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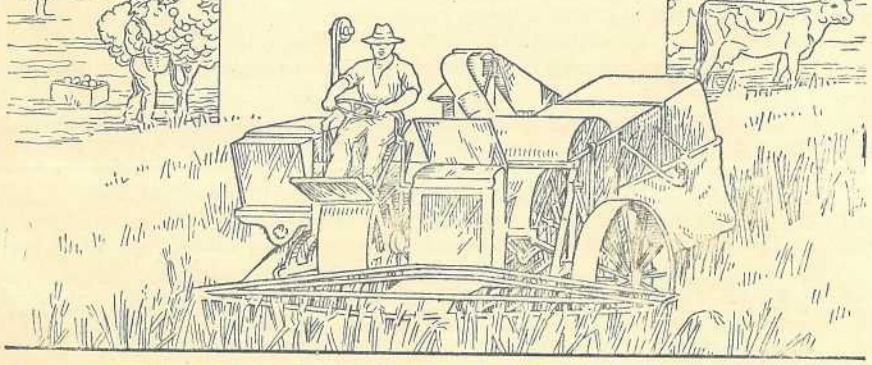

JULY TO DECEMBER, 1939

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THOMAS GILBERT HOPE, Acting Government Printer, Brisbane.

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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Water Conservation and Irrigation—Development of State Resources.

THREE inland streams—the Condamine, Macintyre Brook, and Barambah Creek—have been recommended to the Government by the Rural Development Bureau for survey as to their water storage possibilities, and the Premier (Hon. W. Forgan Smith, LL.D.) has announced that the Government has authorised the Co-ordinator-General (Mr. Kemp) to co-operate with the Irrigation Branch of the Lands Department in having the engineering and other detailed investigational work done. Actual developmental and constructional work will depend mainly on the results of preliminary surveys and the availability of funds. Side by side with the engineering investigations, expert departmental inquiries into the possible effects of irrigation on production within the area to be served have been arranged.

Previous preliminary surveys have been made on the Condamine River—the last in 1920, when a continuous survey had been undertaken on the section from above Killarney to a point about 14 miles south from Goombi, near Miles. At present, some irrigation is carried on from the river under a system of licensed pumping, but there is apparently scope for much better utilisation of the river's resources. It is hoped that the development of sound irrigation schemes on this stream will be of benefit to agriculture, and will be an important step in the fostering of the meat export industry.

The Macintyre Brook traverses good agricultural and farming land suitable for a variety of purposes, including tobacco and cotton growing. The area is not yet fully productive, mainly because of periods of dryness. Irrigation done at present with the limited water available has given great promise in tobacco and lucerne cultivation. With the approval of the Government, certain investigational work has already been undertaken in the area by the Irrigation Branch.

Preliminary investigations into the possibilities of water conservation in Barambah Creek for irrigation and town and stock route supplies in the South Burnett show definite possibilities of economic water utilisation on a considerable scale. Certain smaller group water schemes also are under consideration, but definite recommendations have not yet been submitted to the Government.

Discussing rural developmental plans for the coming financial year, the Premier said that the meat export industry, particularly chilled beef, appeared to be one of the directions in which there were good possibilities of expansion on sound economic lines. Continuity of supplies of suitable cattle was one of the essential factors, but the difficulties in ensuring continuity were great.

The "lean" period seemed to be between the end of winter and the end of the year, and this was therefore the time during which the efforts of man should supplement the workings of Nature. The Government was anxious to enlist the assistance of smaller producers in stabilising supplies of suitable "killers."

Growing and conserving of fodders would help to secure stability, and water storage and irrigation would aid in the growing of suitable fodders for "topping-off" and conservation.

The Government recognised, however, that water schemes for these producers would be more likely to succeed, and certainly would be more generally useful, if they covered a range of purposes, such as beef production, fat lamb raising, pig raising, dairying, wheat, cotton, and tobacco growing, or a combination of two or more of these units or of other allied units. The supplying of water for domestic purposes, also, was an important consideration.

A committee of experts had reviewed various "prospects" before recommending the first three streams for investigation, with due regard to the objectives which the Government had in mind.

The Government had approved the recommendation of the Co-ordinator-General that a co-ordinated water scheme for the South Coast should be investigated. For some time the Southport, Nerang, and Coolangatta Councils had been endeavouring, jointly and severally, to obtain Government assistance to finance water and sewerage schemes in the area.

Mr. Kemp thinks that it may be possible to evolve a co-ordinated scheme, but present individual schemes may have been developed to such an extent that it would be uneconomic to undertake a joint scheme. As the beginning of a complete investigation, he would convene an early conference of the councils and the Irrigation Branch.

It is proposed to establish an irrigation plant at the Agricultural Research Station, Biloela, to correlate investigation in the irrigation

of cotton with the routine cotton work conducted at the station. Investigations also are being made into the adequacy of available water supplies at Biloela.

It also is intended to establish small irrigation plants on approved farms in likely cotton-growing areas, to test the effects of irrigation on cotton-growing. These experiments will be controlled by the Department of Agriculture and Stock.

It has been recognised that the water supply at Townsville is deficient for a city of that size. The matter of remedying this deficiency has been brought under notice again recently by the Townsville City Council, and the Government has now approved Mr. Kemp's recommendation that the possibility of a sound scheme should be investigated.

Quality of Queensland Butter.

IN opening the Annual Butter and Cheese Exhibition arranged by the Australian Institute of Dairy Factory Managers and Secretaries (Queensland Branch), at the Hamilton Cold Stores, the Assistant Minister for Agriculture and Stock, Hon. D. A. Gledson, said that he was very concerned with the great disparity shown in the butter gradings from year to year. In some years there was a drop of 20 per cent. in the gradings, and he quoted the comparative figures for 1934-35, 1935-36, 1936-37, 1937-38, and for the first eleven months of 1938-39; and also the figures for May, 1939, separately. On looking at this grading, it appeared that seasonal conditions had a great deal to do with the quality of butter. In addition to pasturage—which was affected by weather conditions, and other matters, such as temperature—not only the handling of cream, but the transport of the butter itself, had much to do with quality. All these factors in dairying, where capable of improvement, demanded close study, and an endeavour should be made to eliminate any of the causes of lowered quality.

The factory managers and secretaries who had gathered in conference, Mr. Gledson added, were to be complimented on the splendid show which had been arranged. The show provided excellent bases for comparison, and the remarks of the judges on the quality of butter and cheese displayed were of obvious educational value. It had been pointed out by the experts that the manufacture of the butter had a marked influence on grading. If manufacturing standards were maintained at a high level, quality should, at this time of the year particularly, be assured. If, however, through defective machinery or through any fault in manufacturing processes the texture of the butter was not what it should be, then obviously the quality of the product would not be up to the standard desired. Many of the butters examined showed that in manufacture there was very little to choose between each of the exhibits, the difference in most cases being the flavour. The different classes of butter, salted and unsalted, coloureds and whites, had all attained a very high standard and were creditable to all concerned. Mr. Gledson congratulated the winners of the competition on the excellent display of dairy products, and the business-like way in which they had been prepared for market, both for home consumption and for export trade. The matter of still further improvement was one which would have to be dealt with not only by the factory managers, but by the Department of Agriculture and Stock as well, and in co-operation they should be able to attain and maintain the highest standard possible.

Parasites of Poultry.

F. H. S. ROBERTS, D.Sc., Animal Health Station, Yeerongpilly.

POULTRY in Queensland are subject to many diseases, among which those caused by parasites are undoubtedly the most prevalent. There are many different kinds of parasites which infest poultry. Certain species of ticks, lice, mites, and fleas occur on the surface of the body (external parasites), whilst the internal organs, particularly the alimentary canal, are infested by worms (internal parasites).

Parasites are harmful in many ways. The external parasites suck blood and cause irritation and annoyance. The worms rob the host of food, destroy vital tissues, and excrete substances which are poisons. The result of infestation is an unthrifty flock, which shows loss of condition, a decreased egg production, and frequently increased food bills. Furthermore, parasites so lower the vitality of a flock as to make it readily susceptible to other diseases. Unlike many diseases, which break out in epidemic form and then disappear, parasitic diseases are present all the time, working in an insidious sort of way, gradually sapping the strength of the birds, killing an occasional bird, and in many instances, the factor deciding between profit and loss.

It is therefore essential that the poultry farmer should know something of the various parasites which infest his birds; how the birds become infested; what steps to take to prevent losses caused by them, and so on. Without this knowledge he cannot hope to keep his flocks in a healthy condition.

THE WORM PARASITES.

With the exception of the eye worm, worm parasites of poultry in Queensland are found only in the alimentary canal, which is another name for the gullet, crop, stomach, gizzard, intestine, and cæca or blind gut, all of which may be infested.

HOW TO DETERMINE WHETHER WORMS ARE AFFECTING THE HEALTH OF THE FLOCK.

As a matter of routine, the farmer should examine every bird that dies or is killed. It is only in this way that he can keep a check on the degree to which his birds harbour parasites. If parasites are suspected of being responsible for any loss of bloom or condition or for any decrease in production, much can be learned from an examination of birds from the affected flock. It is always wise to examine at least two birds. The bird is opened up by a cut in the region of the vent and on each side of the breast bone. This is then pulled back displaying the intestines, &c. These are carefully removed, and the intestines freed from the webbing that holds them. Each section is then slit open and washed. The stomach is examined for stomach worms which, if present, will be seen with their anterior ends buried in the stomach wall. If there are any dark patches on the horny lining of the gizzard, the lining should be stripped off and the worms will be visible, protruding from the wall of the gizzard. In the case of the intestines, these should be slit open in a bucket of water and drawn several times between the thumb and forefinger to remove as much mucus as possible. This is necessary because many small species lie entangled in the mucus. The

washings are allowed to settle and the fluid carefully poured off. This is done two or three times until the water remains clear. The washings are next examined in a glass dish held over a black background. It is only in this way that the small worms can be detected and that some idea of the number of worms present can be obtained.

In coming to a decision, the following points should be borne in mind:—

(1) Few worms do little harm and it is only when they are present in numbers that the birds' health becomes affected. It would be rather unusual to examine any bird and not find some worms, and it is too often the case that when the farmer sees a few worms in the bird he is examining, particularly such large species as the large roundworm, that he concludes that worms are responsible for the poor condition of his flock.

(2) When worms are definitely affecting the health of a bird, the tissues in which they live are generally unhealthy in appearance. The intestine wall, for example, may show various degrees of inflammation. There may also be hæmorrhages, &c.

(3) There should be some marked relationship between the number of worms present and the symptoms of ill-health displayed by the birds. Unfortunately, there are no symptoms which are characteristic of worm infestation alone, and this point is frequently a very difficult one to decide, even for the trained parasitologist.

(4) Finally, it is essential that other disease conditions be taken into consideration as possibly being responsible. It is by no means uncommon to find birds suffering from such debilitating diseases as tuberculosis to be heavily infested. The removal of the worms by treatment will do little good, for this does not eliminate the real cause of ill-health.

CONTROL OF WORM PARASITES.

In order to appreciate the principles advocated in the control of worm parasites, the farmer should be familiar with the manner by which birds become infested.

LIFE HISTORY OF WORM PARASITES (Plate 1).

Worms do not propagate inside the host, and the only way in which birds can become infested is by swallowing infective material. The female worm in the alimentary canal of the bird lays eggs which eventually reach the exterior in the droppings. Depending upon the species of worm, infestation then takes place in either one of two ways.

(1) The egg of the worm as it lies in the droppings undergoes certain development, providing conditions of temperature and moisture are suitable. After several days, a tiny larval worm is formed in the egg. In the case of such species as the large roundworm and caecum worm, when an egg containing such a larva is swallowed by a bird, it hatches in the intestine, the larva is set free and migrating to that portion of the alimentary canal it favours, settles down and grows to the adult stage. With other species, the egg hatches outside the bird, and the larva grows and reaches what is known as the infective stage when, if swallowed by the bird, it grows to maturity.

(2) Other species again require what is known as an intermediate host to complete their development. The egg is swallowed by this intermediate host in which it reaches the infective stage. When the intermediate host is eaten by a bird, the larva is set free and grows to the adult stage. This type of life history is characteristic of all tapeworms and flukes, and in the case of those species infesting poultry, the intermediate hosts include slugs, snails, bettles, ants, and flies. Each species of tapeworm, of course, has its own particular kind of intermediate host or hosts. The stomach worm, gizzard worm, and eye worm of poultry also require an intermediate host, in this case wood lice, grasshoppers, beetles, and cockroaches being concerned.

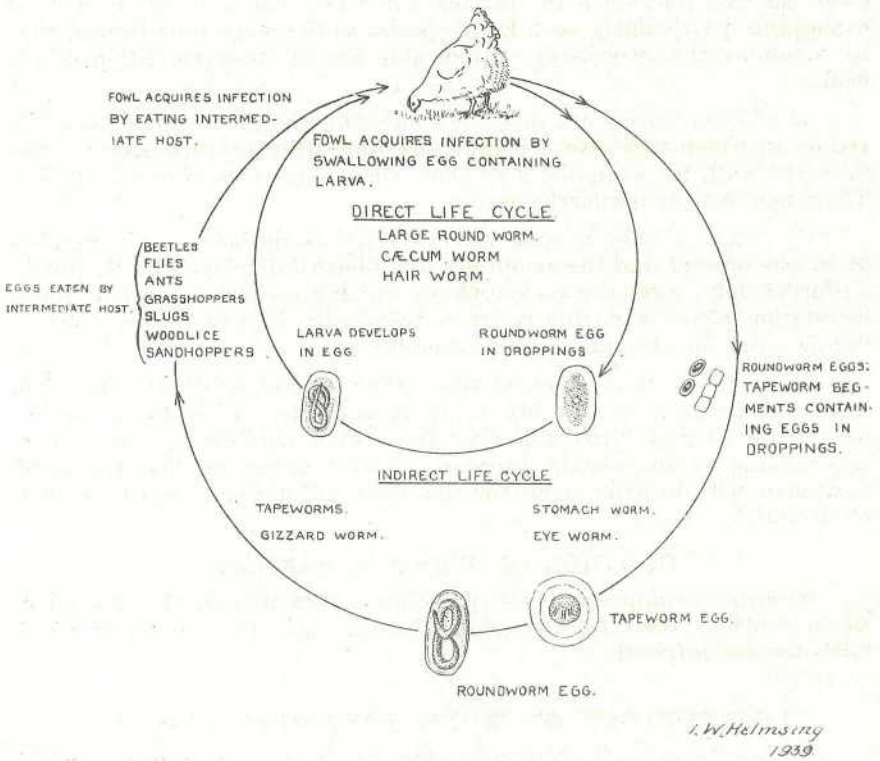

Plate 1.

How Birds Become Infested with Worms.

1. Birds in contact with droppings.
2. Earth floors in houses.
3. Damp areas in yards and pastures.
4. Litter, long weeds in yards and pastures.
5. Heavy stocking.
6. Permanent yards and pastures.
7. Young birds run with old birds.
8. Poor feeding.

CONTROL.

Worm diseases of poultry may be controlled, firstly by putting into operation certain measures which prevent infestation, and secondly by the treatment of infested birds.

Preventive Measures.—It is practically impossible to keep birds entirely free from worms, but much can be done to prevent them from becoming so heavily infested that their health is affected. The above

notes on the life history of worm parasites show very clearly that preventive measures must take into account, firstly, the droppings which contain the worm eggs, secondly, conditions which favour the development of the eggs, and thirdly, the various insects which act as intermediate hosts. With these points in mind, the following principles may be laid down:—

(1) Poultry houses should be built on well-drained sunny sites, and should be provided with floors which permit thorough removal of all droppings. This cannot be done on earthen floors.

(2) Droppings should be removed regularly and disposed of in such a way that they are not available to the birds or to the insects and other intermediate hosts which feed on them. Birds can be protected from their own droppings to a large extent by fastening a length of small gauze wire netting beneath the roosts.

(3) Keep the yards and surroundings as clean and tidy as possible. Loose boards, piles of sacking, old coops, heaps of vegetation, &c., provide shelter for the insects, &c., that act as intermediate hosts.

(4) Keep the yards as bare as possible. This permits the sunlight to destroy worm eggs and promotes dry conditions which are unfavourable to the development of the eggs. Yards should be selected on light types of soil which give good drainage.

(5) Rotate the yards, and where this is not possible remove the top few inches of soil periodically and replace with fresh, clean soil.

(6) Keep the food troughs and drinking vessels clean, and eliminate all damp areas. This applies particularly to the soil around drinking fountains.

(7) For birds on free range, keep the vegetation short. Long grass and weeds encourage the presence of insect intermediate hosts and also provide ideal conditions for the development of worm eggs. Such pastures should be periodically ploughed under to bury the eggs.

(8) On free range and in yards where the collection of droppings is not possible, stock lightly. The more birds there are on a given area of land, the more eggs are present and the greater the risk of infection. It has been estimated that the chances of infestation on a given area of land increase as the square of the number of birds running there.

(9) Young birds are much more susceptible to parasites than old birds. These should then be raised, isolated from old birds and from the runs and houses used by old birds.

(10) Kill off and destroy all weak or obviously diseased birds, as these generally carry large numbers of worms and are a source of infection for the rest of the flock.

(11) Feed an adequate, well-balanced ration. It is well known that birds adequately nourished harbour less worms and are less affected than birds on a poor diet. This is a very important point in poultry parasite control.

Undoubtedly the intensive system is much to be preferred from the preventive point of view to the free range system, for under the intensive system, droppings can be regularly collected, and the birds do not come into contact with the insect intermediate hosts to the extent they do on free range. In warm climates, such as North Queensland, birds

could be maintained on wire mesh floors, which permits the droppings to fall through to the ground beneath. Electrically welded rectangular mesh wire is suitable as this type does not injure the birds' feet.

Treatment.—The progressive farmer should never rely solely on treatment to keep his flocks worm free. So long as no attempt is made to prevent infestation, treatment gives only a temporary measure of relief. The importance of prevention, furthermore, is emphasised by the present unsatisfactory position of treatment. Of the many worms infesting poultry, we know of treatment being reliable against only one species, namely, the large roundworm. In inexperienced hands treatment may also do more harm than good.

The control of poultry parasites rests mainly upon prevention, of which sanitation, hygiene, and proper feeding are the essential features.

There are three different kinds of parasitic worms, namely, flukes, tapeworms, and roundworms.

FLUKES.

Flukes are generally flattened and leaf-like. They are characterised by the possession of suckers, usually two, and as a rule, are hermaphrodite, that is, each fluke contains a complete set of male and female genital organs. They are spread by means of snails, though some species require a second intermediate host to complete their development.

Flukes are serious in poultry in many parts of the world, particularly the species inhabitating the oviducts, which uses snails and dragonflies as intermediate hosts. In Queensland, only one species is known, the caecal fluke, *Echinostomum revolutum,* which is most common in ducks. It does not, however, appear to be very harmful.

TAPEWORMS.

These are elongate flattened whitish worms, which are found in the intestine. At the anterior end is a small head which is provided with suckers and sometimes hooks. This is followed generally by a slender neck, which gradually gives place to a chain of segments which become progressively wider towards the posterior end of the worm. Each segment contains a complete set of male and female organs. The tapeworm has no mouth or intestine, its food being absorbed through the body surface.

Life History.

The segments at the posterior end contain the ripe eggs. These drop off and are passed out with the droppings. They have the appearance of rice grains and may be very active for a short time after reaching the ground. The eggs have then to be swallowed by certain species of insects, such as beetles, ants, house-flies, or slugs, before further development occurs, each species of tapeworm having its own special intermediate host or hosts. The bird becomes infested when it eats those insects or slugs containing the tapeworm larvæ.

Description of the Various Species (Plate 2).

Seven different species of tapeworms are known to infest poultry in this State.

The smallest of these is *Davainea proglottina,* which measures at most only about one-tenth of an inch long. It is found in the anterior

part of the small intestine. This part of the intestine is also infested by a very slender species of *Hymenolepis* which measures about ½ inch to 2 inches in length, and also by a much stouter and longer species, *Raillietina cesticillus*. In the lower portion of the small intestine, two very long species may be seen, *Raillietina tetragona* and *Raillietina echinobothrida*, which grow up to 10 inches in length. The remaining species, *Amoebotaenia sphenoides*, is very small in size and is very rare.

Effect on the Fowl.

The most serious tapeworm is *D. proglottina*, which, despite its small size, is capable when in sufficient numbers, of giving rise to very marked symptoms. Diarrhoea frequently containing blood is conspicuous and death, especially among young birds, is not uncommon. *R. cesticillus*

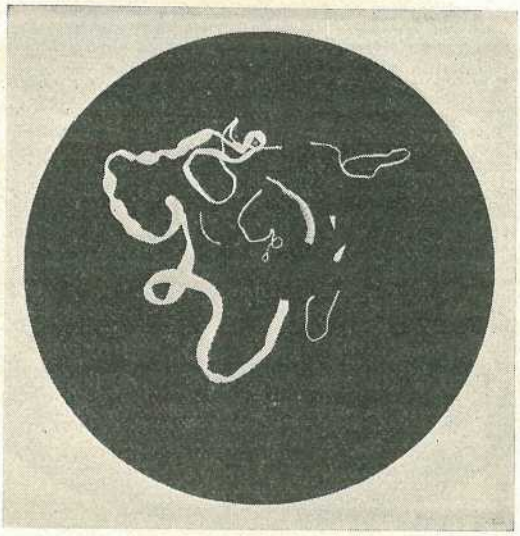

Plate 2.
THE DIFFERENT KINDS OF TAPEWORMS FOUND IN THE FOWL (NATURAL SIZE).

has a marked effect upon the growth of young chickens and in young birds an infestation of fifteen or more worms may be regarded as serious. *R. echinobothrida* is responsible for the formation of nodules in the gut wall, caused from injuries to the tissues by the heads of the worms *R. tetragona*, which is our commonest species, is considered to be very harmful in some countries, but observations in Queensland do not support this view. Frequently one sees heavy infestations of *Hymenolepis* spp. accompanied by inflammation of the intestine and diarrhoea.

In general, it may be said that tapeworms are more injurious to young birds than to old birds. In the case of old birds, they probably become harmful, chiefly when other disease conditions are present, which they tend to aggravate. The symptoms associated with tapeworm disease are unthriftiness, loss of condition, pale combs and shanks, diarrhoea, decreased egg production, and occasionally death.

Treatment and Control.

The frequency with which segments appear in the droppings, together with a consideration of the condition of the flock, is a fairly reliable indication of the degree of infestation.

Treatment is not very satisfactory. Kamala is usually recommended in doses of one gram for adult birds. It fails, however, to remove the heads of the worms, which grow again shortly afterwards. It also has the serious disadvantage of affecting production. On occasions, moreover, its use may be followed by more serious ill-effects. When using this drug it is always wise to treat a few birds first and watch them closely. Kamala is not recommended for turkeys.

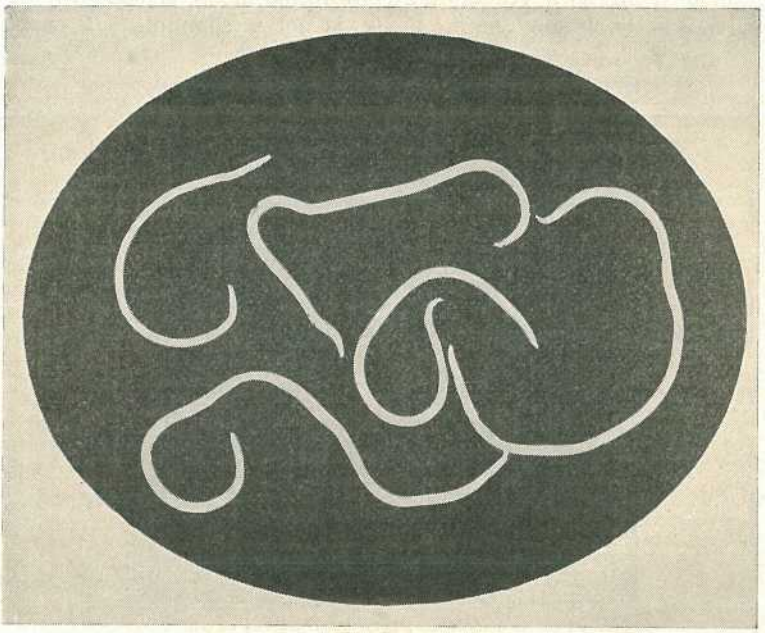

Plate 3.
THE LARGE ROUNDWORM (NATURAL SIZE).

Prevention of infestation is, therefore, highly important in the case of tapeworms. The principles outlined earlier in this article should be followed as rigidly as practicable.

In the case of *D. proglottina,* the slug intermediate host can be eradicated by the use of the following poison bait:—

*Metaldehyde ¼ oz. (1 tablet).

Bran 8 oz.

The methaldehyde blocks are ground up and mixed with the bran. Water is added in sufficient quantities to moisten. The bait is then applied in the form of small pellets, about the size of a walnut. This bait is non-poisonous to poultry.

* This substance is sold under the name "Meta." It is insoluble in water and is used as a fuel.

ROUNDWORMS.

These are elongate cylindrical worms. Roundworms vary greatly in size, and in poultry may attain a length of nearly five inches. In the majority of roundworms the life cycle is direct, that is, the host becomes infested when it swallows an egg or larva which is in the infective stage. Some species, however, require an intermediate host to complete their life cycle, in much the same way as tapeworms.

THE LARGE ROUNDWORM (Ascaridia galli) (Plate 3).

This is one of the commonest species infesting poultry. It is whitish in colour, and may grow up to nearly five inches in length. It is found in the intestine.

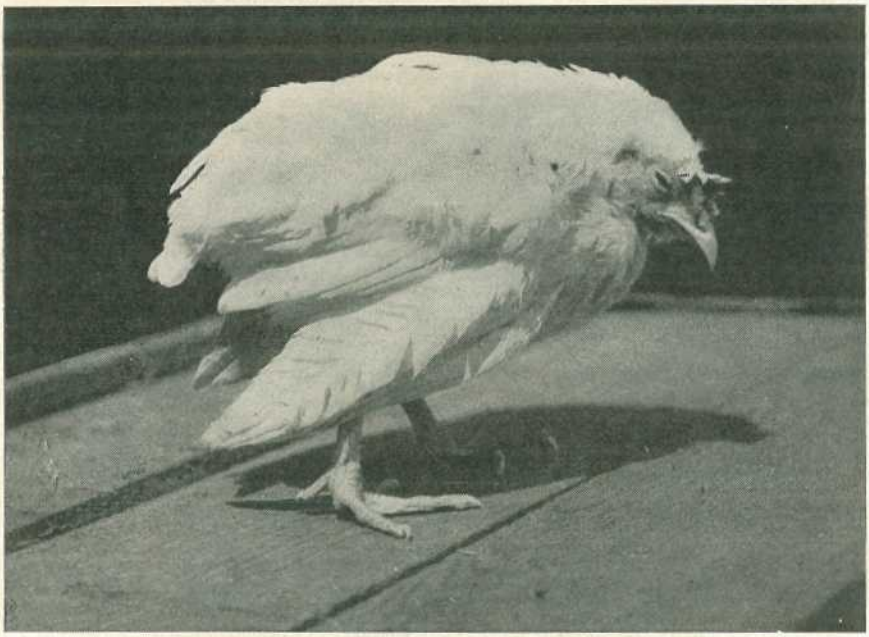

Plate 4.
YOUNG BIRD HEAVILY INFESTED WITH THE LARGE ROUNDWORM.

Life History.

The egg is passed out of the body in the droppings. In eight days, under suitable conditions of temperature and moisture, a tiny larva develops within the egg. On being swallowed by poultry, the egg hatches in the intestine and the larva is set free. Here it remains for about nine to ten days, and then invades the intestine wall, where it may be seen with its anterior end buried into the tissues. After feeding on the tissues for about nine to ten days, the young worm returns to the canal of the intestine where it grows to maturity, which is reached about one month after infection.

Effect on the Fowl.

The large roundworm is most serious among young birds. Among these, symptoms may be visible within the first week of coming into contact with infested soil. There may be loss of appetite, abnormal thirst, and the birds are disinclined to move about. Later on, diarrhoea and paleness in the comb and shanks may be seen. Eventually, the feathers become ruffled, the wings droop, and the bird assumes a hunched up, drowsy appearance. (Plate 4.) There is little growth; in fact, infested birds may lose weight. Death may occur at this stage, but should the bird recover it remains stunted, despite a voracious appetite.

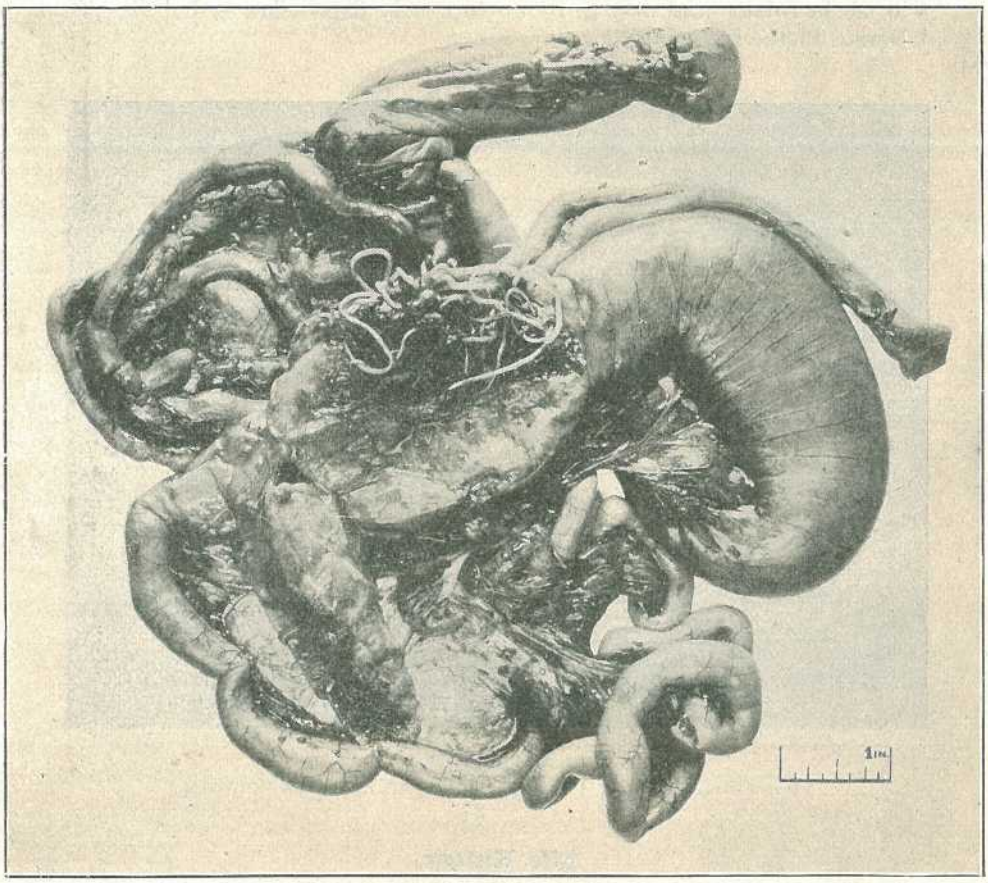

Plate 5.
RUPTURE OF INTESTINE CAUSED BY BLOCKAGE BY ENTANGLED MASS OF WORMS.

In older birds a heavy infestation is denoted by pale combs and legs, dull plumage, loss of condition, increased food consumption, and loss in production. Unless other disease conditions intervene deaths among old birds are much less common than among young birds. Sometimes, the worms become entangled together, completely blocking the passage of food, as a result of which death may occur through a rupture of the intestine wall. (Plate 5.)

Treatment and Control.

Experimental work has indicated that, for birds on an adequate ration, twenty-five worms or more may be regarded as definitely harmful to young birds, and fifty worms or more as harmful to older birds. If the ration is inadequate or badly balanced, the number of worms to be regarded as serious would, of course, be smaller than these figures. Occasionally, young birds may be severely affected, and yet on casual examination, no or few large worms are to be seen. If the intestine is carefully searched under water, however, numerous small worms will be seen, many of them feeding on the tissues of the intestine wall.

Treatment.—Where indicated, treatment for the removal of this species can be successfully applied. There are two methods available, namely, individual treatment and flock treatment.

Individual Treatment.—By this method each bird in the flock is caught and treated. Although objected to by many farmers as laborious and interfering too much with the birds, individual treatment is the only way by which one can be sure that each bird has been treated, and has received no more and no less than the recommended dose of the vermifuge. There is no doubt of the greater efficiency given by this type of treatment.

Best results will be obtained from carbontetrachloride. The drug is given first thing in the morning after overnight starvation. The following doses are recommended:—

Birds, six months and older, 2 cubic centimetres.

Birds, four to six months, 1½ cubic centimetres.

Birds, two to four months, 1 cubic centimetre.

Birds, under two months, ½ to ¾ cubic centimetre.

The drug may be given in capsules, in which form it may be purchased. When giving a capsule to a bird, first dip the capsule in water, take it between the thumb and forefinger and insert it far back into the bird's throat, taking care not to break it or insert it into the wind pipe. Then push it down with the forefinger and work it down the gullet into the crop by manipulating it with the thumb and forefinger from the outside of the throat.

Capsules, however, are very expensive, and a much cheaper method is to administer the drug by means of a syringe and a piece of rubber tubing. A graduated glass barrelled 5 cubic centimetre or 10 cubic centimetre syringe, and a piece of No. 5 gauge rubber tubing about 6 inches long are required. Open the bird's mouth and insert the rubber tubing into the throat and well down into the gullet, *taking care the tubing does not enter the windpipe.* If the drug accidentally enters the lungs, the bird will die. Fill the syringe with the drug, attach it to the tubing and administer the recommended dose. Detach the syringe, wait a moment or two, then pull out the tubing. This last step is advised, because sometimes if the tubing is pulled out still attached to the syringe, there may still be some carbontetrachloride left in the tubing, which may enter the windpipe and cause death.

If carefully carried out this treatment with carbontetrachloride will remove practically every worm. It is, furthermore, extremely safe and will not affect production.

Flock Treatment.—By this method the entire flock is treated at the one time by providing a mash with which the vermifuge is mixed. This method fails to take into account the different food consumptions of the individuals of a flock and consequently those birds with small appetites do not receive as much of the vermifuge as birds with a normal or voracious appetite. As this factor frequently applies to very wormy birds, it is a serious disadvantage to this type of treatment.

Tobacco dust is recommended as a flock treatment in the United States, the prepared mash containing 2 per cent. tobacco dust. The tobacco dust, however, must contain 2 per cent. nicotine, and as it is very difficult to secure a commercial tobacco dust in Australia containing more than 1 per cent. nicotine, this treatment cannot be expected to give good results here.

Recent experimental work at Yeerongpilly has shown, however, that by substituting nicotine sulphate for tobacco dust, a satisfactory treatment can be obtained. *Nicotine sulphate is highly poisonous, and every care should be taken when using it.* The sample used should be of good quality, and should contain 40 per cent. or thereabouts of nicotine. The drug is added to the mash at the rate of 0·5 cubic centimetres per lb. weight of dry mash. The amount of nicotine sulphate required should be accurately measured, and for this purpose a 5 or 10 cubic centimetre graduated glass cylinder should be procured.

The treatment is carried out in the following manner:—

For Birds Fed a Dry Mash.—It is best to prepare the treated mash separately for each pen. Estimate the amount of food consumed each day by the pens to be treated. An adult White Leghorn hen will consume from 3 oz. to 3½ oz. of dry mash each day, and an adult Australorp 3½ oz. to 4 oz. per day. If grain is fed, the amount of dry mash consumed will, of course, be less than the figures quoted above. Suppose there is a pen of twenty-five birds, and that these eat about 6 lb. of dry mash per day, then 3 cubic centimetres of nicotine sulphate will be required. The 3 cubic centimetres of nicotine sulphate is then diluted with not quite half a cupful of water, and *thoroughly* mixed in with ½ lb. of dry bran. The mixing is done with the hands. This prepared bran should be flaky, and is then thoroughly mixed with the 6 lb. of dry mash and fed. In this way each pen can be treated.

The treatment should be continued for a period of four to six days, the treated mash being prepared freshly each morning. For birds fed a dry mash only treatment for four days is ample, but if grain is also fed, a further two days treatment is desirable.

The prepared mash is by no means distasteful, and does not affect the birds in any way.

For Birds Fed a Wet Mash.—Nicotine sulphate is added to the mash at the rate of 1 cubic centimetre for every ten cupfuls (small) of water that are used to moisten the mash. This treated mash should be fed for about six days. Treatment by means of a wet mash is not very satisfactory, however, as the mash becomes distasteful to the birds. Those farmers who use a wet mash would be well advised to use carbon-tetrachloride for any treatment that is required.

The eggs of the large roundworm are thick shelled and very resistant to adverse conditions. Once the farm becomes infested with the eggs of this species, it remains so for a long time. Sanitation is, therefore, the most important measure of prevention.

It has been demonstrated that the older a bird becomes, the more difficult it is to infest, and the less the worms affect it. The critical age is up to about four months. Every effort should, therefore, be made to protect the young birds. They could be raised in concrete-floored pens, away from the older birds. Otherwise, they could be penned on new ground, or on ground on which poultry has not been running for at least a year.

Correct feeding is also very important. An adequate well-balanced diet will do much to reduce the losses associated with this species.

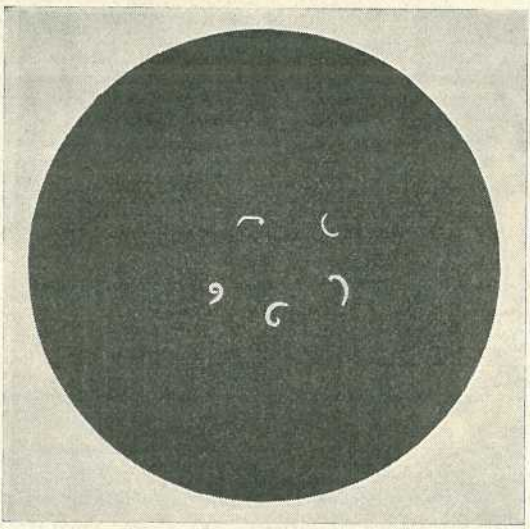

Plate 6.
STOMACH WORMS (NATURAL SIZE).

THE STOMACH WORM (Acuaria spiralis) (Plate 6).

This is a short stout species, less than half an inch in length, which is found in the proventriculus or glandular stomach.

Life History.

The eggs as usual are passed out in the droppings. Before further development can take place the eggs must be swallowed by a woodlouse, in which the larvae hatch, and eventually grow to the infective stage. When the fowl eats one of these infected woodlice, the larvae are set free in the stomach, where they settle down and grow to maturity.

Effect on the Fowl.

This worm is not very common in Queensland, but heavy infestations are sometimes seen. (Plate 7.) The worms invade the wall of the stomach, burying their anterior ends into the glands. The glands are destroyed and ulcers may be formed. This seriously interferes with digestion and infested birds, whilst maintaining a ravenous appetite, lose condition, grow weak, and may die.

Treatment and Control.

The treatment with carbontetrachloride as set out for the large roundworm is recommended.

Attention to sanitation and elimination of conditions encouraging the presence of woodlice are necessary to prevent infestation. Woodlice are very commonly found under litter, which provides the damp conditions which they favour. They measure about half an inch in length and are flat and slate-grey in colour. The body is composed of numerous segments each of which is provided with a pair of pale-coloured legs. Woodlice are not insects, but are related to the crabs, crayfish, and shrimps.

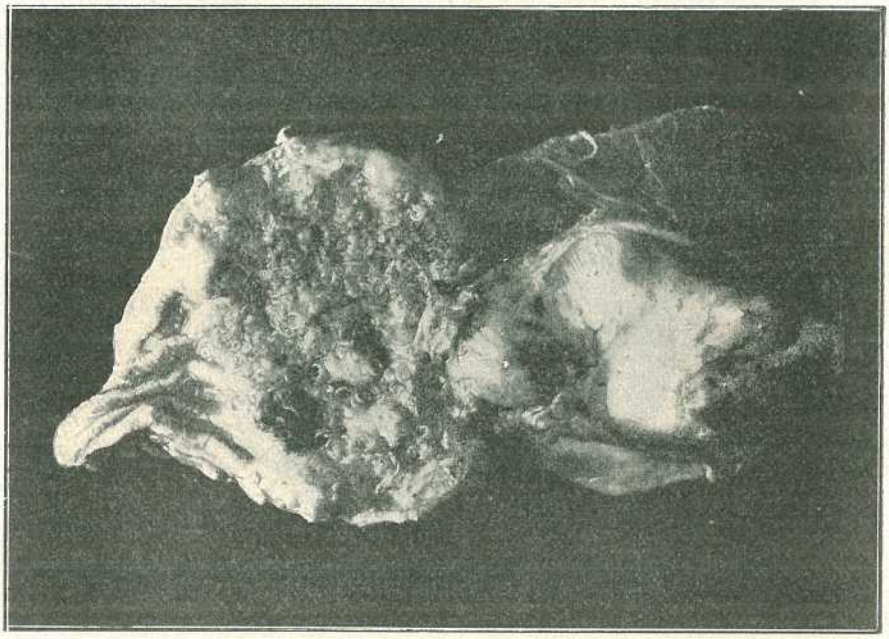

Plate 7.
STOMACH OF FOWL INFESTED WITH STOMACH WORMS.

THE GIZZARD WORM (Acuaria hamulosa) (Plate 8).

These are pinkish worms, measuring up to an inch and more in length, which are found in the walls of the gizzard.

Life Cycle.

The eggs of the gizzard worm also require an intermediate host, and in that case certain species of grasshoppers, beetles, weevils, and sandhoppers are concerned. The birds become infested should they eat one of these insects, which contain gizzard worm larvae.

Effect on the Fowl.

The presence of gizzard worm is denoted by blotchy discoloration of the horny lining of the gizzard. If this is stripped away the worms will be detected in the muscle wall of the gizzard. They are usually

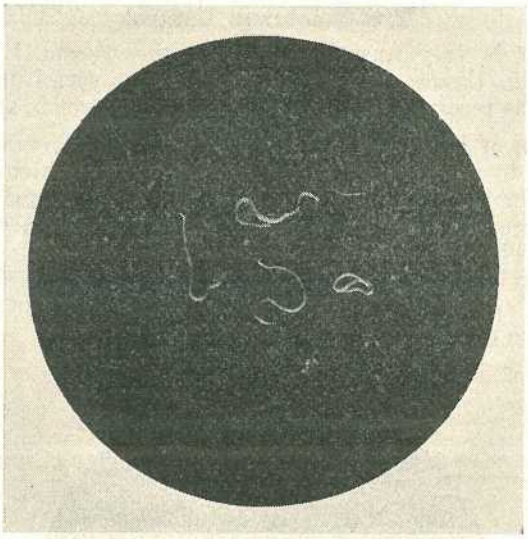

Plate 8.
GIZZARD WORMS (NATURAL SIZE).

found in that portion of the gizzard wall near the entrance of the stomach. The worms burrow into the muscle coat, occurring in soft nodules, thus causing the muscle to become soft and spongy. The gizzard may lose its shape, and may even rupture from the infested area. (Plate 9.) It thus loses its function as a grinding organ, and the infested birds lose condition, become weak, and may die.

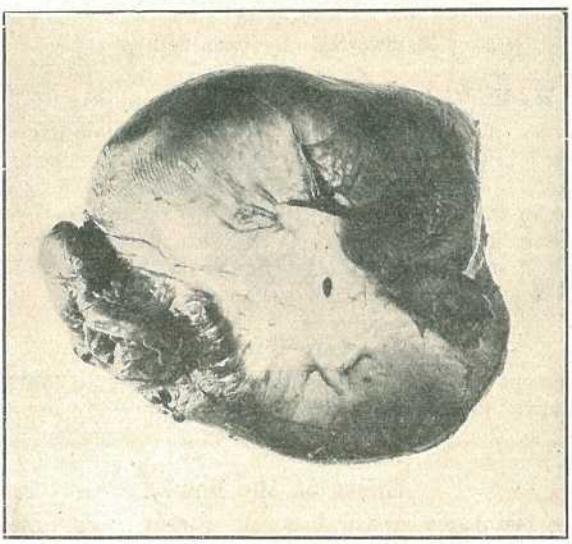

Plate 9.
GIZZARD OF FOWL INFESTED WITH GIZZARD WORMS.

Treatment and Control.

Treatment is very unsatisfactory, as the worms, lying concealed in the muscle tissues, are protected from vermifuges. Carbon-tetrachloride, as recommended for the large roundworm, should be tried.

Prevention of infestation is, therefore, very important. Sanitation and measures to prevent the birds coming into contact with infested insects should be enforced. The elimination of conditions which provide shelter and breeding grounds for these insects is also necessary. The sandhopper which is small, pale, and shrimp-like in appearance, is, for example, found breeding in areas which are shaded and moist. Measures for its control are obvious. Like the woodlouse, it is not an insect, but is related to the shrimp.

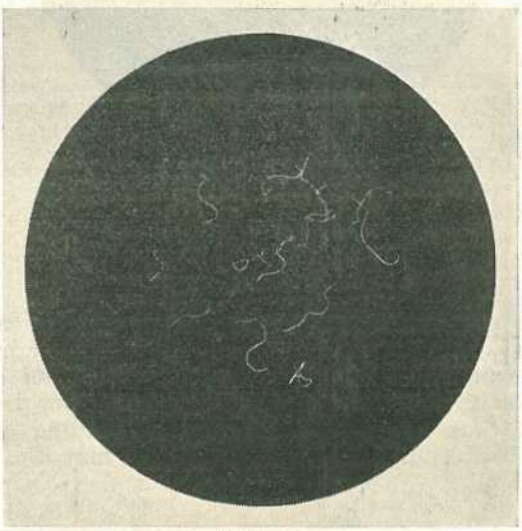

Plate 10.
HAIRWORMS (NATURAL SIZE).

HAIRWORMS (Capillaria spp.) (Plate 10).

Two species of hairworms have been found in poultry in this State. One species is found in the intestine, the other in the caecum. Only the former species, *C. columbae*, is of any importance. These are extremely slender hair-like worms, which may grow up to nearly three-quarters of an inch in length. They are very difficult to detect with the naked eye, and are best seen when the washings from the intestine are examined in a glass dish, held over a black surface.

Life Cycle.

Birds become infested when they swallow eggs containing larvae. The young larva on being set free in the alimentary canal of the bird settles down in the intestine or caeca and becomes mature in about three weeks.

Effect on the Fowl.

Heavy infestations cause loss of weight, weakness, and death. Affected birds assume a depressed attitude with ruffled feathers and drooping wings. The worms may cause a serious enteritis which is manifested by diarrhoea in which numerous pinkish-coloured shreds of mucus may be seen.

Treatment and Control.

There is no satisfactory treatment known, though carbontetrachloride as recommended for the large roundworm might be tried.

Infestation can be prevented by giving attention to the regular removal of droppings and other features of sanitation.

THE CAECUM WORM (Heterakis gallinae) (Plate 11).

This is an extremely common parasite of the fowl and other poultry, such as turkeys. It inhabits the caeca, is whitish in colour, and about half an inch in length. In the caeca, it is frequently found in greatest numbers at the blind tips.

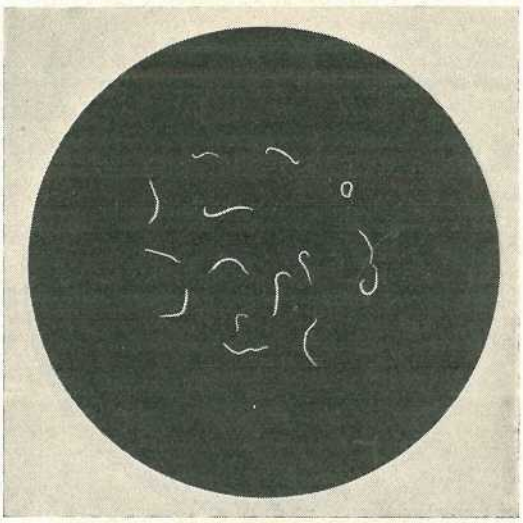

Plate 11.
CAECUM WORMS (NATURAL SIZE).

Life Cycle.

Should conditions be favourable, the egg, which is passed in the droppings, reaches the infective stage in about five days. At this time it contains a tiny coiled larva. When such an egg is swallowed by a bird the larva is set free and makes its way to the caeca. It then invades the wall of the caeca, where it remains to about the fifth day. Returning to the lumen of the caeca, it settles down and grows to maturity, which is reached twenty-four days after infection.

Effect on the Fowl.

It is claimed that the caecum worm can be serious among young chicks causing diarrhoea and death. It is of little importance among older birds, in which, moreover, heavy infestations are rarely seen. This worm, however, is a vector of blackhead, a disease affecting the caeca of poultry, and which is associated with a high rate of mortality among turkeys. At times, also, blackhead can be very serious among very young chickens.

Treatment and Control.

The flock treatment with nicotine sulphate, as advised for the large roundworm, will remove a fair percentage of caecum worms also. The United States authorities recommend enemas of oil of chenopodium in cotton seed oil. For a bird weighing 1½ lb., one-tenth cubic centimetres of chenopodium is given in 5 cubic centimetres of cotton seed oil.

EYE WORM (Oxyspirura mansoni) (Plate 12).

This is a slender whitish worm, measuring up to three-quarters of an inch in length, which is found under the nictitating membrane of the eye. (This is a thin membrane which passes over the eyeball when the fowl winks.) It is of interest only to poultry farmers in North Queensland, as it is unknown south of Rockhampton.

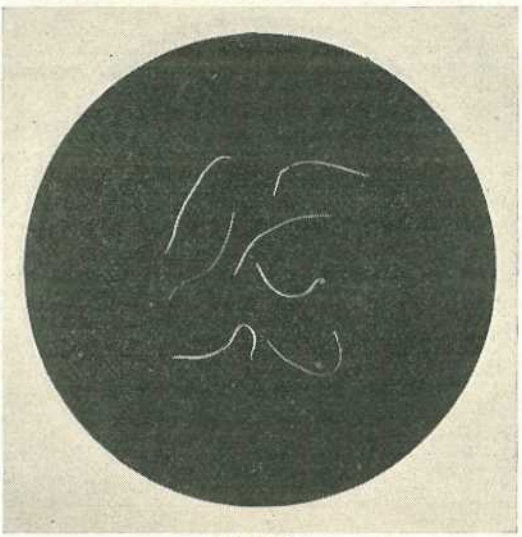

Plate 12.
EYE WORMS (NATURAL SIZE).

Life History.

The eggs laid by the female worms in the eye pass down the tear ducts into the throat, are swallowed and are eventually passed out in the droppings. These have then to be eaten by a particular species of cockroach before further development can occur. Should an infested cockroach be eaten by a fowl, the worms free themselves in the mouth of the bird and passing up the tear ducts take up their position in the eye.

Effect on the Fowl.

Eyeworm infestation is denoted by constant winking, rubbing the eye against the wing, and scratching the eye with the foot. The eyelids become inflamed and swollen, and there is a discharge from the eyes and nose. Occasionally the eye may be covered with a cheesy mass. As a result of infestation blindness frequently results. The affected birds lose condition and assume an unhealthy appearance. Eye worm may also be serious among young ducks, though, as a rule, it infests only the fowl.

Treatment and Control.

Infested birds may be freed from the worms by placing a few drops of turpentine, or a 2 per cent. solution of creolin in the eyes. After about half an hour the eye is washed in lukewarm boracic water, and the worms removed with a small soft brush.

Prevention consists in applying the principles of sanitation and eliminating conditions which encourage cockroaches. The use of an insect spray will assist in controlling these insects.

EXTERNAL PARASITES.

The external parasites of the domestic fowl include the poultry tick and several species of fleas, lice, and mites.

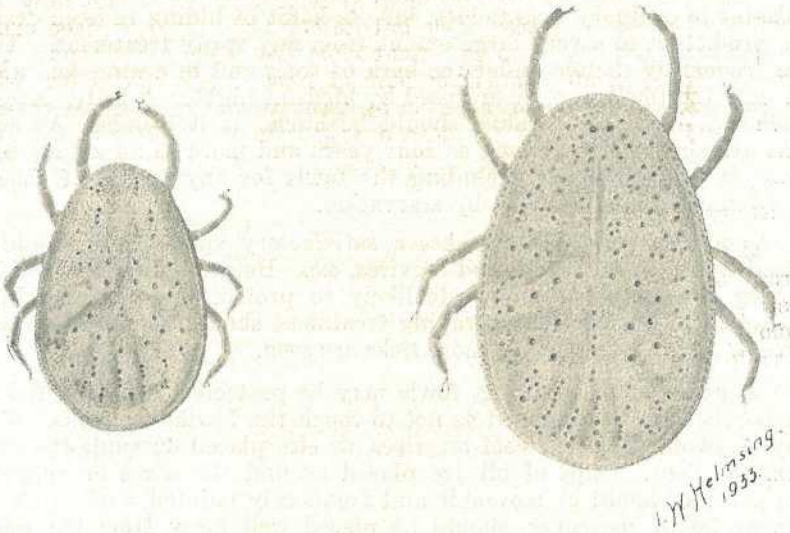

Plate 13.

THE POULTRY TICK (MUCH ENLARGED).—A. Male. B. Female.

THE POULTRY TICK (Argas persicus) (Plate 13).

This is a flat, oval, brownish tick about one-quarter to half an inch in length. The mouth parts are situated ventrally between the front legs, and it is only by turning the tick on its back that these can be seen. It is a powerful bloodsucker, and, like the bed bug, feeds only at night, remaining hidden in cracks and crevices in the fowlhouse during the day.

Life History.

The female tick may lay 500 to 900 eggs during her lifetime, in several batches. These eggs are deposited in sheltered positions, and under favourable conditions may hatch in about ten to fifteen days. The tiny tick that emerges from the egg has only three pairs of legs, and almost immediately after hatching attaches itself to the fowl, preferring the skin on the breast, under the wing, and on the thighs for this purpose. In three to ten days' time it is fully engorged with blood, and, leaving the fowl, seeks a suitable hiding-place, in which it casts the skin, to appear later as an eight-legged nymph. There are two further moults before the adult stage is reached, but, like the adult, these nymphal stages feed only at night.

Effect on the Fowl.

When ticks are numerous, their bloodsucking habits result in distinct injury to the birds attacked. This is due to the amount of blood sucked up by the ticks and to poisonous substances injected whilst feeding. Young chickens are most seriously affected, and the weakness caused by the tick may often be fatal.

The fowl tick is also very important as a carrier of an organism which is responsible for fowl tick-fever, or spirochaetosis, which is a serious and usually fatal disease among fowls.

Control.

The fowl tick is a very difficult pest to control, as not only is it resistant to ordinary insecticides, but its habit of hiding in deep cracks, &c., protects it to a very large extent from any spray treatment. Ticks also frequently shelter under the bark of trees and in crates, &c., which are near the fowlhouse, or are used by birds at night. A badly infested fowlhouse, if of little value, should be burnt as it stands. As adult ticks are able to live as long as four years and more in an empty fowlhouse, it is of little use excluding the fowls for any length of time in an attempt to kill the ticks by starvation.

Crude oil or creosote makes a satisfactory spray, and should be forced well into all cracks and crevices, &c. Before spraying, all litter, nesting straw, and loose boards likely to protect the ticks should be removed and burnt. The spraying treatment should be repeated every three to four weeks until no more ticks are seen.

In addition to spraying, fowls may be protected from the ticks if the perches are so arranged as not to touch the fowlhouse walls. They may be swung from the roof on wires, or else placed on supports rising from the floor. Cups of oil are placed around the wires or supports. The perches should be moveable and frequently painted with crude oil. Nesting boxes, moreover, should be placed well away from the roosts, and are best constructed of metal.

Special coops should be set aside so that any bought fowls may be quarantined as a precaution against bringing in fresh infestations. The period spent in these coops should be about twelve days, and the coops should be kept thoroughly clean and well sprayed.

LICE.

The lice found on the domestic fowl are all biting lice, of which there are several species occurring on fowls in Queensland. The various species are given popular names according to the part of the body or feathers on which they are most frequently found—namely, wing lice, head lice, body lice, shaft lice and fluff lice. The various species are illustrated in Plate 14, figs. 1-6.

Lice infestation is most serious among chickens, and the irritation resulting from their presence may sometimes be fatal. Among grown fowls lice infestation is shown mainly by a decreased egg production.

The two most important lice are the head louse, *Lipeurus heterographus* (Plate 14, fig. 4), and the body louse, *Eomenacanthus stramineus* (Plate 14, fig. 5). The former occurs in the region of the

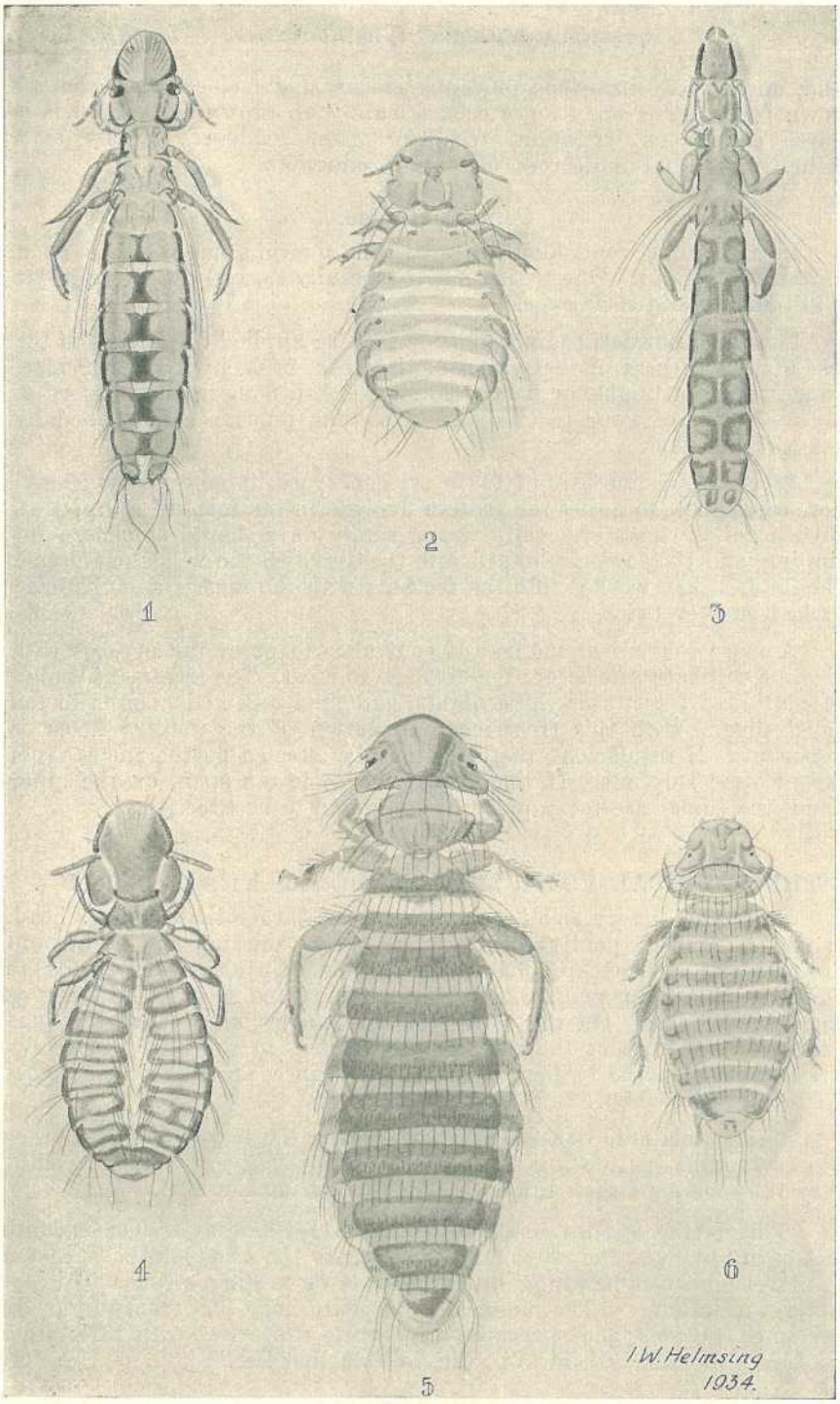

Plate 14.
POULTRY LICE.

Fig. 1.—Wing louse x24.
Fig. 2.—Fluff louse x24.
Fig. 3.—Slender pigeon louse x24.
Fig. 4.—Head louse x24.
Fig. 5.—Body louse x24.
Fig. 6.—Shaft louse x24.

head, and is very injurious to young chicks, and on occasions even to grown fowls. The body louse occurs mainly on grown fowls, and is a source of serious irritation, resulting in a reddened, scabby skin unthriftiness, and a decrease in egg production.

Control of Lice.

Lice may be controlled with sodium fluoride, used either as a powder or as a dip. One treatment, if carefully carried out, is sufficient to kill all lice and their eggs.

Used as a powder, sodium fluoride may be applied in pinches to the base of the feathers in the region of the head, neck, back, breast, vent, wings, tail, and thighs, or it may be mixed with flour in the proportion of three parts of flour to one part of sodium fluoride and applied by means of a shaker.

Where large numbers of fowls are concerned, it may be considered more convenient to apply the sodium fluoride in the form of a dip, 1 oz. to each gallon of water. Only warm, sunny days should be chosen for dipping, and the fowl is plunged into the dip with the wings outspread. The fluid is then worked into the feathers with the fingers and the head ducked once or twice.

A more convenient method of control is to paint the perches with nicotine sulphate just before the birds go to roost. The treatment should be continued for two or three nights, and then repeated in nine to ten days' time. With this treatment ventilation of the poultry house is important. If insufficient, the birds may be affected by the fumes from the nicotine sulphate. If the poultry house is too open, on the other hand, the fumes are too rapidly disseminated to be effective.

THE TROPICAL FOWL MITE (Liponyssus bursa) (Plate 15).

This mite is very small in size, being no larger than a pin's head. It may be seen on poultry at any time during the day and night, and owing to its bloodsucking habits, is distinctly injurious, especially to chickens and young poultry. Sitting hens may be so irritated by it as to leave the nest. On the fowl this mite occurs in greatest numbers below the vent, about the tail, and sometimes on the neck. A heavy infestation gives the feathers a dirty appearance, and the skin becomes irritated and scabby.

The female mite deposits her eggs among the feathers and in other places such as the nesting straw, where the young mites hatch. They may thus complete their life cycle without leaving the fowl.

This is the species commonly seen in fowlhouses in Queensland. When in numbers, the mites may crawl on to the arms and body of the poultryman when handling infested fowls or nesting straw and cause severe irritation. The tropical fowl mite may be transported by starlings, pigeons, and sparrows, and is also concerned with infestation of houses, popularly held to be due to "starling lice."

Control.

Spraying with crude oil or creosote and the burning of all litter and nesting straw is advised. In addition, individual treatment of all fowls by dipping in a mixture of 1 gallon of water, 2 oz. of flowers of sulphur,

and 1 oz. of soap is necessary, taking care to wet the feathers thoroughly. Alternatively, dusting with flowers of sulphur will be found satisfactory, but is not considered to be as efficient as dipping.

A more convenient treatment is to paint the perches with nicotine sulphate just before the birds go to roost. The treatment should be repeated three times at intervals of three days. For precautions regarding the use of nicotine sulphate, see under "Control of Lice."

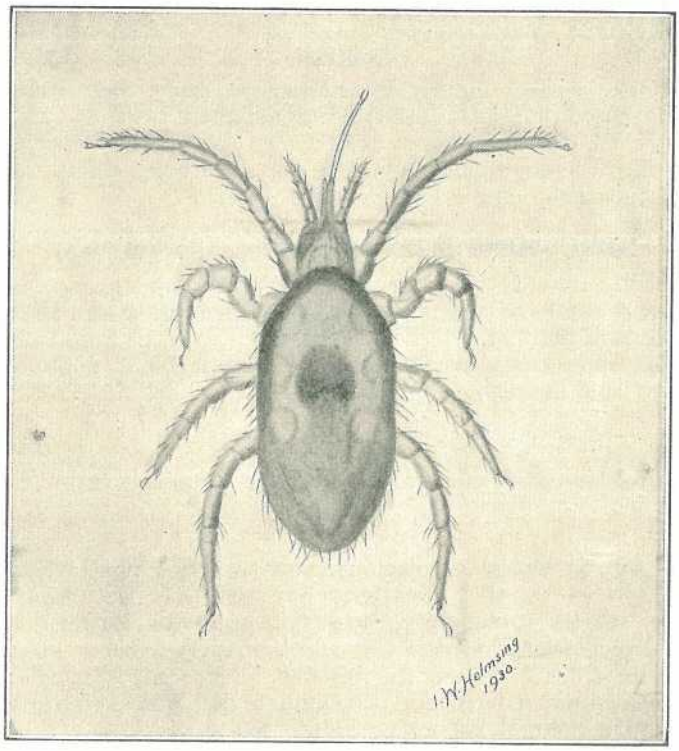

Plate 15.
THE TROPICAL FOWL MITE (MUCH ENLARGED).

RED MITE (Dermanyssus gallinae).

This mite is very similar to the tropical fowl mite in appearance, but, like the poultry tick, feeds only at night, and with few exceptions—for example, in the case of sitting hens—is not found on the birds during the day. The red mite is also a bloodsucker, and when in numbers may be regarded as a serious parasite. Its eggs are laid in the cracks and crevices in which it hides by day. Like the poultry tick, the red mite is a vector of fowl tick fever.

Control.

Red mite control may be accomplished by spraying with crude oil or creosote, and by the destruction of all litter. Dipping in this case is not required. Spraying should be repeated every three days till no more mites are seen.

The nicotine sulphate treatment recommended for the control of the tropical fowl mite is also very effective for the control of red mite.

SCALY-LEG MITE (Cnemidocoptes mutans).

This itch mite, as its name implies, is responsible for a condition among poultry known as scaly-leg. Mite attack is usually confined to the legs, though occasionally it has been known to include the comb and wattles. The mites, burrowing in beneath the scales, cause the formation of large crusts. They usually commence their attack between the toes, and gradually extend up the unfeathered portion of the leg. In severe cases the birds become lame and walk with difficulty, and may rapidly lose condition.

Control.

The mites spread mainly by contact or from the perches, so no hesitation should be shown in treating affected fowls. An effective remedy is crude oil, into which the legs are dipped and washed with a hard brush. The treatment should be repeated after thirty days. The perches should also be painted with crude oil.

DEPLUMING MITE (Cnemidocoptes gallinae).

This mite lives at the base of the feathers and causes an intense itching, as a result of which the affected bird pulls out the feathers. If the stumps of the feathers are examined, they will be found surrounded with scales and crusts, whose presence distinguishes depluming mite infestation from moulting or the vice of feather-picking.

Control.

Dipping in the mixtures used for tropical mite control is recommended.

FLEAS.

Fleas can at times be very injurious pests of poultry. The most harmful species is the sticktight or stickfast flea, *Echidnophaga gallinacea,* which, fortunately, does not occur in Eastern Australia. Occasionally, however, birds in Queensland may become infested with other species of fleas, such as the dog flea, *Ctenocephalides canis,* the cat flea, *Ctenocephalides felis,* and the human flea, *Pulex irritans.* These pests, through their bloodsucking habits, may so irritate the birds as to cause a marked decrease in production.

Control.

Fleas breed in the dust and litter of the fowlhouse floor, and of shaded areas in the yards. Control may be accomplished by—

(1) Removal and burning of all dust and litter.

(2) Dampening the breeding sites with water and keeping them damp for about two weeks.

(3) Spraying thoroughly with crude oil or creosote.

CHANGES OF ADDRESS.

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Pineapple Plant Selection.

With Special Reference to the Elimination of Inferior Types.

H. M. GROSZMANN, B.Sc.Agr., Assistant to Research Officer.

THE plants and fruit in any pineapple field, and especially in a plant crop fruiting in summer vary greatly in appearance. Fruit may differ considerably in size and shape, crowns may be single, double, or multiple, the fruit stalk may be long or short, slips may be absent or number as many as twenty, suckers may be absent or may be more than six in number, and these may be either low-set on the plant or high up almost at the base of the fruit stalk. Some fruits are of a desirable type, others are marketable but inferior, whilst still others are so inferior as to be useless. On some plants the suckers are vigorous and early, whilst on others they are late and poorly developed, and consequently bear late or carry small fruit. In short, some plants and fruit are much better than others, and it is obviously desirable to produce more of the former and to reduce and ultimately eliminate the latter.

Basis of Pineapple Plant Selection.

The elimination of inferior plants and fruit may be achieved, but, in order to do so, it is necessary to understand why some plants are superior to others, and for this there are two main reasons. Firstly, the production of plants and fruit of a desirable type is closely linked with the adoption of correct cultural methods. Secondly, there are, within any given variety of pineapple, some strains which tend to produce superior fruit, while there are other strains which tend to produce inferior fruit, no matter how favourable the environment may be. These facts form the basis of pineapple selection work.

Among the many slips, suckers, and crowns that have been planted in Queensland, there have occurred, from time to time, undesirable plants differing from the parent type, and continuing the difference in their progeny, thus originating new and undesirable strains. Therefore, undesirable types fall into two categories. Firstly, there are individual plants of the better strains which have developed a defect owing to the existence of some unfavourable factor in the environment, and, secondly, there are plants which come from inherently poor strains. Before endeavouring to improve the plant type by selection, however, it is necessary to know to which category any abnormal plant belongs: if the defect be due to the environment, improvement can be effected by improved cultural methods, whereas, if the defect be hereditary, material from the undesirable plant should not be used in future plantings, because it is incapable of giving the necessary response to improved methods of cultivation.

Objectives of the Pineapple Plant Selection Work now in Progress.

A programme of work was drafted late in 1937, in which it was proposed to study the Smooth Cayenne, the most important commercial variety in Queensland, in order to ascertain which abnormalities might be hereditary, and also to discover whether there might be any superior strains, which could be multiplied to replace the average type now planted. This work has not yet been completed, but, from evidence already obtained, and from results of research conducted elsewhere, it is possible to make recommendations which, if followed, must improve considerably the class of plants in Queensland pineapple plantations.

Varietal Strain.

Attention has just been directed to the existence, within any pine-apple variety, of separate strains, which, in the case of the Smooth Cayenne, are numerous. Some of these strains can be recognised very easily as being distinct, while there are others which a casual observer would fail to notice. Now, if a single plant be taken, all the progeny derived from that plant in successive plantings by vegetative means, that is, by crowns, slips, suckers, or any other offshoots, but not by seed, will belong to one type or strain, namely, that of the original plant. All of these plants are said to belong to the one clone, and any differences within the clone are due normally to the environment. In any field there may, of course, be numerous plants of any one clone, but it is difficult, when choosing a number of plants, to be sure of choosing from the one clone, as very slight hereditary differences may be overlooked. However, all plants derived vegetatively from any one selected plant, that is, all the plants within one clone, belong to the one strain. Consequently, when attempting to develop a particular strain, it is customary to begin with one plant of that type and to grow its progeny by themselves. Occasionally a change of an hereditary nature will occur in a clone, giving rise to a new strain, but these changes or mutations, as they are termed, are comparatively rare. Consequently, for practical purposes, if one plant be selected and its progeny kept separate, these may be taken as belonging to a single strain.

Although it is not suggested that the individual grower should attempt to select superior strains, he is strongly advised to cull out all inferior types. The selecting and testing of superior strains is a slow process, but the culling of poor types should produce a rapid and marked improvement, particularly on those farms where such poor types are very prevalent.

Types of Pineapple Planting Material.

Before discussing inherently defective types, it is well to define the various vegetative portions of the plant that are used in propagation, and to describe what plant and fruit characteristics are desirable. Considering first the planting material, there are three main types, namely, slips, suckers, and crowns, all of which are of a vegetative nature as distinct from the seed. These may be best described by considering a normal plant which has matured its first fruit. On top of the fruit is the crown or top. Below the fruit, on the fruit stalk, are offshoots called "slips," "robbers," "buttons," or "gill-sprouts," bearing secondary fruit at the base; in this article the term "slips" will be used exclusively to designate such offshoots. Below the fruit stalk, and originating generally above but sometimes below ground level, are offshoots called suckers, which arise from the axils of the leaves on the stem. Normally these suckers will grow considerably and the following season will bear fruit termed the first ratoon crop. Occasionally, offshoots develop at the base of the fruit stalk which lack the secondary fruit found at the base of the slip, and which in general can be described as intermediate in character between the sucker and the slip. In addition to these main types, the "butt" or stem of an old plant is sometimes used as planting material. In selection, the use of butts is not recommended, as little can be known of their true characteristics, because butts are usually obtained from the oldest plantings on the farm.

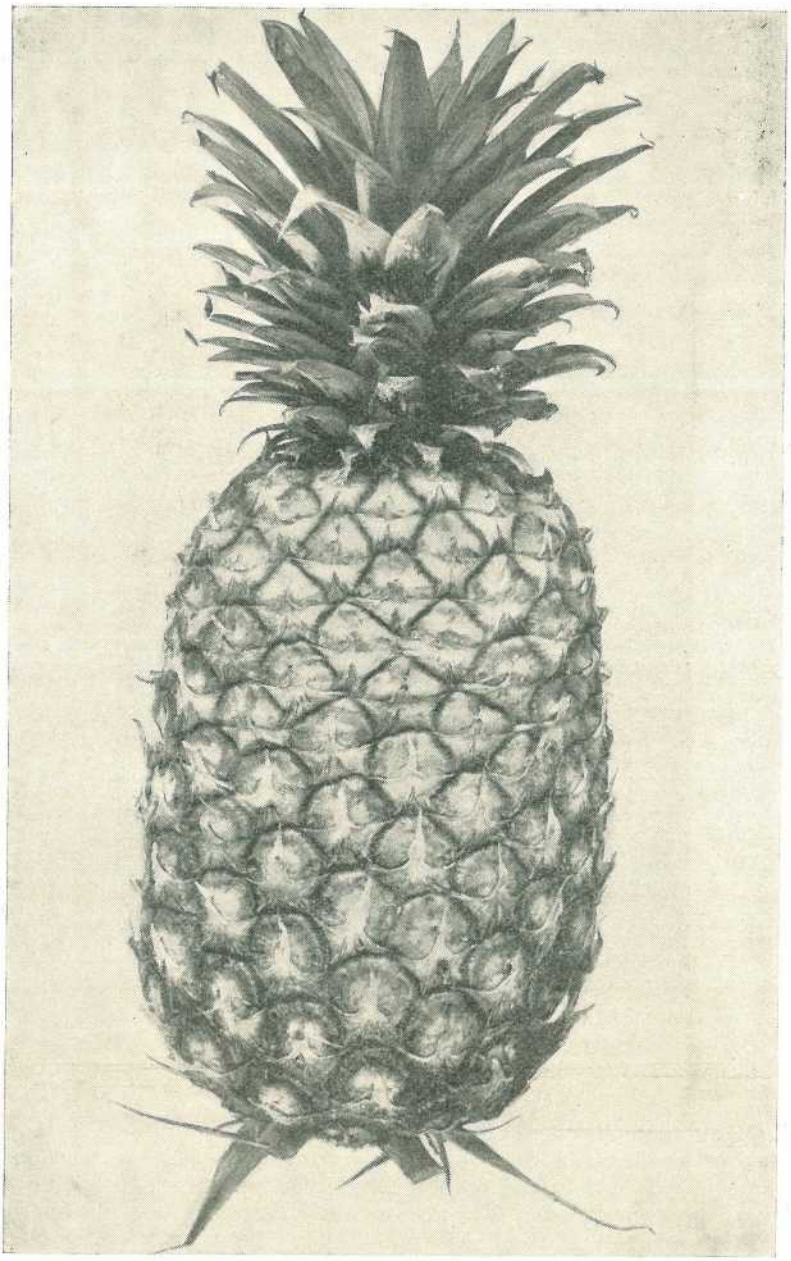

Plate 16.
FRUIT OF DESIRABLE TYPE.

Fruit and Plant Characteristics on which Selection is Based.

A good fruit (Plate 16) should be long and cylindrical, not cone-shaped, of good diameter, with square shoulders and base, flat eyes, and small core. The crown should be small and single, and the fruit stalk should be short. The slips should not exceed four in number, and should neither be clustered near the base of the fruit nor growing from it. (Plate 17.) The stem of the plant should be short, as high plants (Plate 18) have a tendency to fall over when fruiting. The suckers should originate close to the ground and should be about half grown when the fruit is mature so that they will afford a measure of protection

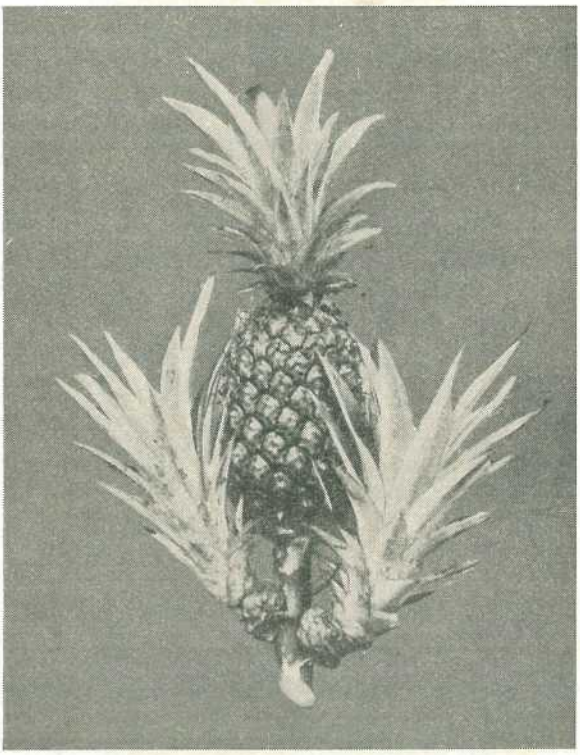

Plate 17.
DESIRABLY PLACED SLIPS.

against sunburn (Plate 19) and also provide an early ratoon crop. The number of suckers is influenced by the growing conditions, well grown plants, as a rule, producing more suckers than plants which have grown under adverse conditions. The grower must therefore take into account the conditions under which the plants have been grown. In a field where growth is vigorous and suckers are prolific and generally well developed, it is necessary to avoid plants with few or weak suckers, since they may belong to strains defective in this respect.

Part of the Departmental selection programme has been the planting and study of a number of clones of desirable plant types, and this work has made it evident that the type of plant and fruit

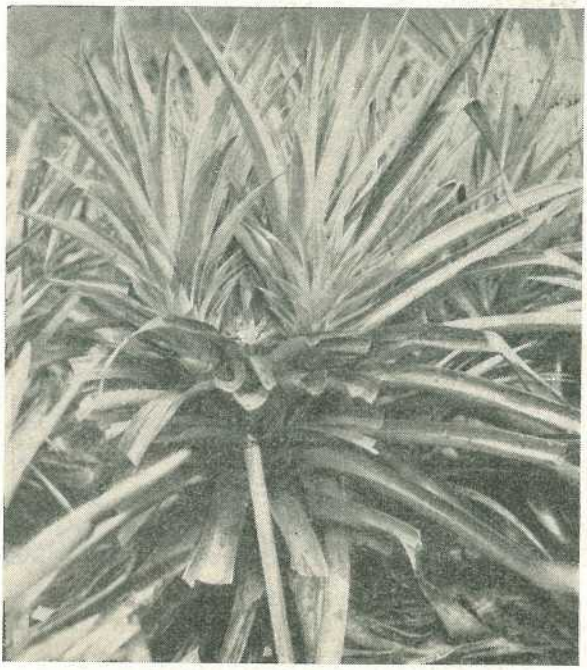

Plate 18.
A HIGH-STEMMED PLANT.—Suckers too high.

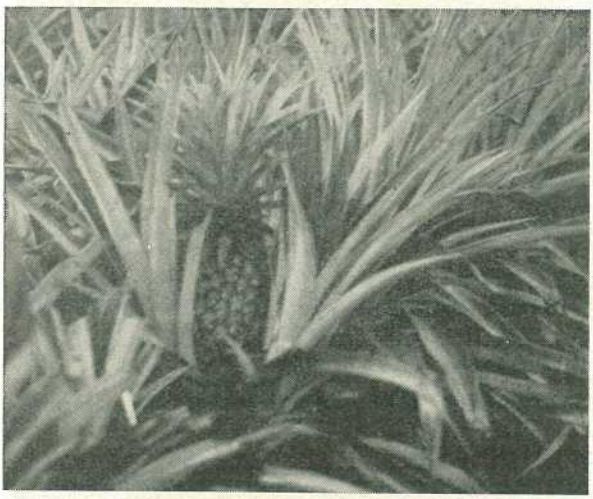

Plate 19.
WELL-SET LOW FRUIT.—Note position and development of suckers, and the protection afforded the plant against sunburn.

Plate 20.

WINTER FRUIT TYPE.—Conical and high on the plant. The suckers are not so far advanced as those in Plate 19.

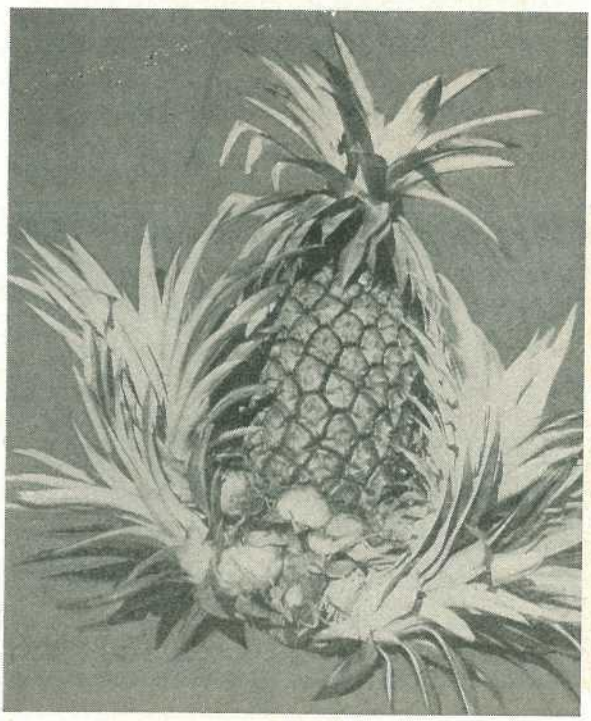

Plate 21.

COLLAR-OF-SLIPS.—Representative type.

within the one clone varies with the season of fruiting. Thus with plant crops maturing their fruit in winter, the fruit is more conical (Plate 20), the eyes more protruding, the fruit stalk longer, the slips fewer, and the suckers later than is the case with plants which mature their fruit crop in summer. The summer-fruiting plant approaches more closely the desired type, and it is advisable in the present state of knowledge to choose summer plant crops for selection work. Furthermore, this

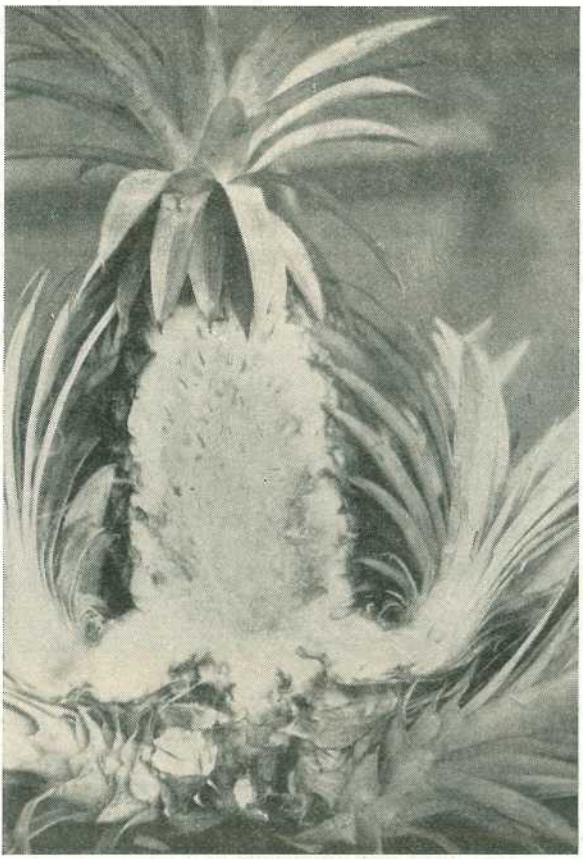

Plate 22.

COLLAR-OF-SLIPS.—Longitudinal section showing slips originating from the base of the fruit.

crop yields more slips for propagation. When these are to be used for planting material, the fruitlets should be removed with a knife when the slips are plucked, and the slips then placed in a shaded position base uppermost, so that the cut end will seal. Treated in this manner it will be found that they will be quite suitable for planting even after several months.

Abnormal Strains in the Smooth Cayenne Variety.

An attempt has been made, by examining a large number of plantations in several districts, to ascertain what are the chief hereditary defects, and to estimate the percentages of these abnormal or "off"

types. The number of inherently abnormal strains in the Smooth Cayenne variety is large, and at least fifteen have been recorded in Queensland plantations. Of these, however, the only markedly undesirable ones occurring in large proportions are the "collar-of-slips," "long tom," "dry fruit," and "bottle-neck" types. Owing to the vigorous nature of these types, and the large number of slips they produce, they will increase rapidly if no form of selection be practised.

Collar-of-slips and its Modifications.

The collar-of-slips type (Plates 21 to 23) is distinguished by the presence of slips rising from the base of the fruit itself. Usually, however, but not invariably, there is an excessive number of slips, not all of which arise from the base of the fruit. Furthermore, the fruit, which also frequently carries knobs at the base in addition to slips, is often small and tapered at the top. Suckering is generally greatly retarded. Removal of the slips is troublesome, owing to the time involved, and tearing of the tissues may lead to leaking of the fruit. The collar-of-slips type is consequently very objectionable.

Plate 23.
COLLAR-OF-SLIPS.—All five plants of the one clone showing the defect.

In Hawaii it has been found that in the progeny of collar-of-slips plants, not only the true collar type occurs, but also three others—viz.: "near-collar," "knobby," and apparently normal types. In the near-collar type (Plate 24) slips are numerous and clustered around the base of the fruit but do not originate from the base of the fruit itself. The knobby fruit (Plate 25) may be quite normal as regards production of slips, but knobs, varying in number and size, are produced at the base of the fruit. As it is very likely that these are merely environmental modifications of the collar-of-slips type, and that such plants may give the same types in their progeny as the true collar-of-slips, it is evident that selection which avoids only the true collar type may fail to eliminate completely this strain.

The near-collar and true collar types are often indistinguishable until the fruit is picked. Frequently, however, a vigorous plant of the normal strain bears six to eight slips fairly close to the fruit. This can be confused easily with the near-collar type, but generally the slips are neither so numerous nor so close to the fruit as is the case with near-collar. With the near-collar and the true collar types, the slips

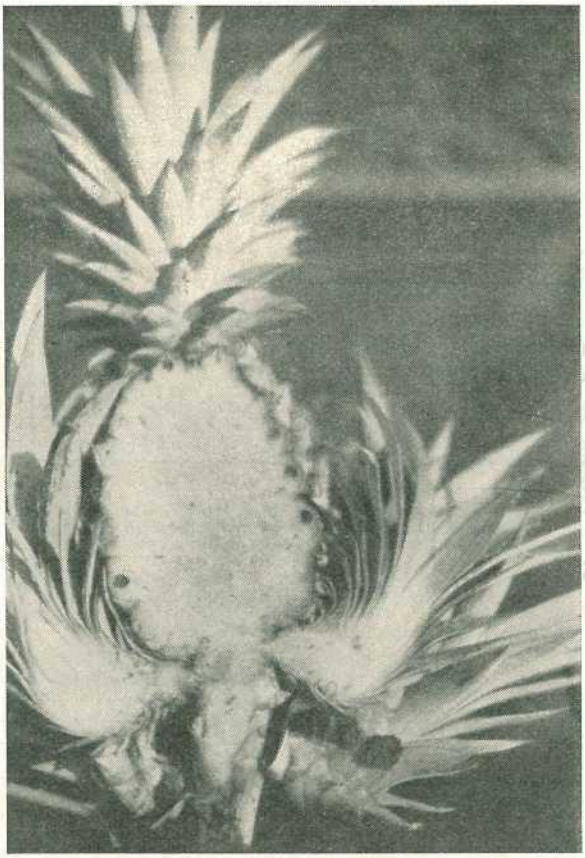

Plate 24.

NEAR-COLLAR TYPE.—A sectional view, showing that the slips do not arise from the base of the fruit.

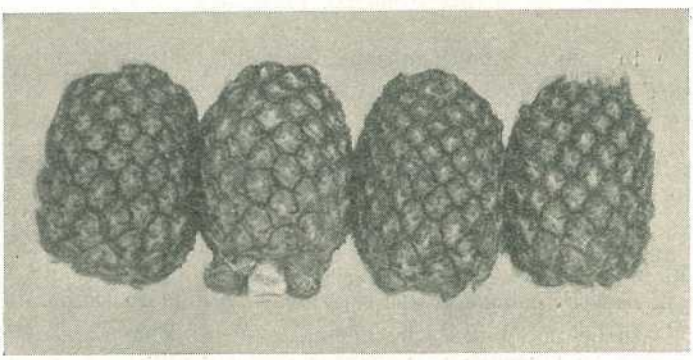

Plate 25.

THREE FRUIT SHOWING DIFFERENT DEGREES OF KNOBBINESS.—Compare with the normal fruit on the left.

rise so close to the base of the fruit as to break the bracts (Plate 27) at the top of the fruit stalk. With the vigorous plants mentioned above, the slips are a little lower, so that the bracts remain intact (Plate 28) as may be seen when the fruit is picked. In attempting to eliminate collar-of-slips, the allied near-collar and knobby types also should be culled when selecting planting material. A good method is to remove all the slips from these plants when the fruit is half grown, as not only has the grower then more time for such an operation than when picking the crop, but, in addition, the size of the fruit and the sucker growth benefit by the early removal of these slips. In this connection it is well to add that whenever slips are not required for any purpose, it is

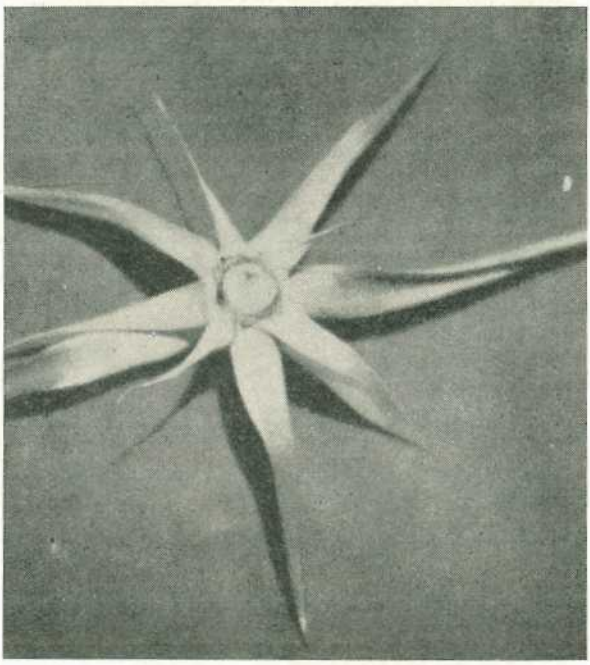

Plate 26.
THE BRACTS BELOW A NORMAL FRUIT.—Viewed from above.

advisable to remove them long before fruit maturity, and also, that when they are to be planted, they should not be left on the plant more than a month after the time the fruit is picked, but should be dealt with as described in an earlier paragraph. As a rule, true collar and near-collar plants produce an excessive number of slips, so that, by breaking off and discarding slips from all plants bearing more than four, and from all plants bearing slips on the fruit, as well as from plants bearing knobby fruit, these types will be greatly reduced. Selection along these lines possesses the slight disadvantage that some plants, not of the collar-of-slips type, may have more than four slips.

It is to be noted that the normal type of Smooth Cayenne pine-apple grown in Queensland produces scarcely any slips when fruiting for the winter crop, while the collar-of-slips type averages about three slips per plant during the winter season. Is is therefore inadvisable to use slips from plants that mature fruit during the autumn, winter, or spring months.

Plate 27.

TORN AND DISTORTED BRACTS OF THE COLLAR-OF-SLIPS AND NEAR-COLLAR TYPES.—Viewed from above.

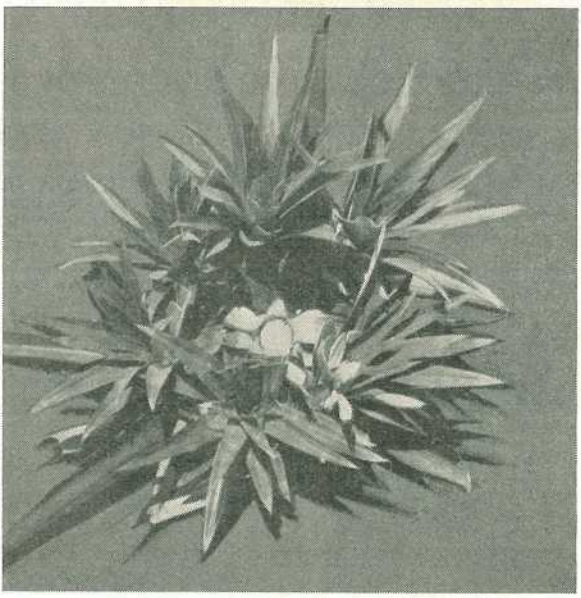

Plate 28.

A TYPE HAVING POINTS OF SIMILARITY WITH THE NEAR-COLLAR.—Distinguished by the slightly lower origin of the slips and the lack of distortion of the bracts.

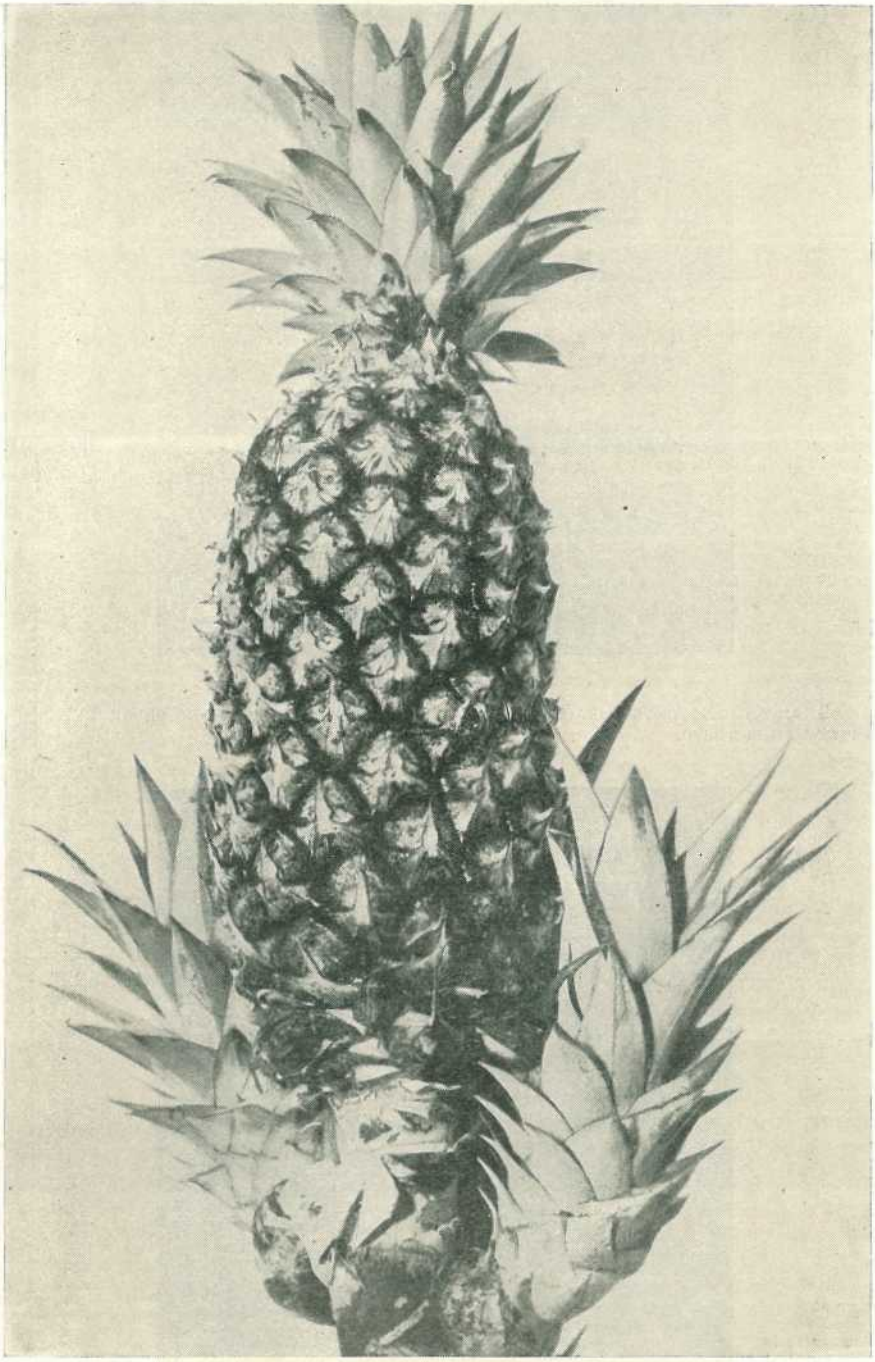

Plate 29.
LONG-TOM FRUIT TYPE.—Note knobs at the base.

The Long Tom Type of Abnormality.

The long tom type (Plates 29 and 30) is distinguished by the length and narrowness of the fruit which is, in addition, generally very knobby. Knobs may occur not only at the base (Plate 29) but also on the shoulders (Plate 30). The fruit usually matures late and, as suckering is delayed, the ratoon crop may not mature until the season following that in which ratoon fruit is produced by normal plants. Slips are numerous, but they are not always clustered at the base of the fruit. Often the fruit, though still of distinct shape, may be of quite good size, but, if produced under adverse conditions, it is mostly of an inferior type and even vigorous plants frequently are found to bear poor fruit. Observations indicate that this strain persists very close to type from generation to generation, so that there should be little difficulty in eliminating it.

The Dry Fruit and Bottle-neck Abnormalities.

The dry fruit and bottle-neck types (Plate 31) are somewhat alike, and instances have been recorded where both these fruit types have occurred on plants from the one parent. At the same time, it is possible that there are clones which run true to one or the other type. In the dry fruit type the fruit is small, the flowers are usually absent, and the fruitlets do not develop. In the bottle-neck type the lower fruitlets develop whilst the upper ones remain undeveloped, giving the upper portion an appearance similar to that of the dry fruit. The plants are vigorous and bear many slips and suckers but, as the fruits of both types are useless, the plants should be eradicated.

General Considerations for the Elimination of Undesirable Types.

The grower should note that in eliminating undesirable types the removal of the slips from such plants before they are mature, or their rejection in any other manner as planting material, will be fully effective only if he takes care not to use the crowns or the suckers from such plants.

It should be borne in mind that off types are much more prevalent among plants fruiting late in the season than among early fruiting ones, and also that they constitute a big proportion of the hold-over population of a plant crop field. Consequently, the grower should exercise great care in selecting from late-fruiting and hold-over plants. The term "hold-over" is applied to those plants which carry their first fruit later than the majority of individuals of a plant crop field.

The main abnormal types have been discussed, but there are many other hereditary abnormalities, most of which are of little or no consequence, while the status of others cannot be definitely determined until further studies have been conducted. The importance of an off type is measured by its value as compared with the normal plant, together with the proportions in which it occurs. However defective a type may be, unless it produces numerous slips or suckers, it is not likely to be of any great importance, whereas another type not nearly so inferior, but much more prolific, may lead to far greater losses. Also, there are types, such as some of the leaf colour mutations which, as they are neither very defective nor very prolific, are of little consequence. However, it is sound practice to avoid planting any abnormal type whether or not it be known to be hereditary, unless it appears to be definitely superior.

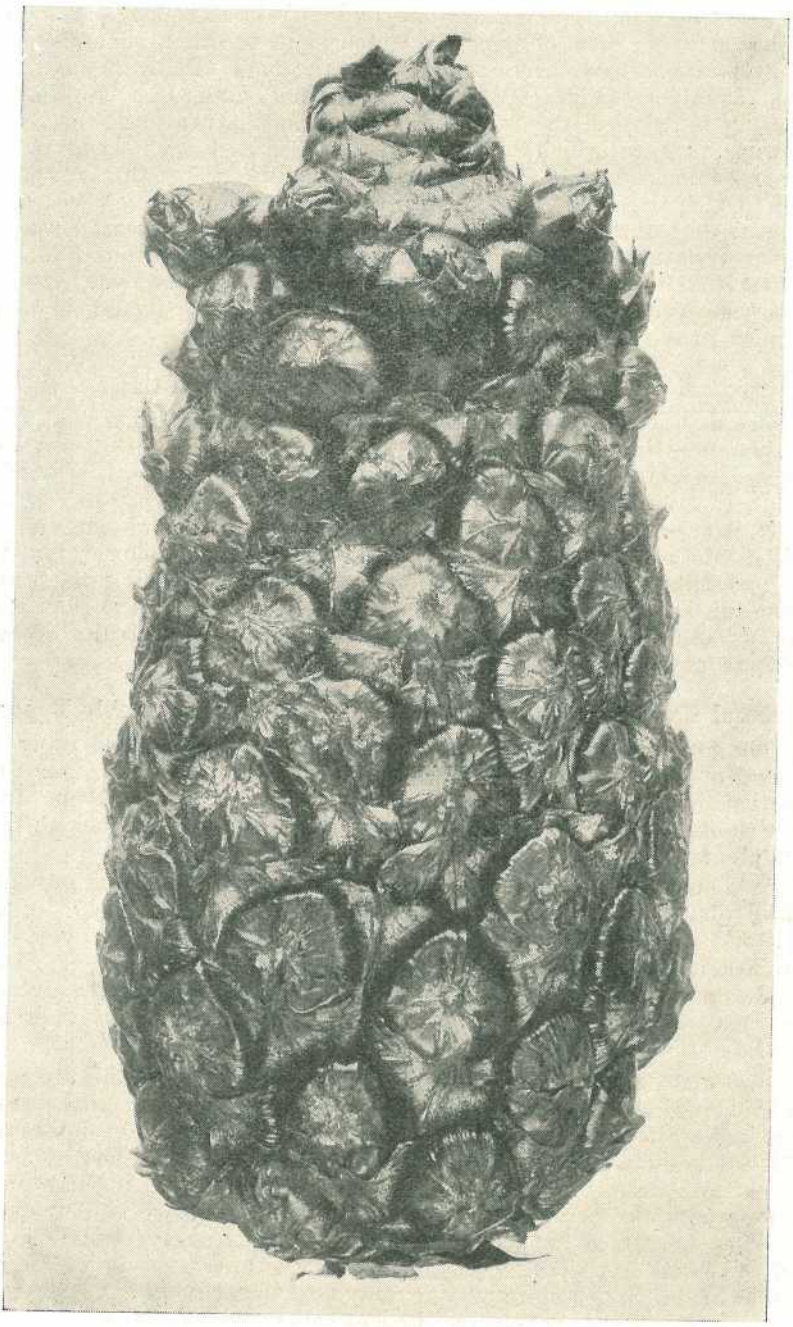

Plate 30.
LONG-TOM FRUIT TYPE.—Note knobs on the shoulders.

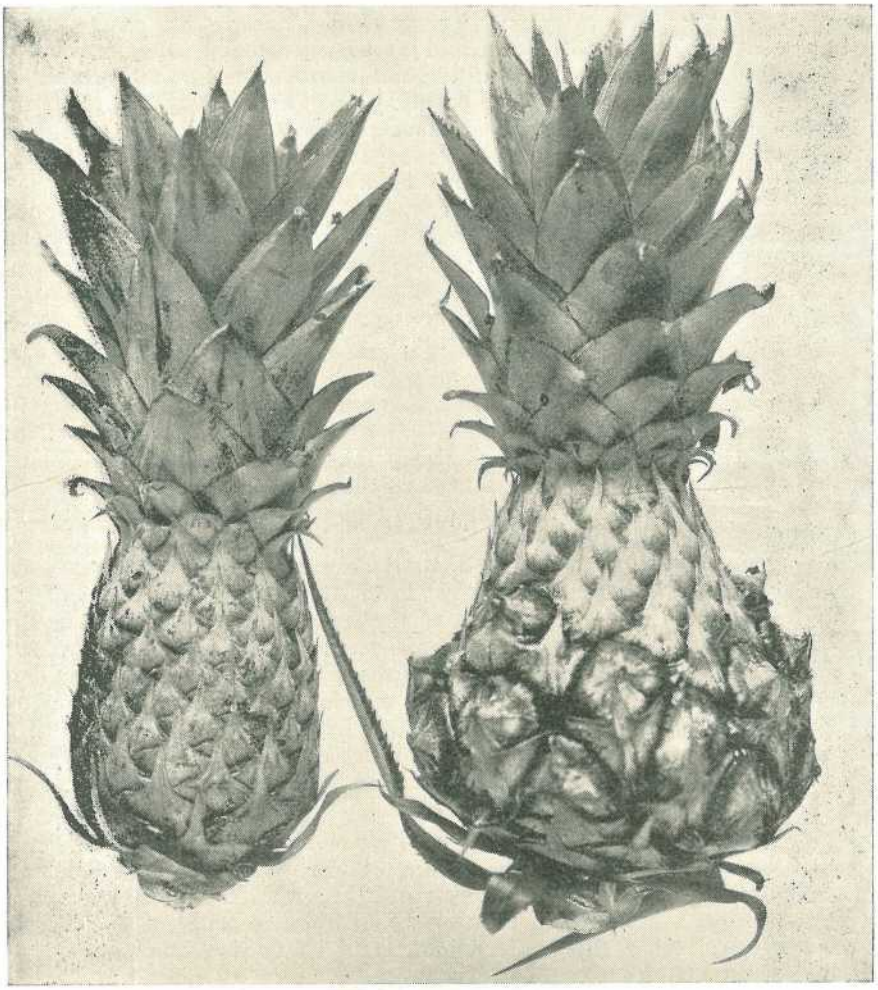

Plate 31.

DRY AND BOTTLE-NECK FRUIT.—Dry fruit on the left. The fruitlets do not develop, as the flowers are either absent or rudimentary. Bottle-neck fruit on the right. Similar to the dry fruit, except that the fruitlets towards the base are normal.

Types of Crowns.

Variation in the types of crowns may present a problem to the grower. Observations have shown that within the one clone, and in plantings of single crowns, single, double, and multiple crowns may occur on the first or plant crop fruit. Such variations are in some way due to environmental causes, and it is believed that little improvement can be effected in this case by selection; nevertheless it is sound practice in selecting planting material to avoid those multiple crowns which have a wide junction with the fruit and which are associated with flattening of the fruit and of its core.

Practical Methods of Pineapple Plant Selection.

Selection of planting material is best practised on plant crops, preferably on summer crop fruit. Ratoon crops are not so suitable, as in these the true nature of the parent plant is not always obvious, and certain defects may be less in evidence than in a plant crop. The main method of selection suggested for the grower at present is the culling of defective types, and this may be achieved by breaking off and discarding slips from such plants when the fruit is partly developed. If suckers from the same field are to be used for planting material, those on poor types of plants must be removed, or marked in such a way as to avoid confusion. Similarly, if tops are to be used for planting, those from inferior plants should be marked before picking the fruit.

Some growers may wish to accelerate the improvement in plant types by planting small separate areas with material taken from plants that are better than the average. A suitable procedure for that objective is to mark such plants with white paint just before picking the fruit. The slips, suckers, and crowns that are taken from each of these plants should be kept separate and planted so that successive clones are placed in the row alternately 3 inches to the right and 3 inches to the left of the line of the row. For example, if five plants be taken from each of three clones, the first five will be planted in a straight line, the second five will be 6 inches to the left of the first, and the five plants of the third clone 6 inches to the right of the second clone, and thus in line with the first. In this way, all risk of confusing the clones will be eliminated. When the first crop matures, a further selection should be made in which all planting material on clones which are late and on those in which any plant shows a marked defect, should be discarded. The planting material from the remaining clones may then be planted without further segregation, and will provide a nucleus of good plants to be increased from season to season.

In conclusion, it must be noted that one characteristic alone, such as the size of the fruit or the vigour of the plant, is not sufficient to establish the superiority of a strain, and the grower is advised to aim at a good uniform type which may be relied upon to crop evenly, thereby greatly simplifying tillage, fertilizing, and harvesting operations.

QUEENSLAND SHOW DATES, 1939.

July.

Bowen	5th and 6th
Ayr	7th and 8th
Cleveland	7th and 8th
Esk Show and Campdraft	7th and 8th
Townsville	10th to 13th
Nambour	13th to 15th
Rosewood	14th and 15th
Charters Towers	18th to 20th
Laidley	19th and 20th
Maleny	20th and 21st
Innisfail	20th to 22nd
Cairns	25th to 27th
Gatton	25th to 27th
Caboolture	28th and 29th
Tully	28th and 29th

August.

Atherton	1st and 2nd
Crow's Nest	2nd and 3rd
Pine Rivers	4th and 5th
Home Hill	4th and 5th
Ingham	4th and 5th
Royal National, Brisbane	14th to 19th
Jericho	25th and 26th

September.

Imbil	1st and 2nd
Canungra	2nd
Pomona	8th and 9th
Rocklea	9th
Mount Tamborine	9th
Beenleigh	22nd and 23rd
Malanda	27th and 28th
Southport	30th
Ithaca	30th

October.

Nerang	6th and 7th

Top Grafting of Grape Vines.

F. L. JARDINE, Fruit Branch, Stanthorpe.

ALMOST every grower is at one time or another faced with the necessity for working over large and old vines growing in his vineyard. In carrying out this work, invariably the procedure has been to saw off the existing vines slightly above ground level, and to cleft-graft the stumps with scions of the new variety. Where the vines are large the grafting operation is often followed by improperly healed unions which leave a large portion of dead root stock exposed to the

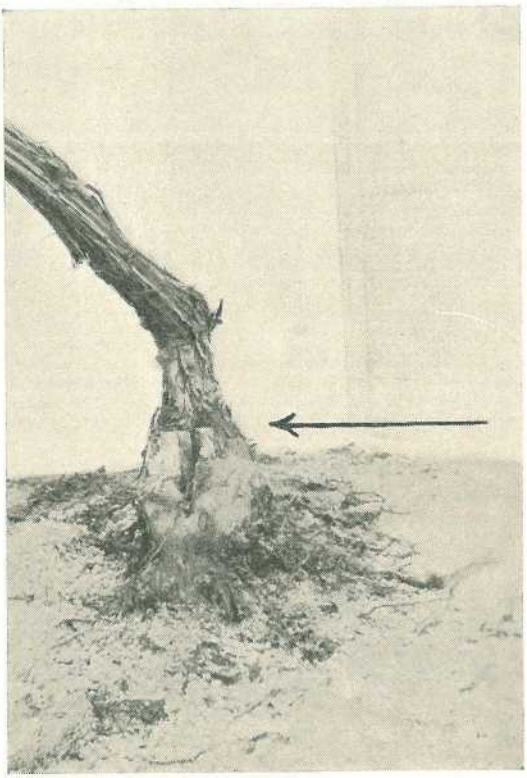

Plate 32.

AN EXAMPLE OF IMPERFECT UNION WHEN SCION IS GRAFTED ON TO A LARGE STOCK NEAR GROUND LEVEL.

ravages of dry rot, white ants, &c. Such a condition also constitutes an impediment to the even flow of sap in the vines and results in the vines entering into a state of premature decline when they should be vigorous with many years of profitable life ahead of them. This is particularly noticeable in the Stanthorpe district, but applies also in other grape-growing areas.

Plates 32 and 33 illustrate typical specimens of large vines which have been cleft-grafted above ground level and show how the wounds have failed to heal. Unfortunately, graft unions of this type are far too numerous.

The underlying cause of these unsatisfactory unions is to be found with the dimensions of the stock when grafted. Large stocks when sawn off near ground level expose a surface that is too great for the knitting tissue or callus of the graft to cover, and it is that portion of the stock which subsequently dies back and undermines the structure of the vine above ground.

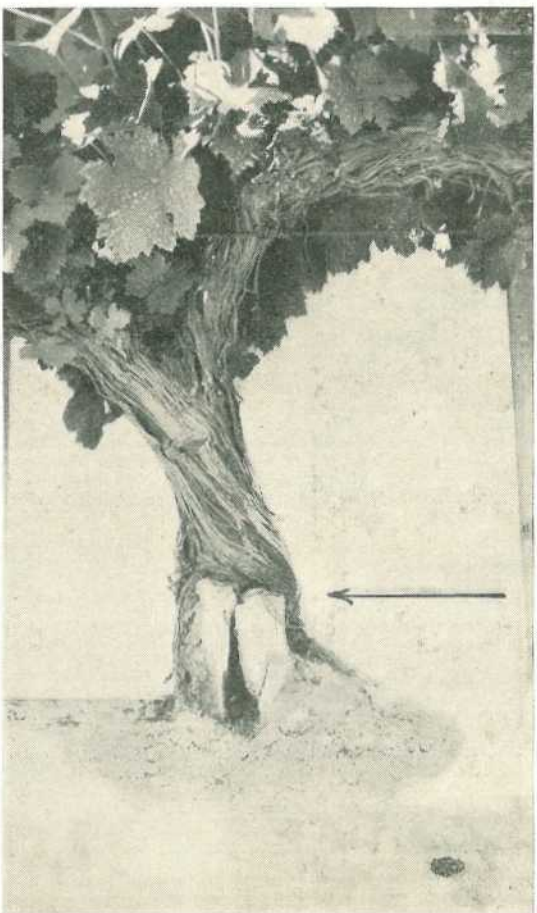

Plate 33.

ANOTHER EXAMPLE OF IMPERFECT UNION WHEN SCION IS GRAFTED ON TO A LARGE STOCK NEAR GROUND LEVEL.

The fault is not apparent in younger and smaller vines, which can be successfully grafted, because the callus can cover the surface of the stock, making the union complete after the second or third summer. Larger vines seem to resent the drastic treatment of being sawn off about ground level. The removal of such a large portion of the vine apparently upsets the entire rooting system, leaving the vine completely unbalanced. This fact is often apparent when grafts fail to make a

union, in which case the vines, instead of sending out strong sucker growth, invariably produce weak canes which seldom, if ever, regain a natural vigour.

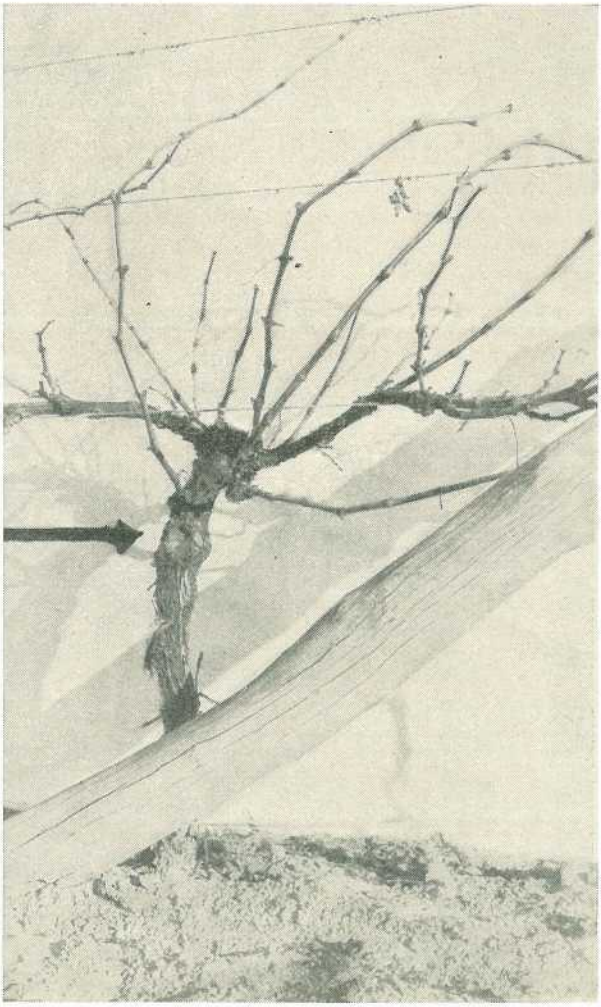

Plate 34.

A VINE TOP-GRAFTED AT THE POINT INDICATED BY THE ARROW.—Showing union almost complete.

In the course of experiments to overcome the trouble various methods of grafting large vines have been tried, and that described in the following has proved so promising that it is worthy of growers' attention.

Plates 34 and 35 show two vines which have been grafted by the new method. Each of the vines in Plates 34 and 35 has a trunk diameter of $1\frac{3}{4}$ inches about ground level. They were each grafted four years ago at the point indicated by the arrow.

The union of the vine in Plate 35 is complete, while that in Plate 34 is almost complete. The vines are vigorous and do not appear to have had any setback as a result of grafting. Apparently these vines received less shock than they would have had they been sawn off about ground level. This fact was evidenced by the strong shoots which

Plate 35.

ANOTHER EXAMPLE OF TOP GRAFTING.—The union in this instance is complete and perfect.

arose from dormant eyes on the trunk after the vines had been grafted in the spring, indicating that the root system functioned better in harmony with that portion of the vine remaining above ground.

In order to stop the young growth on the stock from taking charge and so preventing the scion buds from developing, it was found necessary to completely remove some of the shoots, while the more vigorous growth was pinched back. This had the effect of diverting the sap flow to the scion buds and forcing them into growth.

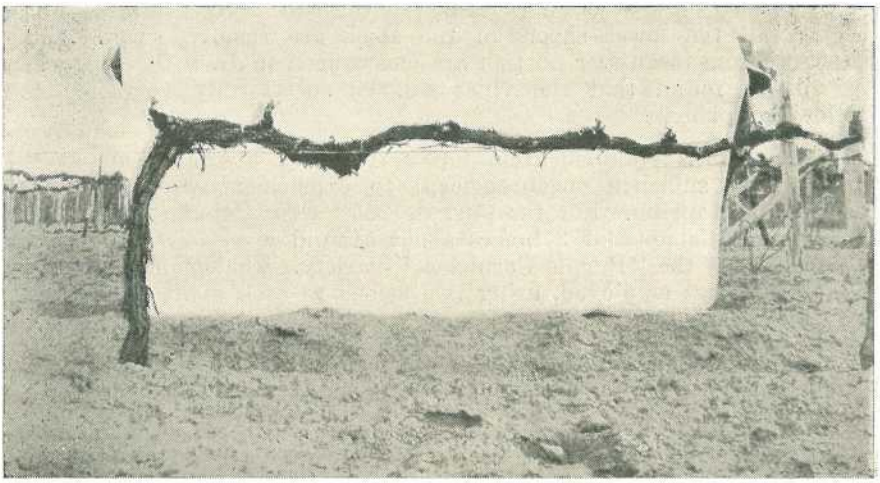

Plate 36.
A TYPICAL VINE USED IN THE TOP-GRAFTING EXPERIMENT.

When the young canes of the scion had made between 15 and 18 inches of growth all the shoots on the stock were completely removed. The growing scion canes then made rapid headway and a strong callus was formed at the union of the graft.

It is a noteworthy feature in top or high grafting in this manner that, in the event of the graft missing, scarcely ever does the stock fail to send out sturdy growth, which is not the case when grafting

Plate 37.
VINE SAWN OFF BEFORE TOP GRAFTING.

is performed close to ground level. In the case of the former, if the scions fail the lower shoots of the stock are removed, while those growing from the upper portion are encouraged to draw the sap, when it will be found that the vines can be successfully regrafted the following spring.

The results obtained from top grafting on a small scale at the outset gave sufficient encouragement to experiment with a number of vines last spring. For the purpose 265 "Gros Colman" vines with an average diameter of 2 inches about ground level were top-grafted with scions of the "Purple Cornichon" variety. The common split* or cleft graft was employed, using two scions to each graft whenever it was practicable.

Plate 38.
A STOCK WITH SCIONS INSERTED.

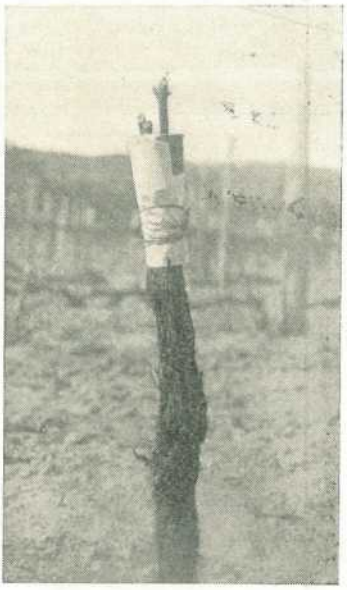

Plate 39.
THE FINISHED GRAFT WRAPPED ROUND WITH PAPER.

Method Adopted.

Plate 36 illustrates a typical vine in the test. In Plate 37 a vine is shown after having been sawn off in midwinter (June or July) in preparation for grafting. The grafting was completed during the month of September, the sap being well up and the vines bleeding profusely.

The cut surface of the stock (Plate 37) was first made fresh by sawing off a short section of the upper portion, care being taken that the end thus left for grafting was as straight and free from knots as possible. Next a tight ligature of stout twine was placed around the stock about 2¼ inches down from the sawn-off surface.

* This method of grafting is described in the pamphlet "Grape Culture in Queensland"—Department of Agriculture, Brisbane.

At this stage two downward sloping cuts about $\frac{1}{4}$ inch deep were made with a knife on each side of the stock 3 or 4 inches above ground level. It was found that from these cuts much sap escaped that would otherwise have flooded about the scions with detrimental results.

The top of the stock was next split with a strong knife and mallet, and when prized open with a chisel the two scions were neatly inserted, care being taken that the points of each scion extended right to the bottom of the split on the stock, thus making a perfect fit. Further tying was unnecessary, as the pressure of the cleft itself was sufficient to hold the scions in position.

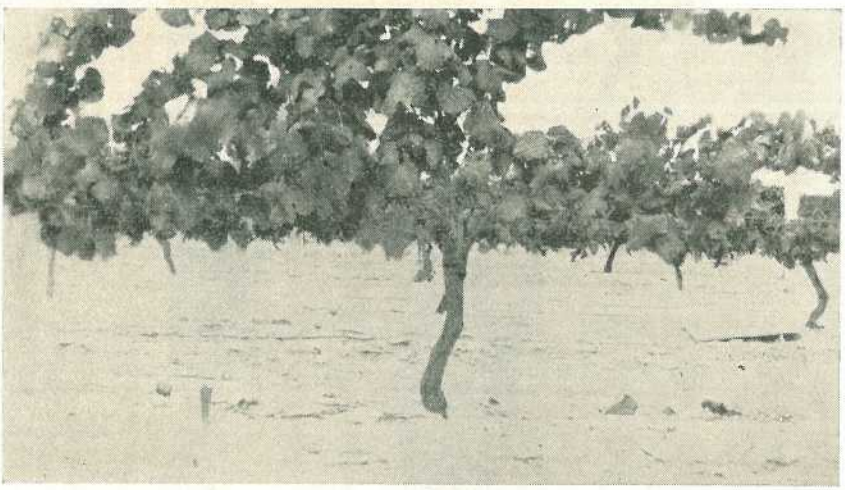

Plate 40.
GROWTH OF SCIONS FOUR MONTHS AFTER GRAFTING.

The wedge section of the graft where the outer bark of stock and scion come in contact was sealed over with a grafting wax. The cuts on the top end of the scions were also sealed, while the opening of the split on the stock between the scions was plugged with wax.

Plate 38 illustrates a stock with scions inserted.

Paper of double thickness was then wrapped round the graft and tied about the base, the cup thus formed being filled with loose soil and slightly firmed down, leaving the top buds of the scions exposed (Plate 39).

The after-care of the grafts consisted of keeping the knife cuts on the stock open to permit the escape of surplus sap until it had finally subsided and, as previously explained, the treatment of shoots that appeared from dormant buds on the stock. It was also necessary to make a periodical inspection of vines exuding an excessive quantity of sap, and any congealed sap lodged about the union of the graft was removed, the paper being replaced and filled with fresh soil.

Plate 40 shows the scion growth of one of the vines four months after grafting, while Plates 41 and 42 are close-up illustrations of the

unions. It will be observed that at this stage the callus had covered almost three parts of the surface of the stock. Plate 41 also illustrates the union of the vine shown in Plate 40.

The total number of vines grafted was 265, and the number of misses was ten, of which two were blown off by the wind. A 96 per cent. strike can, therefore, be regarded as satisfactory.

Plate 41.

FOUR MONTHS AFTER GRAFTING.—Showing the union of the scions with the stock.

At this stage top grafting is recommended for vines having a diameter between $1\frac{3}{4}$ and $2\frac{1}{2}$ inches or slightly larger about ground level. The grafting of larger vines with greater dimensions becomes increasingly difficult and uncertain, and the results in most cases are disappointing.

The method adopted for top grafting has given more satisfactory results than the one usually practised, the unions of the former being more perfect and the vines themselves less subjected to injury by the

Plate 42.

ANOTHER ILLUSTRATION OF THE UNION OF SCIONS AND STOCK FOUR MONTHS AFTER GRAFTING.

operation. It must be borne in mind, however, that top grafting entails a considerable amount of care and attention, not only in the actual operation, but in the after-care of the grafts themselves.

Thanks are due to Mr. J. Ferris, Glen Aplin, and Mr. J. Gesler, Severnlea, without whose helpful co-operation it would have been impossible to have carried out this test on such an extensive basis.

Milking into an Atmosphere of Carbon Dioxide.

M. J. GRIFFITHS, B.Sc. (Dairying), Dairy Research Laboratory.

FOLLOWING on a request received from two firms in Brisbane for information as to the merits of a Danish patent system of milking, requiring the use of solid carbon dioxide ("dry ice"), a series of experiments under practical farm conditions was undertaken. The object was to obtain bacteriological counts and make general observations on the quality of milk drawn into the Jens Grand Milking Pail, patented in Denmark, which has an atmosphere of carbon dioxide, in comparison with that of milk drawn under conditions as nearly as possible identical, but with an atmosphere of air.

This patent milking and transport pail is designed for use by farmers supplying milk depots, and consists of a 5-gallon can of squat type, fitted with a straining device at the top and a hinged, tightly-fitting lid, closing with a rubber ring. The preparation of the patent can for use is carried out at the receiving depot, and consists of thorough cleaning, sterilisation by steam, charging with about 50 grams of solid CO_2 ("dry ice"), and fitting with a cotton wool straining disc. The can is then closed and sent out to the farm, where it remains unopened until required, by which time it is filled with carbon dioxide gas. The can is used for milking direct, the milk falling on the strainer, and through this to the bottom of the pail, where it gradually displaces the heavy CO_2 gas, which in some measure acts as a preventative against the entrance of dust. When the pail is full (indicated by the oscillation of a small float), the straining wad is removed, the lid closed, and the can sent to the depot. The can is alluded to in the Danish reports as the "G-can" and this term will, therefore, be used subsequently.

The claim of the patentees that the effect on fresh milk of an atmosphere of carbon dioxide is to prevent loss of the natural dissolved gas, which amounts to approximately 5 per cent. by volume, and encourage the formation of clean lactic acid with a depressing effect on the putrefying types of bacteria, was substantiated by experimental work carried out by A. Jorgensen and V. Stein, of Copenhagen, and others at the State Experimental Dairy at Hilleroed, Denmark (1). It was, therefore, thought worth while to investigate the practical possibilities of this invention.

It was a question whether the obvious advantages of protection from dust, prevention of utensil contamination, avoidance of human handling, and of several transfers into different vessels on the farm, by milking

direct from clean cows into one sterilised vessel, would be offset by the entire lack of aeration and cooling, except such as might be afforded by the small quantity of dry ice remaining in the solid state in the can at milking time. This, it was thought, would amount to very little, and in practice, it was found to be negligible—in more than one case, no solid remained when milking was begun.

Since the experimental work was started, further reports from Denmark have been received which show that more work has been done on all aspects of the use of the G-can, and many statistics are available from experiments under practical conditions over a period (2). One Copenhagen dairy company has been using these cans regularly for part of their supply, and intends adopting them for the whole of the production. Also a number of G-cans of milk were supplied for consumption by officers in a Danish warship with apparently satisfactory results, and a patent has been applied for in the U.S.A.

Experimental.

A series of bacteriological tests was planned with the object of determining the effect of milking into the G-can charged with CO_2 on—

(i.) total numbers of bacteria,

(ii.) numbers of casein-digesting organisms,

(iii.) numbers of acid-forming organisms,

in the milk. It was intended at the same time to make observations on the practical application of the pail to ordinary farm conditions. In order to make as exact a comparison as possible, two sets of tests were made, one on milk drawn direct into the G-can, and the second on milk drawn direct through a cotton disc type strainer into a 3-gallon can fitted with lid.

Cleaning of both the cans was carried out at Peters Arctic Delicacy Company's factory, and both received identical treatment, i.e., cold water rinse; brushing with hot water containing washing soda; hot water rinse. After cleaning, they received a minimum of two minutes' steaming with live steam.

The mixed milk of two cows was used, and an approximately equal distribution was achieved by the following method:—

(i.) Two cows were selected (from a tuberculin tested herd, free from disease), giving approximately equal yields of milk.

(ii.) After washing the udders and discarding the first-drawn milk, milking was started simultaneously by two milkers, one using the covered can and a disc type strainer, and the other the G-can.

(iii.) After thirty seconds the milkers, using the same pails, changed cows. This was repeated after each thirty seconds, until milking was completed.

(iv.) The strainer was then removed from the control can, and both were closed and kept closed until sampled for testing, when the cotton disc was removed from the G-can.

It was considered that by this method a more representative milk would be obtained than would be possible from one cow, and the variations in count of different portions—foremilk, middle milk, and strippings—during milking would be nearly equalised.

A different pair of cows was used on each occasion on which tests were made.

It was not possible under these conditions to fill the cans completely with milk, so that a certain amount of air or gas was present.

The two cans were removed in a closed milk delivery van immediately after milking was completed (about 10.15 a.m.) to the laboratory, where samples were taken under sterile conditions one hour after milking, and the cans immediately closed again. After a further five hours, during which time the cans were standing at a temperature slightly below summer average (68-76 deg. F.), a second set of samples was taken and tested. The cans were again closed, and the milk remained until next morning, when it was examined for flavour and aroma.

Laboratory Method.

Bacteria were estimated by the plate count method, using milk agar (10 ml. standard agar + 0·2 ml. sterile milk), and litmus lactose agar, and plates were incubated at 37°C. Duplicate plates were poured from each dilution, and average colony counts were obtained from plates giving counts of between thirty and three hundred colonies, unless all counts were outside these limits, when the nearest figures were taken. Differential counts were made at twenty-four and forty-eight hours, total counts at forty-eight hours on milk agar plates only. Seven sets of tests were made, one set (that made on 2nd November, 1938) being discarded as some contamination appeared to have occurred in both experimental cans. This was discovered later to have been due to insufficient steaming before use.

The coliform test—inoculation into MacConkey broth (British Ministry of Health standard)—was applied to the milk (up to 0·01 ml.) at one hour and six hours old, and in the case of tests I. and II. at twenty-four hours old. It was found, however, that bacterial growth had progressed to such an extent that the ordinary milk was very near souring point, or completely soured, after twenty-four hours at 70°-76° F., so that comparative testing at this age was abandoned. The milk from the G-can was in all cases liquid at twenty-four hours.

TABLE I.

AVERAGE MILK COUNTS PER ML. AND COLIFORM CONTENT.

Milk Stored at 68°–76° Fahrenheit.

Experiment. Hours after milking.	Patent pail (G-can) + CO_2.				Covered can.			
	Casein digesters.	Acid formers.	Average total on milk agar.	Coliforms.	Casein digesters.	Acid formers.	Average total on milk agar.	Coliforms.
Exp. I. 1	20	65	260	— 1 ml.	20	25	150	— 1 ml.
Exp. I. 6	10	70	290	..	15	30	280	..
Exp. I. 24	1,900	2,610	3,260	+ $\frac{1}{100}$ ml.	34,200	4,770	43,575	+ $\frac{1}{100}$ ml.
Exp. II. 1	10	5	40	— 1 ml.	<10	20	20	+ 1 ml.
Exp. II. 6	25	10	320	..	3,735	130	4,085	..
Exp. II. 24	∞	∞ (alkaline)	∞	+ $\frac{1}{100}$ ml.	∞	∞ (acid)	∞	+ $\frac{1}{100}$ ml.
Exp. IV. 1	805	1,325	1,365	— 1 ml.	295	290	585	— 1 ml.
Exp. IV. 6	13,000	14,250	27,500	— 1 ml.	450	1,300	7,950	+ $\frac{1}{10}$ ml.
Exp. V. 1	770	410	1,935	— 1 ml.	995	630	2,780	+ $\frac{1}{10}$ ml.
Exp. V. 6	850	1,800	2,500	— 1 ml.	8,950	17,100	26,050	+ $\frac{1}{100}$ ml.
Exp. VI. 1	20	330	1,510	— 1 ml.	1,750	4,650	18,200	+ $\frac{1}{10}$ ml.
Exp. VI. 6	1,000	50	11,900	— 1 ml.	1,300	10,500	27,100	+ $\frac{1}{10}$ ml.
Exp. VII. 1	10	55	530	+ 1 ml.	16,450	1,100	60,850	+ $\frac{1}{100}$ ml.
Exp. VII. 6	200	<100	4,750	+ $\frac{1}{10}$ ml.	55,000	280,000	1,708,000	+ $\frac{1}{100}$ ml.

TABLE II.

LOGARITHMS OF COUNTS ON MILK AGAR AT 37°C.

+ Indicates counts in favour of G-can.

Experiment.	One hour after milking.		After six hours at 70° (approx.).	
	G-can.	Covered can.	G-can.	Covered can.
TOTAL COUNTS.				
Exp. I.	2·4150	2·1761	2·4624	2·4472
Exp. II.	1·6021	1·3010	2·5051	3·6112
Exp. IV.	3·1351	2·7672	4·4393	3·9004
Exp. V.	3·2867	3·4440	3·3979	4·4158
Exp. VI.	3·1790	4·2601	4·0755	4·4330
Exp. VII.	2·7243	4·7843	3·6767	6·2324
	Mean difference = + 0·39842		Mean difference = + 0·74718	
	Standard error ± 0·39866		Standard error ± 0·44196	
CASEIN-DIGESTING TYPES.				
Exp. I.	1·3010	1·3010	1·000	1·1761
Exp. II.	1·000	0·6990	1·3979	3·5723
Exp. IV.	2·9058	2·4698	4·1139	2·6532
Exp. V.	2·8865	2·9978	2·9294	3·9518
Exp. VI.	1·3010	3·2430	3·000	3·1139
Exp. VII.	1·000	4·2161	2·3010	4·7404
	Mean difference = + 0·75540		Mean difference = + 0·74425	
	Standard error ± 0·60510		Standard error ± 0·5938	
ACID-FORMING TYPES.				
Exp. I.	1·8129	1·3979	1·8451	1·4771
Exp. II.	0·6990	1·3010	0·6990	2·1139
Exp. IV.	3·1222	2·4624	4·1538	3·1139
Exp. V.	2·6128	2·7993	3·2553	4·2330
Exp. VI.	2·5185	3·6675	1·6990	4·0212
Exp. VII.	1·7404	3·0414	1·6990	5·4472
	Mean difference = + 0·3606		Mean difference = + 1·17585	
	Standard error ± 0·3285		Standard error ± 0·7146	

Results.

Average counts, together with coliform content are given in table I. A statistical analysis of these results, set out in table II., reveals a distinct tendency in favour of the G-can, although insufficient tests were made for this to be mathematically significant.

In one case only did the counts in the G-can milk, both at one and six hours, exceed those in the control can milk (exp. IV.). This may have been due to external contamination, although none was observed, no coliforms were found, and the usual precautions were taken on every occasion to minimise outside influences.

TABLE III.

FLAVOUR AND AROMA OF MILK.

Experiment.	G-can.	Control can.	Atmospheric temp. °F	Date.
Exp. I. ..	Very tallowy ..	Good	72–76	26/10/38
Exp. II. ..	Sweet; trace of talloviness	Almost sour, unclean aroma (not tasted)	71–73	28/10/38
Exp. III. ..	Sweetish flavour, sl. talloviness	Sickly odour, almost sour (not tasted)	68–71	3/11/38
Exp. IV.* ..	Cowy odour; flavour after aeration, sweet but not good	Trace of feed; flavour quite good after aeration	74–76	10/11/38
Exp. V. ..	Slightly stale flavour	Souring with cowy odour (not tasted)	76	16/11/38
Exp. VI. ..	Sweetish stale flavour	Almost sour (not tasted)	75	22/11/38
Exp. VII. ..	Sweetish stale flavour	Sweet but had off-flavour due to trace of feed and lack of aeration	76	24/11/38

* Strainer holder retinned and Monel metal gauzes fitted.

TABLE IV.

COMPARATIVE TITRATABLE ACIDITIES.

Experiment.	Age of milk in hours.	% Titratable acidity calculated as lactic acid.		Milk temp. °F.
		G-can.	Control can.	
Exp. VI.	6	0·32	0·15	75
Exp. VI.	23	0·31	0·16	..
Exp. VI.	23 (after aeration)	0·24	..	..
Exp. VII.	1	0·22	0·17	76
Exp. VII.	6	0·25	0·17	..
Exp. VII.	23	0·31	0·185	..
Exp. VII.	23 (after aeration)	0·24	..	..

Flavour and Aroma.—The milk was inspected, smelt, and tasted at about twenty-four hours old, to ascertain whether its suitability for use had been affected by any factor in the process of production.

The marked tallowy flavour found in milk from the G-can in the first three tests was thought to be due to the absorption of metal from the straining gauzes fitted in this can which were made of untinned brass, and the strainer holder which showed some rusting. Accordingly these were replaced, before experiment IV., with a set of Monel metal gauzes, and the strainer holder was retinned. This resulted in a complete disappearance of the tallowiness, enabling the true milk flavour to be judged.

In all cases the G-can milk showed a better keeping quality under the test conditions than milk taken in the control can.

The flavour best described as "sweetish and stale" was, however, persistently present in milk from the patent can, and, although it to some extent disappeared after aerating, which was done by pouring the milk twelve or more times from one vessel to another, it was

sufficiently obvious to spoil the palatability of the milk. At first it was thought that this off-flavour might be due to metallic contamination from the can, or parts of the can, but this was not possible after the replacement of the gauzes and retinning had been carried out, and the conclusion is that it was due to the presence of dissolved carbonic acid, which was partially given off during aeration, thus reducing the taint.

This theory is borne out by the relative titratable acidities, using phenolphthalein as indicator, of the milk in each can, and in the G-can milk before and after aeration, which are given in table IV.

According to the work of McDowall and McDowell (3), the titratable acidity at twenty-three hours of 0·31 per cent. calculated as lactic acid, represents about 55 volumes of CO_2 per cent. in solution. After aeration this was reduced to 0·24 per cent., representing 37 volumes of CO_2, a difference of 18 volumes per cent.

Discussion and Comments.

An insufficient number of tests was made to produce absolutely conclusive results, but the colony counts indicated that, judged on numbers of bacteria alone, the patent method using an atmosphere of carbon dioxide was an improvement on the same method with an atmosphere of air. With one exception the carbon dioxide had a depressing effect on total numbers of bacteria, and on the acid-forming as well as on the casein-digesting types in the milk after several hours at temperatures between 68°-76° F.

This effect was more noticeable when Coliform bacteria were found in the milk at one hour after drawing than when this first test was negative. A certain inhibitory effect, lasting for some hours, on the growth and multiplication of coliforms in milk appears to be a useful aspect of the CO_2 atmosphere. A larger number of tests would show whether the consistent absence of coliforms in 1 ml. of milk taken in the G-can (with the exception of Experiment VII.), while they were present in $\frac{1}{10}$ ml. or less of milk from the control can at six hours, was accidental (see table I).

The ratio of casein-digesters to acid-formers varied considerably, no consistent relationship being found in the G-can milk, and the acid-formers being in several cases in the minority. This is contrary to the claim of the patentees that the acid-forming types are encouraged, whilst the proteolytic types are depressed by the atmosphere of CO_2, although this might be so at a later stage.

The milk flavour, owing to precautions being taken to open the cans as little as possible on each occasion of sampling, in order not to disturb atmospheric conditions within the cans, was tasted only after twenty to twenty-four hours—much longer than the milk would normally be kept between the farm and the depot. With thorough cooling and aeration the foreign flavour, due to dissolved carbon dioxide, might be partially removed, but under test conditions, where aeration was carried out by pouring at least twelve times from one vessel to another, it was not found possible to obtain a really palatable milk. This is a grave disadvantage.

With regard to the construction of the can, it may be mentioned that the flat hinged lid is not very practical for handling, and is not

readily sterilised since it cannot be placed over a steam jet. The strainer gauzes would be more satisfactory if made of some metal harmless to milk (stainless steel or a nickel alloy), and more robustly constructed and finished. Further experiments, to find the comparative bacteria counts in milk drawn into the G-can with milk drawn under ordinary farm conditions, strained, and cooled, and to find the changes in bacterial flora when the milk containing CO_2 is stored at different temperatures, were planned, but it was not found possible to carry them out. In view of the unsatisfactory flavour of the milk in the preliminary experiment, further work was considered unimportant from the practical view point.

Conclusions.

(1) Milking direct into an atmosphere of carbon dioxide did not, within six hours, depress the proteolytic bacteria or encourage the preponderance of acid-forming types, when stored at approximately 70°F.

(2) It did, with one exception, produce a milk with lower bacterial count after six hours at 70° F., when compared with that milked direct into an atmosphere of air.

(3) An inhibitory effect on coliform types in milk may be a result of the atmosphere of carbon dioxide.

(4) The construction of the can makes it difficult to sterilise under practical working conditions.

(5) The milk even after aeration had a taint, which made it unpalatable.

(6) The general use of the can on farms in Queensland supplying milk to depots would be likely to result in an improved hygienic quality, but this advantage would be offset by deterioration in the milk flavour.

These findings are in agreement with those of S. Orla-Jensen (4), who found that such a large quantity of carbon dioxide was needed for effective prevention of bacterial growth that a disagreeable flavour resulted, and concluded that the favourable results obtained with the device of Jens Grand were probably due to extra care in sterilisation and handling of the apparatus.

Acknowledgments.

It is desired to acknowledge gratefully assistance in the carrying out of the experimental work from Peters Arctic Delicacy Co. for the cleaning and steaming of the cans and the provision of transport facilities; Chris. Gills, of Eagle Farm, for co-operation in obtaining milk samples, and for the milk supplied; Queensland Butter Board for the provision of storage and laboratory accommodation. Thanks are also due to Miss B. Shield for assistance in planning the experiments and for the statistical work on the bacteria counts.

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Some Agricultural Problems of the Lower Burdekin District.*

H. W. KERR.

THE average production of cane and sugar per acre for the Pioneer, Kalamia, and Inkerman mills during the past five seasons has been:—

Season.	Cane per Acre.	Sugar per Acre.
	Tons.	Tons.
1934	32·3	5·04
1935	22·0	3·48
1936	30·4	4·74
1937	31·5	4·95
1938	28·2 (Est.)	4·37 (Est.)

Though it must be admitted that the district owes its pre-eminence, in a large measure, to the bounteous endowment of nature in providing both a rich soil and an abundance of readily available irrigation water, the possibilities which this combination promises could not be realised were it not for the ingenuity and skill of the farmers of the area in overcoming the inevitable local problems of crop production. In these three mill areas it is virtually impossible to produce crops without recourse to irrigation, and this phase of sugar agriculture has been admirably developed on the Delta lands.

It is my purpose, at this time, to enumerate and discuss briefly certain of the major agricultural problems of the district, and to indicate where possible the lines along which their solution may be found.

Soils of the Burdekin Delta.

The cane soils of the area are alluvial in character, and are generally richly supplied with all the essential plant food materials excepting nitrogen. In texture they vary from sandy loams to heavy clays, though the majority might be classed as loams. As is frequently the case in areas where the river course has so frequently changed, the deposition of sediments has been effected in a very haphazard manner: hence we find sandy loams with clayey or sandy subsoils; clay with sandy or clay loam subsoils; and so on for all possible alternations of strata. This irregularity adds substantially to the problem of irrigation practice, in so far as it influences the rate of water absorption by the soil, and the freedom of sub-drainage in areas where the available water supply is somewhat rich in salt.

Although a mechanical analysis of a selection of these soils would show that they contain a predominance of silt and sand particles, and a relatively small proportion of clay, the last-named is generally in a highly dispersed and sticky state, and its properties bring with them special cultivation problems. Following irrigation, considerable difficulty is experienced in restoring the soil to a state of good tilth, and if cultivation be delayed unduly, the soil breaks up into intractable clods. The

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farmers of the area are at present devoting considerable attention towards the amelioration of this soil condition; one line of approach which has given very encouraging results is the application of moderate dressings of molasses, either to ratoon crops or to fallow land. In fact the apparently permanent benefits from the treatment are so widely appreciated that the demand for reasonably-priced molasses now exceeds the supply.

These experiences suggest that any practice designed to increase the organic matter content of the soil might effect similar results. Trash conservation is therefore urged, though the slow rate at which this material decomposes during the normal summer months, due to moisture deficiencies, is an objection. The rotting process could be accelerated by the aid of green manure crops. But the difficulty associated with the production of a heavy bean or pea crop, without recourse to irrigation, is a factor which prevents the more extensive exploitation of this excellent practice; but growers might discover that even this added effort and cost might well be repaid in the benefits obtained.

Though the Delta soils are normally not in need of liming to neutralise excessive acidity, the proximity of a fair quality earthy lime at a reasonable price has suggested the possibility of this material as an aid in soil improvement. The limited amount of available evidence indicates that this plan is worthy of more extensive trial. The benefits of liming in its influence on the physical condition of the soil have been recognised by farmers since early times; but whether any particular soil will be improved by such an application is best determined by actual trial. Dressings of gypsum might produce results, even where agricultural lime is not successful, but the cost of this material may be a drawback; but similar effects would follow the broadcasting of lime and flowers of sulphur at the one time. A field trial embodying lime, sulphur, and gypsum is at present being conducted by the Bureau on an area of land on the Home Hill side of the river. This block had been seriously affected in productivity by prolonged irrigation with water containing more than a safe limit of salt.

Quality of Irrigation Water.

A very extensive study of the irrigation waters of the area has been made by the Bureau during the past eight years. A review of the analyses was prepared recently by Cassidy [1]. He distinguished two major groups—(*a*) those containing little mineral matter, but with a definite amount of free alkali, and (*b*) more saline waters containing no free alkali. The waters of group (*a*) bear a close resemblance in composition to the flood waters of the Burdekin River, while those of the second group resemble "diluted" sea water; in close proximity to the ocean or tidal water, the contamination by sea water often renders the water totally unsuited for irrigation purposes.

The limit of salt concentration which might be considered safe for the purpose cannot be stated with exactitude. Firstly, no extensive studies with harmful waters have been possible, as farmers naturally refrain from the use of waters which are excessively salt; and, secondly, the concentration of salt which would cause trouble varies with the soil type. With free soil subdrainage and rather liberal applications of the water, a salt content in excess of 100 grains per gallon may be quite safely handled; whereas on a heavy soil type salt accumulation

may be serious with waters containing substantially less than this amount.

Fortunately, the canegrower is usually able to obtain access to a drift which yields good quality water, and perhaps the greatest value of the survey and "vigilance" tests conducted by the Bureau lies in the guidance they have provided to farmers seeking better water supplies.

Any soil treatment leading to an improvement in the physical conditions of the land would automatically lessen the dangers of salt accumulation, while the use of sulphate of ammonia in reasonable amounts as the source of nitrogen for the crop, will normally serve to neutralise the usual concentration of free alkali encountered. In certain extreme cases, however, more drastic corrective treatment may be necessary; moderate applications of sulphur could be expected to prove effective under these conditions.

Irrigation Methods.

The standard method of supplying water to date has been the furrow or semi-flood system. Where water is obtained at a reasonable cost, wastage of water has sometimes been accepted as a fair exchange for saving in costs of labour for water application. Furrow irrigation inevitably introduces the complication that the margin of the field at which the water enters must be excessively flooded, if the distant end of the furrows is to receive its adequate supply. Moreover, the poor grades which are the rule in the Burdekin Delta make it essential to "drive" a large volume of water through the field, and this tends to excessive flooding.

Not only might exception be taken to the wastage of water, but the influence of the mechanical action of running water on the soil structure, combined with the aggravated effects of impurities which it contains, are definitely deleterious to the maintenance of a favourable physical condition of the soil. Increasing the frequency of supply ditches, with the consequent shortening of water furrows should lead to an improvement in this regard: moreover any increase in labour costs would be offset at least in part by a saving in pumping costs, while water supplies would be conserved.

The Bureau has attempted to direct attention to the possibilities of spray irrigation, as offering scope for the elimination of many of the irrigation farmer's troubles, while effecting savings in water and cultivation costs. Recent trends favour the use of rather heavy gauge portable fluming, combined with an efficient sprinkler operating on low or medium pressures. Doubtless our delegate to the Louisiana Conference (Mr. N. J. King) can provide interesting overseas information along these lines, while it is worthy of note that a few of our own canegrowers who have experimented with spray systems during the past year have expressed themselves as satisfied with the prospects they offer.

Soil Plantfood Requirements.

I have already stated that the major soil plantfood deficiency of the area is in respect of nitrogen: this is a direct consequence of the natural organic matter (humus) deficiency of the soils generally. The Bureau has conducted extensive trials to determine the most profitable applications of sulphate of ammonia for the Delta soils. Though top dressings applying 3 cwt. per acre are normally adequate for plant

cane, evidence is available which suggests that on some of the older lands, this amount might be increased with advantage. For ratoons, the optimum application is usually over 4 cwt. per acre, with more liberal dressings for soils which have been cultivated intensively for many years. One of the several virtues attributable to an application of molasses is the nitrogen supply which it adds to the soil; and after a reasonable dressing (6—8 tons per acre), the amount of sulphate of ammonia necessary may not exceed 2 cwt per acre. The advice regarding green manuring is further supported by this natural nitrogen deficiency, and where a heavy leguminous crop has been turned under prior to planting the cane crop, the sulphate of ammonia top dressings could be reduced, if not withheld entirely.

Farmers of the area are advised always to employ a moderate drill application of a planting mixture in order to preserve the natural supply of phosphate and potash in the land, and to guard against any possible deficiency from this cause: the applications need not, in general, exceed 2—3 cwt. per acre.

Certain growers who have been able to effect substantial crop yield increases due to the employment of more suitable manures, are frequently faced with a disconcerting drop in the C.C.S. of the crop. This may be due in part to over-treatment with nitrogen, and reduced applications of sulphate of ammonia might be tried to advantage. Forced early growth, combined with a tapering off of water application as the autumn approaches, should also prove helpful, while the consistent use of planting mixtures with a reasonable potash content will tend to accelerate maturity.

Ratooning Problems.

It is not many years since the practice of ratooning was virtually dropped from the programme of farmers on the older lands of the district. It is pleasing to note that the combined studies of the farmers and the Bureau have led to the discovery of at least some of the reasons why ratoon crops previously failed. The problem involved in getting an early application of water to the stubble, so that an adequate dressing of sulphate of ammonia could be made available for use by the young crop, is one of the most important reasons for many past failures. Doubtless the system will always involve difficulties so long as hilling-up is practised, and farmers consider this essential with the present irrigation methods. Ridging in this manner gives trouble in getting water to the stubble, while it also tends to "bring the stools to the surface."

Obviously the level cultivation methods which could be restored with spray irrigation stresses a further point in favour of this system. The adoption of methods for permanently improving the physical conditions of the land could also be expected to provide more favourable conditions for better and continued ratoon cropping. Trash conservation, by rolling into alternate interspaces, might enable this material to be saved, and also lead to economy in water consumption by ratoons: we have employed this method successfully in the Bundaberg area.

Cane Varieties, Pests and Disease Control.

While it may rightly be claimed that the district would benefit from an infusion of new cane varieties, with special properties, it must be admitted that the present standard varieties are well suited to the district. Canes of the P.O.J. type, with growth and ratooning vigour,

would be assets to the districts; but it has been found necessary to exclude the best of these due to their high susceptibility to downy mildew disease. In an attempt to eliminate this disease, variety B.208 was disapproved a few years ago. Had the growers of the area co-operated to a man in the removal of this variety from cultivation, and adhered rigidly to approved canes only, it would have been possible to re-introduce B.208 and probably certain P.O.J. varieties also during 1939. Unfortunately, diseased areas of B. 208 still exist in the district, while plantings of S.J. 16 (in ignorance, it is admitted) have also served to perpetuate the disease in the area. Those who appreciate the worth of B. 208 realise only too well what this means to them.

At the present time, a suitable early maturing cane is necessary to replace Clark's Seedling, which gives usually only a medium tonnage yield, and is often badly affected with sour rots. The Bureau-bred Q. 20 (a seedling of Badila) shows promise in this respect, and a plot of the variety was established in the district last year. At Mackay it has shown phenomenal C.C.S. values, and it possesses reasonably good ratooning qualities. Yield plots will be set out this year, and if it retains its promise, the cane will be distributed in 1940.

Small plots of other promising canes are also in the area, while the better seedlings raised in other centres will be brought to the Burdekin district for trial as soon as possible. This area is particularly fortunate in that it has escaped the major cane diseases of Queensland, and it is worth while holding up the introduction of new canes for a year or two, if in so doing we can then be certain that all risks of disease introduction are avoided.

The major pest of the district is the greyback grub, which assumes serious proportions from time to time in certain localities. There would appear little danger of this ever becoming a district-wide pest, as conditions generally do not favour its existence. But for those farmers who suffer losses every year from the pest, we feel that the recently adopted policy of subsidised fumigation provides the best means of keeping the pest in check, while saving the infested crop. Giant toads have been liberated also, but it will be some time before their true value in pest control can be gauged.

REFERENCE.

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The Introduction of Sugar-cane Varieties from Overseas Countries.*

ARTHUR F. BELL.

THERE are no varieties of sugar-cane native to Australia, and our sugar industry has been built up entirely on imported canes. From first to last something of the order of one thousand varieties have been imported into Australia, although this figure certainly includes many duplications. The bulk of these have comprised inferior "chewing-cane" varieties collected by various expeditions to New Guinea and which were soon discarded.

Since Australia had no native sugar-canes, it had, of course, no native diseases which are purely sugar-cane diseases. This is a fact which is well always to bear in mind, viz., that our imposing array of serious sugar-cane diseases has also been imported from abroad. These diseases were *all* introduced into the country per medium of cuttings taken from diseased plants, although doubtless these plants appeared disease-free to the untrained eye of the exporter; one cannot imagine that diseased cane was either deliberately or knowingly introduced in any one case.

The early importation of varieties was a happy-go-lucky affair; one wrote to a friend or relative somewhere abroad and a parcel of cane returned without let or hinderance by the next mail. Gradually, however, it became obvious to authorities that this was a very dangerous practice inasmuch as cane diseases were being spread by this means from country to country. The result was that in several countries the importation of foreign varieties was prohibited unless the imported varieties were subjected for a period to rigid quarantine conditions. Such countries, Hawaii for example, have their reward in a comparative freedom from major diseases which they have maintained to this day.

Unfortunately, Australia was very slow to move in this respect and we have the inevitable heritage in the greatest, and thus the worst collection of sugar-cane diseases ever assembled on this earth. Nevertheless, all is not entirely lost and the stable gate may yet be shut wtih advantage. The parasites which cause plant diseases frequently exist in several strains, and these strains do not attack all varieties of the one plant alike. Therefore, although we may have a particular disease present in this country it does not follow that we have all possible strains of that disease.

Most of you will have some recollection of the parlous conditions to which mosaic disease reduced the sugar industry in Louisiana some twelve to fifteen years ago when production dropped from 250,000 tons of sugar to 50,000 tons. Now in Louisiana there are at least six different strains of mosaic; a variety which is immune to one strain may be very susceptible to another, or it may even be resistant to five strains, but

* Address given to Conferences of Sugar Organisations, Brisbane, March, 1939.

very susceptible to the sixth, and so the problem of getting varieties resistant to the whole six strains is made very difficult.

We do not have these six strains of mosaic disease in Queensland, and hence it follows that it would be very unwise to import any cane varieties from Louisiana and plant them direct into the field, without first growing them in quarantine to ensure that they are free from any foreign strains of this disease.

In short, although we have mosaic disease in this country we have not all the available brands. And so it goes for other diseases. I hope, therefore, that I may have convinced you of the necessity for continuing to maintain strict control over variety importation and the absolute necessity for adequate quarantine facilities for the treatment of foreign varieties when they are imported.

Quite a number of canegrowers appear to harbour the belief that the present administration of the Bureau is inimical to the importation of varieties. It is now some ten years since the Bureau was reorganised, and therefore it is of interest to compare the importations made during this period with those made during the previous decade; when this is done we find that during the period 1928-1938 one hundred and five varieties were introduced directly into Queensland from overseas, as compared with forty-five for the 1918-1928 decade. In addition, during 1928-1938 some dozens of seedlings, raised by the C.S.R. Company in New South Wales, have been brought across the border, as well as a considerable number of foreign varieties introduced by that company and which were not duplicated by our own overseas importations. Furthermore in 1929, we had placed at our disposal a duplicate set of over one hundred varieties collected by an American Sugar Cane Expedition which visited New Guinea by aeroplane in 1928-9.

It will have become obvious that 1928-1938, so far from witnessing a slowing down in variety importation, has actually been a period of increased activity. It is true, of course, that these later importations have been done more unobtrusively. In days gone by varieties were brought into the country, rapidly propagated in a convenient cane district, and then distributed far and wide without further ado; nowadays, after passing through the required period of growth in quarantine, they are put in disease-resistance trials and the majority fall at this hurdle (as, indeed, we might expect they would since they were not bred and selected for resistance to our diseases). Of these varieties, of course, you hear nothing; but you are also saved the expense of finding they are disease susceptible *after* you have planted a big acreage.

The choice of the actual varieties which are to be imported from any one country presents a difficult problem. In making the selection one must, of course, be guided by the parentage of the variety and its possible or known resistance to any diseases present in Australia; we must also consider fibre content, sugar content, time of maturity, habit of growth, and its performance under conditions which might be similar to those obtaining in one part or other of the Queensland cane belt. In making any such selection a personal visit to the country in question is of very great assistance, of course, and periodic visits by Bureau

officers should perhaps be considered a necessity from this standpoint. Furthermore, in the absence of personal visits we must rely upon published reports and these, of course, are always delayed.

In recent months, several Queensland technologists have visited Hawaii and two agricultural men have suggested a few seedling canes which they consider it desirable to import into Queensland. Actually the leading one of these varieties was imported into Queensland some twelve months ago and will go to disease trials next Spring; the others have been requested from the H.S.P.A. Incidentally, some extravagant claims seem to have been made for some of these varieties by persons who have not seen them. We have heard from several quarters that there are available in Hawaii some six or eight varieties which are greatly outyielding P.O.J. 2878, and it is at times inferred that the development of the sugar industry in Southern Queensland is being retarded by the fact that these canes have not been introduced here—as a result presumably of indifference on the part of the Bureau. Such ideas are not only wrong, they are silly. All that can be claimed for such varieties at present is that their performance in Hawaii justifies their importation and trial here. How they would perform under the different conditions prevailing in Queensland, and particularly in the presence of a different disease complex, is an entirely unknown quantity. On the irrigated plantations of Hawaii H. 109 is a long way ahead of P.O.J. 2878, but we know from past experience that that proves *just exactly nothing* regarding its performance in Southern Queensland, where it was rejected many years ago. In fact this variety has never been worth a second look anywhere in Queensland. S.J. 4 is a much better cane than P.O.J. 2878 in the North, but we all know that S.J. 4 was a dismal failure in the South. And so we might go on *ad infinitum*. It is rarely that a successful imported cane was of much consequence in the country of its origin.

No one in Mauritius appears to have heard of 1900 Seedling, and D. 1135 and B. 208 were never grown to an appreciable extent in Demerara and the West Indies. Badila, our Queensland wonder cane, is pretty well useless anywhere else; P.O.J. 2725; the standard cane of Formosa, was never grown commercially in Java. Indeed the only seedling which I can call to mind as being prominent in its own country and abroad is P.O.J. 2878, and it is of interest to observe that P.O.J. 2878 remained the leading variety of Java for only about five years.

And after all is not this failure to duplicate yields exactly what we should expect? A leading variety in any one country is a leading variety simply because it dovetails into the conditions peculiar to that country. If it is taken elsewhere the balance is upset and mediocre yields result.

In regard to the future, it would appear inevitable that we must rely much more upon locally-raised seedlings than has been the case in the past. Two factors make it likely that the importation of suitable varieties from overseas will be much more difficult than it has been. In the first place, the long period of economic depression has brought about the suspension of activities of a number of cane-breeding stations and the restriction of activity in others. In the second place, the modern surge of "Economic Nationalism" has not passed the sugar world by and we find an increasing number of countries either prohibiting variety exportation entirely or else greatly restricting it. If country

"A" finds its export market to country "B" greatly restricted by increased production in "B" brought about by the growth of a seedling bred in "A," it is natural that the contributors to experiment station funds in country "A" should not be keen in further exportation of varieties. Moreover, certain countries have never gone to the expense of establishing extensive cane-breeding facilities, but have relied upon the productions of their neighbours. And, naturally, this has not tended to develop the best possible international feeling.

Therefore, while we will endeavour to obtain as wide a selection of varieties as possible, on a reciprocal basis, it cannot be expected that the range will be as extensive as heretofore.

THE ELIMINATION OF GUMMING SUSCEPTIBLE CANE VARIETIES IN THE BUNDABERG DISTRICT.

In the lists of varieties approved for planting in Queensland during 1939 it will have been noted that a number of old varieties, notably D. 1135 and 1900 Seedling, have been omitted from the lists of all Bundaberg mills. It is thought that the farmers concerned would welcome an explanation of the reasons for this step.

As is well known, the diseases downy mildew and Fiji, but particularly downy mildew, are causing a great deal of concern in the Bundaberg district. The two leading canes, P.O.J. 2878 and P.O.J. 213, are both highly susceptible to downy mildew, while P.O.J. 2878, 2725 (and all other high-numbered P.O.J. canes) are highly susceptible to Fiji disease.

The situation, then, boils down to this. It is possible that the spread of downy mildew and Fiji disease may force us to discontinue the cultivation of the present standards, and we will then be faced with the very serious problem of what varieties to substitute.

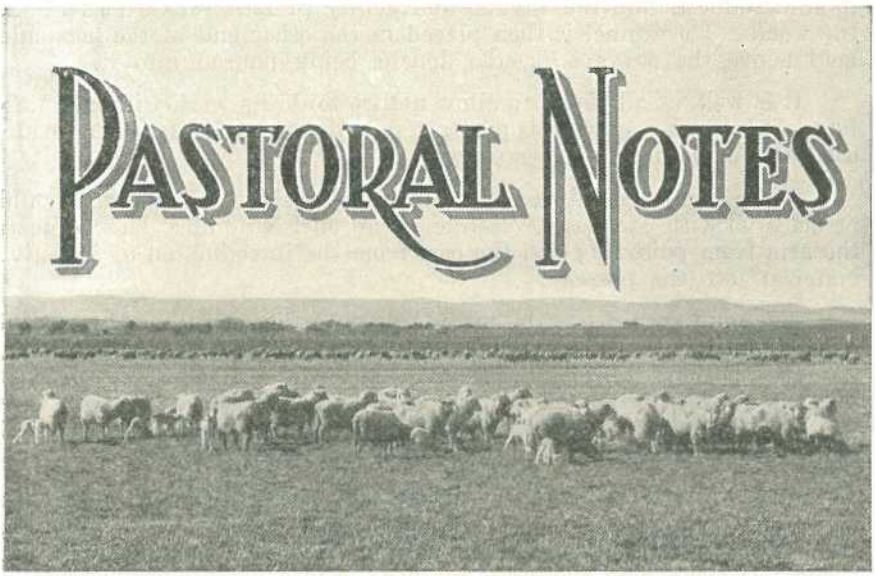
At the present time, of course, we cannot consider the release of any varieties which are at all susceptible to gumming disease, as their survival would be very short-lived. If, however, we can eliminate from culture *all* stools of the old gumming-susceptible varieties we could then start off with a clean sheet and the standard of resistance required in respect of gumming disease could then be greatly reduced and varieties which would otherwise be discarded could then be retained.

The policy then is to make a serious effort to clear out gumming disease from the southern areas, and at present the only susceptible variety left on the Bundaberg lists is Mahona for restricted plantings in frosty areas.

If, then, we later have to beat a retreat in the face of downy mildew and Fiji diseases, it will be of great assistance if we can be assured that gumming disease has been eradicated from the district, and we need not further seriously consider this factor when choosing alternative varieties.

It is, of course, greatly to be hoped that it will not be necessary to abandon the P.O.J. canes. It would not be necessary if all farmers took reasonable care both in the selection of their plants and in the inspection of their crops.

—A.F.B., in "The Cane Growers' Quarterly Bulletin."



Difficult Parturition.

W. DIXON, District Inspector of Stock.

WHEN calving becomes imminent, the cow leaves the herd and seeks a quiet spot. There she will become restless—getting up and lying down—and show evident signs of pain.

As labour advances the back is arched, the hindquarters are drooped, and straining becomes violent and continuous. Meanwhile blood may appear on the vulva and tail, and the waterbags protrude between the lips of the vulva. They increase rapidly and the feet of the calf may be seen within them.

The waterbags furnish a soft uniform pressure for the preliminary distention of the womb and passages, and prepare the way for the delivery of the calf. In normal presentations, it is wrong to break these bags prematurely.

When the cow calves standing up, the navel string breaks when the calf falls to the ground; but, when she calves lying down, the string is broken when she rises. A few hours after calving normally, after-pains commence and the placenta or afterbirth is expelled. If this is not expelled within twenty-four hours, it should be removed by careful traction. A good method is to take two sticks about two feet long, between which the end of the afterbirth is grasped, and rotated around them until close to the vulva, when gentle traction is applied, from side to side, and backwards and downwards, care being taken not to break it. A vaginal douche of boiled water at blood heat, to which has been added a mild antiseptic, should be given. A cheap and efficient outfit for this purpose consists of about 4 feet of ½-inch rubber hose and an ordinary funnel. The end of the hose should have its edge pared off

with a sharp knife, and, after having been smeared with carbolic vaseline, it is introduced into the vagina, and gently pressed forward as far as the womb. The funnel is then placed in the other end of the hose and held above the cow's back, the douche being poured into it.

It is well, at all times, to allow nature to do its work without interference; but, when calving is protracted, and progress is not being made, a careful examination is necessary.

The operator should wear a clean sleeveless shirt, and his arm should be smeared with carbolised vaseline, or an antiseptic oil. This protects the arm from poisoning and the cow from the introduction of infective material into the passage.

The hand should now be introduced into the vagina and a careful examination made. It may be found that (1) the waterbags have burst, and that neither the feet nor head of the calf are presented, or that there is a presentation of (2) one fore foot and head; (3) both fore feet, and head back; (4) head with both fore feet back; (5) one hind foot without the other; or (6) other abnormal presentation.

Whatever part is presented should first be secured by a rope with running noose, so that it will not be lost during subsequent manipulation, and may be readily brought into position when the missing parts are found. If the cow is standing, her head should be turned downhill so that the fœtus and abdominal organs lie forward to give more room to bring up the missing head or limb. If lying down, she should be turned over on to the side opposite to that on which the limb is missing. When the missing part is located, no attempt should be made to bring it up during a labour pain, but after the pain has ceased, an effort should be made to secure it before the next pain comes on.

If the pains are continuous and violent, they may be checked by putting a tight surcingle round the body in front of the udder. If it is found that the passages are dry, pure olive oil may be run into the womb through a rubber tube. If the head is back, the limbs which are presented should be first secured with a rope having a running noose, then the fœtus should be pushed as far back as possible and an attempt made to secure the head with a noose or hook, and to bring it up into the passage. Having brought the limbs and head into a suitable position, traction should now be applied in a downward and backward direction, but only when the cow is straining.

Pulling when the cow is not straining should not be attempted. Patience and care are necessary. The extraordinary practice of attaching a draught horse or motor car to the fœtus and pulling it out by sheer force is not only cruel, but usually results in the death of both the cow and the calf. After a protracted calving the cow will be exhausted, and she should be provided with a warm rug and bed, also a few bottles of warm gruel.

Points to remember are:—

Do not interfere too soon.

When interference is necessary, exercise patience and take time.

Do not use force until the fore feet and head or the hind feet are secured in position.

Remember to pull only when the cow is straining.

TRUCKING YARDS.

Some bruising of stock occurs in the trucking yards, and it is quite commonly held that this is unavoidable. Suitable design of yards and races and quieter working of stock are the answers to this fallacy.

In moving cattle from yard to yard or pen to pen, there is some congestion just before, during, and just after passing gate or race. It is obvious that at such places rails should be flush with the posts and padding used where the fence makes sharp angles. It is equally obvious that working must be very steady to avoid jamming and, consequently, bruising—more particularly with the outside beasts. To prevent undue crushing at the approach, it is best to have the fences funnel- or V-shaped. If the wings are long and the gate wide the working is not slowed up and the number that can pass through is regulated well back, so that a jam does not occur at the actual place of passage. After passing through, there should be no obstructions to prevent fanning out. For this reason, a straight fence forming a side of two yards is not desirable when a corner gate is used.

When working cattle through one yard to another, gates should be opposite each other—i.e., in a direct line with the direction in which the beasts are streaming. The wings to a crush should both converge. It is bad practice to have one wing in a direct line with one side of the crush. This is often the case when an existing fence is used for one wing. As cattle work better uphill, the loading-out race or crush should be slightly inclined upwards to the truck.

DRUG TREATMENT FOR REDWATER.

There are two kinds of redwater in Queensland. Both are caused by minute blood parasites and are carried by the tick. The differences between these two organisms are so small that they can only be recognised under the microscope. It is impossible to determine which type of redwater is present by an examination of an animal in the field. Fortunately, this is not necessary.

During the last few years intensive efforts have been made to find a suitable drug which would be effective in treatment and yet easy to apply. For many years piroblue held favour. This is effective in the treatment of one kind of redwater, but is ineffective against the other. Unfortunately, the common form in Queensland is unaffected by piroblue. Moreover, piroblue has a great disadvantage in that it requires to be used intravenously—i.e., it must be inoculated into the jugular vein.

Acaprin is now used largely in the treatment of redwater outbreaks, and is known to be effective against both forms of the disease. It is easily applied because the dose is small and it can be injected subcutaneously—under the skin. Supplies of the drug are kept on hand at the Department of Agriculture and Stock and by leading chemists. It is put up in the form of a solution and in single doses.

In areas where redwater is common, owners should keep a few doses of the drug on hand, together with a small hypodermic syringe.

Cases should, of course, be treated as early as possible, but even those which look hopeless at the start will, within an hour or two, show improvement, and so go on to recovery. A second injection can also be given without harming the animal in any way.

SHEEP DRENCHING.

Reports have been received from sheepowners at various times of ill-effects following the use of the nicotine sulphate and bluestone drench, which is advised for the removal of hair worms from sheep. This drench is perfectly safe providing the sheepowner knows when and how to use it. Where it is followed by ill-effects these are usually due to:—

1. *Careless Mixing.*—Nicotine sulphate is a highly poisonous drug, therefore the mixing of the drench should be given every care. The nicotine sulphate is measured in fluid ounces and not in ounces weight.

2. *Careless Administration.*—The majority of ill-effects which have followed the used of this drench are due to careless administration. The dose given depends not only upon the age, but also upon the condition of the sheep. The recommended doses are for sheep of various ages in fair to good condition. If the condition of the sheep is low, the dose should be reduced about one-fourth.

   If the drenching is hurried, a portion of the fluid may enter the lungs of the animal with fatal results. It requires only a very small quantity of nicotine sulphate to kill a sheep should it reach the lungs. In hurried drenching, which is most frequently the case where automatic drenching guns are used, the tissues of the mouth and throat may become cut or bruised. The nicotine sulphate is rapidly absorbed through these wounds with frequently disastrous results.

While the nicotine sulphate and bluestone drench is highly effective against stomach worm, it should not be employed where a heavy stomach worm infestation is present. Under such circumstances this drench becomes dangerous as it may be rapidly absorbed into the body.

In sheep which are suffering from stomach worms, bluestone alone should be used.

It is always wise before drenching a flock to find out which species of worm is responsible. This can be readily determined by killing and examining one of the most affected sheep.

A HORN-TIPPING TIP.

Much time and energy is often wasted in the practice of tipping the horns of cattle. Some owners of stock are slipshod in their methods of removing the points of horns. In doing the job, care should be taken to ensure that the cut does not slant. Oblique or slanting saw cuts defeat the object of the operation, for, although the tips are removed, sharp, chisel-like edges remain on the horns, leaving an animal still capable of inflicting a nasty injury to another. Even when cut squarely across, tipped horns remain capable of causing severe bruises. Horns with chisel-shaped points are a menace to all other animals within reach of their possessor, and consequently a probable cause of reduced profit to the stockowner.

—*S. C. O. Jessop.*

A CRUSH FOR CATTLE AND HORSES.

A crush for holding cattle or horses should be built on every farm. It costs little and occupies a small area; yet it saves much time and labour when full-grown stock are to be dehorned, branded, castrated, speyed, drenched, or otherwise treated. For these operations, the animal should be held in a position which allows of no movement.

The ordinary crush can be arranged to accommodate large or small animals. A series of auger holes ($\frac{1}{2}$ inch diameter) are bored about 6 inches apart along two rails of convenient height on each side of the crush. The holes should be deep enough to seat a bolt or iron pin firmly. The bolt or pin should stand 4 to 6 inches above the rail. These pins—one on each side—serve as chocks against which a cross rail may be placed. By working the animal right to the front of the crush, the pins and rails may be arranged to prevent any "backing." In a similar way the width of the crush may be adjusted to prevent lateral movement.

To secure the head of the animal, the "A" shaped bail-type of structure may be made from a double cross rail between which slide vertical poles attached to the base of the crush posts by stout hinges. With such a crush, many farm operations usually requiring four men can be done quickly and efficiently by a man and boy.

"LUMPY JAW" OF CATTLE.

Actinomycosis, "lumpy jaw" or "wooden tongue," is a common disease of cattle. There are two forms of the disease, indicated by the foregoing terms, one of which attacks the bones of the jaw and the other the tongue. Strangely enough, each form is caused by a different type of organism.

These organisms are found on the grass, and infection probably takes place through a small injury to the gums. From there they penetrate the tongue or the jawbone, as the case may be.

Advanced cases are easily recognised by the stockowner. In one form, the tongue is increased in size and may be so large as to project out of the mouth. It is very hard to the touch—hence the term wooden. When the jaw is attacked there is often considerable swelling and pus formation. The pus works its way to the exterior, and openings are produced through which the pus flows. Extension of the process leads to the formation of several openings and the jaw may, as a result of the formation of new bone tissue and inflammatory swelling, grow to an enormous size.

Bad cases, whether of the tongue or jaw form, lead to emaciation of the animal because of the difficulty in taking food. Owners are not advised to attempt treatment of bad cases. It is better to destroy the animals, as they may cause infection of other stock.

In the case of valuable animals, if the disease is not too far advanced, treatment may be possible, and owners are asked accordingly to get in touch with the Animal Health Station, Yeerongpilly.

CLASSING THE EWE FLOCK.

Many grazing properties in Queensland are now stocked well up to their carrying capacity, and, with the coming crop of lambs to be provided for, some reduction in numbers will be necessary. It is more profitable to own a flock of good ewes than a flock containing a mixture of good and bad stock. Besides being more profitable, it should give the owner far more satisfaction to have a flock as near as possible to uniformity in type and which will cut a heavy fleece of good quality wool.

On most large holdings, classing the ewe flock forms part of the station routine, and there is no reason why smaller flocks should not be classed in the same way.

Just before shearing is the most suitable time to do the classing and, usually, the flock can be classed in three groups to advantage. The tops should consist of all the large-framed deep-bodied ewes carrying a covering of even type, well grown, and showing the character and colour typical of the breed. Ewes selected for the main flock should be as free from fault as possible, but need not be so even or up to the standard of the tops. The third class will be the culls, including light cutters, ewes producing inferior wools in quality or colour and ewes rejected for defective frames, weak constitution, or objectionable folds or wrinkles. The rams to be mated with them should be classed in the same way, the best being selected for the top line. All culled ewes should be fattened, and sold as soon as possible; the same may be said of those cast for age.

—Jas. Carew.

CARE OF THE DIP.

Cattle owners in ticky country often neglect their dipping vats. Consequently, they lose money without realising it, for cattle dipped recently in a dirty vat lose their bright, clean appearance, which helps the seller when the bidding in the sale ring is brisk.

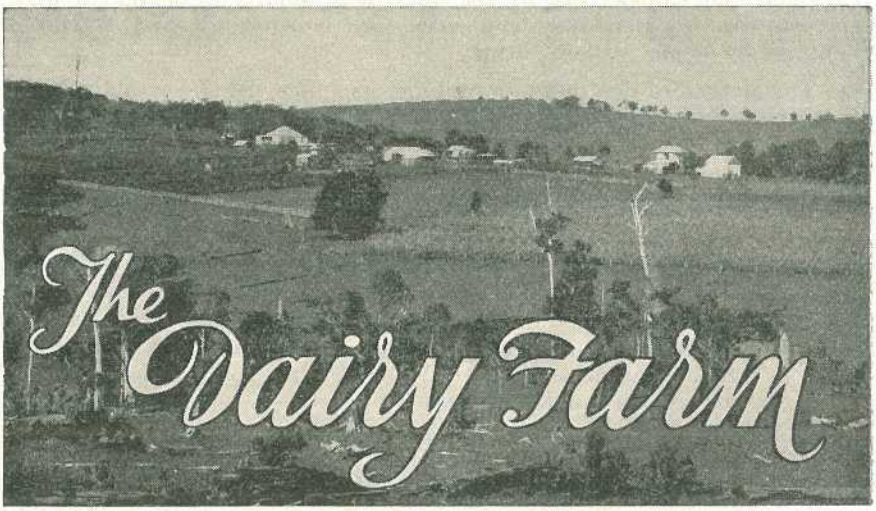
In the course of time, a dipping vat will accumulate a considerable quantity of filth which settles slowly on the bottom as a deposit of sludge. It may become so bad that an owner is forced to empty the vat, and is then put to the expense of recharging.

This can be avoided by cleaning the vat periodically. For this purpose, a kerosene tin is cut in half diagonally to make a scoop, which is attached to a handle with wire. Small holes are cut in the bottom and sides. After dipping cattle, the surface of the fluid may be skimmed with the scoop and floating hair and dirt removed. This helps to keep the vat clean for a long time.

After dipping, the sump should also be cleaned and dirt prevented from accumulating.

A white mark should be placed on the side of the vat to show the height of the fluid. It will be noticed, particularly in hot weather, that evaporation is very rapid, and the surface of the fluid will fall far below this mark. Before next dipping, water can be added until the dipping fluid is again at the correct level. It is only the water that evaporates—not the concentrates.

—Dr. John Legg.



Care of Milking Machines.

M. J. GRIFFITHS, B.Sc. (Dairying), Dairy Laboratory.

MILKING machines, although they have revolutionised dairying methods, may, if mishandled or neglected, constitute one of the biggest menaces to milk and cream quality that the dairy farmer has to face. Many people hold the opinion that clean milk of good keeping quality and choice grade cream cannot be produced with a machine, but this has been investigated fully, and both research work and practical experience have proved that it is wrong. As good a quality of milk can be produced by machine as by hand, provided the correct procedure is followed in care and cleaning.

Another objection often brought forward is that the machine tends to increase udder trouble. This is, of course, true if the farmer fails to notice cases of infection as soon as they occur and allows diseased cows to be milked by the machine. The great importance of inspecting the foremilk for any abnormal appearance should be realised, and any cow showing signs of mastitis in the first-drawn streams should be milked out by hand and the milk isolated from that used for human consumption. Cows with sore teats should also be milked by hand, although the machine may safely be used if they are left until last. A machine is very unlikely to cause teat sores—in fact, one Queensland dairy farmer with a large herd has experienced complete freedom from them over six months since he started machine milking—but it is liable to transfer the infection if used subsequently, without sterilization, on other cows.

The solution of most milking machine troubles lies in proper cleaning and sterilizing after each milking. It is essential that cleaning should be done promptly after milking is completed before the milk solids have time to dry on the rubber parts, for once dry they are far more difficult to remove completely. The first machines were crude inventions made with ordinary rubber parts which were easily cracked and pitted by the action of fat and hot water, making them excellent breeding places for contaminating bacteria. Nowadays, the modern machines are solidly

built and the rubbers are of the very best quality resistant to high temperatures, so that they can safely be boiled and even sterilized regularly by steam, without injury.

The method of dealing with milking machines, using a weak solution of caustic soda in boiling water, is well adapted to Australian conditions, and has proved economical, rapid, and successful. This method is as follows:—

(1) One gallon of clean *cold* water is drawn through each set of teat cups by suction, lifting the unit up and down in a bucket of water to allow air to mix with it.
(2) The outsides of teat cups and rubber tubing are then washed and brushed in *warm* water and caustic soda.
(3) At least 1 gallon of *boiling* caustic soda solution is drawn through each separate set of teat cups, holding them so that all receive equal treatment.
(4) The solution is removed completely by drawing at least 2 gallons of *boiling* water through each set of cups.
(5) If steam is available, this is applied for five minutes to complete the sterilization.

Strength of Solution.—One teaspoonful of caustic soda added to every 4 gallons of boiling water is the correct amount and, provided this strength is not exceeded, no damage will be done to the machine, and satisfactory results will be obtained. Used carelessly, however, caustic soda is dangerous in its action, and care is needed in handling it and in making up the solution. The water used must be really boiling to achieve proper cleansing and sterilization, and by this treatment the resistance of the rubber parts to cracking is actually increased.

The vacuum line is often a source of trouble, and should receive a complete flushing once each day with boiling water, care being taken not to flood the pump. All taps should be left open when the machine is not in use, and the teat cups should be hung up in a cool, dust-free place. The use of chemicals other than in the washing process has been found to be unsatisfactory, and there is great danger of traces of them finding their way into the milk and cream and causing taints.

BUTTER AND CHEESE COMPETITIONS.

THE Downs Co-operative Dairy Association Ltd. won singular success in the Dairy Produce Show, conducted by the Australian Institute of Dairy Factory Managers and Secretaries at the Hamilton Cold Stores on 21st June.

The show was opened by the Acting Minister for Agriculture and Stock (Mr. D. A. Gledson), who announced the principal awards as follows:—

The grand aggregate competition for butter was won by the Downs Association factory at Toowoomba with 1,040½ points, with the Maryborough Association's factory at Kingaroy second with 1,030½ points, and the Warwick Association's factory, Allora, with 1,029½ points, third.

The P. and O. Line's championship for storage butter was also won by the Downs Association's Toowoomba factory with 286 points.

The Orient Line's continuous grading competition for export butter was won by the Toowoomba factory of the Downs Association with 94·04 points. The Maryborough Association's factory at Kingaroy was second with 93·65 points, and the Gympie factory of the Wide Bay Association third with 93·43 points.

The Downs Association's factory at Goombungee also won the competition for the greatest improvement with 48 points. The Caboolture Association's Eumundi factory was second with 39 points, and the Gympie factory of the Wide Bay Association third with 28 points.

The moisture content competition was won by the South Burnett Association's factory at Proston with an average moisture content of 15·74. The Queensland Farmers' Association factory at Booval was second with an average of 15·68, and the Murgon factory of the South Burnett Association was third with an average of 15·63.

The Bestobell cup was won by Mr. R. W. Thomas, of the Downs Co-operative Association at Toowoomba. The Wyandotte trophy was won by Mr. S. Olsen of the Downs Association at Crow's Nest.

The champion cheese of the show was made by the Pittsworth Association's factory at Pittsworth, and was awarded 95½ points.

The grand aggregate competition was won by the Irongate Association at Irongate with 559 points. The Downs Association's factory at Westbrook was second with 558½ points, and the Pittsworth factory with 556½ points third.

COTTON-WOOL FILTER DISCS FOR STRAINING MILK.

Although the superiority of cotton-wool filter discs for straining milk has been stressed repeatedly, some dairy farmers continue to use muslin or cheesecloth for the purpose. The greater advantage of the filter disc, especially from the hygienic point of view, is that it is destroyed after every milking, while cloth strainers are usually used again and again. Muslin or cheesecloth, if washed and boiled twice daily and used by those who understand what is really meant by bacteriological cleanliness, may make fairly satisfactory strainers, but if not washed and boiled after every milking, cloth strainers may be a serious source of contamination—a fact only too plainly evident on visits to some dairy farms. Moreover, cloths are not as efficient as discs in removing the finer dirt from milk.

Every dairy farmer producing milk intended either for the retail trade or for cheese manufacture is strongly urged to use only cotton-wool filter discs for straining, as provided for in Regulation 39 of "*The Dairy Produce Acts, 1920 to 1938.*" Most cheese factories now keep supplies for distribution to their suppliers; they also are obtainable from any dairy supply business at a reasonable price. The direct advantage of the use of cotton-wool filter discs would amply offset the small cost involved.

—*E. B. Rice.*

STRAINING, COOLING, AND STORAGE OF MILK AND CREAM.

Temperatures on the average farm present a difficult problem in summer, but good dairy management depends largely on their regulation and control. The removal of animal heat from milk and cream as soon as possible after milking or separating, followed by storage in cool surroundings, will greatly lengthen their useful life by delaying the growth and development of bacteria. Together with straining, which serves to remove the visible dirt and so reduce the numbers of micro-organisms, control of temperature forms a method whereby the farmer can definitely increase the value of his product.

Straining.—Cow-hairs, flies, dust, and dung particles and other foreign matter carry with them enormous numbers of bacteria, and should be kept out of milk by every possible means, for no amount of straining can remove bacteria once they have become free in the milk. Should some visible dirt gain entrance, however, the straining of each cow's milk through a cotton-wool disc immediately after milking will minimise the damage caused.

Straining should be done once only, and should take place before cooling or separating. The disc type strainer prescribed by the Dairy Regulations is preferable to any other, since each disc is discarded after use; provided that the metal parts are scrubbed and sterilised, there is no risk of recontaminating the milk as with a cloth which has not received thorough washing and boiling; also, the finer mesh of the wad will trap smaller particles than will a cloth. If a large quantity of sediment is being removed, the disc should be changed during milking.

Cooling.—Some form of cooling is necessary to counteract rapid bacterial development; and the most usual medium for the purpose is water. Adequate water is necessary for cooling, and if the supply is insufficiently cold an evaporating device or the use of ice may be required to bring the temperature of the cooled milk to 60 deg. F. or lower and cream to 70 deg. F. or lower. If deep well water is available the maximum advantage in temperature can be obtained by pumping it direct to the cooler or trough when required. In the case of shallow well, surface, or tank water, some means of storing it, protected from the heat of the sun, must be devised if it is to be useful as a cooling agent.

An insulated tank, through which cold water flows, and in which cream cans may be placed, is a fairly satisfactory arrangement for reducing the temperature steadily with constant stirring, which also aerates the cream; the water is then run to a trough for watering stock.

For cooling and aerating milk, the best type of cooler is the endless corrugated type, which can be used in conjunction with a water-bag evaporator (filled after each cooling in preparation for the next), or with a fixed tank to which water is pumped and flows through the cooler by gravity, or with a refrigerating unit using brine. Such a cooler, having wide corrugations and no end plates, can be easily cleaned with a brush and has no awkward crevices. Porous cylindrical containers, large enough to hold a single can, working on the evaporation principle, are being used in some districts successfully, and have the advantage of being transportable and economical of water.

Refrigerating is a sure and certain way of improving quality, for, although it actually does not kill harmful bacteria, it renders them dormant and unable to cause deterioration of milk or cream. Many farmers are coming to the conclusion that the improvement in grade resulting from refrigerating their product on the farm makes it financially economical. Very little bacterial growth takes place below 45 deg. F., but the growth rate of the common milk types increases steadily above this, up to around 100 deg. F., and is, of course, favoured by summer conditions. During sultry weather especially extra care and precautions need to be taken with regard to cooling and cool storage of milk and cream.

Storage.—The Dairy Regulations provide for a suitable storage room (Dairy House A) for milk and cream, or for milk only a well-covered ventilated stand will suffice. A clean wet bag wrapped around a can will assist cool storage by insulation and by evaporation. Direct summer sunshine in Queensland has tremendous heating power, and the proper protection of cream left adjacent to the road awaiting the carrier is, therefore, also important. Thick timber roofing over the cream stand affords greater protection than galvanised iron, which is not permitted under the Dairy Regulations.

Careful temperature control right from the start is the key to safeguarding quality in either milk or cream production, for whatever purpose they may be required.

—*M. J. Griffiths.*

STERILIZATION OF DAIRY UTENSILS.

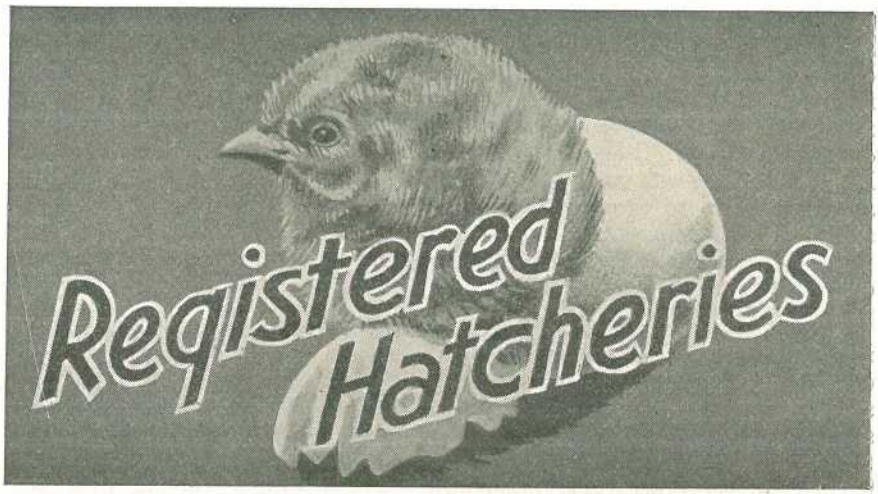
More bacteria are added to milk and cream from improperly washed and ineffectively sterilized utensils than from any other source. While the methods of washing on some farms are reasonably sound, the sterilization practised is frequently ineffective.

Steam sterilization is very satisfactory, but, unfortunately, it cannot be done on every farm.

Boiling water, however, can be made available in every dairy; and, if effectively used, will annihilate all but the most resistant micro-organisms. A common, but undesirable, practice is to obtain the boiling water from the kitchen stove. While the pouring of boiling water on utensils is to be commended in ordinary circumstances, the effectiveness of the sterilization is reduced considerably when the boiling water has to be removed from the kitchen to the dairy, with a consequent drop in temperature.

The best results are achieved by the provision of a boiler in the vicinity of the separator room or dairy house. For this purpose, a 12-gallon boiler has been stipulated under the Dairy Produce Acts. To obtain thorough sterilization, the utensils should be immersed in the boiling water for at least ten minutes.

The time and trouble taken by the farmer in the regular sterilization of his milk and cream utensils will be repaid amply in the consistently good grading and keeping quality of his product.



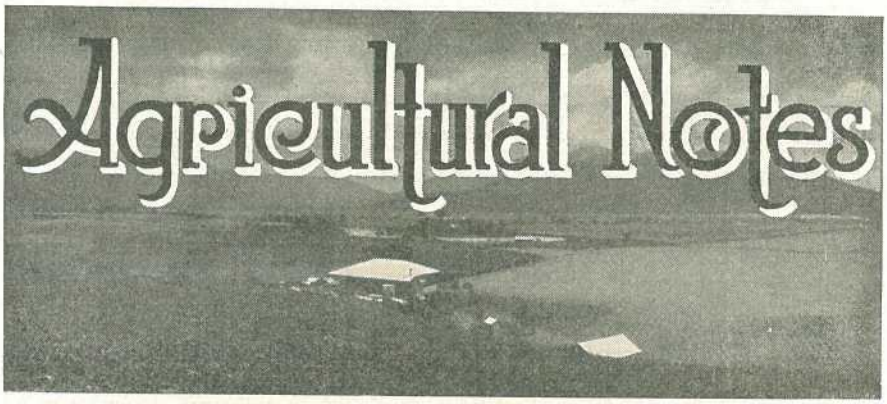
Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire ..	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains	Elmsdale ..	White Leghorns and Australorps
E. J. Blake, Rosewood ..	Sunnyville ..	White Leghorns, Australorps, White Wyandottes and Rhode Island Reds
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard ..	White Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
T. G. Crawford, Stratford ..	Rho-Isled ..	Rhode Island Reds
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
Rev. E. Eckert, Head street, Laidley	Laidley ..	Australorps, White Leghorns, and Langshans
Elks & Sudlow, Beerwah ..	Woodlands ..	Australorps and White Leghorns
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
G. Grice, Loch Lomond ..	Kiama	White Leghorns
J. W. Grice, Loch Lomond ..	Quarrington ..	White Leghorns
Mrs. M. Grillmeier, Mount View, Milman	Mountain View	Australorps, Minorcas, and Rhode Island Reds
C. & C. E. Gustafson, Tannymorel	Bellevue ..	Australorps, White Leghorns, and Rhode Island Reds
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
C. Hodges, Kuraby	Kuraby ..	Anconas and White Leghorns
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva ..	White Leghorns and Australorps
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps

Name and Address.	Name of Hatchery.	Breeds Kept.
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White Leghorns, and Langshans
J. A. Miller, Racecourse road, Charters Towers	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	Australorps, Brown Leghorns, and White Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric Hatcheries	White Leghorns
J. W. Moule, Kureen	Kureen ..	White Leghorns and Australorps
D. J. Murphy, Marmor ..	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Cooper's Plains	Norup's ..	White Leghorns and Australorps
H. W. & C. E. E. Olsen, Marmor	Squaredeal Poultry Farm	White Leghorns, Australorps, Black Leghorns, Brown Leghorns, and Anconas
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Indian Runner Ducks, and Bronze Turkeys
E. K. Pennefather, Oxley Central	..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Rhode Island Reds, and Brown Leghorns
G. R. Rawson, Mains Road, Sunnybank	Rawson's ..	Australorps
J. Richards, Atherton	Mount View Poultry Farm	White Leghorns and Australorps
H. K. Roach, Wyandra	Lum Burra ..	White Leghorns and Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. J. Teitzel, West street, Aitkenville, Townsville	Teitzel's ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
W. A. Watson, Box 365, P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's Stud Poultry Farm	Wyandottes, Indian Game, Barred Rocks, Australorps, White Leghorns, Anconas, Rhode Island Reds, Buff Orpingtons, Black Orpingtons, and Buff Leghorns.
T. Westerman, Handford road, Zillmere	Zillmere ..	Australorps and White Leghorns
P. A. Wright, Laidley ..	Chillowdeane ..	Brown Leghorns, White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns and Australorps

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 26th June, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
R. H. & W. J. Bowles, North Rockhampton	Glenmore Poultry Farm and Hatchery	White Leghorns and Australorps
W. J. B. Foxwell, Coomera ..	Foxwell's ..	White Leghorns and Australorps



The Preservation of Concrete on the Farm.

CONCRETE floors and feeding troughs on the farm often show signs of wear soon after being laid down, a fault which is often due to the action of various acids in milk and some other foods. If the farmer does nothing to prevent further wear, the concrete becomes pitted and quickly breaks up.

This deterioration of the concrete may be delayed successfully by the correct use of a special type of silicate of soda, which is cheap and easy to apply. When mixed with water the solution thus obtained is sprinkled on the surface of the concrete to be treated, is absorbed, and combines with the concrete, forming a tough coating which is impervious to water and acids under ordinary farm conditions.

One gallon of the special silicate of soda is thoroughly mixed with 4 gallons of water. The 5 gallons of solution will suffice for three applications to an area of 300 square feet of average concrete. Very dry or porous concrete will require a fourth application.

In making new concrete floors, the work should be finished off so that the surface is not very smooth, otherwise the stock will be liable to slip when it becomes wet. When the concrete is firm and nearly dry the solution of silicate of soda in water is applied by means of a spray pump, a watering can with a fine sprinkler, or a mop. Do not flood the solution on, but apply just as much as the concrete can absorb readily. A second, and later a third, application of the solution should be made as the surface dries out each time. For new concrete three coats should be sufficient.

Worn floors and troughs may be renovated in the following way:— First, the surface should be thoroughly scrubbed with soap and hot water to remove grease and dirt. Then the area is coated over with a mixture of one part cement to three parts clean, fine sand. When the concrete is firm and drying, treat with the silicate of soda solution as for new concrete.

Floors and troughs in sound condition will benefit by treatment with silicate of soda. The surface should be freed from grease as before mentioned; four applications of solution will probably be necessary, and twenty-four hours after the last application any solution remaining on the surface should be removed with a mop.

Concrete floors and troughs treated in this way last longer, are easier to clean, and dry more quickly than untreated concrete. For best results, the concrete should receive a light treatment once each year following the initial treatment.

When purchasing silicate of soda for conditioning concrete, the purpose for which it is to be used should be definitely stated to ensure obtaining the correct material.

—*T. Abell.*

COUNTING SHEEP.

It may be taken as a fact that unless one is born with or has developed an aptitude for this work he will never make a first-class sheep counter.

There are many methods of counting. The novice will try and count them singly as they come—one, two, three, four, and so on. This is a very slow process, and the gate has to be very narrow if an accurate tally is to be obtained.

Some count in twos—two, four, six, eight, and so on. This again is slow where big flocks have to be dealt with, and the sheep would be better on grass than in the break.

A successful method is to count in groups of three, one up to thirty-three, and let a single sheep go and tally 100.

It is astonishing to observe the speed and correctness of two good counters, one giving delivery and the other taking delivery.

It is a rare thing when two good men are engaged to see a check count, and this applies where thousands of sheep have to be correctly tallied. Constant practice is necessary to keep in form. To this cause may be attributed the fact that many drovers excel in counting sheep.

—*J. L. Hodge.*

DIET AND NATIONAL EFFICIENCY.

Australians are becoming nutrition-conscious and, in this respect, are merely keeping step with the peoples of other countries of the world, for every nation is seeking a solution to the pressing problem of raising nutritional standards.

Great Britain has given considerable attention to the nutrition problem, and is attempting to develop better nutrition habits among her people.

France has revolutionised her diet completely since the Great War. The consumption of bread has shrunk to less than half what it used to be, and there has been a corresponding increase in the amounts of milk, butter, cheese, fresh fruit, and vegetables eaten. With this change in diet has come an improvement in national physique and prolongation of life.

Other countries of Europe and America, also, are attacking problems of nutrition in practical ways.

A recent statement of the Queensland Nutrition Council concludes with these words of warning:—"Let us realise that the vital factor in any scheme of defence is the healthy individual. Even the largest gun is but a tool which must be manned. The wellbeing of individuals, and therefore nutrition, is paramount during peace or war!"

DODDER IN LUCERNE SEED.

Lucerne is grown from seed and is usually sown with the object of providing a stand for several years. With this in mind, only the best seed should be bought with an assurance that it is free from dodder.

Dodder is an annual parasitical plant found in the warmer parts of the world. Its seed germinates in the soil, sends up a stem and attaches itself to the host plant, which, in Queensland, is mostly lucerne. It is leafless, with twining thread-like stems, which attach themselves to the host plant by means of tubercles; from then onwards the parasite draws its nourishment from this source and severs its connection with the soil. The immediate effect is that the host plant is called on to support not only itself but also the dodder until ultimately the exhausted plant dieds, in most cases smothered in a tangled mass of light brown threads. Dodder produces seed quickly, so that it can run the full life cycle (seed to seed) before the host plant dies from starvation. Dodder seeds are borne in a globular capsule with four seeds in each. These seeds are pressed together, giving them their characteristic flattened surfaces.

Unfortunately, this parasitical growth is common in lucerne fields. Experience shows that the dodder seeds cannot be removed satisfactorily from lucerne seed with cleaning machinery, or by sieving; this statement is based on many unsuccessful attempts to make saleable dodder-infested lucerne seed.

Growers of lucerne seed, in fairness to themselves as well as to those who may buy their seed, *should never harvest seed from a dodder-infested field.*

It should be borne in mind that any seed for sowing, or any material found to be dodder-infested, is subject to immediate seizure, and the person offering infested seed for sale is liable to prosecution. A £50 fine is provided for the sale of lucerne seed containing dodder. No excuse can be accepted for the presence in seed or feed of such a destructive parasite, which can well be considered as lucerne's worst enemy.

Buyers should always insist on an assurance that the seed they are purchasing is dodder-free.

Samples of lucerne seed representing seeds purchased by farmers for their own sowing are examined free of charge, at the Seed Testing Station, Department of Agriculture and Stock, Brisbane. Samples should be of not less weight than 4 oz., and marked as follows:—

Sample of.....seed drawn from.....bags
representing a total of.....bags marked.....
Purchased from.....of.....on.....

Name and address of sender, and date.

It is better to send a sample for examination as soon as it is purchased, rather than wait until the crop has grown, and then find it contains injurious weeds.

—*F. B. Coleman.*

Preparing for and Planting Citrus Trees.

R. L. PREST, Instructor in Fruit Culture.

THE selection of the orchard site is of great importance. Citrus trees thrive in a frost-free, well-sheltered, warm situation. In districts where the prevailing winds are likely to interfere with the normal tree growth, belts of standing timber or scrub should be retained as a protection to the orchard. In inland areas, where timber is scarce, shelter-belts should be planted.

The site should be an area of unbroken, nearly level or gently sloping land. Steep hillsides should be avoided, for, in addition to the risk of irreparable losses by soil erosion, the costs of general orchard practice are high. Most places along the coast are free from damaging frosts. In the Burnett district, however, low temperatures have occurred on occasions, causing injury to young citrus trees. In such districts, hollows and low areas, where frosts are likely to be experienced, should be avoided as sites for citrus orchards.

The first essential in planting an orchard is to plough the land thoroughly and subsoil it, always, however, taking care that the subsoil is not brought to the surface. This can be done by ploughing a furrow in the usual way, followed by a subsoiler to loosen up the bottom of the furrow before the next sod is turned. Ploughing should be followed by harrowing, working down, and grading.

Citrus trees require plenty of room for growth and cultivation. The mistake of close planting has generally been a common one. In the drier areas, where the application of water can be controlled, plantings should be made at least 30 feet apart. This distance, of course, can be varied according to soil and climatic conditions, but it should never be less than 25 feet.

To ensure the young trees being placed exactly in the position occupied by their place pegs, a planting board will be found useful and is easily constructed. A board some 4 or 5 feet in length, 4 or 5 inches in width, and 1 inch thick is used, and a "V" notch is cut in the middle of one side and of each end. The centre notch is placed against the peg denoting the position of the tree, and pegs are driven in at the notches at either end of the board. The board and the tree peg are then removed, leaving the latter two pegs in place.

The hole to receive the tree is next dug, the board being again brought into use, and fixed, as before, at the ordinary soil level between the two remaining pegs. The tree is placed in the hole at the centre notch in the board, taking the position formerly occupied by the tree peg, and the soil filled in.

The planting board serves another purpose in that it ensures the planting of the tree at the proper depth—the depth at which it was grown in the nursery. The mark can usually be distinguished on the tree.

The union of the stock and scion is always a weak spot in a tree and liable to attack from fungous diseases; it should, therefore, be kept above the level of the soil. When using the planting board, the union should be kept slightly above the top of the board to ensure that the tree is not planted too deeply.

In digging the holes for the trees, the surface soil should be taken out and kept on one side. The subsoil at the bottom of the hole should be finely broken up. If the land has been properly prepared, there will be no need to dig deep holes. So long as they are large enough to space the roots without cramping, they will serve the purpose. A little top soil may be returned to form a small mound at the bottom of the hole.

The roots, which should be carefully washed and trimmed, should be spaced as evenly as possible, and with a downward and outward slope of from 40 to 45 degrees. The spaces should then be filled with fine soil and pressed firmly, water being applied and allowed to soak in before the hole is completely refilled with soil. Where there is danger of sun-scald the trees should be protected by cylinders of paper placed around the trunks.

TALL-GROWING VARIETIES OF BANANAS.

At present, the standard commercial banana is the Cavendish, a relatively low-growing form.

Although some of the tall-growing types—such as the Gros Michel, Williams' Hybrid, Vernon, and Mons Marie—have been in cultivation in small areas for a long period, the demand for suckers of these varieties has only recently become of any consequence. In certain favoured localities, they may yet become as popular as the shorter-growing Cavendish.

The fruit of some tall-growing varieties compares favourably with the Cavendish in both size and quality, while their carrying capacity is frequently superior.

Under ordinary conditions, cultural methods applicable to the Cavendish banana can be used for tall varieties. They respond to approved desuckering systems used for the Cavendish and, generally speaking, yield a greater weight of fruit per acre. The returns per acre from tall varieties are thus sometimes better than those received from the more widely-grown Cavendish.

CONTROL OF WHITE LOUSE OF CITRUS.

White louse of citrus occurs throughout the State, and although temperature does not appear to be an important factor determining its abundance, there seems to be reason for believing that it prefers dry

climatic conditions. All portions of the tree are subject to attack, but infestation generally starts on the trunk near ground level and spreads upwards. The male scales are a very conspicuous white colour, and as they are much more numerous than the female scales, a colony of this species produces a white appearance on the infested surface which has led to its being given the quite appropriate name of white louse.

It is not a difficult insect to control, but growers should remember that vigorously-growing trees are much less susceptible to attack than trees in poor health. The health of infested trees should, therefore, be attended to in order to reduce susceptibility, and whatever adverse factor is impairing their health should be eliminated so far as practicable.

Spraying with lime sulphur or resin-caustic soda-fish oil gives a very good control of white louse. Control is generally best accomplished by spraying in the late winter just before blossoming, using lime-sulphur at a strength of one to twelve. The preference for lime-sulphur is based very largely on the fact that its application is attended by other beneficial results in addition to establishing control of white louse.

When the correct time for spraying has arrived certain late-maturing varieties—e.g., the Valencia late—may still be carrying fruit. This does not really matter very much, because usually only the inside parts of the tree require spraying. However, should the harvesting of the crop have been completed, then it is desirable that the whole tree be sprayed.

Fumigation with hydrocyanic acid gas also gives a good control of the white louse, and can be employed against it when conditions render fumigation practicable.

THE REMOVAL OF SOOTY MOULD FROM CITRUS FRUITS.

Because of the very wet weather during late summer and autumn, citrus-growers in the coastal areas were not able to adhere to the normal spray programme. As a result, scale insect infestation, particularly pink wax scale, is now at a very high level, and, as usual, is accompanied by a copious growth of sooty mould. Many growers will be considerably inconvenienced by the presence of this growth on the fruit. The fungus, as most growers are aware, subsists on the sweet secretions of certain scale insects, notably pink and white wax. Except in very severe cases, it causes little direct injury to the tree, but the disfiguration of the fruit is a serious matter.

Various methods are used for the removal of sooty mould. In all of them, injury to the rind should be avoided at all costs, because it opens the way to infection with blue or green mould in the fruit. With moderate blemishes, a light brushing of the fruit will suffice. If the fruit is badly affected, brushing, sufficient to remove the mould, may seriously injure the rind. Cleaning the fruit in a rotating barrel partially filled with sawdust is a method very commonly used but has little to recommend it. Damaged rind and bruised flesh too often result from this procedure.

If washing has to be resorted to, the fruit should be immersed for about one minute in a solution containing $\frac{1}{4}$ lb. of boracic acid and $\frac{1}{4}$ lb. chloride of lime to each gallon of water. This solution has been used extensively by growers and has been found very satisfactory. After immersion in the cleansing solution, the fruit should be well washed in clean water to avoid a whitish deposit on drying, and then should be dried thoroughly before packing.

The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

FRUIT marketing conditions during June were affected by climatic diversity, and prices varied correspondingly.

The rain in April and early in May affected detrimentally the keeping qualities of most fruits, citrus fruits particularly. Some growers lost through not sweating the fruit before marketing.

Bananas were hard to quit, some lines not ripening satisfactorily. Growers are advised to leave the fruit hang as long as possible, and to retard the development of the exposed side of the bunch by covering it. This allows the back of the bunch to fill to the same quality as the exposed side, forming a full bunch of quality fruit when cut.

Many inquiries have come from growers desiring to colour tomatoes. It is again advised that leaving the fruit on the plant is the quickest method. Where this is not practicable, the fruit should be allowed to mature on the plant, and be coloured in a properly-built cabinet using ethylene gas. Acetylene gas from carbide has not proved satisfactory for tomatoes, although it has given good results with citrus fruits.

Too much green fruit still goes on to southern markets; this applies particularly to pineapples and papaws. Last month's experience has shown the necessity for marketing only quality fruit, as most lines have been sold at unpayable prices after staying on the agents' sections for lengthy periods.

For marketing conditions to show any great improvement, an extended period of bright, sunny weather is necessary. Prices should then advance to high levels.

The following were the ruling market prices during the last week of the month of June, 1939:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Small, 4s. 6d. to 7s.; sixes, 4s. to 10s.; sevens, 4s. 6d. to 13s.; eights and nines, 12s. 6d. to 15s.

Sydney.—Cavendish: Sixes, 10s. to 12s.; sevens, 12s. to 14s.; eights and nines, 14s. to 16s.

Melbourne.—Cavendish: Sixes and sevens, 8s. to 9s.; eights and nines, 8s. to 10s.

Lady's Finger: 1½d. to 9d. per dozen.

Pineapples.

Brisbane.—Smoothleaf, 4s. to 7s. per case; loose, 2s. to 5s. 6d. dozen; Ripley, 4s. to 6s. case; 1s. 6d. to 3s. 6d. dozen.

Sydney.—Smoothleaf, 7s. to 11s.

Melbourne.—Smoothleaf, 8s. to 11s.

Papaws.

Brisbane.—Yarwun, 3s. to 5s. bushel; Gunalda, 3s. to 4s.; Local, 1s. 6d. to 3s. 6d.

Sydney.—6s. to 12s.

Melbourne.—7s. to 10s.

Green fruit unsaleable.

Custard Apples.

Brisbane.—2s. to 3s. 6d. half-bushel.

Sydney.—5s. to 7s. half-bushel.

Melbourne.—6s. to 8s. half-bushel. Cool weather causing market to ease.

Monstera Deliciosa.

Brisbane.—3s. to 6s. dozen.

Avocados.

Brisbane.—6s. to 8s. per half-bushel; special higher.

Sydney.—8s. to 9s.

Granadillas.

4s. to 6s. dozen.

Passion Fruit.

Brisbane.—Firsts, 6s. to 10s.; seconds, 4s. to 5s.

Sydney.—3s. to 8s. half-bushel

Melbourne.—8s. to 10s. half-bushel

Other Tropical Fruits.

Coconuts, 3s. to 5s. dozen.

CITRUS FRUITS.

Oranges.

Brisbane.—Navels: Gayndah, 6s. to 10s.; Locals, 6s. to 8s. Commons: 4s. to 7s. bushel.

Mandarins.

Brisbane.—Emperor, 3s. to 6s. bushel; Glens, 6s. to 10s.; small, 4s. to 5s.; Scarlets, 3s. to 7s.

Grapefruit.

Brisbane.—4s. to 7s. bushel case.

Queensland consumers are not yet grapefruit-minded, due, possibly, to the many poor varieties marketed in the past.

Lemons.

Brisbane.—Locals, 3s. to 8s.; Gayndah, 6s. to 10s.; Benyenda, 10s. to 12s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 8s. to 11s. per bushel; Granny Smith, Stanthorpe, 8s. to 12s.; Sturmer, 7s. to 8s.; Cleopatra, 7s. to 11s.; French Crab, 5s. to 7s.; Scarlets, 6s. to 8s. 6d.

Pears.

Brisbane.—Josephine, 8s. to 13s.; Packham's Triumph, 6s. to 11s.; Winter Cole, 9s. to 14s.

OTHER FRUITS.

Tomatoes.

Brisbane.—Ripe, 1s. 6d. to 3s. 6d.; coloured, 2s. to 5s.; green, 1s. to 3s., and very hard to sell.

Melbourne.—8s. to 10s.

Sydney.—Cleveland, 2s. to 4s.; Bowen, 3s. to 5s.

Cape Gooseberries.

5d. to 7d. per lb.

Strawberries.

Brisbane.—6s. to 12s. dozen boxes.

Sydney.—Trays, 3s. to 5s. each; boxes, 9s. to 14s. per dozen.

MISCELLANEOUS, VEGETABLES, &c.

Cucumbers.—*Bowen:* 7s. to 10s. bushel.

Pumpkins.—*Brisbane:* 4s. to 5s. 6d. bag. *Sydney:* 6s. to 8s. bag.

Marrows.—1s. to 2s. 6d. dozen.

Lettuce.—6d. to 1s. 6d. dozen.

Cabbages.—Small, 2s. to 3s. dozen; prime, 5s. to 7s.

Cauliflowers.—Small, 2s. to 4s. dozen; large, 9s. to 12s.

Beans.—*Brisbane:* 7s. to 9s. per sugar bag, inferior lower. *Sydney:* 8s. bushel. *Melbourne:* 3d. to 5d. lb.

Peas.—8s. to 10s. *Melbourne:* 3d. to 5d. lb.

Beetroot.—6d. to 1s. bundle.

Chokos.—6d. to 1s. dozen.

Carrots.—3d. to 1s. bundle.

Celery.—Local, 1s. 6d. to 2s. bundle; South Australian, 15s. to 17s. crate.

Rhubarb.—9d. to 1s. 6d. bundle.

The Veterinary Medicines Acts, 1933 to 1938.

F. B. COLEMAN, Registrar of Veterinary Medicines.

Veterinary medicines under the above Acts include the following:—

Alteratives
Antiseptics
Aperients
Applications
Barbed wire preparations
Biological products
Black oils
Blackleg preparations
Blight preparations
Blister preparations
Blood mixtures
Bot preparations
Canker preparations
Cat medicines
Condition powders
Constitution powders, balls, &c.
Correctives
Disinfectants (animal)
Distemper preparations
Diuretic preparations
Dog medicines
Drenches
Eczema preparations
Embrocations
Eye preparations
Foot preparations
Gall preparations
Garget preparations
Germicides (animal)
Greasy heel preparations
Iodine preparations
Kidney preparations
Lampas preparations
Laxatives
Leg preparations
Liniments
Lotions
Lung worm preparations
Mammitis preparations
Mange preparations
Ointments
Pessaries
Physic balls
Poultry medicines
Purgatives
Redwater preparations
Roup preparations
Scour preparations
Sexual stimulants
Skin preparations
Specifics
Stomach preparations
Tonics
Udder preparations
Vaccines
Vaginitis preparations
Wart preparations
White oils
Worm preparations

and any mixture, compound, or preparation of one or more drugs or ingredients in any form or any biological products, including both living and dead vaccines, sera, and diagnostic agents intended to be administered to stock by any means.

Every seller of veterinary medicines has to obtain a license—costing 5s. yearly—in the month of January.

All veterinary medicines offered for sale in Queensland must be registered every three years, i.e., 1939, 1942, 1945, &c., during the month of January with yearly payment of fees. Application for registration involves the forwarding of a statutory declaration, setting out the formula of the preparation, accompanied by a specimen label and sample, and the necessary fees, i.e., £1 1s. for the first preparation, and 5s. for each subsequent veterinary medicine, with a maximum of £5 5s. per year. These applications are duly examined with respect to the Act's requirements and placed before the Veterinary Medicines Board—consisting of the Agricultural Chemist, Chief Inspector of Stock, a bacteriologist, and a veterinary surgeon.

The formulae, claims, and statements made are considered, and, if approved, the veterinary medicine, upon completion of all the Act's requirements, is duly registered.

All labels are required to set out the following:—

(*a*) The distinctive name of the veterinary medicine;

(*b*) The net weight contained in the package, or, in the case of liquids, the true volume content expressed in Imperial measure;

(*c*) In the case of any liquid veterinary medicine having or claiming to have germicidal and/or disinfecting properties, its bactericidal efficiency expressed in terms of absolute phenol (100 per cent.) as determined by the Rideal-Walker test;

(*d*) A printed statement giving quantity or proportion of any substance or substances prescribed in the Second Schedule of the Regulations.

(*e*) In the case of biological products, in addition to the other requirements of the Regulations, the date from which they should no longer be used; this must be expressed in the following manner:—

"Kept in a dark, cool place, this product remains fully potent until [*Here insert date*].

(*f*) The name and address of the Queensland primary dealer or manufacturer;

(*g*) All directions for use of the veterinary medicine;

(*h*) The following wording:—

"Registered under the Queensland Veterinary Medicines Acts";

(*i*) The word POISON when required.

All veterinary medicines containing *Carbon tetrachloride, Tetrachlorethylene, and Trichlorethylene,* must be labelled "Poison" and packed in the manner prescribed by Regulation 15 under the Veterinary Medicines Acts.

The word "POISON" should be in red letters on a white ground, in larger and heavier type than any other letter on the label; and no other word shall appear on the same line. No other letter on the label shall be in a red colour.

Farmers and other buyers would be well advised **never to accept delivery** of any veterinary medicine unless it has affixed to the package a plainly printed label setting out the required information.

In the absence of a label it is obvious that the buyer should at once communicate with the Department of Agriculture, William street, Brisbane.

The Veterinary Medicines Acts provide that no person shall affix any label to or use or issue with or in connection with any veterinary medicine offered for sale, directions for use, or any printed, typed, or written matter, and/or advertisement which contains any statement or

claim which directly or by implication indicates or suggests that it will prevent or cure the following diseases:—

Malignant growths (cancer), tuberculosis, or contagious abortion.

The veterinary medicines as set out in the following list are those that have been registered for the three-year period January, 1939, to December, 1941, under the above Acts. These and any published in subsequent lists are the only veterinary medicines that should be offered for sale or requested by prospective purchasers.

It should be noted that the sale of any unregistered veterinary medicine would render the seller liable to a penalty not exceeding £20.

Veterinary Medicines Registered for the period January, 1939, to December, 1941.

List published on 31st May, 1939, in accordance with section 6 (7) of the Acts.

	Reg. No.
A.C.F. and Shirleys Fertilizers Limited, Brisbane—	
A.C.F. Cop-Nic	1732
Andrew Dryden's Famous Blood and Water Powders for Horses and Cattle	446
Andrew Dryden's Famous Embrocation for Horses and Cattle	447
Andrew Dryden's Famous Gripe Drench for Horses and Cattle	448
Andrew Dryden's Famous Liquid Blister for Horses and Cattle	449
Andrew Dryden's Famous Scour in Calves	451
Andrew Dryden's Famous Specific for Horses and Cattle	450
Andrew Dryden's Famous Worm and Condition Powders for Horses and Cattle	452
Dairy Ointment	454
Dryden's Cleansing Drench for Cattle	455
Dryden's Gall Cure	456
Dryden's Invaluable Specific for the Cure of Warts on Poultry	453
Animal Health Station, Yeerongpilly—	
Contagious Mammitis Vaccine (Streptococcal)	334
Armitstead, J., Warwick—	
Mawson's Sheep Drench	231
Australian Chemical Company Proprietary Limited, South Brisbane—	
Acco Savol	62
Australian Disinfectant Company, Brisbane—	
Novama	1424
Safonia	400
Wagstaff's Stock Drench	471B
Berry, Henry and Company Proprietary Limited, Brisbane—	
Carbox	345
Bickford, A. M., and Sons, Limited, Brisbane—	
Bone Radiol	45
Pedicine	1842
Radiol Brand Leg Wash Powder	46
Radiol Chemical Liquid	44
Radiol Kidney Powder	439
Bryce Limited, Adelaide street, Brisbane—	
Bio Blackleg Pellets	171
Pegasus Blackleg Aggressin (liquid)	172
Pegasus Gall Cure	173
Pegasus Mammitis Toxiculture	174
Pegasus Stock Drench (concentrated)	175
Pegasus Vaginitis Capsules	176
Pegasus Worm Drench for Horses	177
Pegavo	325
Pegasol	249

	Reg. No.
Butler, Edward, and Company Limited, Brisbane—	
Benbow's Alterative Mixture for Dogs	2274
Hagley's Hopple Chafe Specific	280
Buzacotts (Queensland) Limited, Brisbane—	
Bio Absorbine (liquid)	484
Bio Blister Paste	365
Bio Bot Bombs	366
Bio Bowel Laxative for Dogs	1439
Bio Bronchial and Pneumonic Distemper Mixture	1438
Bio Canine Distemper Vaccine	1723
Bio Canker Cure	1436
Bio Condition and Kidney Powders	367
Bio Condition Powders for Pigs	368
Bio Cough Electuary	1036
Bio Diarrhoea Powders for Dogs	1435
Bio Eczermol	1429
Bio Eye Powder	369
Bio Flatulent Colic Drench	370
Bio Flukure Double Strength Carbon Drench	1552
Bio Fosfodine	372
Bio Greasy Heel Ointment	373
Bio Greyhound Tonic	1432
Bio Healing Balsam	374
Bio Healing Ointment	375
Bio Laxative Drench for Horses	376
Bio Mange Ointment	377
Bio Painidine	390
Bio Physic Ball (No. 2, 3, 3½, 4, 4½, 5)	391
Bio Puppy Worm Syrup	1434
Bio Scours Remedy	380
Bio Solid Absorbine	485
Bio Soothing Liniment	381
Bio Spasmodic Colic Drench	382
Bio Special Colic Drench	383
Bio Tendonol	487
Bio Titbalm	384
Biotone	1430
Bio Urine and Diuretic Powders	1037
Bio Uterine Bombs	385
Bio Vaginol	386
Bio Worm Capsules	1433
Bio Worm Drench for Horses	387
Bio Worm Powders for Pigs	388
B.W.K. Bio Worm Killer for Sheep	389
Stewarts Bio Royal Embrocation	392
Campbell Bros. Proprietary, Limited, Brisbane—	
Safa	413
Chaplin, F. G., Glasshouse Mountains—	
Chaplin's Famous Mammitis Treatment	2317
Cloudust Spray Manufacturers, South Brisbane—	
Sulfnico	1921B
Collins, W. A., Cairns—	
Collins Alterative Worm and Condition Powders	363
Veterinary Cough Paste	364
Committee of Direction of Fruit Marketing, Brisbane—	
Waratah Nicotine Sulphate	1665A
Cramsie, Dwyer and Company, Wallangarra—	
Cupiss Aromatic Physic Balls	326
Cupiss Condition Powders for Dogs	1123
Cupiss Constitution Balls	327
Cupiss Embrocation	328
Cupiss Tonic Powders	320
Dog Constitution Capsules (Cupiss)	1124

	Reg. No.
Cramsie, Dwyer and Company, Wallangarra—*continued.*	
Floctone Medicinal Tonic Sheep Drench	2027
Lamtone	2008
Nycatone	2007
Tetratone	2023
Cray, O. P., Brisbane—	
Puppy Worm Syrup	25
Dalgety and Company, Brisbane—	
Kerol	822
Sayers Blu-Nik	1604
Sayers Green Seal Fluke Drench—Single Strength	162
Sayers Green Seal Worm and Fluke Drench—Double Strength	163
David, F. D., Brisbane—	
Happidog Alterative Mixture	339
Happidog Blood Tonic	1706
Happidog Canker Lotion	1707
Happidog Iodised Condition Powders	338
Happidog Nukote Mange Prescription	1708
Happidog Puppy Worm Syrup	340
Happidog Trumpit Distemper Mixture	341
Happidog Zinol Skin Lotion	1052
Denhams Proprietary Limited, Brisbane—	
Diamontone Poultry Tonic	1736
Denny, A. G., 42 Nebo Road, Mackay—	
Denny's Absorbent Ointment	2286
Denny's Bot Worm Expeller (Horses)	2279
Denny's Burn Application	2280
Denny's Colic Drench (Wind Colic) for Horses and Cattle	2290
Denny's Cow Impaction Drench	2281
Denny's Gall and Chafe Cure	2292
Denny's Gland Liniment	2282
Denny's Hoof Dressing	2285
Denny's Kidney Drench (for Horses)	2288
Denny's Mange Ointment (Itch Ointment for Horses)	2283
Denny's Purgative Drench (Purge for Horses)	2291
Denny's Red Blister (for Horses)	2287
Denny's Sprain Liniment	2289
Denny's Worm Expellent Powder (for Horses)	2284
Dryden, Victor, Brisbane—	
Gall Ointment for Horses and Cattle	27
Victor Dryden's Blood and Water Powders for Horses and Cattle	28
Victor Dryden's Embrocation for Horses and Cattle	29
Victor Dryden's Gripe Drench for Horses and Cattle	30
Victor Dryden's Liquid Blister for Horses and Cattle	31
Victor Dryden's Poultry Specific for the Cure of Warts on Poultry	32
Victor Dryden's Scour in Calves	33
Victor Dryden's Specific for Horses and Cattle	34
Victor Dryden's Worm and Condition Powders for Horses and Cattle	35
Eden and Co., J. H., Brisbane—	
Cylol	1977
Evans Products Agency, Dayboro—	
Evpro Mammitis Treatment	1131
Evpro Scour Cure	278
Finn, J. F., Brisbane—	
Gilmour's Salve	1854
Finney, Hubert, and Ure Limited, Brisbane—	
Karswood Dog Condition Powders	317
Karswood Poultry Spice	58
Flynn Bros., Brisbane—	
Bronchos Cough Paste	478
Eclipsal	430
Osmond and Sons Lifesaving Red Draught	329

	Reg. No.
Flynn Bros., Brisbane—*continued.*	
Osmonds Antiseptic Pessaries	134
Osmonds Aphrodisiac Powders	1918
Osmonds Bot Capsules	210
Osmonds Brown Draught	1073
Osmonds Cattle Oils	348
Osmonds Cattle Shampoo	1132
Osmonds Chlorosyl	2167
Osmonds Compound Santonin Worm Powders for Pigs	1477
Osmonds Concentrated Ovolis	480
Osmonds Ethodyne	1072
Osmonds Fluid Zenos Disinfectant	337
Osmonds Foot-Rot Paste	1074
Osmonds Grease Wash	2168
Osmonds Hooseiline	479
Osmonds Oxygas	209
Osmonds Pig Powders	347
Osmonds Saltona Blood Salt	330
Osmonds Special Scour Cordial	481
Osmonds Special Worm Drink for Horses	482
Osmonds Vaccadyne	331
Osmonds Vitaline	1917
Osmonds White Oils or Newmarket Embrocation	349
Osmonds Worm Drench and Fluke Kill (Double Strength)	432
Ganter Bros., Monto—	
F.G.B. Blood Scour Mixture	418
Gollin and Co. Pty. Ltd., Brisbane—	
Meggitts Pure Medicinal Linseed Oil	1818
Happidog Stores Proprietary Limited, Brisbane—	
Happidog Alterative Powder	2299
Happidog Canker Lotion	1871
Happidog Eczema Lotion	2297
Happidog Eye Ointment	2298
Happidog Skin Lotion	1872
Happidog Worm Capsule	2300
Happidog Worm Powder	2301
Hayes Veterinary Company, Brisbane—	
Aloetic Ball (Wyley's Ltd.)	276
Blackleg Antigen (Blacklegol)	263
Cutter Blackleg Aggressin (Solid) (Cultural)	235A
Gonadin Serum	1919
Havcol	323
Hayes' Barbed Wire Liniment	236
Hayes' Cattle Blight Powders	237
Hayes' Cleansing Drench	251
Hayes' Condition Powders	238
Hayes' Lampas Lotion	239
Hayes' Mammitis Remedy	240
Hayes' Mange Ointment	241
Hayes' Redwater Cure	242
Hayes' Scour Powders	243
Hayes' Udder Ointment	245
Hayes' Veterinary Ointment	244
Hayes' Wart Lotion	246
Hayes' Worm Powders	247
Lung Worm Injection	248
Yohimbin	324
Leggo, A. Victor, and Company Proprietary Limited, Brisbane—	
Vallo Brand Nicotine Sulphate	784A
Ling, H. J., Babinda—	
Hayden's Special Gripe Drench	321
Hayden's Special Veterinary Ointment	1581

	Reg. No.
Lovelock, W., and Company Proprietary Limited, Brisbane—	
Day, Son & Hewitts Black Physic Balls	294
Day, Son & Hewitts Broncholine	295
Day, Son & Hewitts Colonial Red Drench	307
Day, Son & Hewitts Curdolix	297
Day, Son & Hewitts Diuretic Balls	298
Day, Son & Hewitts Easakof	299
Day, Son & Hewitts Eye Wash	300
Day, Son & Hewitts Gall Ointment	301
Day, Son & Hewitts Gaseodyne	302
Day, Son & Hewitts Gaseous Fluid	303
Day, Son & Hewitts Globe Disinfectant	304
Day, Son & Hewitts Kossolian (For Racehorses, &c.)	306
Day, Son & Hewitts Kossolian Blood Salt (for General Farm Stock)	305
Day, Son & Hewitts Kurbicura	1593
Day, Son & Hewitts Non-Poisonous Worm Pellets	315
Day, Son & Hewitts Red Paste or Condition Balls	308
Day, Son & Hewitts Red Worm Mixture	309
Day, Son & Hewitts Udder and Sore Teat Salve	310
Day, Son & Hewitts Universal Brown Chemical Extract	296
Day, Son & Hewitts Universal White Chemical Extract	313
Day, Son & Hewitts Vetalenta	311
Day, Son & Hewitts Wart Solvent	312
Day, Son & Hewitts Worm Balls	314
Day, Son & Hewitts Worm Powder	322
Day, Son & Hewitts Xemos	316
McDonald, A. H., and Company Proprietary Limited, Brisbane—	
Vetamac Antiseptic Capsules	2190
Vetamac Fluke & Worm Specific	2188
Vetamac Fluke Drench	2187
Vetamac Ointment	2192
Vetamac Stock Drench	2184
Vetamac Tape & Large Bowel Worm Drench	2189
Vetamac Vaginitis Remedy	2191
Vetamac Worm and Tonic Pig Drench	2186
Maclean, D., Proprietary Limited, Brisbane—	
Baxters Alterative Mixture	401
Baxters Distemper Capsules	402
Baxters Husk Mixture	404
Baxters Kidney and Bladder Pills	405
Baxters No. 1 Worm Capsules	457
Baxters No. 2 Worm Capsules	458
Baxters No. 3 Worm Capsules	459
Baxters Puppy Worm Syrup	406
Baxters Red Tonic	407
Baxters Skin and Blood Pills	408
Baxters Skin Lotion	403
Baxters Stomach and Bile Pills	396
Baxters Tasteless Condition Powders	397
Baxters Worm Powders for All Dogs	409
Judge's Blight Lotion	2102
Judge's Blight Powder	2090
Judge's Bot Bombs	2084
Judge's Bot Powders	2085
Judge's Colic and Gripe Drench	2087
Judge's Condition Powder	2098
Judge's Cough and Cold Remedy	2095
Judge's Dairy Drench	2099
Judge's Dairy Ointment	2101
Judge's Foot-Rot Powder	2093
Judge's Mange Oil	2096
Judge's Nasal Ointment	2089
Judge's Physic Balls	2083
Judge's Poultry Powder	2086
Judge's Purple Paint	2091

	Reg. No.
Maclean, D., Proprietary Limited, Brisbane—*continued.*	
Judge's Scarlet Blister	2094
Judge's Scour Powder	2103
Judge's Special Tasteless Horse Laxative	2088
Judge's Vaginal Pessaries	2104
Judge's Vaginitis Powder	2092
Judge's Veterinary Embrocation	2106
Judge's Vettoll	2105
Judge's Wart Ointment	2100
Judge's Worm Powder	2097
Mactaggarts Primary Producers Co-operative Association Limited, Brisbane—	
Cutter Blackleg Aggressin (Cultural) (Solid)	131
Cutter Blackleg Antigen (Blacklegol)	78
Equinoint	132
Mactaggart's Carbol	1065
Mactaggart's Carbon Tetrachloride Fluke and Worm Drench	228
Mactaggart's Medicated Spaying Tar	1271
"Max-tar" Dehorning Dressing	2449
Mitchell, Kenneth, Brisbane—	
Barko Alterative Blood Mixture	1624
Barko Anti-Diarrhoea Mixture	1627
Barko Anti-Diarrhoea Powders	1619
Barko Canker Powder	1618
Barko Distemper and Cough Mixture	1626
Barko Ear Canker Lotion	1631
Barko Eczema Pills	1614
Barko Eye Lotion	1628
Barko Eye Ointment	1617
Barko Iodine Dog Soap	1622
Barko Liniment	1625
Barko Lotion for Cuts, Wounds, and Abrasions	1633
Barko Mixture for Chorea (St. Vitus' Dance)	1623
Barko Pad Paint	1632
Barko Pills for Gastritis	1616
Barko Pills for Rheumatism	1615
Barko Powders for Chorea (St. Vitus' Dance)	1620
Barko Skin Lotion	1612
Barko Tasteless Condition Powders	124
Barko Tonic Food	1634
Barko Worm Mixture for Dogs	1629
Barko Worm Mixture for Puppies	1630
Barko Worm Powders for Dogs	1621
Moase, W. E., Wynnum—	
Alterative and Condition Powder for Horses and Cattle	350
Moase's Famous Antiseptic Disinfectant Deodorant	351
Moase's Famous Blister "The Ideal"	352
Moase's Famous Dairy Ointment	353
Moase's Famous Diarrhœa or Scour Mixture	354
Moase's Famous Draught for Horse or Cow for Colic	355
Moase's Famous Drench for Cattle	356
Moase's Famous Eye Specific	357
Moase's Famous Liniment	358
Moarse' Famous Specific for Tympanites, Bloat, or Hoven	1454
Moase's Famous Specific for Worms in Calves, Sheep, &c.	360
Moase's Famous Purgative and Worm Balls for Horses	1742
Moase's Special Liniment	361
Murray, K., East Brisbane—	
Fleet-Foot Pad Paint	2385
New Zealand Loan and Mercantile Agency Company Limited, Brisbane—	
Cooper's Antiseptic Powder	2200
Cooper's Condition Powders	2240
Cooper's (Improved) Worm Tablets	85
Kur-Mange	87
Lavene Animal Wash	86
Zealone AHP Nicotine and Bluestone Sheep Drench	1666
Zealone AHP Sheep Drench for Worms and Fluke	1120

	Reg. No.
Nicol Chemical Company Proprietary Limited, Brisbane—	
Nicol's White Oil Embrocation	1075
Nobles Proprietary Limited, Brisbane—	
Contagious Vaginitis Ointment	36
Sykes's Animol	38
Sykes's Concentrated Animal Chemical Food	39
Sykes's Creatol	40
Sykes's Drench	41
Sykes's Farm and Home Embrocation	42
Sykes's Udderine	43
Noble, W. A., and Sinnamon, Toowoomba—	
Bot Capsule	1956
Noble's Aperient Pills for Large Dogs	213
Noble's Aperient Pills for Small Dogs	212
Noble's Blight Lotion	80
Noble's Cleansing and Tonic Dairy Drench	79
Noble's Colic and Gripe Drench	1391
Noble's Dairy Ointment	1390
Noble's Dog Alterative	160
Noble's Dog Condition Powder	1601
Noble's Mange Oil	161
Noble's Non-Irritant Fluid Blister	1392
Noble's Physic Balls	434
Noble's Poultry Powder	81
Noble's Scour Remedy for Calves	82
Noble's Tonic Alterative and Condition Powders	426
Noble's Vettoll	83
Noble's Wart Ointment for Poultry	1586
Noble's Worm and Condition Pills (Large Dogs)	215
Noble's Worm and Condition Pills (Small Dogs)	214
Noble's Worm Specific for Puppies	84
Norris Agencies Proprietary Limited, Brisbane—	
C.N. Disinfectant	133
Sidolia	265
Sidolia Dairy Ointment	2348
Sidolia Powder for Controlling Mammitis	1730
Nyal Company, Brisbane—	
Krect Condition Powders	1674
Krect Condition Tablets	1675
Krect Laxative and Stomach Tablets	1677
Krect Mange Lotion	1676
Krect Puppy Worm Syrup	1678
Krect Veterinary Ointment	1873
Krect Worm Capsules (Nos. 1, 2, 3)	1673
Outridge Chemical Company, Wondai—	
Burnett Worm Drench Powder	164
Parke Davis and Company, Brisbane—	
Bio 731 Antibronchisepticus Serum (Canine)	2366
Bio 813 Equine Influenza Mixed Bacterin	2365
Bio 805 Mixed Bacterin (Canine)	2364
Bio 808 Mixed Bacterin (Canine)	2363
Bio 827 Streptococcus-Staphylococcus Bacterin (Equine)	2367
Blackleg Vaccine (Blacklegoids) Single	70
Blackleg Vaccine (Blacklegoids) Double	71
Nema Worm Capsules	69
Nema Worm Drench	180
Parke Davis & Co.'s Fluke and Worm Drench (Double Strength)	175
Tetanus Antitoxin (Veterinary)	72
Worm and Fluke Drench Special	178
Pennefather, E. K., Brisbane—	
Golden Egg Fowl Pox Vaccine (Attenuated)	1889

	Reg. No.
Poultry Farmers Co-operative Society Limited, Brisbane—	
Healo	48
Red Comb Bronchitis Cure	49
Red Comb Chick Tonic	50
Red Comb Cleansing and Tonic Drench	51
Red Comb Eye Roup Cure	52
Red Comb Fowl Pox Vaccine (Attenuated)	76
Red Comb Iodine Specific	470
Red Comb Nicotine Sulphate "40"	1691A
Red Comb Roup Cure	53
Red Comb Scaly Leg Ointment	54
Red Comb Tonic Spice	2333
Red Comb Vaginitis Powder	1368
Red Comb Veterinary Iodine	55
Red Comb Vi-Tone (Poultry Tonic)	437
Red Comb Wart Preventative	56
Red Comb Worm and Condition Powders	57
Red Comb Worm Capsules	75
Red Comb Worm Killer	436
Queensland Pastoral Supplies Proprietary Limited, Brisbane—	
"Hibiscus" Nicotine Sulphate	2427A
Stockaid Bluestone Snow	1865
Stockaid Concentrated Arsenical Sheep Drench	1866
Stockaid "Double V" (Veterinary Standard) Drench	1976
Stockaid "Double X" Drench	1870
Stockaid "Fifty-Fifty" Drench	1868
Stockaid "Single X" Drench	1869
Reichel, H. G., Brisbane—	
Berg Oil	2166
Riddell, R. A. (Bayer-Pharma Limited), Brisbane—	
Aricyl	66
Ascaridol	1662
Astibulin Polyvalent Joint-Ill Serum	1647
Carbo-Pulbit	1653
Entozon (Granulate)	1664
Istin	67
Joint Ill Vaccine (Astibulin Vaccine)	1992
Murnil	1253
Nemural	1528
Odylen	68
Omnadin	1659
Pellidol Ointment	1655
Veridan	1252
Robinson and Bott Proprietary Limited, Brisbane—	
Rawleighs Colic and Bloat Ease	23
Rawleighs Poultry Powder	232
Rawleighs Roup Powder	129
Rawleighs Stock Tonic	233
Rawleighs Veterinary Application	24
Salmond and Spraggon (Australia) Proprietary Limited, Brisbane—	
Bob Martin's Antiseptic Dog Soap	429
Bob Martin's '92 Ointment	421
Bob Martin's Tasteless Condition Powders	399
Bob Martin's Worm Powders	420
Bob Martin's Worm Tablets	419
Elliman's Royal Embrocation	47
Sharkey, S. B., Mackay—	
Bot and Worm Expeller	424
Sharkey's Special Physic	425
Smith, H. F., Brisbane—	
Co-Lak Vaginitis Remedy	1119
Soden, J., Brisbane—	
Pep Health Powder for Dogs	2230

	Reg. No.
Surgical Supplies Limited, Brisbane—	
A.B.C. Blood Tonic	2112
A.B.C. Canker Lotion	1304
A.B.C. Canker Powder	1526
A.B.C. Coca Skin Oil	1525
A.B.C. Cough Mixture	1523
A.B.C. Eczema Powder	1524
A.B.C. Eye Drops	1395
A.B.C. Green Ointment	1521
A.B.C. Luberine Oil	1566
A.B.C. Tasteless Condition Powders	1234
A.B.C. Puppy Worm Syrup	1394
A.B.C. Worm Mixture	1305
A.B.C. Zip Ointment	1522
A.B.C. 3 in 1 Worm Capsules	2242
Aloetic Physic Ball (Wyleys Ltd.)	1792
Alterative Worm and Condition Powders	137
Bio Blackleg Aggressin	258
Bio Blackleg Pellets	260
Bio Blackleg Toxiculture	259
Bio Mastitis Toxiculture	274
Bio Pleuro-Virus	261
Bio Strangles Toxiculture	275
Blackleg Cords	262
Blackleg Solid Aggressin	332
Dr. Metcalfe Sharpe's Application	138
Duttons Mange Specific	139
Duttons Redwater Cure	140
Equine Cough Syrup	141
Gelatine Coated Cough Balls No. 17 (Wyleys Ltd.)	1982
Gelatine Coated Diuretic Balls No. 8 (Wyleys Ltd.)	1979
Gelatine Coated Tonic Balls No. 10 (Wyleys Ltd.)	1981
Gelatine Coated Worm Balls No. 13 (Wyleys Ltd.)	1980
Gripe Drench	216
Sapocarb	362
Scour Powders	142
Sexine	1238
Spavin Paste	217
Special Bull Tonic	143
S.S. Black Oil	145
S.S. Blight Powder	146
S.S. Heal-All Ointment	147
S.S. Lung Worm Specific	148
S.S. Reliable Embrocation	149
S.S. Scour Cure	150
S.S. Tonic Powder for Cattle	151
S.S. Udder Specific	152
Surgical Supplies Antiseptic Vaginal Kugloids	144
Surgical Supplies Blister	153
Surgical Supplies Dairy Ointment	154
Surgical Supplies Gall Cure	218
Surgical Supplies Garget Powder	1050
Surgical Supplies Ltd. Cleansing Drench	155
Surgical Supplies Ltd. Lampas Cure	156
Surgical Supplies Ltd. Worm Powders for Horses	157
Veterinary Blood and Water Powders	158
Wart and Horn Solvent	159
Taylors Elliotts and Australian Drug Proprietary Limited, Brisbane—	
Austral Aloetic Physic Ball	94
Austral Arsenic and Copper Worm Drench for Sheep	73
Austral Barb Wire Embrocation	95
Austral Blood and Water Drench	96
Austral Bot Mass Capsules	1949
Austral Calcifer Powder	97
Austral Calcifer Solution	98
Austral Canker Ointment for Dogs	1859
Austral Caustic Stick	99
Austral Cleansing Drench	100

	Reg. No.
Taylors Elliotts and Australian Drug Proprietary Limited, Brisbane—*contd.*	
Austral Cold and Fever Mixture for Dogs	1847
Austral Cooling Lotion	101
Austral Dairy Ointment	102
Austral Dusting Powder	103
Austral Gall Ointment	105
Austral Garget Powder	106
Austral Green Liniment for Dogs	1848
Austral Gripe Drench	107
Austral Horse Blister	108
Austral Iodine Capsules	109
Austral Liquid Blister	110
Austral Lung Worm Drench	74
Austral Mange Dressing	111
Austral Mange Lotion for Dogs	1849
Austral Pig Cough Powder	112
Austral Pig Purgative Powder	113
Austral Pig Worm Powders	114
Austral Puppy Worm Syrup	1850
Austral Regulating Drench	115
Austral Ringworm Ointment	116
Austral Scour Drench	117
Austral Tonic Powders for Dogs	1851
Austral Trypan Blue	118
Austral Vaginal Douche Powders	119
Austral Vaginal Pessaries	120
Austral Veterinary Embrocation	121
Austral Wart Paint	122
Austral Worm Capsules for Dogs	1929
Austral Worm and Condition Powders	123
Bickmore's Gall Cure	125
Blackleg Aggressin (Cultural) (Solid)	1975
Blackleg Antigen (Blacklegol) (Cutter)	1974
Butler's Leeming's Essence	398
Cupiss' Aromatic Physic Balls	326A
Cupiss' Condition Powders for Dogs	1123A
Cupiss' Constitution Balls	327A
Cupiss' Embrocation	328A
Cupiss' Tonic Powders	320A
Dog Constitution Capsules (Cupiss')	1124A
Lieut. James' Blistering Ointment	279
Skinner's Cleansing and Tonic Drench	127
Skinner's Ointment	126
Stevens Ointment	433
Weaver's Sheep Drench	411
Tudor and Petty, Toowoomba—	
Condition Powder for Horses	165
Stock Cough Paste	181
Vaginitis Powder	166
United Chemical Company Limited, South Brisbane—	
Cresola No. 1	2040
Germacol	1053
United Concentrated Arsenic and Epsom Salts Liquid Drench	318
United Fluke and Worm Drench	229
United Medicated Stockholm Tar	1270
United Nicotine Sulphate-Bluestone Worm Drench	2381
E. P. Walsh, Gympie—	
Cattle Blight Specific	1457
Scour Specific for Calves	1458
Warwick Friendly Societies Association, Warwick—	
Equine Physic Powder	1425
Turner's Sheep Drench	1274

	Reg. No.
Webster Bros. Proprietary Limited, Brisbane—	
Hamilton Preparations.	
Blakemere Eczema Cure	253
Hamilton Fistula Vaccine	257
Hamilton Mammitis Vaccine	183
Hamilton Strangles Vaccine	256
Pro-Vet Antiseptic Capsules	184
Pro-Vet Black Spot Application	186
Pro-Vet. "Blighty"	187
Pro-Vet Bloat Draught	188
Pro-Vet Cantharides Compound Blister	208
Pro-Vet Colic Remedy for Horses	192
Pro-Vet Condition Powder	416
Pro-Vet Cough Electuary for Horses	193
Pro-Vet Diuretic or Staling Powder	194
Pro-Vet Embrocation	221
Pro-Vet Foot-Rot Paste	196
Pro-Vet Gall Cure	222
Provetine	197
Pro-Vet Laxative Drench for Horses	417
Pro-Vet Liquid Blister	267
Pro-Vet Pig Powders	254
Pro-Vet Red Blister Sweating Blister	200
Pro-Vet Scour Remedy	202
Pro-Vet Speedo Tonic for Dogs	203
Pro-Vet Udderlin	205
Pro-Vet Worm Mixture for Dogs	207
Pro-Vet Worm Powders for Horses	224
Vita Lick Preparations.	
Carbene Sheep Drench	1063
Cee-Tee-Cee Sheep Drench	1064
To-Cu-Sul Sheep Drench	1719
Too-Partz Sheep Drench	2132
Wurm-Ez-Ol Sheep Drench	1062
Wilcox Mofflin Limited, Brisbane—	
Cesto Tape Worm Drench for Sheep and Lambs	336
N-ee-ma	1459
Nikosul	1598A
Red Spot Double Strength	225
Tetralene	226
Tri-Kos Concentrated Sheep Drench	1130
Tri-Kos Nicotine-Bluestone Sheep Drench	1130A
Tri-Kos Separate Ingredients (Nicotine Sulphate) (Copper Sulphate)	1440
Wilkinson, L. A. (Northern) Proprietary Limited, Brisbane—	
Dog Worm Capsules	287
L.P. Barb Wire Embrocation	281
Vetsalve	282
Wilkinsons Canker Lotion for Dogs	283
Wilkinsons Cleansing Drench	284
Wilkinsons Condition Powder	293
Wilkinsons Distemper Capsules	285
Wilkinsons Dog Tonic	286
Wilkinsons Eye Ointment for Dogs	288
Wilkinsons Laxative Dog Syrup	289
Wilkinsons Mange Lotion for Dogs	290
Wilkinsons Poultry Tonic	291
Wilkinsons Worm Powder	292
Wilkinsons Worm Syrup for Dogs	2025
Winchcombe Carson Limited, Brisbane—	
Bailey's Amolene Odorless Ointment	342
Bailey's Anti-Mammitis	343
Bailey's Cow Drench	344

Index of Brands that are not indicated in the foregoing list by the Primary Dealer's Name.

Brand.	Primary Dealer.
A.B.C.	Surgical Supplies Ltd.
Acco	Australian Chemical Co. Pty. Ltd.
Andrew Dryden's	A.C.F & Shirleys Fertilizers Ltd.
Austral	Taylors Elliotts & Australian Drug Pty. Ltd.
Bailey's	Winchcombe Carson Ltd.
Barko	Mitchell, Kenneth
Bayer	Riddell, R. A.
Baxters	Maclean, D. Pty. Ltd.
Benbow's	Butler, Edward & Co. Ltd.
Bickmore's	Taylors Elliotts & Australian Drug Pty. Ltd.
Bio	Bryce Ltd.
Bio	Buzacotts (Q'ld.) Ltd.
Bio	Parke Davis & Co.
Bio	Surgical Supplies Ltd.
Blakemere	Webster Bros. Pty. Ltd.
Bob Martin's	Salmond & Spraggon (Aust.) Pty. Ltd.
Burnett	Outridge Chemical Co.
Butler's	Taylors Elliotts & Australian Drug Pty. Ltd.
C.N.	Norris Agencies Pty. Ltd.
Cooper's	New Zealand Loan & Mercantile Agency Co. Ltd.
Cupiss'	Cramsie Dwyer & Co.
Cupiss'	Taylors Elliotts & Australian Drug Pty. Ltd.
Cutter	Mactaggarts Primary Producers Co-op. Assn. Ltd.
Cutter	Taylors Elliotts & Australian Drug Pty. Ltd.
Day, Son & Hewitts	Lovelock, W. & Co. Pty. Ltd.
Dr. Metcalfe Sharpe's	Surgical Supplies Ltd.
Duttons	Surgical Supplies Ltd.
Elliman's	Salmond & Spraggon (Aust.) Pty. Ltd.
Evpro	Evans Products Agency
Gilmours	Finn, J. F.
Hagley's	Butler, Edward & Co. Ltd.
Hamilton	Webster Bros. Pty. Ltd.
Happidog	David, F. D.
Happidog	Happidog Stores Pty. Ltd.
Hayden's	Ling, H. J.
Judge's	Maclean, D. Pty. Ltd.
Krect	Nyal Co.
Lieut. James'	Taylors Elliotts & Australian Drug Pty. Ltd.
Mawson's	Armitstead, J.
Meggitts	Gollin & Co. Pty. Ltd.
Nema	Parke Davis & Co.
Osmonds	Flynn Bros.
Pegasus	Bryce Ltd.
Pro-Vet	Webster Bros. Pty. Ltd.
Radiol	Bickford, A. M. & Sons Ltd.
Red Comb	Poultry Farmers Co-op. Society Ltd.
Rawleighs	Robinson & Bott Pty. Ltd.
Sayers	Dalgety & Co.

Brand.	Primary Dealer.
Sidolia	Norris Agencies Pty. Ltd.
Skinner's	Taylors Elliotts & Australian Drug Pty. Ltd.
S.S.	Surgical Supplies Ltd.
Stevens	Taylors Elliotts & Australian Drug Pty. Ltd.
Stewarts	Buzacotts (Qld.) Ltd.
Stockaid	Queensland Pastoral Supplies Pty. Ltd.
Sykes's	Nobles Pty. Ltd.
Tri-kos	Wilcox Mofflin Ltd.
Turner's	Warwick Friendly Societies' Association
Vallo	Leggo, A. Victor & Co. Pty. Ltd
Vetamac	McDonald, A. H. & Co. Pty. Ltd.
Vita Lick	Webster Bros. Pty. Ltd.
Wagstaff's	Australian Disinfectant Co.
Weaver's	Taylors Elliotts & Australian Drug Pty. Ltd.
Wyleys Ltd.	Surgical Supplies Ltd.
Zealone A.H.P.	New Zealand Loan & Mercantile Agency Co. Ltd.

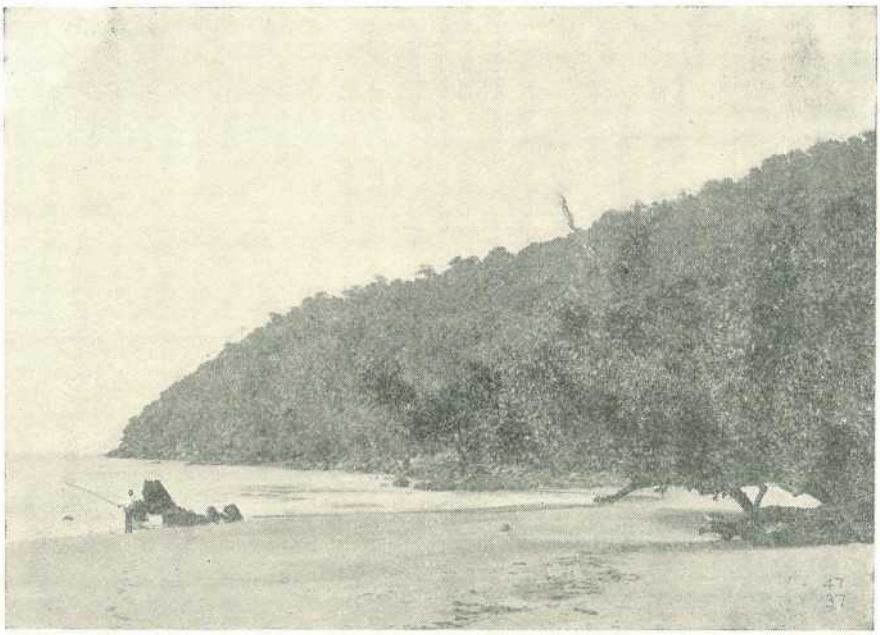


Plate 43.

WHERE THE JUNGLE COMES DOWN TO THE SEA.—A sheltered beach on the coast near Cairns.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Jersey Cattle Society, Australian Illawarra Shorthorn Society, and the Friesian Cattle Society, production charts for which were compiled during the month of May, 1939 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
JERSEY.				
Mature Cow (Standard 350 lb.)				
Trinity Daffodil 2nd	J. Sinnamon and Sons, Moggill	9,543·12	486·129	Some Hope
Trinity Golden Wedding	J. Sinnamon and Sons, Moggill	8,685·29	456·334	Some Hope
Hampstead Beryl 5th	J. H. C. Roberts, 230 Herries street, Toowoomba	8,239·4	391·569	Kelvinside Favourite's Raleigh
Trecarne Chimes 2nd	T. A. Petherick, Lockyer	7,278·1	388·101	Trecarne Golden King
Malwand Verbena	Queensland Agricultural High School and College, Lawes	7,190·56	371·439	Aveley Rex
Hampstead Olivette 2nd	J. H. C. Roberts, 230 Herries street, Toowoomba	7,071·75	370·814	Kelvinside Favourite's Raleigh
Senior, 4 Years (Standard 330 lb.).				
Glenview Hawthorne	F. P. Fowler and Sons, Coalstoun Lakes	9,960·89	531·299	Trinity Governor's Hope
Pineview Royal Star	J. Hunter and Sons, Pineview, Borallon	7,968·55	434·072	Oxford Jeweller
Trinity Royal May	J. Sinnamon and Sons, Moggill	7,079·89	387·453	Some Hope
Trinity Royal Daisy	J. Sinnamon and Sons, Moggill	7,400·57	372·665	Some Hope
Oxford Kitty	Farm Home for Boys, Westbrook	6,068·3	360·3	Overlook Nancy's Remus
Junior, 4 Years (Standard 310 lb.).				
Darling of Peeramon	A. H. O. Kopper, Peeramon	6,847·3	380·65	Trinity Segunda's Prince
Trinity Spotted Beauty	J. Sinnamon and Sons, Moggill	6,701·51	352·455	Some Hope
Trecarne Lottie 6th	T. A. Petherick, Lockyer	5,890·63	343·974	Trecarne Barley King
Oceanview Molly's Buttercup	J. Sigley, Millaa Millaa	6,871·45	333·091	Rockyglen Buttercup's King
Senior, 3 Years (Standard 290 lb.).				
Glenview Pontorsen	F. P. Fowler and Son, Glenview, Coalstoun Lakes	9,374·4	510·982	Trinity Governor's Hope
Oxford Thelma	J. Sigley, Millaa Millaa	8,150·65	474·237	Overlook Nancy's Remus
Trinity Graceful Duchess	J. Sinnamon and Sons, Moggill	8,805·92	458·64	Some Hope
Trinity Valley Daisy	J. Sinnamon and Sons, Moggill	7,448·82	388·569	Some Hope
Westbrook Tulip 63rd	Farm Home for Boys, Westbrook	6,892·1	318·706	Trinity Ginger Boy

JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Westbrook Tulip 68th	Farm Home for Boys, Westbrook	7,224·25	394·233	Oxford Gem's Ambassador
Oxford Flora 2nd	E. Burton and Sons, Wanora	6,997·95	378·182	Oxford Peer
Calton Averier	W. J. Semgreen, Coolabunia	7,062·0	367·895	Laddie of Calton
Trecarne Jersey Queen 2nd	T. A. Petherick, Lockyer	6,556·25	347·934	Trinity Some Officer
Bellgarth Claire De Lune	D. R. Hutton, Cunningham	6,508·75	346·13	Trecarne Renown 2nd
Bellgarth Roseleaf 2nd	D. R. Hutton, Cunningham	5,177·15	292·74	Trecarne Renown 2nd
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Glenview Lady Lynn 4th	F. P. Fowler and Son, Coalstoun Lakes	7,713·78	403·765	Trinity Governor's Hope
Glenview Meadowsweet	F. P. Fowler and Son, Coalstoun Lakes	7,494·15	388·363	Trinity Governor's Hope
Trecarne Dairymaid	T. A. Petherick, Lockyer	6,550·76	321·756	Trinity Some Officer
Broadview Hazel	W. S. Kirby, Byrnestown	5,518·85	311·05	Glenview Mason
Stoneleigh Buttercup	W. and C. E. Tudor, Branch Creek, Gayndah	6,515·44	288·631	Brooklands Royal Sirdar
Abbeystead Cocoatina	J. C. Davey, Gatton	5,203·11	256·932	Westbrook Prince 22nd
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Glenview Wallflower	F. P. Fowler and Son, Coalstoun Lakes	5,682·35	343·367	Trinity Governor's Hope
Oxford Ginger Maid	E. Burton and Sons, Wanora	6,387·8	342·787	Oxford Golden Lad
Bellgarth Queen	D. R. Hutton, Cunningham	5,790·37	326·462	Carnation Buttercup's Prince 2nd
College Floss 3rd	Queensland Agricultural High School and College, Lawes	5,696·17	307·909	Earpark General Beau
Glenview Sultane's Empress	F. P. Fowler and Son, Coalstoun Lakes	5,707·59	306·719	Trinity Governor's Hope
Bellgarth Ruby 3rd	D. R. Hutton, Cunningham	5,427·92	296·893	Trecarne Renown 2nd
Trecarne Eileen 7th	T. A. Petherick, Lockyer	4,533·98	294·295	Trinity Some Hope
Trinity Crescent	J. Sinnamon and Sons, Moggill	5,270·25	279·75	Trinity Royal Sovereign
Boree Princess	W. and C. E. Tudor, Gayndah	5,800·82	273·054	Brooklands Royal Sirdar
Carnation Dainty	W. Spresser and Son, Redbank	4,654·85	272·85	Vinchelez Golden Victory
Oxford Aster 3rd	W. J. Semgreen, Coolabunia	5,011·95	269·383	Oxford Deer
Kathleigh Flossy	C. W. Barlow, Euston road, Spring Creek	4,923·2	262·291	Retford King's Thorn
Pineview Lora	J. Hunter and Sons, Borallon	5,199·3	253·302	Oxford Fawn's Lad

Production Recording—*continued.*

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
	JERSEY—*continued.*			
	JUNIOR, 2 YEARS (STANDARD 230 LB.)—*continued.*			
Bellgarth Pretty Lady 2nd	P. Kerlin, Killarney	5,558·13	253·004	Bellgarth Bellboy 2nd
Trecarne Jersey Queen 3rd	T. A. Petherick, Lockyer	5,044·38	245·232	Trinity Some Officer
Boree Charm	W. and C. E. Tudor, Gayndah	5,226·57	244·088	Brooklands Royal Sirdar
Bellgarth Galatea	D. R. Hutton, Cunningham	5,123·43	243·192	Bellgarth Bellboy 2nd
	AUSTRALIAN ILLAWARRA SHORTHORN.			
	MATURE COW (STANDARD 350 LB.).			
Cedargrove Lady Prim 11th	P. D. Flechtner, Pilton View, Greenmount	11,254·0	452·32	Duke of Cedargrove
Kyabram Rosette (248 days)	A. H. E. Black, Kumbia	11,102·54	445·55	Ledger of Greyleigh
Corunna Opal 2nd	J. H. Anderson, Southbrook	8,604·08	350·507	Mountain Home Kitchener
	SENIOR, 4 YEARS (STANDARD 330 LB.).			
Valera Lila	M. C. and A. M. Sullivan, Pittsworth	10,519·05	443·882	Blacklands Daphne's Boy
Springleigh Beaudetta 5th (257 days)	H. F. Moller, Boonah	8,686·5	336·335	Springdale Bruce
Navillus Amy 3rd	C. O'Sullivan, Ascot, *via* Greenmount	8,991·56	351·151	Parkview Mars
	JUNIOR, 4 YEARS (STANDARD 310 LB.).			
Navillus Vera 5th (256 days)	C. O'Sullivan, Ascot, *via* Greenmount	7,988·72	319·548	Alfa Vale Re Nell
	SENIOR, 3 YEARS (STANDARD 290 LB.).			
Alfa Vale Lovely 7th (365 days)	W. H. Thompson, Nanango	15,099·65	581·031	Reward of Fairfield
Blacklands Daphne 10th	Estate of P. Doherty, Gympie	10,291·05	448·208	Sultan 2nd of Blacklands
Alfa Vale Plum 2nd	W. Hinrichsen, Clifton	9,501·8	391·052	Reward of Fairfield
Navillus Violet 4th	C. O'Sullivan, Ascot, *via* Greenmount	9,661·53	378·408	Alfa Vale Re Nell

JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Springleigh Buttercup 6th	H. F. Moller, Boonah	8,181·5	327·06	Governor of Greyleigh
Billena Buttercup	K. Henry, Tara, Watts Siding	8,871·3	316·183	Greyleigh Winall
Croydon Sunglow	T. Knopke, Laidley	9,813·88	315·249	Mount Blow Mikado
Ennismore Fancy	E. Jackson, Watts Siding	6,857·05	280·113	Navillus Amy Sheik
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Blacklands Miss Jean 16th	J. Meier, Mount Mort, Grandchester	13,533·6	532·6	Sultan 2nd of Blacklands
Rhodesview Carnation 9th	W. Gierke and Sons, Helidon	7,817·99	302·233	Blacklands Prospector
College Radiance	Queensland Agricultural High School and College, Lawes	6,913·52	299·661	Fussy's Kitchener of Hillview
Rhodesview Beauty 13th	W. Gierke and Sons, Helidon	7,843·26	286·727	Blacklands Prospector
Rhodesview Handsome 5th	W. Gierke and Sons, Helidon	7,727·92	279·748	Blacklands Prospector
Cedar Grove Queen 12th	C. O'Sullivan, Ascot, Greenmount	6,984·32	278·82	Cedar Grove Umpire
Murray's Bridge Shamrock 2nd	P. D. Fiechtner, junr., Greenmount	6,893·8	271·024	Greyleigh Winall
Tara Charm	K. Henry, Tara, Watts Siding	6,116·7	267·615	Pansy's Gift of Murray's Bridge
Billena Rose 3rd	K. Henry, Tara, Watts Siding	6,482·95	257·226	Greyleigh Winall
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Glen Idol Queen	Estate of P. Doherty, Gympie	8,737·25	394·745	Excellency of Blacklands
Newhaven Iris 2nd	E. O. Jeynes, Raceview	8,410·45	318·279	Fairy Bower Brilliant
Sunnyside Cissy 25th	A. H. E. Black, Kumbia	7,199·86	303·452	Cosey Camp Rupert
Tara Isis	K. Henry, Tara, Watts Siding	7,474·7	299·568	Pansy's Gift of Murray's Bridge
Rhodesview Fanny 33rd	W. Gierke and Sons, Helidon	7,506·3	298·753	Blacklands Prospector
Alfa Vale Jane 6th	T. G. Lamkin, Kaimkillenbun	7,009·41	293·594	Reward of Fairfield
Valera Milkmaid	M. C. and A. M. Sullivan, Pittsworth	6,970·29	292·537	Kilburnie Royalist
Rhodesview Beauty 14th	W. Gierke and Sons, Helidon	8,517·88	289·303	Blacklands Prospector
Rhodesview Biddy 17th	W. Gierke and Sons, Helidon	7,573·6	262·243	Blacklands Prospector
Rhodesview Queenie 21st	W. Gierke and Sons, Helidon	6,803·99	254·538	Blacklands Prospector

FRIESIAN.

JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Tent Hill Princess	W. H. Grams, Upper Tent Hill, Gatton	11,365·54	411·894	Tent Hill Starling's Actuary

General Notes

Staff Changes and Appointments.

Mr. W. C. Armstrong, instructor in apple and pear growing, Stanthorpe, has been appointed also an inspector under the Diseases in Plants Acts.

The transfer of Mr. C. W. Steley, assistant cane tester, from the Plane Creek Mill to the Tully Mill has been cancelled, and Mr. C. W. Maslen has been appointed assistant cane tester in his place.

Sergeant (2nd Class) W. Newman (Finch Hatton), Constable J. D. Evans (Malanda), and Constable D. C. McQuaker (Eton) have been appointed also inspectors under the Slaughtering Act.

Messrs. D. Jackson (Teneriffe) and H. S. Handley (Pampas) have been appointed members of the Darling Downs North District Stallion Board and the Northern Coast District Stallion Board, respectively, in place of Mr. G. Elliot, deceased.

Mr. A. Edminstone, of Pink Lily, Rockhampton, has been appointed an honorary protector under the Fauna Protection Act.

The resignation of Mr. D. M. Corbett as assistant cane tester at the Tully Sugar Mill for the coming season has been accepted.

Mr. J. E. Maher, inspector under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock, will be transferred from Brisbane to Cunnamulla.

Senior-Sergeant W. G. Bonas (Gympie), Constable D. V. Farrell (Calliope), and Constable A. J. Horne (Dimbulah) have been appointed also inspectors under the Slaughtering Act.

The appointment of Mr. J. F. Shaw (Forest Home Station, Georgetown) as an honorary inspector of stock has been cancelled, and Mr. L. R. Shaw has been appointed an honorary inspector of stock at Forest Home.

The following transfers of inspectors under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock, have been approved:—

J. J. Shelvey, from Helidon to Allora.
W. Williamson, from Murarrie Bacon Factory to Helidon.
G. K. L. Clark, from Oxley Bacon Factory to Murarrie Bacon Factory.

Mr. J. L. Bowman (South Brisbane) has been appointed a member of the Wide Bay and Burnett District Stallion Boards.

Mr. W. R. Drew (Aspley) has been appointed an honorary protector under "*The Fauna Protection Act of* 1937."

The Officer in Charge of Police, Dirranbandi, has been appointed also an inspector under the Brands Acts.

The following officers of the Department of Agriculture and Stock have also been appointed inspectors under the Apiaries Act:—

Messrs. H. Barnes (Brisbane), C. C. Barth (Townsville), J. W. Brown (Brisbane), J. R. Canty (Cairns), J. P. H. Clark (Gladstone), H. Collard (Maryborough), T. Douglas (Goondiwindi), H. J. Freeman (Brisbane), B. Funnell (Cairns), S. A. Green (Wallangarra), J. H. Gregory (Brisbane), H. Hacker (Brisbane), D. Hardy (Rockhampton), F. T. Heers (Bundaberg), E. R. Hollamby (Maryborough), S. F. Kajewski (Bowen), K. King (Coolangatta), W. D. Lewis (Brisbane), E. J. Lorraine (Brisbane), J. W. Mackay (Rockhampton), P. McCallum (Gladstone), A. F. Moodie (Mackay), C. L. Mudd (Killarney), F. W. Olney (Coolangatta), A. Person (Brisbane), C. R. R. Roff (Brisbane), W. J. Ross (Rockhampton), J. H. Simmonds (Brisbane), J. T. Smallhorn (Coolangatta), S. C. Smith (Mackay), A. G. Smyrell (Bowen), S. E. Stephens (Cairns), R. A. Tarrant (Bundaberg), S. C. Todd (Townsville), T. E. Tuck (Townsville), H. J. Walker (Bundaberg), J. A. Weddell (Brisbane), W. C. Woodhouse (Maryborough), and A. Wooller (Townsville).

The undermentioned persons have been appointed honorary inspectors under "*The Sugar Experiment Stations Acts,* 1900 *to* 1938":—

Messrs. W. J. Stapleton(care of Mossman Mill, Mossman), E. H. Fox (care of Mourilyan Cane Pest Destruction Board, Mourilyan), C. R. Crofton (care of Haughton Sugar Co., Giru), C. S. Wynter, R. D. Sherrington, H. A. Barton, and E. A. Friend (care of Pioneer Sugar Mill, Pioneer), M. R. Preece, J. F. Epworth, A. J. Phaff, jun. (care of Proserpine Mill, Proserpine), S. J. Axam and P. J. Long (care of Racecourse Mill, Mackay), F. W. Parsons (care of Marian Mill, Marian), B. J. Bourke (care of Bundaberg Cane Diseases Control Board, Bundaberg), N. Courtice, and D. James (care of Bundaberg Cane Disease Control Board), B. A. Bourke (care of Gibson and Howes Ltd., Bingera Plantation, Bundaberg), V. Wood and N. A. W. Gibson (care of Gibson and Howes Ltd., Bingera Plantation), T. W. Pulsford and R. L. Lehfeldt (care of Fairymead Sugar Co., Bundaberg), D. N. Davidson, A. Gordon, D. B. O'Leary, and C. Colquhoun (care of Millaquin Mill, Bundaberg), A. G. Morris (Mount Bauple Sugar Mill Association Ltd., Bauple), and J. A. Clark (Mount Bauple).

Tableland Maize Board.

An Order in Council has been issued under "*The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1938," amending the constitution of the Atherton Tableland Maize Board, to provide that elections of growers' representatives on such Board shall be held triennially and that such representatives shall hold office for a period of three years.

The Apiaries Act.

A Proclamation has been issued bringing "*The Apiaries Act of* 1938" into force as from 1st July, 1939.

Regulations to give effect to the provisions of the Act have also been approved, and these provide, amongst other things, for the lodgment of applications for approval, or for the renewal of approval, of hives in which bees are to be kept and of the site thereof; for the appointment of honorary field men who shall have power to inspect and report to the Under Secretary on the registration of apiaries, the keeping of bees, and the condition of bees; and for the introduction of bees, honey, or appliances into Queensland and the conditions of such entry.

Cucumber Virus.

A Proclamation has been issued under "*The Diseases in Plants Acts,* 1929 *to* 1937," declaring cucumber virus (mosaic) to be a disease within the meaning of the abovementioned Acts.

Butter Board.

An Order in Council has been issued amending the constitution of the Queensland Butter Board to permit it to meet from its funds the expenses of taking a ballot of suppliers of cream to butter factories on the question of whether section 30 of the Primary Producers' Organisation and Marketing Acts should be extended to the dairying industry—i.e., as to whether there should be formed a dairymen's organisation along the lines of the Queensland Cane Growers' Council for the sugar farmers.

Judging of Export Pigs.

An interesting new class has been added to the Royal National Association's schedule for the August Exhibition.

It is additional to the junior judging competitions, for which special trophies have been provided.

The new class is known as the Dr. Graham Brown £10 Prize, for the best appraisal of live export baconer pigs. They have to be judged alive by the competitor for their commercial carcase value, based on export standards for the English market.

The prizes will be awarded in order of merit to the competitors whose score cards most closely approximate to the official award of the carcase judge.

Entry in this class is strictly limited to pig farmers, members of their family, and farm workers who are actively engaged in the pig-raising industry.

The pigs to be judged will be selected from the class for three baconer pigs in the commercial section, judged alive at the showground, and again at Brisbane Abattoir after they have been dressed.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of Mr. W. D. Francis, Botanist.

Native Tobacco.

Inquirer (Townsville)—

The specimen from the Mount Isa district is the native tobacco, *Nicotiana suaveolens.* Feeding tests have proved this plant to be poisonous to stock. Seddon and McGrath, who conducted feeding tests with it in New South Wales, found that 12 oz. of the dried leaves were repeatedly poisonous to sheep. On the other hand, they found that repeated small doses of less than 12 oz. were not toxic.

Mostly the plant is avoided by stock, which suggests that it is unpalatable, but hungry stock, and especially stock travelling over bare stock routes, are often forced on to it.

Purple Plum Grass. "Red Head."

D. McK. (Goondiwindi)—

No. 1. *Triraphis mollis,* Purple Plume Grass. This is rather a grass with a wide distribution in Australia. It is a handsome grass, the seed-heads soft and plume-like and usually of a purple colour, at least when mature. Silver Top is a name sometimes given to it. Stock eat it both green and dry, although it is generally regarded as of only secondary value in the mixed native pasture.

No. 2. *Chrysopogon pallidus.* Being a tall grass with a reddish seed-head, it is sometimes called "red head," a name applied to a number of different grasses in Queensland. Further west it is also known as blue leaf. It has a very wide distribution in the State, and probably finds its greatest development in the Central West, where it forms an important constituent of the pasture in many places. Most graziers report it to be quite good fodder, greatly sought after by sheep, especially in its young stages. When old and dry, that is, after the seed has fallen, the grass is of very little value, but this applies to the great majority of grasses.

Sour or Yellow Grass.

S.H. (Caboolture)—

The grass has been determined as sour or yellow grass (*Paspalum conjugatum*). This grass is a serious pest on the Atherton Tableland. It also appears to be spreading in parts of southern Queensland. Experience in this State shows that it is an inferior grass, and a menace in many districts to paspalum and other good pastures.

Cockspur Thorn.

Querist (Ayr)—

Your specimen is the cockspur thorn, *Cudrania javanensis.* It is a native plant, which is also indigenous to East Africa and Southern Asia. It is somewhat of a pest about Brisbane in vacant allotments, and along roadsides. We have not heard of the fruit being edible before.

Milky Cotton Bush.

J.T.B. (Clifton)—

The plant specimen is red head or milky cotton bush, *Asclepias curassavica.* This is a common weed on very many farms, although it never seems to be prevalent in very large numbers. As it is a poisonous plant, causing gastro-enteritis when eaten, it is mostly avoided by stock. It is a native of South America.

A Native Convolvulus.

T.B. (Dimbulah)—

The vine has been identified as *Ipomoea quinata*, a native plant belonging to the convolvulus family. The species is also found in Burma and southern China. We were very interested to read your remarks about the palatability of this plant and its speedy growth after fires have passed over the country. We are keeping a record of your remarks to be filed away with our specimens in the herbarium.

A Fungus.

F.Y. (Hemmant)—

Your specimen is one of the Star Fungi. It is a species of *Aseroe*, probably *Aseroe rubra*.

Native Rosella.

J.F.B. (Flaggy Rock)—

The specimen has been determined as the native rosella, *Hibiscus heterophyllus*. This plant has not so far been found to be harmful to stock. In most cases it is assumed that it is good fodder. So far as we know, this plant is not likely to be the cause of the death of stock on your property.

A Rattlepod.

Inquirer (Windorah)—

The specimens have been determined as *Crotalaria dissitiflora*, one of the rattle pods, and belonging to the legume family. *Crotalaria striata*, another species of the genus, was found to be poisonous, in the Northern Territory. Although we have no experimental proof, it seems likely that the plant you send may be the cause of the deaths of the sheep. On the whole, stock avoid the crotalarias. This circumstance suggests that these plants are at least unpalatable. Your letter has been referred to the Poison Plants Committee of this Department.

Hop Bush.

J.P.P. (Chinchilla)—

The specimen has been determined as *Dodonaea viscosa*, fairly well known as "hop bush" on account of the winged fruits. We have no records of its being poisonous or harmful to stock. As a matter of fact, it is generally considered to be a good fodder plant. In spite of this, it is, of course, possible that the eating of this plant might have had something to do with the losses of the calves referred to in your letter, which has been referred to the Poison Plants Committee.

"Wild Peach."

E.Y. (Dirranbandi)—

Your specimen belongs to the pittosporaceous plant known botanically as *Citriobatus pauciflorus*. In the Dawson Valley it is sometimes called "Wild Peach," probably on account of the appearance of the fruit. It is a native species. We have no data as to the edibility of the fruit.

Tick Trefoil.

Inquirer (Townsville)—

The specimen from the Tully district is a tick trefoil (*Desmodium triflorum*). This is a leguminous plant, and is mostly looked upon as a good fodder. Its chief disadvantage is that it is very small and very low-growing, so that it provides very little growth which can be eaten off by dairy stock. It is recorded as common in different tropical parts of the world. So far as we have observed, it is very well established in many coastal parts of the State, from the New South Wales border up to Cairns.

Kaffir Plum.

A.H.B. (Nambour)—

Your specimens are from the Kaffir Plum, an ornamental species with an edible fruit and a native of South Africa. It is commonly planted in gardens in Queensland. It is known botanically as *Harpephyllum caffrum*.

Rural Topics

A Duck's Diet.

The gizzard of a duck found dead in a farmyard in Devon, England, contained two pieces of wire 3 inches long, several parts of a razor blade, a wire nail, a lump of glass, and a large assortment of brightly coloured scraps of pottery, glass, and stone. No wonder it dodged the kitchen axe!

The Cow "Wired In"—Remarkable Veterinary Surgery.

When a cow owned by an Indiana (U.S.A.) farmer became violently ill recently, the veterinary surgeon who was called in to examine her removed a rib and found that a 3-inch piece of barbed wire had worked its way from the cow's stomach to the heart. He cut out the wire, sewed up the wound, and now she is as good as new.

Bulls on the Bucket.

On a property in the Argentine, bulls are not weaned until they are two years old. At feeding time, the huge animals, some of them weighing three-quarters of a ton each, and all of them matured, are tied to racks where they feed like unweaned calves on a succession of cows. Each bull drinks about 30 quarts of milk a day and requires two to three "foster mothers" at a feeding. When they are two years old, the bulls are graduated to a diet of carefully-mixed grain.

Cocktails in the Fowlhouse.

Strutting roosters and waddling hens step right up and demand a cocktail on the house at a poultry farm near Cedar, Iowa (U.S.A.). The cocktails, however, are made of tomato juice. The farmer's wife claims that the bottled sunshine, which she puts up in the autumn, keeps her flock free from roup and other ailments, and produces hardier chicks.

Farmers become Air-minded.

Farmers in some parts of the United States have used aeroplanes for marketing, for sowing and dusting crops, and even for mustering cattle. Now the market gardeners of Delano, California, are using an aeroplane as a flying scarecrow. Despairing of controlling flocks of sparrows which were ravaging their lettuce crops, they recently chartered a plant to roar over their fields for six hours daily. The birds couldn't stand the racket, and went off the lettuce diet—science marches on!

Hidden Wealth—A Slab of Farm Philosophy.

Many of us are familiar with the fable of the hidden fortune left by the old farmer to his more or less shiftless sons. The wise old man failed to specify the exact place where the treasure could be found, so the sons proceeded to dig up the earth with great energy until finally they had gone over the best of the fertile, untilled fields and still no pot of gold had been uncovered. In despair, they gave up looking for the easy money left by their departed parent. Then they suddenly realised that the land they had turned over was ready for a crop. From that crop an abundant harvest was reaped, and then the sons awakened to the fact that they had stumbled on the hidden wealth left to them by the old man.

The obvious moral of that old yarn is that there is hidden wealth to be uncovered in every district. It is no good trying to find it with a divining rod. What are needed are the firm hands and strong arms of the willing worker directed by an alert mind and backed up by a co-operating community. Around us is a great abundance of many kinds of material ready to be put to good and profitable use—lands, for instance, which are calling for proper cultivation, and, most important of all, labour of varying degrees of skill which is not fully employed to the best advantage.

A thousand outside influences help to colour the life of a community. We should not ignore them, for we cannot afford to lose the advantages they make possible for us, but the pot of gold is not behind the distant green hills—it is in the soil at our feet.

A Drastic Penalty.

A Scottish farmer was recently fined the maximum penalty of £10 for having failed to seal twelve milk cans before delivering them to a motor haulage contractor for transit.

Mankind a "Biological Nuisance."

In a characteristic utterance at the Science Congress at Canberra, Mr. H. G. Wells said that from the earliest time man appears as "a biological nuisance to himself as well as to the rest of living things. He cuts down trees, he destroys soil, and he acclimatises destructive animals. A map of the world showing the devastated regions due to mankind would amaze most people. In the last hundred years you have seen great regions of the United States turned into a desert, you have seen Australia swept by weeds and rabbits, you have seen a slaughter of useful animal species, you have seen a monstrous destruction of natural resources, and your old history teaching does nothing to awaken the minds of the coming generation to the gravity of this process."

The Farm and the Town—An Economic Combination.

Happily with a better understanding of each other's place in the scheme of things, the farmer and the townsman are both realising how much each depends on the other economically. We could never make any real progress in the economic field without mutual confidence between the producer of primary products and the producer of secondary industry, for, apart from those engaged in supplying services, they are the chief components in what is called the body politic. Without co-operation between those engaged in rural and urban industry, and a complete understanding of each other's viewpoint, our economic system could not function properly and the active advancement of the country would be retarded.

Each section of the community has its share to contribute to the welfare of the whole, each has a definite influence on our national life, and each is entitled to a fair reward for its contribution.

The plain fact is that neither the producer nor the consumer can exist without the other; and his home market—that is the market provided by the town dweller—is the farmer's best market.

Health and Agriculture.

The most hefty obstacles to progress in nutrition and health are, it is said, poverty and ignorance. To these, however, must be added the national fears on which plans for "self-sufficiency" are based, and these plans have increased the prices of protected foodstuffs, lowered the standards of living, and hampered international trade. It is believed that governments, by raising the level of nutrition and increasing the consumption of foodstuffs can indirectly revive international trade and promote agricultural production. Some governments, including those of Australia and Great Britain, are now taking steps to do so. If such policies were pursued vigorously and generally, the primary producer as well as the community in general would benefit considerably. A "marriage of health and agriculture" would end—or help to end—the sterile restriction of production. This is what the last report on nutrition from Geneva says:—"The malnutrition that exists in all countries is at once a challenge and an opportunity—a challenge to men's consciences, and an opportunity to eradicate a social evil by methods which will increase economic prosperity."

Changing Trends in Agricultural Research.

Pressing problems have given renewed impetus to agricultural research. The whole world is in a state of flux, and almost overnight, so to speak, we are faced with an entirely new set of problems.

One of the most marked changes in our thinking which has been brought to the point of action is in regard to the necessity for conservation and the wise use of our land resources. This has led to greater need for emphasis on research in agricultural economics. More time and attention has to be given to soil surveys and soil studies, because the information in this field has much to do with the long-time soundness of changes in land use; to pasture and fodder crop research; to crop improvement; to new uses for agricultural products; to erosion investigations; to reforestation; and to marketing and distribution.

The Romance of the Queensland Dairy Industry.

Having to milk as usual every morning convinces us of the realism rather than the romance of dairying; still, the realism of bail and bucket may be forgotten for a moment to contemplate the romance of achievement. Here it is:—In the lifetime of men still comparatively young the Queensland dairy industry has grown to become one of the main sources of the State income. This year it is actually worth, in round figures, more than ten millions (£10,000,000) to Queenslanders.

Farm Notes

AUGUST.

AUGUST is normally a dry month throughout the State, but where good soil moisture exists the advent of warmer weather will cause weed growth to increase, necessitating the use of cultivators in growing crops and land being prepared for maize, cotton, sorghums, and other crops.

Well-worked land having reserves of subsoil moisture is essential for satisfactory subsequent growth, as spring sown crops often have to withstand moderately dry conditions until the occurrence of early summer storms.

In coastal districts where frost is not liable to occur, early sowings can be commenced of maize, sorghums, millets, sudan grass, pumpkins, and melons, together with the planting of arrowroot, artichokes, sweet potatoes, &c., but unless ample soil moisture is present, there is little to be gained by very early sowings before the soil is sufficiently warm, as later-established areas will often make rapid growth, equalling or excelling that of earlier sowings.

Potato planting will be carried on in the Downs, South Burnett, and other areas away from the coast, where July plantings are likely to be affected by frost, the bulk of the spring crop being established during July and August.

Potatoes show a partiality to thoroughly prepared virgin soils, more especially deep, friable well-drained alluvial loams and scrub soils, which indicates that the maintenance of a supply of humus in the soil is essential for profitable yields.

Seed potatoes for this crop are usually procured from the Southern States, where certified seed true to varietal type is now available, but to prevent seed-borne disease all seed should be treated either by the hot formalin or corrosive sublimate methods, full particulars of which are obtainable from the Department. Whole sets are preferable, but cut sets may be used for the spring planting, dusting the cut surfaces with wood ashes or slaked lime shortly after cutting.

Dairymen in many districts will now be utilising early sown winter fodder crops to maintain production, and where crops are grazed, temporary subdivision will prove valuable in conserving growth and providing fresh pastures at frequent intervals.

On the Downs the grazing of wheat areas, intended ultimately for grain, should cease by late July, otherwise probable yields are likely to be considerably reduced.

Orchard Notes

AUGUST.

THE COASTAL DISTRICTS.

IN many centres the bulk of the citrus fruits, with the exception of the late-ripening varieties, will have been harvested, and cultural operations should be receiving attention.

Trees which show indications of impaired vigour will require a somewhat heavy pruning, both in respect to thinning and shortening the branches. Where the trees are vigorous and healthy a light pruning only will be necessary, except in the case of the Glen Retreat mandarin. The densely-growing habit of this variety leads to a profusion of weak shoots, which, if allowed to develop, will cause overbearing with resultant small and inferior fruit at an early age.

Where trees show signs of failing, investigations for the presence of collar rot should be made at or near ground level. The roots should be examined for disease, and in the North Coast districts for the presence of the citrus root bark channeller. A light application of paradichlorobenzene buried a few inches deep in circular drills arounds the tree and with the surface stamped firmly has been recommended for controlling this pest. The distance between the circular drills should be not more than 18 inches, and care should be taken to prevent the crystals of para-dichlorobenzene from coming into contact with the roots. It may be necessary to repeat the application after an interval of three or four weeks.

Where it is necessary to control black spot, melanose, scab, and brown spot of Emperor mandarins the fungicide should be applied at the correct time. The control measures recommended are—

For Scab and Melanose.

Colloidal copper (3-40) or Bordeaux mixture (3-2-40) + 1 per cent. oil emulsion when half to three-quarters of the blossom has fallen.

For Black Spot.

(1) As above;

(2) Repeat the spraying at similar strength two months later.

For Brown Spot of the Emperor Mandarin.

(1) As for black spot;

(2) As for black spot;

(3) Repeat the spraying at a similar strength in late February.

Where for any reason healthy trees of vigorous constitution are unprofitable, they may be headed back—in fact, have the whole of the top removed—leaving a few selected arms. All other branches should be cut away at their source of origin. The three or four remaining arms, of which lengths will vary from 2 to 4 feet, will form the future framework of the tree. Care must be taken to cover the whole of the exposed bark with a suitable coating of whitewash to prevent sunburn. The numerous shoots which will grow from main arms should be suitably reduced, leaving from two to four on each arm. Under favourable conditions, these will be in a fit condition to receive selected buds from desirable trees by the following autumn. It is desirable that when shoots intended for budding have attained a length of from 6 to 9 inches, their terminals should be nipped off in order to stiffen their growth and guard against the possibility of damage by strong winds.

Fertilizing should be completed as early as possible, the mixture for the spring application being high in readily available nitrogen. Ploughing should then be completed, the depth being regulated by local conditions and the nature of the original preparation of the land. Following the ploughing, the land should be worked down to a fine state of tilth. On hillside orchards, attention should be given to the care of possible storm waters. Cultivation should be so arranged as to form shallow drains or banks along the tree rows and across the heaviest slope, leading into suitable side drains which may be grassed to prevent erosion.

The planting of trees may be continued and, with the exception of custard apples, expedited. The attention of citrus growers should be confined to varieties suited to their local conditions.

The pruning of grape vines should be completed, and where cuttings for planting are required these should be selected, trimmed, and heeled-in in slightly dry soil. Canes intended for cuttings should not be allowed to lie about and dry out, but should be treated the day they are severed from the plant. Cuttings are frequently made of excessive length. From 10 to 12 inches is a suitable length which allows for insertion in the soil so as to permit of the top bud, with a short section of the internode, protruding above the surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL pruning other than that applied to peaches and varieties which are late in coming into growth should be completed this month, and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. When there are indications of the swelling of the buds, the time is opportune for working over unprofitable trees, where the stock is reasonably vigorous. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

The pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation as they are subject to much variation.

The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted deep working is most detrimental. The matter of seedling stocks for apples and the inferior plants frequently received from Southern nurseries prompts a query as to how many seeds have been stratified for spring planting, and whether any effort is being made towards raising a local supply of nursery stock.

HANDY BOX FOR TOOLS.

In the old days carpenters used a hand basket for carrying the tools they needed on the job. A box is handier and can be made from stuff picked up around the place. The sides are best of thin material. For carpenter's tools it is best made long enough

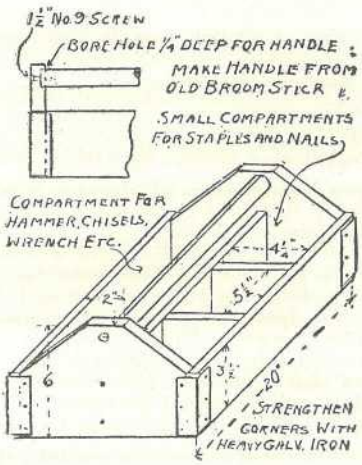


Plate 44.

to take a saw, though this is not absolutely necessary. The box shown is 20 inches over all, and has corners reinforced with sheet iron. The sides are 3½ inches deep, and the ends at the highest point 6 inches. The width is about 10 inches. One side is divided into compartments for nails and staples.

Our Babies.

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

PREVENTION OF INFECTION.

WINTER INFECTIONS.

COUGHS and colds and sore throats occur all the year round, but are more common at this time of the year. Although these infections are mild in the majority of cases, they may interfere temporarily with the child's appetite and nutrition, as well as with his sleep, making him restless and fretful. Occasionally the infections are serious, or they may be accompanied by serious complications, particularly in the case of young children.

How Infections are Spread.

It is most important that mothers should understand the cause of these infections and how they are spread. They are caused by disease germs and are spread from one person to another—

Firstly, by those persons suffering from mild attacks of the infection.

Secondly, by those persons who are convalescent from an attack and are able to go about while harbouring the germs.

Thirdly, by those persons who appear well, but who are carrying germs in their noses and throats.

When these persons cough or sneeze, or even speak, these germs are expelled into the surrounding air.

Dwellings, public buildings, and conveyances are often poorly ventilated in the cold weather, hence the air tends to become more polluted than it is in the warm weather when ventilation is generally good.

"Colds" are not Caused by Cold.

A drop in the temperature in itself will not cause a cold, providing the body is adequately clothed and is not subject to sudden chilling. Chilling temporarily lowers the resistance and will predispose to illness when the germs of the disease are being carried by the child. The chilly feeling experienced at the onset of an attack is part of the disease process not its cause. It may be stated, therefore, that winter infections are not caused by going into the fresh air but by being confined in badly ventilated buildings or rooms with persons carrying the germs of infection.

Smearing.

A method of spread common amongst young children is that of putting their fingers into their mouths and noses and transferring secretions containing germs to the hands and mouths of other children.

Cause of Illness.

Whether exposure to infection will cause illness or not depends upon two things.

First, the child's resistance or the power of his body to kill or disable the germs.

Second, the massiveness of the infection or the number of germs making the attack and the virulence or strength of each.

With good resisting power a child may resist an infection unless the germs are massed in sufficient numbers, or are sufficiently virulent to overcome his resistance.

To Increase Power of Resistance.

The child's general resistance can be built up by attending to his general management and feeding. The breast-fed or naturally-fed infant has better resistance than the infant who is fed artificially or unnaturally. The resistance of the older child is increased by feeding him on a balanced diet containing such food as milk, butter, cheese, whole meal or wheat germ bread, marmite or vegemite, eggs, fish, meat, fresh vegetables and fruit according to his age. The addition of cod liver oil emulsion is useful, particularly in the case of the poorly nourished child and in cold weather.

Resistance to specific or particular infections is brought about by methods such as immunisation against diphtheria, vaccination against smallpox.

To Diminish Power of Attack.

Reference to the importance of good ventilation has already been made. Ventilation provides us with a means of dividing up the invading hosts of germs, and thereby rendering their attack less effective. Young children, and particularly babies, should not be taken into crowded buildings or be allowed to associate with older children and adults who are suffering from obvious infections, such as coughs, colds, and sore throats. When the mother or other attendant is the person affected she should avoid coughing or sneezing into the child's face. Many persons suffering from coughs and colds thoughtlessly neglect to use handkerchiefs.

No child should be exposed to infection unnecessarily. There was a time when mothers deliberately exposed their children to certain infections with the idea of allowing them to develop the diseases and thus acquire immunity. This procedure would be a sound one, if the dose and the strength of the germs causing the infection could be controlled.

Cultivate a Public Health Conscience.

In the interests of those children who are well, a child suffering from an infection should not attend a nursery school or kindergarten or any other school. He should not be taken to a baby clinic, where he will came into contact with babies and older children who are well and whom the nurses are doing all they can to protect from infections and keep well. The clinic nurses are trained to advise mothers in regard to the general care and management and the correct dieting of children up to school age, with the object of building up their resistance to infections.

There are still those who think that clinics are institutions to which sick children should be taken. These children should attend the hospitals, or go to their own doctors for advice.

You may obtain information on all matters concerning infant and child welfare by visiting the nearest clinic, or by writing to the sister in charge, or by communicating direct with the Baby Clinic and Child Welfare Training Centre, Alfred street, Valley, N.1, Brisbane.

IN THE FARM KITCHEN.

STEAMED PUDDINGS.

At this time of the year steamed puddings are always welcome additions to the menu. Here are a few simple and tested recipes:—

Sago Plum Pudding.

Take 3 tablespoonfuls of sago, 1½ gills hot milk, ½ cupful breadcrumbs, ¾ cupful stoned raisins or sultanas, ½ cupful sugar, 2 oz. butter, 1 egg, ½ teaspoonful bicarbonate of soda, toffee sauce.

Wash the sago and strain it. Pour the hot milk on the sago and let it stand for three hours. Add the raisins to the sago with breadcrumbs, sugar, and butter. Put the mixture into a saucepan and heat it till the butter is melted. Beat the egg with the soda and stir it in. Pour into a mould which has been well greased and twist a greased paper over the top. Steam for two hours. Leave the pudding for three minutes before turning out. Pour toffee sauce round and serve.

Toffee Sauce.

Take 2 oz. butter, ¾ lb. golden syrup, ¾ lb. brown sugar.

Melt the butter and add the sugar and syrup, stir till it boils. Boil it for fifteen minutes. Stir till it begins to thicken and pour it quickly round the pudding.

Roly-poly with Nut Filling.

Take ½ lb. flour, ¼ lb. suet, 1 flat teaspoonful baking powder, water to mix, 2 tablespoonfuls golden syrup, 2 oz. breadcrumbs, ½ flat teaspoonful ground ginger, 1½ oz. shelled Brazil nuts (or other suitable nuts).

To make the filling, warm the syrup in a saucepan, then stir in the breadcrumbs mixed with the ground ginger, also Brazils (previously put through a mincer). Mix all together, then leave to cool. Chop the suet finely and mix with the flour and baking powder, add water gradually, and mix to a dough. It must not be at all sticky. Turn on to a floured board and roll to an oblong shape (not too thin). Then turn on to the other side and spread over the prepared filling, leaving a good margin all round. Damp the edges and roll up, pinching it well together at either end; then roll in a scalded and floured pudding cloth and tie securely. Put into boiling water and boil for about one and a-half to two hours.

Tricolour Pudding.

Take ¼ lb. flour, 1 oz. cleaned currants, 2 oz. margarine or butter, 2 tablespoonfuls sugar, cochineal, ½ oz. cocoa, 1 egg, 1 dessertspoonful sugar extra, vanilla essence, ½ teaspoonful baking powder, ½ cupful milk, jam sauce.

Grease a basin and put the currants at the bottom. Put some water on to boil. Cream the margarine and sugar till soft and beat in the egg. Add the flour, milk, and baking powder. Leave one-third of the mixture in the bowl used for mixing and do not colour it. Put one-third of the mixture into another bowl and stir into it the cocoa mixed with the dessertspoonful of extra sugar. Add a few drops of vanilla. Put one-third of the mixture into a basin and colour it red with cochineal. Take dessertspoonfuls of the red, white, and brown mixtures alternately and put them in the greased basin, which should be little more than half full. Cover the mixture with greased paper and stand it in a saucepan containing enough boiling water to come half-way up the basin. Steam steadily for one hour. Pour jam sauce round, and, if desired, decorate with cream.

Jam Sauce.

Take ½ cupful raspberry jam, juice of a lemon, ½ pint water, a little cochineal, 1 tablespoonful sugar, ½ dessertspoonful cornflour.

Put the jam, lemon juice, and sugar in a small pan, add half the water and boil up. Mix cornflour to a smooth paste with remainder of the cold water and pour the boiling sauce on to it, stirring well. Return it to the pan and stir till it boils. Add a little cochineal. Simmer for ten minutes and strain.

Steamed Pineapple Pudding.

Take 3 oz. stale sponge cake, small tin pineapple, 3 dessertspoonfuls sugar, 2 eggs, 1½ gills milk.

Drain the pineapple. Put it through the mincer, and then make it up to half a pint with some of the syrup. Crumble the sponge cake finely and mix with the prepared pineapple. Separate the eggs. Beat up the yolks, add the milk, then stir into the pineapple, &c., with the sugar. Whisk the egg-whites to a very stiff froth and fold in lightly. Turn the mixture into a well-buttered mould, cover securely with a buttered paper, and steam for about one and a-half hours. The water should simmer, not boil fast, and should not reach more than half-way up the mould. When cooked turn out carefully and serve hot or cold. If liked, the remainder of the syrup can be heated and coloured with a few drops of cochineal and poured round the pudding.

Cardinals.

Take 1 tablespoonful butter, ½ teacupful soft sugar, 1 teacupful flour, ½ teaspoonful baking powder, pinch salt, 6 dessertspoonfuls jam, 2 eggs.

Soften the butter in a basin, add the sugar, and beat well again. Mix the flour, baking powder, and salt together and stir into the mixture. Have six small moulds well buttered, put a dessertspoonful of jam in each (apricot jam is excellent for this), half fill the moulds with the mixture, place them in a saucepan with about an inch of boiling water, and steam for half an hour. Serve at once.

Delicious Plum Pudding.

Take 5 tablespoonfuls plum jam (stoneless), ½ lb. breadcrumbs, 1 lemon, ¼ lb. suet, 1 egg, milk to mix.

Make the breadcrumbs. Grate the lemon rind and add. Chop the suet finely and mix it with the breadcrumbs. Beat up the egg. Squeeze the lemon and strain the juice. Put the jam in the centre of the dry ingredients, add the lemon juice, and mix with some of the breadcrumbs, &c. Add the egg with some milk as required and mix all together. Put into a greased pudding basin, cover securely with a greased paper and steam for about two hours to two hours and a-half. Turn on to a hot dish, dredge with castor sugar, and serve.

Golden Pudding.

Take 6 oz. flour, 6 oz. suet, ¼ lb. sultanas, ½ flat teaspoonful bicarbonate of soda, 6 oz. breadcrumbs, 6 oz. syrup, a little grated nutmeg, 1 egg, milk and water to mix about 1½ to 2 gills.

Wash the sultanas, rub in a cloth, remove stalks and dry them well. Mix the soda with the flour and sieve through into a basin. Make the breadcrumbs. Skin and finely chop the suet. Add these together with the sultanas and grated nutmeg

to the flour; mix well. Beat up the egg, add the syrup, and whisk together. Then add to the dry ingredients with sufficient milk and water to make a rather wet mixture. It should be about the same consistency as a cake. Put into a greased basin, cover with a greased paper and floured pudding-cloth and steam for two and a-half to three hours. Turn on to a hot dish and serve with golden sauce around it.

Golden Sauce.

One gill syrup, ½ gill water, 1 tablespoonful lemon juice.

Boil all together for five minutes and pour round the pudding.

SOME SPONGE MIXTURES.

This simple sponge mixture can be used in at least twelve different ways for cakes and steamed or baked puddings.

Take 2 eggs, their weight in butter, sugar, and flour.

Cream the butter and sugar, beat up the eggs, and add separately, mixing in thoroughly. Mix in a little flour at a time, also a small teaspoonful of baking powder if plain flour is used. Beat up thoroughly. This mixture can be put in a buttered basin and steamed for one and a-half to two hours, or baked in a buttered pie-dish for three-quarters of an hour to one hour. As a cake it takes about one hour in a moderate oven.

Treacle Sponge.

Put two tablespoonfuls of syrup at the bottom of pie-dish or basin.

Ginger Sponge.

Add two level teaspoonfuls of ground ginger to the flour. Serve with vanilla sauce.

Cherry Sponge.

Cut up two or three ounces of glace cherries and add to mixture. Serve with custard sauce.

Marmalade Sponge.

Put two tablespoonfuls of marmalade at bottom of basin or pie-dish.

Sultana Sponge.

Four ounces of sultanas, raisins, or currants, or all mixed added to sponge mixture.

Date Sponge.

Four ounces of dates are added. These two puddings take a little longer to cook, and if more fruit is added still longer cooking will be required.

Coffee Sponge.

Add one tablespoonful of coffee essence to mixture, and a little extra flour. Serve with white sauce flavoured with coffee or cream.

Chocolate Sponge.

Add a good tablespoonful of cocoa and a little extra sugar or chocolate powder without extra sugar to the flour. Serve with chocolate sauce.

Orange Sponge.

Grate rind of two oranges into mixture and mix well. Serve with white sauce flavoured with juice of one orange.

Lemon Sponge.

Same as orange with a little more sugar added to sauce.

Peach Sponge.

Drain the juice from a tin of peaches, cut up small, and place in bottom of pie-dish. Pour sponge mixture over. Any tinned, stewed, or fresh fruit, drained of juice, can be used for this pudding.

Strawberry Sponge.

Mix enough cochineal into the mixture to colour it pink. Put two tablespoonfuls of strawberry jam at the bottom of the basin. All these mixtures except the treacle, marmalade, jam, and peach can be baked as cakes.

TREE VALUES.

"Waratah," the well known *Sydney Morning Herald* writer, has the subjoined appreciation of tree values in a recent issue of that journal—

In city, country towns, and right out-back, interest in trees grows steadily, as their value for decoration, as shade givers, and as general beautifiers becomes more known and appreciated.

For home garden, street, and park use intensive research is now going on for the best and most suitable varieties to give long and worthy service.

Growers from farm and station have joined the quest for tree beauty in foliage and line and flower, which transforms homesteads as well as the garden plots of suburban allotments.

Some tell me that they have no room for trees in "small gardens," because the roots are voracious and the branches throw shadows over precious space where annuals and other colour-makers are growing.

To that, I reply that my own garden was built on an ordinary home plot of 50 feet x 200 feet, and it contains trees, mostly small—but also a few large—growing in perfect harmony with shrubs and roses and annuals. The contemplation of this finished outlay is one of the real pleasures of life. There is always something happening—this or that shrub is blooming and another tree is in bud, ready to show its glory. . . . Needless to say, the birds love these little touches of introduced bushland beauty, as I do, and a friendship is born of the questing in quiet corners.

Sometimes they scold me—these feathered visitors—when they are searching for honey, which is abundant at flowering time, but mostly they know that we have a dual kinship with nature and a respect for the rights of smaller living things.

But we set out to talk about trees, and I must tell of those which give me so much joy as they progress on this small holding.

There are two Jacarandas; both are in the growing-up stage. Bauhinia purpurea is another small-tree colourist which I cherish, as its springtime purple cloud of bloom rivals the Jacarandas.

The Cape Chestnut (*Calodendron capense*) finds a place for its grand work when in the mood, and a Virgilia has given some splendid colour pictures on hot summer days. . . .

I cannot imagine any garden which I may make consisting merely of small shrubs and beds of annuals—even of the gayest colours—or of lawns and roses, without my beloved trees and tall shrubs. . . .

The trees and shrubs in my garden form a nice background setting for the rose garden, and they hide the obtrusive fences effectively. Neighbours' feelings are not outraged by intruding roots and overhanging branches, either, because most of the larger subjects are well out of the way.

A few tall trees and shrubs are against the western fence, where their shade is gratefully accepted "next door," and these are rather deep or tap-rooters. It is all a matter of collaboration.

"All this is very interesting," a country friend reminded me, when he heard the recital, "but how does it help us outback? There are not any varieties mentioned for our conditions, and country gardens need trees or shrubs, large or small, for breakwinds, shade, and beauty."

SALT FOR WORKING HORSES.

A good farm horse is well worth his feed. Most farmers realise this, but all too frequently plough horses may be seen licking the dried sweat from each other.

Working horses are incapable of sustained effort without a liberal supply of salt, and when the food is low in this mineral they try to remedy the deficiency by licking the saline deposit from evaporated sweat round the collar, saddle, and other gear of a team mate.

It is, therefore, sound practice to keep rock salt in a convenient place for working horses.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1939 AND 1938, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of years' records.	May, 1939.	May, 1938.		May.	No. of years' records.	May, 1939.	May, 1938.
North Coast.	In.		In.	In.	*South Coast–contd.*	In.		In.	In.
Atherton	2·23	38	2·69	1·38	Gatton College ..	1·60	40	..	6·39
Cairns	4·50	57	2·63	3·19	Gayndah	1·58	68	0·28	4·03
Cardwell	3·61	67	1·55	2·98	Gympie	2·84	69	1·35	8·77
Cooktown ..	2·79	63	0·71	1·40	Kilkivan	1·85	60	1·57	4·98
Herberton ..	1·72	53	0·80	0·44	Maryborough ..	3·00	68	2·15	6·62
Ingham	3·72	47	2·85	7·90	Nambour	5·10	43	4·77	26·71
Innisfail	12·39	58	11·33	10·52	Nanango	1·54	57	0·49	4·50
Mossman Mill ..	3·77	26	0·96	1·88	Rockhampton ..	1·60	68	1·41	2·34
Townsville ..	1·26	68	0·45	0·39	Woodford ..	3·03	52	2·61	15·23
Central Coast.					*Central Highlands.*				
Ayr	1·08	52	0·12	..	Clermont ..	1·31	68	0·37	5·32
Bowen	1·26	68	0·60	0·11	Gindie	0·93	40	..	3·88
Charters Towers ..	0·77	57	0·23	0·43	Springsure ..	1·24	70	0·82	3·07
Mackay P.O. ..	3·78	68	6·28	4·17	*Darling Downs.*				
Mackay Sugar Experiment Station	3·32	42	7·11	4·11	Dalby	1·29	69	0·01	2·25
Proserpine ..	4·22	36	3·46	2·67	Emu Vale ..	1·15	43	0·12	2·87
St. Lawrence ..	1·75	68	0·75	1·95	Hermitage ..	1·18	33	..	3·56
South Coast.					Jimbour	1·18	51	0·20	1·13
Biggenden ..	1·77	40	1·32	5·80	Miles	1·52	54	1·09	6·24
Bundaberg ..	2·64	56	0·84	7·53	Stanthorpe ..	1·79	66	0·55	2·53
Brisbane	2·82	87	1·35	11·81	Toowoomba ..	2·18	67	1·38	6·75
Caboolture ..	2·99	52	2·30	14·20	Warwick	1·51	74	0·08	3·59
Childers	2·17	44	0·91	6·32	*Maranoa.*				
Crohamhurst ..	5·08	46	4·31	21·91	Bungeworgorai ..	0·97	25	..	5·43
Esk	2·05	52	0·93	9·78	Roma	1·44	65	0·49	8·10

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MAY, 1939.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·94	81	69	82	1, 11-13, 16-18, 20-22	60	31	71	6
Herberton	..	72	56	76	16, 17	47	5	80	11
Rockhampton	30·08	79	62	85	21	50	25	141	8
Brisbane	30·16	74	58	81	22	51	30	135	13
Darling Downs.									
Dalby	30·18	75	48	80	20	35	25	1	1
Stanthorpe	..	67	44	73	21	30	24, 25	55	7
Toowoomba	..	69	53	75	22	43	1	138	11
Mid-Interior.									
Georgetown	29·98	87	60	91	17	50	4	..	..
Longreach	30·07	83	56	88	2	46	25	7	1
Mitchell	30·15	75	46	81	22	33	25	34	2
Western.									
Burketown	29·98	88	63	93	17, 18, 19	58	27	..	..
Boulia	30·10	83	56	89	10	45	25	..	..
Thargomindah ..	30·11	78	51	83	11	42	25, 26	87	2

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	July, 1939.		August, 1939.		July, 1939.	Aug. 1939.
	Rises.	Sets.	Rises.	Sets.	MOONRISE. Rises.	MOONRISE. Rises.
					p.m.	p.m.
1	6·46	5·6	6·35	5·21	4·53	6·17
2	6·46	5·7	6·34	5·22	5·48	7·6
3	6·46	5·7	6·33	5·23	6·39	7·54
4	6·46	5·8	6·33	5·24	7·32	8·50
5	6·45	5·8	6·32	5·25	8·21	9·39
6	6·45	5·9	6·31	5·26	9·14	10·33
7	6·45	5·9	6·31	5·26	10·4	11·28
8	6·45	5·9	6·30	5·27	10·56	a.m.
9	6·44	5·10	6·29	5·27	11·47	12·23
10	6·44	5·10	6·28	5·28	..	1·19
					a.m.	
11	6·44	5·11	6·28	5·28	12·42	2·20
12	6·43	5·11	6·27	5·29	1·36	3·17
13	6·43	5·12	6·26	5·29	2·36	4·13
14	6·43	5·12	6·25	5·30	3·34	5·6
15	6·42	5·13	6·24	5·30	4·37	5·57
16	6·42	5·13	6·23	5·31	5·34	6·43
17	6·42	5·13	6·22	5·31	6·29	7·27
18	6·41	5·14	6·21	5·32	7·20	8·11
19	6·41	5·14	6·20	5·33	8·7	8·55
20	6·41	5·15	6·19	5·33	8·52	9·38
21	6·40	5·15	6·18	5·33	9·35	10·21
22	6·40	5·16	6·18	5·34	10·16	11·8
23	6·40	5·16	6·17	5·34	10·57	11·58
						p.m.
24	6·39	5·16	6·16	5·34	11·40	12·49
					p.m.	
25	6·39	5·17	6·15	5·35	12·24	1·38
26	6·38	5·17	6·14	5·35	1·11	2·31
27	6·38	5·18	6·13	5·35	2·0	3·22
28	6·37	5·18	6·12	5·36	2·52	4·12
29	6·37	5·19	6·11	5·36	3·41	5·4
30	6·36	5·19	6·10	5·37	4·34	5·55
31	6·36	5.20	6·9	5·37	5·26	6·46

Phases of the Moon, Occultations, &c.

1st July	○ Full Moon	4 16	p.m.
9th „	☾ Last Quarter	7 49	p.m.
17th „	● New Moon	7 3	a.m.
23rd „	☽ First Quarter	9 34	p.m.

Perigee, 18th July, at 9.0 a.m.
Apogee, 5th July, at midnight.

Mercury rises at 8.22 a.m., 1 hour 36 minutes after the Sun, and sets at 6.48 p.m., 1 hour 42 minutes after it, on the 1st; on the 15th it rises at 8.15 a.m., 1 hour 33 minutes after the Sun, and sets at 7.16 p.m., 2 hours 3 minutes after it.

Venus rises at 5.26 a.m., 1 hour 10 minutes before the Sun, and sets at 3.48 p.m., 1 hour 18 minutes before it, on the 1st; on the 15th it rises at 5.37 a.m., 1 hour 5 minutes before the Sun, and sets at 4.14 p.m., 1 hour 5 minutes before it.

Mars rises at 6.59 p.m., on the 1st, and sets at 8.45 a.m., on the 2nd; on the 15th it rises at 5.48 p.m., and sets at 7.45 a.m., on the 16th.

Jupiter rises at 11.52 p.m., on the 1st, and sets at 10.59 a.m., on the 2nd; on the 15th it rises at 10.59 p.m., and sets at 10.56 a.m., on the 16th.

Saturn rises at 1.34 a.m., and sets at 12.54 p.m., on the 1st; on the 15th it rises at 12.44 a.m., and sets at 12.3 p.m.

A noteworthy event of this year will be the opposition of Mars to the Sun, which means that Sun, Earth, and Mars are in a straight line, with the Earth in the middle. In this position exactly they will be on the 23rd of this month, and as Mars travels in an elongated orbit it will, on this occasion, be nearer to us than it has been since 1924, and, therefore, at its greatest apparent size and luminosity. A favourable position for telescopic observation of Mars occurs every 2 years and 2 months, a more favourable every 15 years. It is not recorded that anything new was discovered at the nearest approach of the century in 1924, about the "geometrical lines" seen by some astronomers on the planet, nor of any other signs which would give assurance that Mars could be the abode of intelligent beings. However, at the next opposition, 2 years hence, the greatest telescope in the world may be installed in the Observatory, on Palomar Mountain, in Southern California.

8th Aug.,	☾ Last Quarter	7 18	p.m.
15th „	● New Moon	1 53	p.m.
22nd „	☽ First Quarter	7 21	a.m.
30th „	○ Full Moon	8 9	a.m.

Apogee, 2nd August, at 10 a.m.
Perigee, 15th August, at 6 p.m.
Apogee, 29th August, at 1 p.m.

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.