders.

It is very often the case, particularly with the tractor that is working hard, that the ignition, through general wear and dirt, becomes weak, and, although the tractor gives excellent service while working, it is very difficult to start in cold weather.

If the cause of the weak spark cannot be removed, then it may be necessary to drain the radiator and fill with hot water in order to vaporise the fuel more fully to get the initial explosion.

A Common Cause of Hard Starting.

The common cause of hard starting with the old Fordson tractor is water in the commutator. This is generally formed as follows:—When the tractor is left to cool off after the day's work the commutator cools off rapidly and the hot air coming from the motor condenses on the inside of the commutator and forms small globules of water. This causes a "short" between the commutator and the roller, with the result that starting is very difficult. With a Fordson that is hard to start, the first thing to do is to remove the commutator, wipe it out thoroughly with a piece of rag, and introduce about a spoonful of light clean lubricating oil.

The factors mentioned above are the main causes of hard starting, and should you be unsuccessful after eliminating all these suggested causes, then it is a job for an expert.

Engine Missing.

Probably the most common irregularity encountered with the tractor engine is what is commonly termed "missing," meaning the failure of one or more of the cylinders to fire regularly. The result is, of course, loss of power out of all proportion to the percentage of cylinders which are not working.

There are many ways in which missing can be detected, such as irregular sound of exhaust explosions occurring in the silencer, a decided knocking in the motor and excess of motor vibration, and general loss of power and unsatisfactory pulling.

The fuel system may be the cause of missing. If the line to the carburettor is partially choked, sufficient fuel will not be obtaining entrance to the float-chamber in order to supply explosions to each cylinder. Water in the carburettor will have the same effect. If the mixture is too rich or too lean, missing will occur. An over-rich mixture is generally indicated by black smoke issuing from the exhaust. A lean mixture very often results in small explosions occurring in the carburettor and vaporiser.

Poor compression, due to leaky or pitted valves or badly worn pistons and rings, will also cause miss-firing. The sticking of valves, either intake or exhaust, will also cause the engine to miss, or if the valves are not properly adjusted the result will be the same.

In all cases where miss-firing is taking place operations should be stopped immediately, regardless of cost, and the trouble righted. A missing cylinder causes great havoc in a motor, not only from the point of view of the incorrect balance of the engine causing excessive vibration and wear, but owing to crankcase dilution. It must be remembered that the non-exploding cylinder is still drawing into the combustion chamber quantities of gas; the gas is not being exploded and a considerable quantity of it finds it way past the piston rings into the crankcase oil, resulting in excess crankcase dilution.

There is no doubt that the premier tractor fuel to-day, which can be depended on, not only to give greatest power and economy, but also to give those essentials of good idling and easy starting under bad weather conditions with a minimum of crankcase dilution, is the famous new "Cross" kerosene. This new fuel is a departure from any kerosene previously manufactured by the Shell Company and is specially prepared to meet every requirement and every class of work indulged in by the tractor owner to-day.

Backfiring.

Sometimes an engine, particularly when it is being started, backfires into the carburettor. A moment's thought on the matter will make you appreciate that for this to occur at least one of the inlet valves must have been open when the actual explosion occurred. Investigation will generally prove that a valve has stuck. On the other hand, the seat of the valve may be so very bad as not to cause any obstruction to the explosion entering the induction system.

An excess of carbon on the piston will also cause a backfire to the carburettor, particularly if the motor has been running for some time, as the carbon deposits become so heated as to burn, thus causing the explosion very often before the intake valve has closed.

Ignition may cause backfiring by a retarded spark or a spark too far advanced, or if the magneto wires are connected to the wrong plugs.

The most common cause of backfiring is a slow-burning fuel mixture, which in turn is most often caused by insufficient heat on the motor.

It should be borne in mind that in order to obtain economy from a tractor fuel it must have weight, and in order to explode the weighty fuel sufficient heat must be on the vaporiser to completely turn it into combustible gas.

If the correct working heat of 200 deg. and 210 deg. is not being obtained, and a blind is not fitted to the radiator, then you should suggest to the tractor owner that he tie a bag across the front of the radiator. Heat on the motor is all-important, and too much stress cannot be laid upon it.

Overheating.

While efficient operation can only be obtained from a tractor when it is working at a temperature near boiling point, very often through various causes the motor *over* heats. As you know, the boiling point of water is 212 deg., and if it were possible to work the tractor motor at 210 deg. without overheating, this would be the most satisfactory temperature for it. Nevertheless, overheating sometimes occurs and is damaging to the motor.

The cause may lie either in the ignition or the carburettor or in the motor itself. A late or retarded spark or a very weak spark over a long period will cause overheating. Again, if the carburettor mixture is too rich or too lean overheating will result.

But more often the cause of overheating is to be found in the engine itself, and it is caused by the excess of carbon on the cylinder and piston head. This overheats

the motor because the carbon is a poor conductor of heat and does not permit the heat caused by the explosions to dissipate itself through the cylinder head into the circulating water. A poor quality lubricating oil or an oil too heavy or too light in body will cause overheating; impeded circulation of the radiator tubes; the water pump not working properly, resulting in poor circulation; a slipping fan belt, resulting in insufficient air being drawn past the radiator tubes; bent fan blades; all these causes can be easily corrected.

If overheating is allowed to continue, bad wear results, and many a good engine has been ruined from this cause.

Smoke.

When black smoke issues from the exhaust it is almost a sure indication that the mixture is too rich, and the smoke you see is actually unburnt fuel. Other causes for the issue of black smoke are poor quality kerosene and insufficient motor temperature, both resulting in poor combustion.

Blue smoke issuing from exhaust is an indication that either too much oil is in the crankcase or that the oil is of poor quality or too light in body. While the crankcase should be kept well up to the full mark with lubricating oil, it is not good policy to put in any excess quantity, as it only results in excess carbon deposits and does not give any better lubrication.

White smoke.—In some tractors small quantities of water are injected with the fuel mixture. The issue of white smoke from the exhaust is an indication that too much water is being taken in. This is a matter of easy adjustment.

Crankcase Dilution.

It is a common fallacy that crankcase dilution means that unexploded portions or kerosene in liquid form run down past the piston rings into the crankcase oil. It should be borne in mind that crankcase dilution takes place in any motor burning a heavy fuel like kerosene for the following reason:—When the piston goes down to the bottom of its stroke and draws in a cylinderful of gas the gas comes into contact with the cylinder wall, which, in comparison with the vaporiser, is cool. The result is that the gas partially condenses on the cylinder wall and is absorbed by the oil thereon, and from there works down into the crankcase. The presence of the kerosene in the crankcase oil rapidly destroys its lubricating qualities.

The main cause of crankcase dilution is insufficient heat on the motor. The corrective for this has been previously explained.

Other causes of crankcase dilution are, missing cylinders, poor compression, badly worn pistons and rings, sticky valves, &c. More harm is done by crankcase dilution than any other factor of tractor operation.

Power Loss.

One of the most serious troubles which can be encountered is loss of engine power. There are many factors which can be responsible for this. We itemise them hereunder:—

Ignition.—If the spark is retarded and firing too late full power is not developed. It is seldom, however, providing that the spark lever is fully advanced, that a spark will become retarded, unless the engine has been previously overhauled and incorrectly timed.

A weak spark, due to bad ignition, is another factor, resulting in only portion of the charge being exploded, due to the lack of heat of the spark.

Fuel System.—A too lean or too rich mixture prohibits the motor from developing full power. There must be enough fuel present in the mixture to utilise all the oxygen in the air which has been mixed with the fuel. With a lean mixture this does not occur. On the other hand, if too much fuel is present for the amount of oxygen, too little pressure is generated in order to develop maximum power. The ideal mixture is one wherein every atom of fuel can be burned.

Motor.—Probably the most common cause of power loss is due to carbon. These deposits reduce power in three ways—

(1) By filling part of the combustion chamber, thereby preventing a full charge being drawn in.

(2) They cause pre-ignition by becoming so hot as to ignite the incoming mixture too easily.

(3) They prevent the escape of the heat developed by the explosions, thereby causing overheating, which expands the mixture to such an extent that the explosion is weak.

If the motor is too cold, loss of power results, because the mixture has not been completely vaporised and therefore does not completely fire.

Poor lubricating oil will cause loss of power, because it does not keep the wearing surfaces apart, and permits unnecessary friction. Furthermore, a poor lubricating oil does not seal the spaces between the piston rings and the cylinder walls, thereby allowing the explosive gases to escape on the power stroke, instead of exerting the pressure which means power.

Another common cause of loss of power which is not generally given credit for the trouble, is an impeded exhaust system. If carbon is blocking the exhaust ports or the exhaust pipe considerable back pressure is set up in the combustion chamber, thereby impeding the entrance of the incoming charge of gas.

Other factors, such as bad compression, due to leaky valves and worn piston rings, are, of course, responsible for poor power.

It is interesting to note that the new "Cross" kerosene of the Shell Company is remarkable for its property of complete combustion, wherein an absolute minimum of crankcase dilution is assured. Only in a kerosene specially prepared to meet all conditions of tractor operation is this very desirable feature to be found.

Answers to Correspondents.

PIG RAISING.

(Selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.)

Cassava as Pig Food.

F.M. (Mundubbera)—

The tubers of cassava should be boiled before use and the water discarded, this as a precautionary measure, seeing that most farmers are not conversant with the different varieties, non-poisonous or otherwise.

It is as a standby for use in time of drought that cassava appeals most as a pig food, for the plant is very hardy and will live and do reasonably well during periods when other crops will dry off. It would probably pay very much better during reasonably good seasons to depend more upon sweet potatoes than upon cassava. These tubers can be fed without any risk at all, either in the raw or cooked form. We prefer to recommend the growth of sweet potatoes by reason of the fact that farmers are more conversant with methods of cultivation and use, but it must be remembered that the feeding of an excess of sweet potato vines may be productive of harm, while it does not pay at any time to depend entirely upon the one class of food. There are many excellent varieties of sweet potatoes, and for details see our pamphlet on the subject.

MAIZE—THE GROWING CROP.

Important as is the thorough preparation of the soil for maize, it is no more important than thorough after-cultivation. The cultivation of maize should begin almost from the day the crop is planted, and the first operation should be a light harrowing. This harrowing may be left with advantage until four or five days after planting, as it then becomes almost imperative if rain falls soon after sowing, especially on heavy land. In such circumstances, this harrowing will make all the difference between a poor and a good germination; the harrowing kills a heavy crop of weeds, and aerates and warms the soil.

The use of the harrow should be continued until the maize is about 6 inches high. The single-horse cultivator is an implement that is used far too early in the cultivation of the crop by many farmers. Many cannot yet reconcile themselves to the use of the harrow on the growing crop, but the practice is growing rapidly, for it is a case of "once tried, always used." There are, however, two words of caution to be remembered when harrowing growing corn: the first is to select a bright day for the work, as the plants are soft and brittle on a cloudy, cool day, or in the early morning, but quite tough and supple in the heat of the day; the second is to keep the harrow free from clogging rubbish, as this is the cause of many plants being torn out.

The use of the harrow on young maize saves a very large amount of more expensive cultivation and hand-hoeing later on, as it destroys a big crop of young weeds and grass which later becomes troublesome. A light lever harrow is the best type of implement for this purpose.

The next cultivation should be done with a riding instrument which straddles the rows—either a springtooth or rigid-tooth cultivator, or a disc cultivator. The last-named is an implement which has rapidly gained favour in the maize districts on account of the good, clean work done by it. It can be made to throw as much hill to the rows as is desired by altering the set or cut of the discs, and it is a considerable improvement on the objectionable practice of hilling with the plough. The rigid-tooth cultivator is a better implement than the springtooth for tearing out summer grass, couch, or paspalum which threatens to obtain a hold, and which is not so easily dealt with by the disc cultivator.

When the maize becomes too high to "straddle" with a two-horse cultivator, recourse must be had to a single-horse implement, the use of which should be continued for as long as practicable up to the tasselling stage.

The depth of the cultivation should be regulated according to the height of the crop, it being borne in mind that as the crop grows in height its roots more nearly approach the surface. During the early stages of growth, cultivation may be given to a depth of 4 or 5 inches, but later this must be reduced to 2 or 3 inches, or a large number of valuable feeding roots will be destroyed.

For this reason the practice of hilling with the plough is not recommended, as, when the maize is 18 inches or 2 feet high, a large number of roots are cut through by ploughing close to the rows. If hilling is thought necessary at this stage it should be done with a disc cultivator, or with mouldboard sweeps on the single-horse cultivator. It is thought, however, that hilling is a practice for which, in many cases, no good reason can be given. Where young maize "goes over" with the wind, it usually "picks up" again readily of its own accord, and hilling is not necessary for this reason alone. The only justification for hilling with the plough is in a wet season, when a heavy weed growth or grass has obtained a good hold in the rows, and requires early smothering to kill or check it. But this condition can be avoided in most seasons by a thorough preparation of the soil before planting, and by harrowing after planting both before and after the maize is up.

Many farmers practice the removal of suckers from the maize crop with the idea of increasing the yield, and incidentally of providing a little fodder for stock. The experience of the Department has been that the value of suckers is practically offset by the cost of their removal, and that the yield of the crop is much reduced by desuckering.—A. and P. Notes, N.S.W., Department Agriculture.

General Notes.

Staff Changes and Appointments.

Mr. F. B. Coleman, Inspector, Pure Seeds Act, Brisbane, has been appointed an Expert for a period of seven weeks as from the 19th August, 1929, during the absence of Mr. F. F. Coleman, Expert and Inspector, Pure Seeds Act.

Police Constable T. A. Brady, of Gympie, Acting Sergeant R. S. Christie, of Coen, and Acting Sergeant J. R. Gannon, of Augathella, have been appointed Inspectors of Slaughter-houses as from the 31st August, 1929.

Mr. Noel Manning, of Kolijo, has been appointed Canegrowers' Representative on the Farleigh Local Sugar Cane Prices Board, vice Mr. Philip Pearce, resigned.

Mr. S. C. Smith, Inspector of Slaughter-houses, Mareeba, has been appointed also Inspector of Stock and Brands as from the 31st August, 1929.

Mr. E. R. Boyd, of Hawthorne, has been appointed a Dairy Inspector, on probation, Department of Agriculture and Stock, Brisbane.

Constable T. Dunlea, of Ravenshoe, has been appointed an Acting Inspector of Stock.

All Dairy Inspectors have been appointed also Inspectors under and for the purposes of "*The Diseases in Stock Act of* 1915."

Mr. S. E. Pegg has been appointed Dairy Inspector, on probation, Department of Agriculture and Stock.

The Officer in Charge of Police at Cambooya has been appointed also an Inspector of Stock.

Mr. G. J. Gray, the General Superintendent of the Mount Isa Mines, Limited, has been appointed an Honorary Ranger under the Animals and Birds Acts, as from the 14th September, 1929.

Mr. T. R. Quinn has resigned his position as Senior Clerk (Accounts) Agricultural Bank, Brisbane, as from the 26th August, 1929.

A Progressive Queensland Firm for Farmers' Needs.

Customers of the firm of Buzacotts (Queensland)' Limited, who regularly call at the company's offices to renew acquaintance with the chiefs of staff will be interested to know that a move has been made back to their own premises in Adelaide street, Petrie Bight, next door to Atcherley House and Australian General Electric Company. We are advised that the business is quite settled down in its new premises, and the managing director is confident that the change will mean much better service to customers and anticipates another successful year. The company has on its large staff specially trained experts in pumping and irrigation, dairy requirements, jetting and spraying plants, and orchard pest controls, as well as for Buzacott steel gates and fencing and other rural requisites.

The Medicinal Value of the Milk Thistle and other Herbs.

Mr. J. A. Hamilton, Carbeen, Cairns, writes:—"I beg to offer you our appreciation of your paragraph in the August "Journal" on the great medicinal value of the milk thistle. It is indeed of inestimable value. I have tested them for many years. We often got sores on our hands pulling corn and they were very difficult to heal, but I found the milk of the thistle would cure them. At the same time, when I got thirsty pulling corn I used to chew the milk thistle leaves and they alleviate thirst and seem to act as a tonic. I am quite sure if the thistle and lettuce, endive, and chicory, which all seem to be more or less of the same family, were more generally used, many ailments would be relieved, including cancer. Mrs. C. L. H. Wallace, editress of the "Herald of Health" (London), was the authority for the statement that a lady who had cancer had been cured by living on lettuce, with hot baths and hygienic treatment advocated in her paper. This was forty years ago. I'd like to bring to your notice a herb book published by Messrs. Heath and Heather, St. Albans, Herts., England. . . . . The weed Cobbler's Peg will cure old running sores and fistula on horses. Ageratum will also cure sores. These are aboriginal remedies. The bark of the Leichhardt tree is a cure for malarial fever. I learnt this from Mr. J. Curr, of the Gulf."

Travelling Stock Regulation.

Regulation 37 of the Diseases in Stock Act has now been amended in order to give Stock Inspectors power to define the route by which stock shall be travelled.

Banana Permits.

The Minister for Agriculture and Stock (Mr. H. F. Walker), when interviewed recently relative to the issue of permits to those desiring to grow bananas or increase their areas under this fruit, stated that the present system of dealing with applications for permission to plant banana suckers and the issuing of the necessary permits is being handled in the most efficient manner possible.

The system in force is that as soon as the inspector for the district receives the application for permission to plant he forwards it to the Department of Agriculture and Stock with his endorsement as to the circumstances of the case, and in all cases where the prescribed conditions are complied with a permit is issued and promptly despatched to the grower; or if permission is considered inadvisable the grower is immediately informed of the fact. Mr. Walker added that the conditions appertaining to planting further areas were identical with those recommended by the growers' representatives on the recent deputation.

From the foregoing it will be seen that the banana growers who are in a position to conform with the required conditions are not subjected to any unnecessary delay in the matter of obtaining sanction to plant bananas.

The Royal Society of Queensland.

The ordinary monthly meeting was held in the Geology Lecture Theatre of the University on 26th August. Mr. F. Bennett, B.Sc., was in the chair. Mr. H. J. G. Hines, B.Sc., was proposed for ordinary membership.

Mr. C. T. White, F.L.S., read a paper by himself and Mr. Francis entitled "Contribution to the Queensland Flora, No. 4." Two new species—*Labichea Brassii* from North Queensland and *Albizzia xanthoxylon* from the Alberton district—were described as new, and several plants were recorded from Queensland for the first time.

Dr. D. A. Herbert read a paper, entitled "Changes in Osmotic Pressure in Relation to Movement of *Mimosa Pudica*."

Dr. Herbert exhibited (1) *Empusa muscæ*, a fungus causing fly chlorea, and (2) *Penicillium expansum*, a mould from a decaying custard apple, also found on the apple.

Mr. C. Schindler exhibited a rust fungus, *Phragmidium longissimum*, on *Rubus parvifolius*, from Mount Crosby.

Restrictions on Banana Planting.

A deputation representative of the banana growers of Diamond Valley, Mooloolah, waited on the Minister for Agriculture and Stock (Mr. H. F. Walker) recently to discuss certain phases of banana planting. The deputation comprised Messrs. J. E. Delaney and C. A. Joseph, and was introduced by Mr. R. J. Warren, M.L.A.

Mr. Delaney said that the growers in the district were being refused permits to plant because of the limited occurrence of disease in their neighbourhood. The position was that two plants affected with Bunchy Top had been found in the locality, and because of this permits were being refused in accordance with the regulation which had recently been issued stipulating that no permits would be granted within a radius of two miles of an affected plantation. He thought that the regulations should be more flexible.

Mr. Joseph supported Mr. Delaney's remarks. He had had considerable experience with Bunchy Top, having grown bananas in the Tweed district for some years, and he would rather be within half a mile of an affected plantation with a high hill between than within ten miles where there was a direct airline.

The Minister, in reply, said that he would constitute an Appeal Board consisting of two representatives of the Department and two growers, who would hear any cases presented to it on their merits. He would also arrange for this to be done in any other district similarly affected. Mr. Walker also announced that he would enforce any recommendations made by the Banana Industry Committee.

Scrub Turkeys and Cactoblastus.

As an extract from the progress report of the scientific work of the Commonwealth Prickly-pear Board in Australia during June, 1929, indicated that the Scrub Turkey was feeding on the Cactoblastus larvæ, an Order in Council has been issued reducing the period of protection for Brush or Scrub Turkeys on prickly-pear infested land from an annual period of seven months to a period extending from the 1st to the 7th July in each year, inclusive.

Marketing of Tomatoes.

Following upon the issue of a notice by the Committee of Direction of Fruit Marketing that they intended to issue a "Direction" for the marketing of tomatoes intended for treatment at factories, a petition was received asking that a poll be held to decide whether or not the "Direction" should operate. Regulations have now been issued under the Fruit Marketing Organisation Acts to govern the handling of the necessary ballot.

The "Direction" will apply to tomatoes intended for manufacturing purposes produced in the district bordered on the north by Nambour, on the west by Rosewood, on the south by the New South Wales border, and including the islands in Moreton Bay. It will apply for three months from the 15th September, 1929.

The State Wheat Board—Mr. J. T. Tod Appointed Chairman.

The Minister for Agriculture, Mr. H. F. Walker, has announced that certain changes have been made in the personnel of the State Wheat Board as from the 31st August. It has been decided by the Government to regard the wish of the Board that an elected representative of the growers shall be appointed as chairman. He has therefore appointed Mr. J. T. Tod, of Goomburra, to that position.

Mr. Tod is an extensive landholder on the Darling Downs, having considerable interests in wheat growing and dairying in the Goomburra and Inglewood districts. He is well and favourably known throughout Queensland as president of the Co-operative Dairy Companies' Association, which position he has held for many years. As well as being a member of the Wheat Board, Mr. Tod is also a director of the Warwick Co-operative Dairying Association and was also a member of the first Council of Agriculture.

The Minister has also appointed the Director of Marketing, Mr. L. R. Macgregor, to the Board.

Mr. Walker also informed the Press that he has been looking into matters pertaining to the wheat industry, and that he felt that there is scope for considerable development in that industry, given the full co-operation of all concerned. He had, therefore, convened a conference which was held in Brisbane on the 4th September, between the Wheat Board, as representing the growers, and representatives of the millers, over which he presided.

Preference for Queensland Goods Urged.

"I am determined to see that Queensland people get a full recognition of what our secondary industries are doing as far as propaganda can assist, and I want to have them built up," said Hon. H. E. Sizer (Minister for Labour and Industry), when officially opening the John Reid Hall at the recent Brisbane Show.

The hall contained numerous industrial exhibits neatly displayed.

In introducing the Minister and asking him to perform the opening ceremony, Mr. M. P. Campbell (president of the Chamber of Manufactures) said that some people thought that the secondary industries were antagonistic to the primary ones. That was a wrong impression. Their one aim was to do the best for the State.

In opening the hall, Mr. Sizer said that by virtue of the office he held for the time being he was constantly in contact with secondary industries. He was determined to see that the people of Queensland obtained full recognition of what the secondary industries were doing as far as propaganda could assist, and he intended to have them built up as far as he was able. It was essential for the Empire's progress that the secondary industries should be fostered.

There was great scope for education to develop manufacturing industries in Queensland, and if the people would stand behind the manufacturers and the State, and purchase home-made goods, then the industries would grow, and unemployment would disappear quicker than otherwise or by a wholesale loan policy.

New Bird Sanctuaries Proclaimed.

An Order in Council has been issued declaring Connolly Dam, Silverwood (Warwick), Rifle Creek Dam (Mount Isa), and portion of Harrow Station (Cambooya) to be sanctuaries for animals and birds from which places it will be unlawful for any person to take or kill any animal or bird.

Pure Water for Dairy Cows.

"What is the cheapest and best form of food for dairy cows?" "Pure water," the owner of a cow which last year produced 10,584 lb. milk and 542.6 lb. of butter-fat, is stated to have replied, adding: "Only be sure that the water is put in the cow and not in the milk can."

Milk is approximately 87 per cent. water, and if the cow does not have access to an unlimited supply of fresh, clean, palatable water her milk flow is bound to suffer heavily. A high-producing cow will consume from 25 to 30 gallons of water per day. A reliable automatic water supply system has proved to be one of the most valuable items of a dairy farm's equipment.

Food and Emotions.

"There are three ways of regarding the body. The first is as an enemy, an evil to be fought and ill-treated; the second as the spoiled child, pampered and put first, and protected; and third, as a good servant and friend, that is the winning, harmonious co-operator with mind and spirit. The third way is the correct way in which to regard the body. The whole personality should be considered. Looking to the harmonious working of the body did not mean fussiness. Wholesome food eaten in a happy, controlled spirit may do more good than a faultless diet combined with worry. All negative emotions such as anxiety, fear, resentment, and anger have ill-effects on the body. Confidence, trust, and love, and other positive emotions liberate the physical powers."—Dr. Evelyn Saywell, in an address to a health conference.

SEED MAIZE.

UNPRECEDENTED DEMAND FOR DEPARTMENTAL STOCKS.

The demand for seed maize this season was unprecedented, and although large stocks of several varieties were held these were quickly exhausted.

The response to the advertisement of seed for sale in this Journal was extraordinary. The rush of early orders soon covered the whole of the supply available, and a very large number received later and which could not possibly be filled had to be returned with regret.

Each season sufficient seed to sow some thousands of acres is raised by the Department, and the demand is ever increasing. This is proof of the reputation won for the improved strains and grades of grain bred by the Department; and it also shows that farmers are realising the value of planting seed of tested varieties.

All the varieties that were advertised in this Journal have been grown by the Department for many years, and the valuable work of improving type and yielding capacity is carried on from season to season.

The Department is continually introducing new varieties, which are tried out in the several maize-growing districts, and any that prove good yielders and of a suitable type are retained. Included among them is Funk's Ninety Day, which is so popular with Queensland maize growers.

Plans are now well forward for meeting every possible future demand for selected seed of all improved varieties tested under ordinary field conditions, and thus avoiding the risk of disappointment to growers who desire to obtain the best seed from the Departmental plots.

The Way of the Reformer.

"It is quite proper to accept a compromise as an instalment. If we cannot get the whole, it may be quite right to accept the half. We may live to secure the other half another time. We must, however, see what the acceptance of the half involves. It may be that if we accept it we shall be hindering instead of advancing a genuine reform. We may be sidetracked. John Morley put this with great force when he said, commenting on the French saying that small reforms are the worst enemies of great reforms:—'There is a sense in which the saying is profoundly true. A small and temporary improvement may really be the worst enemy of a great and permanent improvement, unless the first is made on the lines and in the direction of the second. . . . The second possible evil of a small reform may be equally mischievous—where the small reform is represented as settling the question. . . . It sets men's minds in a posture of contentment which is not justified by the amount of what has been done, and which makes it all the harder to arouse to new effort when the inevitable time arrives.' "—James Scott, in "Chambers' Journal."

Shearing of Lambs.

Generally speaking, lambs intended for sale direct from their mothers should not be shorn. The value of the wool will not recompense the reduction in the quality of the flesh due to the handling and bruising, nor does a shorn lamb look attractive, rarely realising a good price in the market. The principal item in fat lambs, of course, is the flesh, but the pelt has a certain value, which is practically nil if the lamb has been shorn.

In a season like the present, however, observes the Sheep and Wool Expert of the Department of Agriculture, the question of shearing is one to be considered, as unless seasonal conditions change for the better it seems problematical whether the lambs can be brought to a marketable condition by weaning time, and so long as there is no danger of loss due to cold they may respond more quickly if shorn than if left right through the season in the wool.

With regard to Merino lambs, in ordinary seasons, weaning and shearing are often carried out at the same time, but when, as at present, the lambs are not in very good condition and no good feed is available for weaning them on, the two operations (weaning and shearing) at once may be too great a strain on the lamb's constitution, and it may therefore be advisable either to leave the weaning until a later date or put off the date of shearing.

Uses of Lemon.

Many people prefer lemon juice to vinegar when mixing a salad dressing, and it is much more digestible.

For washing dainty handkerchiefs add a few lemon rinds to the water when it is cold, and boil it with the handkerchiefs, and you will be surprised at their snowy whiteness.

As everyone knows, lemon juice is very useful after an accident with the inkpot. Rub lemon juice on the mark at once, leave for five or ten minutes, then wash off with milk, and the stain will have disappeared.

The juice of a small lemon, or half of a large one, taken first thing in the morning, without adding either sugar or water, is wonderfully helpful for rheumatism and indigestion.

The same treatment will soon make the muddiest complexion clear. After the lemon has been squeezed out, save the skin and rub it over the fingers if you want to remove ink or other stains from the hands. A few drops of lemon juice added to a little glycerine will make the hands soft and white again after a day's work in the garden.

In cookery the lemon is invaluable. Many sauces are insipid unless a squeeze of lemon juice is added. Sauces and custards are all the nicer if the thinly-grated rind of the lemon is boiled in the milk or cream preparation and then strained out. In stuffings a little finely-grated lemon rind adds piquancy and flavour. Many people prefer a slice of lemon in their tea to sugar and milk. Cakes for tea and some light puddings are nice with the finely-grated lemon rind added. Lemons, too, are invaluable for garnishing, their yellow tint adding colour to insipid food. Cutlets, fillets of fried fish, and pancakes all look and taste better if garnished with slices of lemon.

The Care of Hides and Skins.

Careless methods of flaying the skins of cattle and sheep, and excessive branding of cattle and calves, are the causes of heavy losses annually—the present methods of branding are computed to be responsible for damage to Australian hides amounting to a yearly loss of half a million sterling. Inefficient curing and the dirty and stained condition in which hides and skins are often marketed are other causes of depreciation, while the cuts and score-marks received by the living animal through horning, contact with barbed wire, and other external injuries, also combine to discount values.

The practices responsible for bad hides, and the correct methods of slaughtering and skinning, curing, and marketing, are discussed in detail in a pamphlet recently issued by the Department of Agriculture. It is pointed out that farmers, station-owners, and country butchers supply a fair proportion of the hides and skins reaching the city skin stores. Country hides are for the most part ripped off carelessly, without regard to final shapeliness, and very often very little attempt is made to cure them or preserve them in any way. As they are generally marketed indirectly, they frequently reach the tanner in a condition known as "slippy," and are more or less putrid, and very little good leather can be manufactured from them.

If consignors improved their methods of branding, flaying, and curing their hides, the reader is reminded, city buyers would quickly recognise the fact and pay accordingly. By disposal on the farm to country dealers the hides eventually lose their identity, and the careful man is not compensated to the full extent for the care he may have exercised. Hides and skins may be forwarded in large or small parcels to the various stores and sold on account of consignors. Clean, well-cured, good-shaped hides, free from scores, cuts, blemishes, and slip, will fetch top values.

The Principles of Sheep Feeding.

The principles affecting the feeding of sheep are studied even less than those affecting the feeding of other animals, observes the Chief Veterinary Surgeon of the New South Wales Department of Agriculture, but their consideration is periodically a matter of very great importance. The writer draws attention to some facts of which pastoralists might well be reminded just now.

The tendency is to regard the fact that sheep have lived for some considerable time on scrub or very dry innutritious food as evidence that the food is sufficient for them, but as a matter of fact a continuous lowering in tone is taking place, varying in degree according to the quantity and quality of the food. This lowering in tone may be so slight that no ill-effects are observed, and when good feed comes again the sheep recover their tone; on the other hand, it may be so marked that the digestive system becomes unable to deal with the food, impaction results, and heavy mortality may follow. This is particularly liable to occur in pregnant ewes towards lambing time, and in sheep that are travelled or put to some other strain. In between these manifestations are all gradations of the trouble, and in many cases only small numbers of the weaker sheep die.

What the animals suffer from is actually slow starvation. The impaction is certainly increased by the astringent nature of so many scrub fodders. It is impossible to lay down any hard-and-fast rules as to when and under what particular conditions mortality will occur, but it is obvious that the longer the period of innutritious feeding the more likely it is to have unfavourable results. Experience with the particular fodders used and the conditions existent on each holding must serve as the owner's guide.

It is plain that prevention of such mortality depends on the supply of food which will counterbalance both the lack of nutritive quality and the astringent nature of the scrubs and rough, dry fodders. Although, to prevent all ill-effects, this must be undertaken throughout the period of dry feeding, it is remarkable how rapidly sheep will recover from very severe loss of tone and impaction—even after deaths have occurred in the flock from these causes—if food is changed. Losses of lambs through deficiency of milk in the ewes (an indirect effect of the trouble discussed) may also be guarded against at the same time by use of the same measures.

But not only does loss occur from continued dry feeding—yet further loss is involved in the sudden change to extremely succulent food. Surprise is often expressed that mortality in sheep is so heavy after the appearance of what is referred to as good food, but, as a matter of fact, such rapid-growing, succulent food as appears after copious rains following drought possesses very little body, and in the already weakened condition of the animal will not sustain life, particularly as at such times the animal requires the production of a good deal of body heat. The question then arises of the possibility of supplying some dry roughage in addition to the green food.

Poisoning of Sheep by Chemical Fertilisers.

An inquirer asks whether sheep are likely to suffer ill-effects from the residue of artificial fertilisers used in the topdressing of pastures.

The ingestion of basic slag has been alleged to have caused the deaths of sheep grazing on land which had been recently dressed with this fertiliser.

Heavy applications, followed by a period of dry weather, when the slag is inclined to lie on the ground or cling in an undissolved state to the roots and stalks, may lead to animals consuming it in quantities sufficient to cause fatal results.

Reputed cases of poisoning have occurred twelve days after sheep had been depastured on to paddocks dressed with slag in the proportion of 2½ cwt. per acre, and in the complete absence of rain. Certain of the animals became ill, were unable to stand, and had to be destroyed.

In experimental cases, the lesions due to basic slag poisoning are those of inflammation of the lining membrane of the stomach and small intestines. The urine may have an opaque creamy appearance.

Experiments carried out in Vienna in 1919 proved that fertilisers such as basic slag, superphosphate, kainit, sulphate of ammonia, nitrate of potash, and nitrate of soda are capable of killing sheep receiving small quantities mixed in the feed.

Under ordinary circumstances, it is rare that sheep are able to pick up from the pasture sufficient of the material to cause death, or even derangement of health.

The possibility of this contingency should, however, be remembered when chemical fertilisers are being used. It is prudent not to depasture sheep on to freshly treated paddocks until the fertiliser has been to some extent dissolved and washed into the ground by rain.—The "New Zealand Farmer."

Bloat in Cattle—Causes and Treatment.

Bloat, or hoven, is due to succulent foods eaten under certain conditions which cause the formation of large quantities of gas in the rumen or paunch, and, in consequence, a swelling of the left flank. It is most often seen in the following circumstances:—

(1) When cattle are turned hungry on to such succulent green food as lucerne or clover.

(2) When cattle used to dry feed are suddenly changed on to green, soft food.

(3) When travelling cattle are allowed access to large amounts of green food, such as variegated thistle.

(4) When cattle gorge themselves on wet grasses or herbage.

(5) When cattle are fed on roots or potatoes under certain conditions.

Some animals appear to be more subject to hoven than others.

Keeping the mouth open with a gag, or a piece of wood, until the beast has belched most of the gas out through the mouth will be useful in mild cases. The internal administration of 1 oz. of bicarbonate of soda and 1 oz. of ginger is sometimes useful, and it may be repeated in a few hours—if necessary.

In a bad case the most effective treatment is the puncture of the paunch. This is done on the left side in the flank—at a point equidistant from the last rib, the edge of the loin bones, and the angle of the haunch. The correct instrument for this purpose is trocar and cannula. The cannula is a tube through which passes a sharp pointed instrument—the trocar. This instrument is thrust into the rumen, and the trocar is withdrawn, leaving the cannula in place, and through this the gas escapes. In case of emergency a knife may be used in the same way, the gas escaping through the cut, but complications may set in and cause death if this is not done expertly. After the gas has escaped the animal might be given a dose of linseed oil (1½ pints) and turpentine (1 tablespoonful). This mixture should be well shaken up while being given.

Every effort should be made to prevent the occurrence of hoven in stock. In feeding lucerne and clover, if the animals are not used to it they should be put on it gradually until they become accustomed to it. If lucerne is fed in a wet state, or after heavy rain—when it is soft and juicy—it will almost always produce trouble; and cattle should, therefore, be kept off it until it is drier.

Whitewash on the Farm—The Spring Cleaning.

Whitewash has a wide application to farm use and deserves a much greater popularity than it at present enjoys. Its ingredients are inexpensive and readily obtained; it is not difficult to make, and it is easy to apply. In addition to these advantages, it protects the surfaces to which it is applied, brightens up dark interiors, and is sanitary. Whitewash may be coloured provided that light tints and shades are used, and that the pigments are not affected by lime. Among such are yellow ochre, raw and burnt umber, and raw and burnt sienna. The surface to be whitewashed should be just as clean as one that is to be painted, and it is a first essential to good results that all dirt, dust, grease, and scaly material be removed before there is any attempt to apply the wash. This implies a liberal use of scrapers and stiff brushes. When the cleaning is finished and the surface dusted, it is well to dampen it slightly just before applying the wash.

Action of Frost on Soil.

It is known that frost is one of the principal agents in the disintegration of rock and in its transformation and final conversion into soil. This action continues to be exercised on the soil, increasing the proportion of fine particles, but with extreme slowness. On the other hand, frost has an immediate effect on soil colloids—e.g., it breaks up compact clayey soils into separate lumps. According to Ehrenberg this effect is not due solely to the expansion to the interstitial water, but also to the growth of ice crystals. The resulting lumpy texture increases the permeability and aeration of the soil, which tends to dry it and facilitate its cultivation without risk of its again uniting into a solid mass. The solidification is apt to be renewed, however, as a result of heavy spring rains, also in many vegetable soils. Attempts have often been made to attribute the beneficial effect of frost to the fact that it renders soluble the nutritive elements in the soil, but this could not be conclusively proved experimentally. On the other hand, it has been shown that the total surface of the particles of a granite soil has increased 6.13 per cent. after exposure to frost. This effect is directly beneficial to plant growth, which shows that the old saying, "If the ground does not freeze the crop will be thin," has not lost its meaning in countries with a cold winter.

Bee Culture.

Whether it is intended to go in for bee-keeping commercially or merely as a hobby, spring or early summer is the most suitable time to make a start. In either case, too, but especially in the case of the person who hopes eventually to depend upon bee-keeping for a livelihood, the enterprise must be given proper thought.

Success or failure is often determined by the method of making a beginning, and it is well to avoid if possible the purchase of bees in old boxes, and the consequent necessity for transferring, which process is itself sufficient to damp the ardour of one who is unacquainted with the work. There is also the risk of introducing disease. The better way is to purchase a hive (or hives) outright. The purchase should be made from a reputable breeder; otherwise the hive should be examined by an expert previous to purchase to certify its freedom from disease. Another method of establishing an apiary is to prepare hives (factory-made for preference) by nailing, painting, and fitting with comb-foundation, and then to purchase prime swarms from a neighbouring bee-keeper when swarming is prevalent.

The land for an apiary should be fairly level, well-drained, and for preference the hives should face the north-east. A trellis of passion vines around the plot makes an ideal windbreak, and affords protection to the hives both in summer and winter. The equipment required for the running of a small apiary is neither extensive or costly. The requisites are mostly standardised throughout Australia, which is an advantage. The Langstroth ten-frame hive may be purchased in lots of five with supers at a reduction in price. A smoker, hive tool, veil, uncapping knife, and honey extractor are among the other requisites.

Bees play a very important part in the pollination of fruit trees, and the establishment of an apiary might well be considered by every orchardist. One to three colonies per acre of orchard should show a material increase in quantity and quality of fruit, while sufficient honey and beeswax will at ordinary times be produced to enable a surplus to be marketed. The site of the apiary need not be in the orchard. A small allotment of ground should be selected where the bees are not likely to be disturbed when cultivating.

The Waler still Wanted—Australian Horses for India.

General W. H. Anderson, Director-General of Remounts for the Indian Army, is at present visiting Australia in connection with the supply of horses for the Indian Army.

The impression, he says, that horses from Australia are no longer required, owing to the mechanisation of the army and the fact that India is breeding her own horses, is quite erroneous.

India requires about 3,000 horses every year for the army, while the native States require another 1,500. In addition, there is a large private demand for polo ponies and horses for sporting and utility purposes.

Australian stations, General Anderson considers, must continue to breed horses for home use, and the surplus can be exported to India. The quality of the remounts needs, however, to be improved, as there has been a serious decline in the standard in recent years.

An Argument for "Safeguarding."

"Last year a friend of mine sold 5,000 tons of rags. He told me that these rags would be made into cloth by skilled men in Poland who were receiving from 13s. to 15s. a week. If any hon. members opposite were in business, could they say how they would compete with that country if they were having to pay £3 per week to men doing the same kind of work? A man in my division who has a woollen mill comes to London and buys certain materials. The man in France also comes to London for the same purpose. The freight charges from London to Roubaix are more than they are from London to the West Riding of Yorkshire. In Roubaix they have their mills well equipped; rebuilt out of reparations since the war. The mills are well fitted up and they employ workmen who are probably as skilled as the workmen in Yorkshire. That is the reason why we cannot compete with them. Simply because in Roubaix the worker in the woollen mills receives a standard rate of £1 2s. 11d. per week, while for the same work in the Dewsbury and Batley area in the West Riding of Yorkshire the standard wage is £2 14s. 10d. Can the House say this is a fair and reasonable competition?"—Mr. C. V. GIBSON, M.P., in the House of Commons.

Silage for Sheep—Some Feeding Points.

Although silage is one of the best substitutes for green grass and a reserve of it is of great value in a season such as the present, a certain amount of disappointment is sometimes expressed by those who are feeding it for the first time. Writing to the Department of Agriculture recently, a sheep-owner stated that he had been feeding silage with lucerne hay, but that the sheep showed a marked discrimination in favour of the lucerne, and if they picked up a bit of silage immediately dropped it again. He had been feeding it for four or five days.

Such an experience is by no means unusual, stock apparently having to acquire a taste for silage. To begin with, only a small quantity should be fed to sheep in a small paddock, and it is best to feed it out in the evening, for if large quantities are put out in the morning and the sheep do not at once take to it, it will dry out in the hot sun in a few hours and be wasted. Once the sheep become accustomed to silage they greatly relish it and will follow the wagons when the silage is being carted out.

Although sheep are often satisfactorily fed on silage alone, continued feeding on silage exclusively results in loss of condition, the feed being lacking in protein. It is therefore preferable to feed silage in combination with a small quantity of wheaten, oaten, or lucerne hay—especially the last mentioned, because of its high protein content.

Feeding should be commenced while the sheep are still in good, strong condition, and while there is some rough grass about. The silage need only be thrown over a clean piece of ground, but it should be well spread out, and it is best to get a good deal out every day before the sheep are allowed to feed. The sheep should be drafted into lots according to their strength.

A plentiful supply of salt should be provided for sheep when feeding on silage, even in districts, such as salt-bush country, where it is not ordinarily used to any extent. The lick is improved by adding about 6 oz. of Epsom salts to about 100 lb. of coarse salt.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

THE MENACE OF BAD TEETH.

The enamel which caps our teeth is the only surface tissue which is never renewed. Once injured, it can never be repaired. A crack or hole in the enamel is an open gateway for bacteria, which enter and destroy the teeth. The tooth decays, and becomes offensive; decayed teeth cause inflammation, abscesses, and open sores, which do not heal over until the teeth fall out, or have been extracted. We might imagine that nature had been careless, in leaving this part of our bodies vulnerable and defenceless. But our teeth are formed on the same plan as those of other animals, whose teeth continue good throughout their lives. Prehistoric man had excellent teeth from infancy to old age, and many primitive races have the same to-day. Bad teeth, on the other hand, are becoming almost universal in modern civilised man, and in all primitive races as soon as they adopt civilised customs in food. We may say that they are the result of civilisation, or more correctly, of some defects of our civilisation which need amendment.

Modern medicine is becoming more and more impressed with the dangers of bad teeth. The miseries of toothache are well known, and the abscesses of the jaw that may be caused by decayed teeth are serious troubles. But far more serious is the poisoning of the system by the constant swallowing of the agents and products of dental decay, to which may be attributed many cases of dyspepsia, gastric, and duodenal ulcers, and appendicitis. Septic teeth may be the original cause of septic tonsils which need surgical removal. Recently that fatal disease, pernicious anaemia, has been traced, if not with certainty, at least with much probability, to the same cause. With still more confidence do we point to dental abscesses as frequently the root cause of crippling rheumatism. Medical men are becoming more and more inclined to attribute some obscure heart troubles, nervous troubles, and other mysterious conditions to the same source. Even cancers of the mouth appear to be more frequently in dirty than in clean mouths. Gradually, we have come to recognise bad teeth as one of the chief causes of disease.

Causes which act slowly, and at a long interval of time, are apt to pass unrecognised. Careless neglect of the teeth of a child may, and often does, lead to the death of a man or woman in the prime of life, or to such crippling as leads to chronic invalidism. Now that we are coming to recognise the cause of these disasters, after the mischief is done, surely we shall endeavour to save our children from such a fate by removing the cause. Certainly, owing to the occurrence of toothache, which is one of the greatest blessings ever bestowed upon mankind, we have learnt to some extent, with the help of the dental profession, to care for our teeth. But it would be better still to preserve our children's teeth by natural methods, as they were preserved in primitive man and the lower animals.

To Grow Good Teeth Right Foods are Necessary.

Weakly developed teeth do not necessarily decay. This is a fact established by dental observation. Nor do strongly developed teeth necessarily escape destruction. This also is well established. But other factors being equal, teeth of weak construction are more easily destroyed. For the growth of strong teeth, two things are necessary. The first requirement is a sufficient supply of food containing the necessary vitamins. The most important vitamin-containing foods are uncooked vegetables, fresh fruit, fresh milk, eggs, and butter.

These foods are necessary for the child-bearing mother that her baby may have good teeth. They are necessary also for the child after his first year in order that his permanent teeth may be strongly developed. For the first year of life—the most important period for the development of the permanent teeth—nothing is so good as the mother's milk.

Nipped in the Bud.

The second requirement is sufficient space in the jaws for the developing tooth germs, the avoidance of undue pressure and overcrowding. It is for this reason that the preservation of the temporary teeth of children is so important. If a temporary tooth is allowed to decay early and become lost, the adjacent temporary teeth tend to fall together. The developing permanent teeth beneath them have then insufficient room for strong development. They may emerge out of place and overlap, so as to be useless for mastication. Another frequent cause of malformation is poor and restricted development of the jaw bones, with crowding of the developing teeth. It is often forgotten that bone is a living tissue, constantly altering its form, as it reacts to strains and stresses, and that this is more especially true in the growing child. Most serious deformities of the teeth may result from nasal obstruction, accompanied by narrowing of the jaws, and high arched palate-bones, or from the constant pressure caused by habitual sucking of the thumb, or fingers, or dummy. Still more common is the arrest of development, owing to want of use, more especially the want of hard biting. Most unfortunately, most of the foods we give our children are too soft, and those that are not soft, such as crusts of bread and meat, are tough and not hard. Tough foods have to be chewed; hard foods have to be crushed, and it is the powerful crushing muscles that exert the greatest force in widening the growing jaws. The baby should be given hard, crisp, baked bread, which may or may not be toasted (bread toasted without being baked is only hard on the surface) instead of soft bread and butter, hard baked oatcakes sometimes instead of soft porridge. Breakfast foods are valuable in porportion to their hardness and crispness, and porridge may be improved by the addition of a large spoonful of prepared bran. Of course the baby must be taught by degrees how to bite his food. As soon as he is old enough he may be encouraged to nibble a piece of raw apple at the end of his meals. In narrow, poorly developed jaws the developing germs of the permanent teeth, which lie closely packed between the roots of the temporary teeth, have not sufficient room for healthy growth. Literally, not metaphorically, they are nipped in the bud. They emerge weak and are easily destroyed. And so, from want of hard biting, we grow teeth that will not bite. For older children cracking nuts and crushing their kernels (within reason and moderation) is a valuable exercise for the jaws, and so is the biting of sugar-cane. Indeed, for dental purposes sugar-cane may be regarded as a fruit, the sweet acid juice being beneficial and the exertion needed for its extraction entirely wholesome. Perhaps in some future generation (most of the present generation are, alas, incapable of such feats) our school children will enjoy ten minutes interval every morning for nut-cracking and cane-biting, and every child who cannot crack his nuts, or crush his sugar-cane, will be referred to the school dentist for treatment.

Let us grow as strong teeth as we can, but whether strong or weak, let us preserve the teeth we have.

BOUGAINVILLEA.

Anyone visiting the beautiful garden of Mr. Thomas, at Indooroopilly, again this year, will be impressed with the many possibilities of design and effect that can be made with this very hardy and showy climber. The appreciation of the bougainvillea is shown by the hundreds of persons who go to see it in bloom. It is a hardy plant, and loves sunshine, and there is no reason why it should not be more widely grown. A little time and patience will amply repay anyone who contemplates its culture. Cuttings strike readily as soon as the blooming period is over. They should be about 12 in. long. Select last season's growth, and plant in sandy soil in a shady place.

Put the cuttings about 6 in. deep in the soil, and press down firmly. Keep the ground moist, not soaking wet. If you require a more immediate result, obtain plants from the florists in pots. There are about seven different colours to select from. When the plants have grown to a height of 2 ft. then select your design and prune accordingly. To train the plant make a skeleton design of wire, and then trim the plant by removing all shoots that may be growing in a direction that is not required. About May or June pruning must be stopped, as all the new shoots then appearing will be flowering shoots. As soon as the blooming period is over commence pruning again to still improve your design.

There are many methods of growing bougainvillea, and one that finds favour with many is that of planting it around an old tree that is not wanted, and ringbarking the tree when the bougainvillea is firmly established. It will then hang down from the branches of the tree and form a beautiful garland of bloom. It is an evergreen and never appears unsightly.

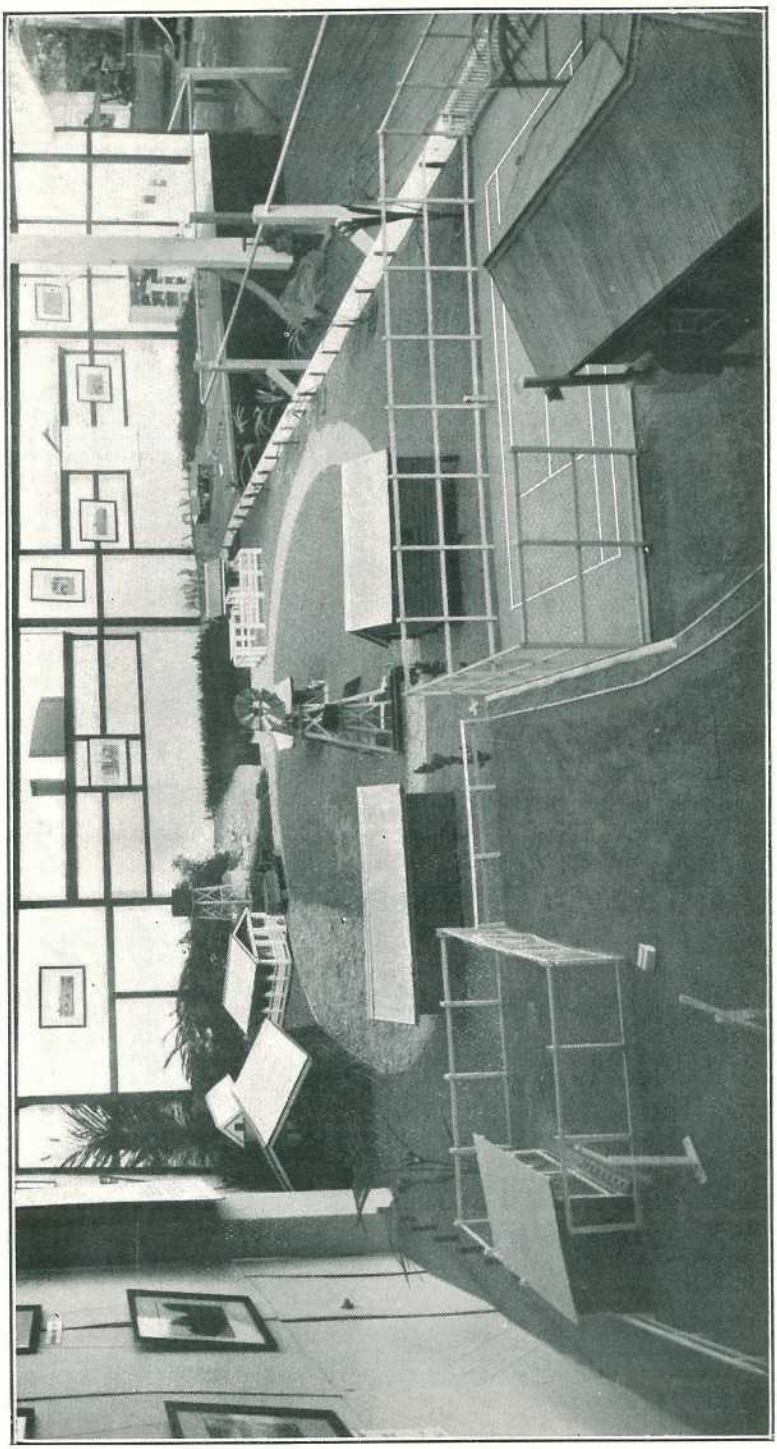


PLATE 168.—A LAY-OUT OF A MODERN FARMYARD—A MODEL HOMESTEAD IN THE RURAL SCHOOLS' DISPLAY, ROYAL NATIONAL SHOW, 1929.

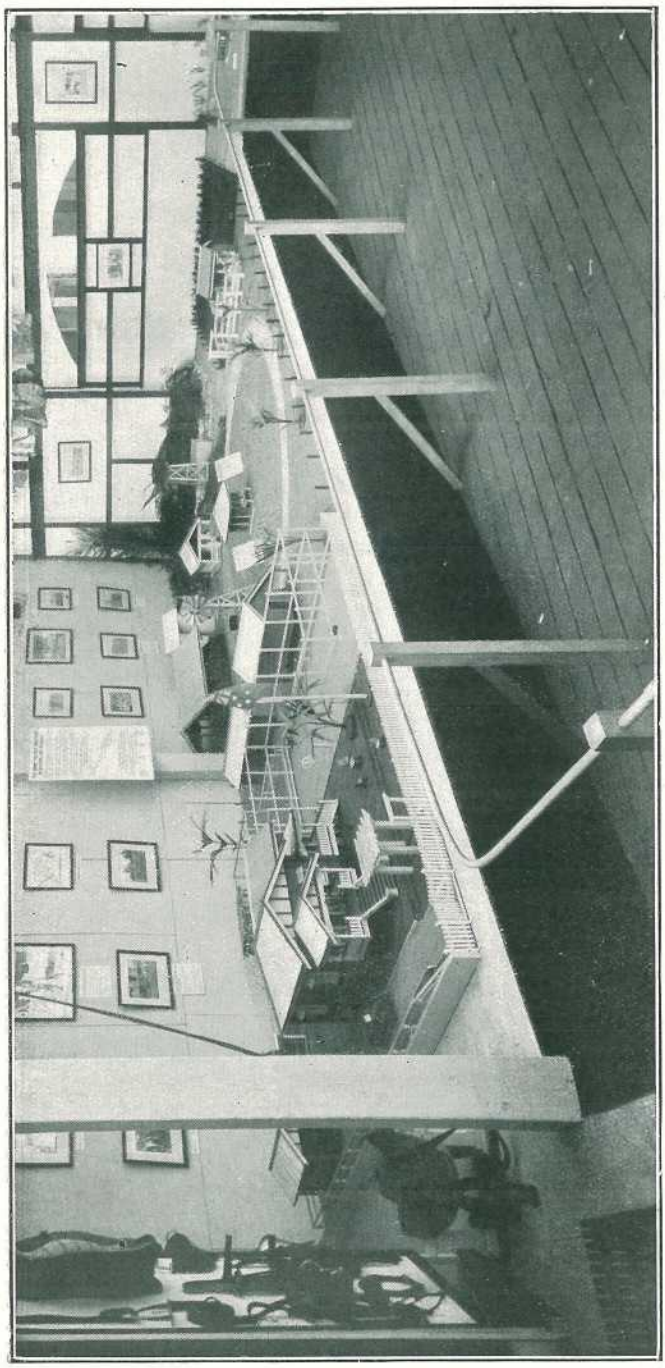


PLATE 169.—ANOTHER VIEW OF A MODEL FARM HOMESTEAD IN THE RURAL SCHOOLS' DISPLAY. ROYAL NATIONAL SHOW, 1929.

PEOPLE AND GARDENS.

"It depends on the mood of the man, whether he shall see the sunset or the fine poem."

In the garden among the flowers, I have learned the value of work, for it is only by working, planning, and planting, "sowin' things, an' growin' things, an' watching of 'em grow" . . . . that we obtain any results in the garden or learn anything about the flower world, and how to get them to grow.

We prepare the soil, sow the seeds, water them, and in due time are rewarded by little soft, green shoots thrusting their way through the earth, and then there is the joy and wonder in the final and lovely harvest of glorious leaf, bud, and blossom.

I have learned the value of prayer in my garden, the value of good, strong thoughts that working in a garden and among flowers must necessarily bring. Every green thing that grows in the flower-patch was a prayer when I planted it, as I looked forward to its lovely future, picturing it in its gay beauty, and in the bud, blossom, and fruit of it, I see the realisation of my prayer.

The beauty of nature, and the significance of it touches different people in different ways. Some understand it, and because of this understanding, they find in it a great love and joy, pleasure and profit. Others remain perfectly or imperfectly oblivious to it, and are quite unconscious of the fact that they are missing anything, accepting the sunshine, the air, the sky, fruit, and flower as a matter of course, and just as a very ordinary fact of creation.

Nature acts differently on many of us, making great writers of some, great poets and artists of others; and then there are others who are content and happy to make a garden, and fill with flowers. But it makes good and strong men and women of all of us, if we allow it to enter and ennoble our daily life and existence . . . but how many of us do not?

Some people understand and comprehend nature in an indefinable and aching longing to possess a garden filled with flowers, others are content to admire the flowers, pick them and decorate their house with them, while there are others who even find a joy in flowers from a florist's shop . . . . and then there are some who have not the money to buy them, and yet find a certain longing fulfilled in gazing at the flowers for sale in the window of a flower shop, or even by gazing at lovely gardens on the way. Some people who have no garden space, try to grow flowers in pots or on window ledges, but wheresoever we may go, we will see the urge of nature expressing itself in different ways.

The actual possession of a garden gives one more joy than we realise, until we have become the owner of one and worked and walked in it. It raises us to higher things, cultivating habits of observation, and not only habits, but powers of observation too, for it is only when we have worked among the flowers, planted them and grown them in the sweet-smelling earth, that they begin to whisper their secrets, and we hear the "still small voices" of nature whispering on the breeze. It gives us a healthy interest, a love of the beautiful, and the power to appreciate the great growing world outside, and teaches us to realise and grasp the joy that life can give.—Enid, in "The South African Gardening and Country Life."

CONTROL OF WEEDS ON LAWNS.

Weeds in lawns and on bowling and golf greens cause considerable annoyance and trouble, and are often difficult to control, especially if proper precautions have not been taken from the outset. As a rule, most trouble is experienced on lawns and greens which have not been properly drained, or which are shaded, or where the soil has not been enriched before laying down the grasses. It is obvious, therefore, that control of weeds in such places must be kept in view from the time that the lawns are being established.

In the case of bowling-greens and golf greens special care should be exercised to see that they receive direct sunlight throughout the whole of the day, particularly during the winter months, and also that they are thoroughly drained by means of agricultural drain pipes placed below the ground. The soil should also be enriched either by adding a better class of soil or by heavy dressings of well-rotted animal manure. If these precautions are adopted and high-grade seed, free from weed seed, is sown thickly, little trouble will be experienced from weeds. Subsequently, a vigorous growth of the grass should be encouraged by frequent watering and by top-dressing with well-rotted animal manure composted with soil.

When such dressings are being made, care should be exercised to see that all weed seeds have been destroyed in the compost. This can only be done by composting the soil and manure in heaps which can be kept under observation for some months. If it is not possible to ensure that the composts are free from weed seed, it is preferable to use artificial fertilisers for top-dressing.

Despite the greatest care that is taken, however, weeds will occasionally appear in lawns, and they must be immediately hand-pulled. If care is exercised in this direction, no great difficulty will be experienced in keeping the weeds under control. Clover is often troublesome in lawns, and this can be checked to some extent by top-dressing with sulphate of ammonia, which does not encourage the growth of clover, but stimulates the growth of grass, which checks the clover.

Superphosphate and lime should not be used on lawns which are likely to be infested with clover, as they stimulate the growth of clover.

Chemical exterminators cannot be recommended to any extent for control of weeds on lawns, but they can be used, particularly arsenic preparations, for killing individual plants such as paspalum grass. A little of the preparation should be dropped on the middle of the plant.

THE FARM HOME.

PURITY OF FOODSTUFFS—SOME SIMPLE TESTS.

Thanks to the efforts of the authorities that are responsible for the purity of our foodstuffs, the adulteration of commodities is not so common as in the past, says the "Journal of Food Industry," London. Unfortunately, however, impure foods are still on the market. The following tests will enable buyers to determine if the foods they are receiving are pure or otherwise.

The expert coffee taster can tell by simply tasting the beverage if chicory has been added, but to the ordinary consumer this would not mean much. An infallible test is to place a teaspoonful of the dry coffee in a tumblerful of cold water, stir well with a spoon, and leave for a minute or so. If the water remains clear the coffee is pure, but if it takes on a brownish tint chicory has been added. The darker the brown tint the greater the amount of chicory that has been added.

To test the quality of sugar, burn a sample in an aluminium spoon over a gas jet. If the sugar burns away entirely it is pure, but if any ash remains adulterations have been added.

The best way to test olive oil is to pour a quantity into a small bottle, add an eighth of the quantity of household ammonia, and shake well. If the mixture assumes a milky mass the oil is pure, but if it has a granulated appearance other oils have been added.

The simplest test for butter is to place a little in a spoon and hold it over a gas jet. If the butter boils evenly it is pure, but if it splutters and a scum appears margarine has been added.

To test flour, press a sample in the hand; if, when the hand is opened, the flour retains the impression of it and appears slightly yellow it is pure, but if it falls into powder and retains its usual colour adulterations have been added.

A good way to ascertain if milk has been "creamed" is to skim it after it has stood for an hour or so. If after the skimming a slightly bluish tinge appears round the edges, the milk is all right, but if the edges appear as before, the milk has been "creamed." To test if water has been added to the milk dip the point of a well-polished needle into it, and withdraw, holding the needle perpendicular, with the point downwards. If the milk adheres to the point it is pure, but if all of it drops off water has been added.

THE GARDEN SPIRIT.

Quoting the words of him who coined the phrase "The Garden with a Soul."—"Each year provides a novel interest with something different to look at in addition to one's old loves!"

Says Shakespeare: "I doubt this garden lacks no flowers to make a garland of, in any season." It is a place for strengthening a weary spirit, for dreams and fancies where the murmur of a stream, the hum of the bees, and the song of the birds

fill the air with their music. Francis Bacon said: "It is nothing for great princes (the wealthy) that for the most part, taking advice with workmen, with no less cost set their things together for state and magnificence, but add nothing to the true pleasure of a garden." "God Almighty first planted a garden and, indeed, it is the purest of human pleasures; it is the greatest refreshment to the spirits of man; without which buildings and palaces are but gross handy-works." Bacon was writing of no ready-made thing, filled with masonry, when he penned the famous words—"Whoever owns a garden has one chamber roofed by heaven, in which the poet and the philosopher can feel at home. An increasing happiness—a little pleasance of the soul by whose wicket the world can be shut out, and where something of the Golden Age lingers."

Such a garden as this will, like Shakespeare's "Rosemary and Rue," keep its seeming and savour, and ever be to all who enter it—"Full of Grace and Remembrance."—"The South African Gardening and Country Life."

MARKET GARDENING.

JERUSALEM ARTICHOKES.

This valuable plant seems to be little known in Queensland, and still less grown and used, and yet it is an excellent esculent for man as well as a first-class food for domestic animals. The stems, leaves, and flowers bear a great resemblance to the well-known sunflower of the same family.

The plant is propagated by tubers. It is not at all exacting as regards soil, and will grow in almost any situation, excepting low-lying, ill-drained soils. The best crops are obtained from rich, friable, sandy loams. The cultivation is extremely simple, and does not require any extra care or skill. The land should be turned as for potatoes—that is, deeply ploughed and thoroughly pulverised. The smallest tubers are planted in the same manner as potatoes. Hilling up is not essential, but it is an advantage to mould over the soil at each cultivation. The tubers are very difficult to eradicate, consequently they should be put in some situation where they are not likely to prove troublesome. Four to five cwt. of tubers will plant an acre.

The tubers should be ready for digging in from four to five months. If not required for immediate use, they may be left in the ground and taken up at any time. If dug, they will not keep very long, without shrivelling up and becoming soft, but may be kept for a time by packing in layers of fine soil, sand, or ground charcoal if these substances are in a dry condition.

ASPARAGUS.

This plant is a perennial, and a native of the seashore, thriving best in soils containing a large proportion of sand. However, the rich alluvial soils of river flats should produce asparagus of large size and good quality, therefore their composition may be imitated in preparing garden soil for this culture. Although asparagus can make use of large quantities of water when growing, it requires a well-drained soil, for anything approaching stagnant water is fatal to the plant. Asparagus may be propagated by root divisions; it is preferable, however, to raise the young plants from seed sown in early spring, allowing them to remain in the seed-bed for at least two years. As soon as the roots are large enough, they may be transferred to their permanent positions, the soil of which should be previously well trenched and manured. The best results, under local conditions, will be obtained by making a drill of sufficient width, and about 6 inches in depth, with a slight ridge in the middle; the root should then be carefully lifted and trimmed of any damaged parts, and set in the trench saddlewise, with the point of the roots tending downwards. Cover to a depth of 3 or 4 inches, and firmly press the soil about the roots; where possible mulch with a thick coating of stable manure. During the early stages of growth it will be found advantageous to give copious watering during dry periods. The first growth is allowed to seed, the tops being cut down when they begin to show signs of yellowing. The mulch can then be lightly forked in, and during the winter a fresh supply may be applied. In these operations the depth of soil may be slightly increased over the roots; this will ensure long blanched heads of fine appearance. It is not advisable to cut too many heads until the third year, and cutting should cease in good time, in order to avoid the premature exhaustion of the plant. Sufficient tops must be left to mature, and thus stimulate the growth of the plant in general. The variety recommended for general use is Connover's Colossal.

FRENCH BEANS.

A considerable variety of beans are grown in Queensland. As far as market gardening is concerned, the principal sort is undoubtedly Canadian Wonder. This French bean appears to suit our conditions to a greater extent than any other, and produces good, long, green pods in great profusion.

As French beans are one of the crops that pay, some attention must be given to the preparation of the land. Market gardening at all times demands good cultivation, and the free use of well-rotted stable or other manures. To apply a heavy coat of such manures to land in which it is intended to grow French beans will, in most instances, induce the plant to produce a lot of foliage, and consequent loss of bean pods. It therefore follows that the land should be in good heart, and preferably that which has been heavily manured for a preceding crop. If this is impossible, a light dressing of artificial manures, rich in phosphates or potash, will have a beneficial effect. The usual practice of planting is to strike out shallow drills and drop the seed by hand, covering them up with a light harrow. It is possible to adapt a maize-planter, by fitting it with a special plate, thus saving a considerable amount of labour. The one idea before every grower should be to limit the area to that which he can keep free from weeds, and not so big as to be neglected during picking time. In order to get the most out of the plants, the beans must be gathered as they become fit—that is, when young and tender—otherwise they will begin to form seed and cease to bear marketable beans.

The Chinese gardeners are most particular as to the quality of the bean seeds they purchase, and it is well to note that seed grown in Queensland often contains bean weevil. These beetles lay their eggs on the growing crop, and their presence is not noted until after the crop has been harvested and threshed. As diseased pods and stems left on the ground will provide infection for the new crop, it is desirable to collect and burn all such refuse, and sow clean seed only. Any seed affected with insect attack should be rejected.

In many parts of the State it is difficult to raise a good crop during the hot summer months, owing to the ravages of a small fly, the grubs of which travel in the stem. These can easily be found if the skin of a beanstalk be carefully peeled with a sharp knife. There is not any known commercial remedy, but the hilling up of the stems with soil will often be found to be effective. Strict attention, as stated, must be paid to the destruction, by burning, of all plants immediately a crop is harvested, also of those which show signs of wilting during growth. Rotation of crops must be practised where this trouble manifests itself.

It is as well to note that horse work should not be started in the early morning, when the crop is wet with dew, neither should it be attempted after a shower. Sufficient time should elapse to allow the plants to dry, otherwise the spores of some diseases will be easily scattered, the rainy season being the most favourable time for their spreading.

The principal varieties suitable for market are Canadian Wonder and Burpee's Stringless Greenpod.

LIMA BEANS.

These are often called shell beans, as the part cooked is the seed in its green state. When harvested they are in good demand, the dry beans being soaked in water for a few hours and then cooked as haricots. As the Lima varieties succeed in dry, hot weather, the extension of their culture will no doubt be made, as soon as growers and buyers are more acquainted with their use. They do not require any special culture or attention; if kept well picked they will produce pods for a considerable time, provided that the crop is on fair soil and kept cultivated and free from weeds.

BROAD BEANS.

Broad beans may be grown in the cooler parts of Queensland, doing well on heavy land. Unlike French and Lima beans, they easily respond to nitrogenous manure. Being a winter crop, they will not require as much cultivation as French beans, and under suitable conditions will prove a paying proposition. Their cultivation on a large scale, however, is not recommended unless a ready market is available.

From May to June is the best time to sow.

BEETROOT.

Good beetroot may be grown in almost any kind of soil, provided that it is well broken up, and not of too stiff and clayey a nature; but the best beets are produced in fairly rich, dry, sandy loam soils. As in the case of the carrot and parsnip, fresh, new manure should never be used for beetroot. If manuring is

necessary, it should be done some time before the seed is sown, and be well mixed with the soil. The seed may be sown for the winter crop in February or March, and for the summer crop in August or September; or, by sowing a little every six weeks or so, a constant supply can be kept up all the year round. When thinning the plants, any blank spaces which may occur in the rows can be filled up, as beet stands transplanting well.

Varieties recommended: Crimson Globe and Egyptian Turnip-rooted.

CABBAGES AND CAULIFLOWERS.

Most of our cultivated vegetables and fruits have originated from comparatively worthless beginnings, and there is no more striking example of what can be accomplished by means of cultivation than is presented to us by the cabbage and cauliflower—in fact, by most of the cultivated plants of the cabbage family. It has, of course, been a process of evolution for hundreds of years, by hybridisation and by selection, that the fittest have survived and to-day exist in their present useful form.

Cabbages.

Under certain conditions, cabbages can be grown in most parts of Queensland. They naturally, however, come to the greatest perfection in the colder districts. The conditions which best suit the cabbage are: A rich soil, deep cultivation, and plenty of water, besides thorough after-cultivation. If the soil be not naturally rich, it must be made so by working in quantities of good well-rotted stable and cowyard manure, and the soil fertility can also be still more increased by adding some dried blood manure. The first thing to be done, however, is to prepare a seed-bed, as already explained. Then sow the seed in drills about 1 foot apart, and cover them by shaking fine rotted manure or fine soil over them. Give the plants plenty of water as soon as they appear above ground, shading them, if possible, but do not keep them constantly covered, or they will grow up weak and spindly. In about four or five weeks they should be ready for planting out. This operation should, if possible, be done in showery, or at least in cloudy weather. If the ground is dry at transplanting time, a little water should be used to prevent the soil falling into the hole made by the dibble.

Before taking up the young plants, soak the seed-bed thoroughly, so that the former may be raised with little injury to the roots. If there be any aphis or grubs on the plants, plunge every part of them *except the roots* in tobacco water. Trim off about half the leaves, as these would drop off and decay in any case, but before doing so would act prejudicially by using up the moisture in the ground.

When the plants are taken out of the seed-bed, place the roots at once in a puddle made of soil and water, in the bottom of a bucket, so that when carried out on to the field, the roots may not be exposed to sun and wind. The handiest implement for planting is a wooden dibble, made out of the handle of an old spade or fork. Some care must be taken in putting in the plant. The hole made by the dibble should only be deep enough for the plant. See that the roots reach the bottom, turn in a little soil, and then draw the plant slightly upwards before pressing the rest of the soil firmly round it. This ensures that the main root will not be doubled up, which would have a bad effect on the maturing plant. Should dry weather continue, constant watering will be necessary, but by the use of mulch the labour of watering will be considerably lessened. A well-grown cabbage will occupy a space of about 2½ feet; therefore give plenty of room. Leave 3 feet between the rows each way for the large varieties, and 2 feet for the smaller ones. To avoid the trouble of hilling up, the plants may be set in the bottom of a shallow furrow. Thus they are to some extent protected from the sun, and will not require hilling up, as the gradual filling up of the furrow during subsequent cultivation will do all that hilling up performs, and do it better.

The great secret of success in cultivating plants of the cabbage family is to *keep them constantly growing*, and never allow them to be checked by any cause whatever. Keep them on the move by regular cultivation, and plenty of water. About twice a week give them a watering of liquid manure, which will help greatly to promote rapid growth. Insect pests are most troublesome when plants are checked in their growth from some cause or other.

If cabbage plants take too long to mature, the heads, instead of being tender and succulent, become tough and leathery. Good tender cabbages should only take at most four months to be ready for the table. To ensure success, keep the ground clean, and conserve the moisture by constant cultivation. Do not wait till you see weeds to cultivate, but do it after every shower of rain, until the plants get too large to allow of implements being used among them. In the cooler parts of the

country, cabbages may be grown all the year round, but in the warmer districts it is hardly worth while growing them in the summer months, as there are so many insects and other pests to contend with that a great deal of the profit is lost in keeping the plants clean.

Cabbages derive much benefit by the application of lime to the soil every second year, using either slacked lime or pulverised limestone, at the rate of 15 and 30 cwt. per acre, respectively.

In the warmer districts, the first sowing may be made in January or February, and then, at intervals of a month or so, up to August or September.

The varieties most suitable for marketing are Henderson's Succession, Burpee's Surehead.

Cauliflowers.

Cauliflowers thrive during our coldest months, and should, therefore, be planted out in time to ensure their heading in that season. The best time for sowing the seed is between the middle of February and the middle of March, as cauliflowers occupy the ground from five to six months, and should be in head in the coldest weather. If any is sown after April, it must be an early variety, which will mature before the weather gets too hot. The seed is sown in the same way as cabbage seed, and the planting out is also done in the same manner, but more care is required in transplanting than in the case of cabbages. The soil must be of the richest, and cauliflowers do better in virgin soil than elsewhere, provided the ground is thoroughly dug over to a depth of 15 inches and well pulverised. Cultivation should be thorough and fairly deep until the plants begin to head, or until the leaves spread so much that they are liable to be broken by the cultivating implements. As soon as the heads begin to form, cultivation may cease, because, if still carried on, there is a tendency for the heads to grow loose and coarse, instead of firm and compact. At this stage water is more essential than ever, and a good watering with liquid manure twice a week will add greatly to the bulk and quality of the crop.

It should always be borne in mind that the market value of cauliflowers depends entirely on their being of fair size and *white* and tender. To secure the whiteness of the head, as soon as the heads begin to form the leaves may be drawn together at the top and tied or skewered over the heads. This will protect them from the sun and cause them to be properly blanched.

When cutting the matured plants, the work should be done early in the morning, while the dew is on them, as they keep fresher for a longer period than if left till the sun gets hot.

The following indications will show when a head is ready to cut:—

The leaves bulge out considerably at the base, and the head begins to lose the polished smooth appearance which has hitherto characterised it, and becomes grained and somewhat irregular. To examine the head, it is not necessary to untie the top leaves, but part them at the side, so that, if not quite ready, cutting may be deferred until the next day. Cut with 2 inches or 3 inches of the stalk, and two or three circles of leaves.

Handle very carefully, and take care not to bruise the heads in any way, as even a slight bruise soon becomes black, and this detracts greatly from the market value. It is said that cauliflowers may be preserved for some time after the crops are over by attention to the following directions:—

Pull the plants up by the roots a day or two before they are ready for cutting. Tie the tops of the leaves loosely together; then place them in a cool shed; cover the roots with damp sand or sandy soil, and the heads will keep quite fresh for several weeks.

Cauliflowers should never follow a cabbage crop, nor be grown two seasons following on the same land.

The varieties recommended for market gardening are:—Primus, Eclipse, Early Italian Giant.

Insect Pests.

Both cabbage and cauliflower are subject to the attacks of insect pests, which either eat the heart of young plants right out or riddle the leaves, and render them unsightly. Paris green sprayed on the plants immediately the larvæ are discovered will destroy them. Aphides are a great source of trouble, and should be promptly dealt with. Weak kerosene emulsion or tobacco water will destroy aphides easily. It should be borne in mind that Paris green, being an arsenical poison, must not be used on crops of this kind within five or six weeks of their being ready for market.

Farm Notes for November.

Field.—Farmers are commencing to realise that quick-manuring wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kaffir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghums have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools

being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil, and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young papaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit it appears to be covered with a grey dust, and if the fruit is examined with a good lens, it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime-sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be

continued, and all pip fruit trees must be bandaged at the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

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?

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.

	October, 1929.		November, 1929.		MOONRISE Oct., 1929.	MOONRISE Nov., 1929.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5.35	5.49	5.4	6.8	4.32	4.42
2	5.34	5.49	5.3	6.9	5.6	5.6
3	5.33	5.50	5 3	6.9	5.39	5 50
4	5.31	5.51	5.2	6.10	6.11	6 30
5	5.30	5.52	5 1	6.11	6.43	7.15
6	5.29	5.52	5.0	6.12	7.16	8.4
7	5.27	5.53	5.0	6.12	7.52	8.57
8	5.26	5.54	4.59	6.13	8.36	9.49
9	5.25	5.54	4.58	6.14	9.27	10 38
10	5.24	5.55	4.58	6.15	10.13	11 40
						p.m.
11	5.23	5.55	4.57	6.16	11.6	12.36
12	5.22	5.56	4.57	6.16	11.59	1.33
					p.m.	
13	5.21	5.56	4.56	6.17	12.55	2.29
14	5.20	5.57	4 55	6.18	1.52	3.28
15	5.19	5.57	4.55	6.19	2.50	4.30
16	5.18	5.58	4.54	6.20	3.47	5.33
17	5.17	5.58	4.54	6 21	4.45	6.43
18	5.16	5.59	4 54	6 22	5.45	7.52
19	5.15	5.59	4.53	6.23	6.47	9.0
20	5.14	6.0	4.53	6.23	7.52	10.4
21	5.13	6.0	4.53	6.24	9.2	11.3
22	5.12	6.1	4.53	6 24	10.8	11.53
23	5 10	6.1	4.52	6 25	11.13	...
						a.m.
24	5.10	6.2	4.52	6.26	...	12.46
					a.m.	
25	5.9	6.3	4.52	6.27	12.14	1.15
26	5.8	6.3	4.51	6.27	1.8	1.42
27	5.8	6.4	4.51	6 28	1.54	2.13
28	5.7	6.5	4.51	6.29	2.33	2.44
29	5.6	6.5	4 51	6.30	3.7	3.14
30	5.6	6.6	4.51	6.31	3.39	3.39
31	5.5	6.7			4.10	

Phases of the Moon, Occultations, &c.

3 Oct.	●	New Moon	8 19 a.m.
11 ,,	☾	First Quarter	4 5 a.m.
18 ,,	○	Full Moon	10 5 p.m.
25 ,,	☽	Last Quarter	6 21 p.m.

Apogee, 11th October, at 12.42 a.m.
Perigee, 23rd October, at 8.0 a.m.

The occultation of Venus by the Moon on the 30th, belongs to the northern hemisphere only, and it will occur when both are far below the horizon.

When the Moon sets, about two hours after the Sun on the 5th, it will be apparently near Alpha Libri; about 8 p.m., on the 7th, it will be not far from Antares, the brightest star in the Scorpion; on the 9th, it will seem to be in Sagittarius, whose bow will be to the eastward of it; on the 11th, still in Sagittarius, past the bow, and near to Capricornus; on the 13th, still in Capricornus, but near the border of Aquarius; on the 16th, it will be near the junction of Aquarius, Pisces, and Cetus. The Moon being full on the 18th, the stars in its neighbourhood will not be distinctly seen; on the 20th, at 8 p.m., it will be apparently in Aries, but still too bright to allow the stars of that constellation to be well seen; on the 25th, at 4 a.m., the waning Moon will be near Pollux, the brighter of the Twins; when, rising about an hour before the Sun, on the 31st, it will be approaching Spica, the principal star in Virgo.

1 Nov.	●	New Moon	12 1 p.m.
10 ,,	☾	First Quarter	12 10 a.m.
17 ,,	○	Full Moon	10 14 p.m.
24 ,,	☽	Last Quarter	2 4 a.m.

Apogee, 7th November, at 9·0 p.m.
Perigee, 19th November, at 3.48 p.m.

One of the most beautiful astronomical phenomena is an annular eclipse of the Sun. Such an event will occur on 1st November. It will not be visible in Australia, the negroes in Africa having an almost total monopoly. Other people in Egypt and South Africa will have only a partial eclipse. In England some view of the latter will be obtained.

During the eclipse the planet Mars will be at a distance of about one and a-half times the length of the Southern Cross to the east-south-east. Eighteen hours later the Moon will pass on the south side of Mars and apparently very close to it, but in reality Mars will be more than 300 million miles beyond it.

After sunset on the 5th the Moon and Saturn, low down in the west, will be not far apart, as two hours later the Moon will pass five degrees south of the planet.

When the Moon rises on the 18th, the day after being full, the planet Jupiter will be seen to be about five degrees higher.

On the 27th, Mercury will be passing from west to east of the Sun, a little more than the diameter of the Moon from it on its southern side.

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 noticing 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 somewhat 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.