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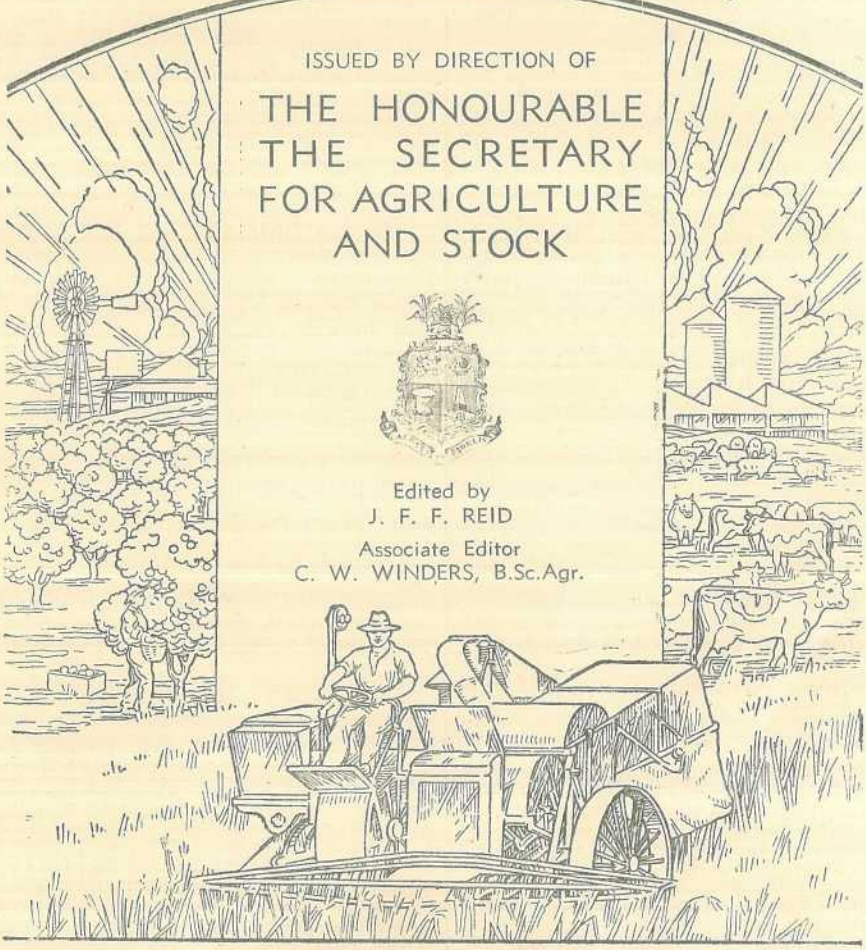

Edited by
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Associate Editor
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JANUARY TO JUNE, 1946

Vol. 62 Parts 1 to 6

QUEENSLAND AGRICULTURAL JOURNAL

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Volume 62 Part 1

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MINISTER FOR AGRICULTURE AND STOCK

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Contents

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

QUEENSLAND AGRICULTURAL JOURNAL

Volume 62 1 JANUARY, 1946 Part 1

Event and Comment.

Extension of Agricultural Research.

FOR the Department of Agriculture and Stock, the past year was one of substantial progress. Under its new divisional organisation, the Department has the ground already cleared for further advancement in the coming year.

Plans for the immediate future include a very considerable intensification of research and experimental work. With a view to implementing this aspect of the departmental programme, the Government decided some months ago to reopen the Hermitage, near Warwick, as the regional experiment station for the Darling Downs. It has also been decided that the property of the Department at Kairi, which has been occupied by the Army for several years, will be reopened as soon as it is available, the intention being that it should serve as a regional experiment station for the Atherton Tableland and other Cairns hinterland districts.

Another important contribution to the extension of research and field experimental facilities is the recent purchase of a suitable and conveniently located property in the Maroochy district to serve the purposes of a Maroochy horticultural experiment station at which a wide range of fruit and vegetable problems will be investigated.

The research and experimental work, of course, will not be confined to the experiment stations, the work at those centres being supplemented by field trials throughout the districts which the stations are intended to serve.

These and other developments will obviously be of great value to the primary producers of Queensland, to whom results will become progressively available through a strengthened extension service.

THE MINISTER'S NEW YEAR MESSAGE

★

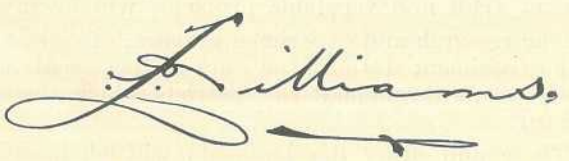
AT the beginning of another year I wish to record my cordial appreciation of the outstanding achievements of the farmers and graziers of Queensland during the past year in face of many difficulties, seasonal and otherwise, and also of their continued friendly and valuable co-operation with me and the officers of my Department.

The year just ended brought victory, but not without sacrifice and suffering. We acknowledge our debt to those who fought for us, and our thoughts and heartfelt sympathy are with all those families to whom the war brought bereavement.

We now have to make our contribution to peacetime readjustments, and to the solving of the pressing problems of a post-war world. Our job will not be easy, but its accomplishment will come from the strength which lies within ourselves. None of our immediate tasks of reconstruction and further development is, however, beyond the means and capacity of a vigorous and skilful people; and we will surely tackle those tasks in the same spirit which saved our country from invasion and ultimately gave us the victory.

The need for essential food production in 1946 will be just as great as it was in 1945, and for a long time yet the demand for our exportable surpluses will be just as strong. Therefore, the maintenance of adequate food supplies of the highest attainable quality remains for us an essential duty.

To all the primary producers of Queensland and their families I wish health, happiness and prosperity throughout the coming year.



Secretary for Agriculture and Stock.

1st January, 1946.

Control Measures for Wild Turnip.

C. W. WINDERS, Agrostologist.

VARIOUS plants belonging to the mustard family occur as weeds on the Darling Downs. During the winters of 1944 and 1945, two or three of these plants, commonly called "wild turnip," were present as heavy infestations in crops and grassland and on fallows and roads in various districts. The prevalence of wild turnip caused considerable alarm to farmers in 1945, but the infestation was so dense in some areas that the best a farmer could do to protect his property from heavy re-infestation during 1946 was to destroy the weeds on his farm and on adjacent roads before they had seeded. The weeds seeded so heavily on many properties and roads, however, that if seasonal conditions are favourable this year most farms in the heavily-infested districts and many previously clean will be troubled with wild turnip.

Farmers who suffered crop losses during 1945 due to wild turnip, and those who were put to the trouble and expense of handling the weed in the flowering stage to prevent seeding, realize that it is most satisfactory to deal with the pest in its young stages. This note is written as a warning to farmers who may not be seized with the importance of eradicating wild turnip in the early stages; that is, in the seedling and rosette stages, before the erect stem is produced.

Treatment During Summer.

Although the wild turnip weeds are normally winter-growing annuals, germinating with the autumn rains and dying after seeding in the spring months, there is likely to be some out-of-season germination in the warmer months. Farmers should watch for seedlings of these weeds and destroy them before they develop into firmly established plants. Fallows are easily kept clean by cultivation if the weeds are handled early. Plants surviving cultivation and those in pastures and other parts of the farm should be eradicated by hoeing. Under no circumstances should the light summer infestation be allowed to seed. Their yellow flowers enable the plants to be readily observed in the early flowering stage, and at the latest the plants should be eradicated then. Prevention of seeding during the summer months is regarded as particularly important on properties which have not been heavily infested by the weed.

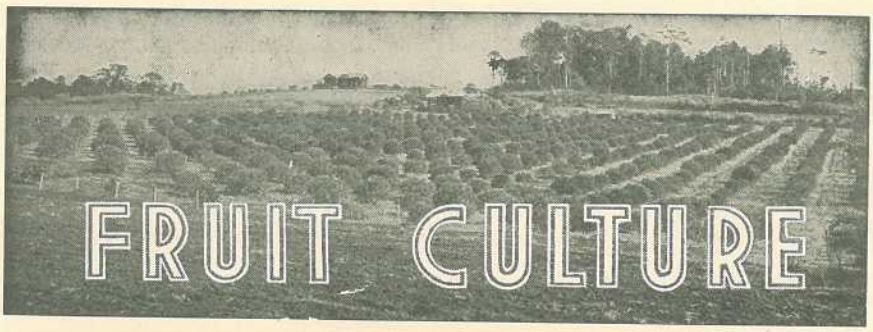
Control of the Main Infestation.

Where the 1945 infestation was only light, farmers may be able to control the weed simply by refraining from planting winter crops until the weeds germinating with the autumn rains have been struck out. It is desirable to wait for the second wave of germination if seasonal conditions do not force earlier planting. Planting before the bulk of the wild turnip seed has germinated and the seedlings destroyed is likely to result in a troublesome infestation of the crop. If the weed seeded freely during 1945 on or adjacent to the farm, or if running water is likely to have carried seed on to the cultivations from other places, the farmer should not plant winter crops during 1946, but should allow the land to fallow during the winter months. Systematic working of the land during the fallow period would eradicate the bulk of the weed, and at the same time have the effect of keeping the land in good tilth for the reception of summer-growing crops.

During the growing period of winter crops, systematic weeding to eliminate wild turnip is desirable. In many cases seeds of the weed are likely to germinate in the young crop; if allowed to develop into adult plants these will cause difficulties in harvesting, will probably lower the grade of the grain, and by seeding will accentuate the weed problem in the following year.

Headlands should be kept clean by regular cultivation, and whatever measures may be practicable should be employed to prevent the weed seeding on roadways, gullies, watercourses and so on. Fencelines provide a special problem, in that cultivation implements cannot deal satisfactorily with weeds directly beneath the wires. In such situations, hoeing or spraying with chemical weedkillers should be employed.

Investigational work which has been planned may enable further recommendations to be made later for dealing with the infestation which may occur in the winter of 1946. Farmers in hitherto relatively free areas are urged to take all precautions in the meantime against the spread of the weed on their farms.



Propagation of Citrus Trees.

R. L. PREST, Senior Adviser in Horticulture.

DURING the war years, because of the shortage of manpower, nurseries were compelled to reduce their output of many kinds of fruit trees, including citrus. In consequence, there were not enough young trees available to meet the demand for the planting of new areas. Consequently, many enquiries have been received by the Department from growers for advice on the raising of fruit trees. The following notes are published as a guide to the procedure usually adopted.

The Seed Bed.

The seed used for the raising of root stocks is very important. It is unsound practice to select seed indiscriminately, and unwise to imagine that all resultant seedlings will always grow into good, profitable trees. Seeds of the seedling bush lemon or, as it is sometimes called, the common rough lemon, are most commonly used for root stocks in Queensland; next in order of preference is seed of the seedling sweet orange. The seedling lemon stock is easier to bud than the orange and the resultant tree also grows faster, but it is usually not so long-lived as the orange and the fruit tends to be of a somewhat coarser texture.

The seed beds should be located in a convenient place so that they can be easily watered and readily observed. They require to be carefully prepared and deeply dug as far as the subsoil. The soil should be broken up finely and then evenly levelled. Medium to light sandy loams make the best seed beds and they may have humus added in the form of rotted grass and leaf mould, but it is not advisable to add large amounts of animal manures. The beds should be laid out about 4 feet apart, with wide paths on either sides. Good drainage is, of course, essential, and this will be facilitated if the beds are built up a few inches above ground level. Only seed from clean, healthy and vigorous seedling trees should be selected.

The seed may be extracted from the fruit by cutting off about a quarter of the top and squeezing out the seed and juice into a container, preferably of wood. Fresh water may then be added, and several washings will leave the seed quite clean. Seed also may be extracted by placing whole fruits which have been previously bruised in some way into a barrel and allowing them to rot and ferment. This may take two to three weeks after which the seed can be washed free from the pulpy mass with running water. If care is used it will be found that most of the poorly developed seed will float and wash away when pouring off the water, while the good, heavy seed will sink to the bottom.

After washing, the seeds may be dried in the sun, but care should be taken that they do not become too dry, otherwise the cotyledons separate and the seed will not germinate. To obtain best results, it is advisable to plant citrus seeds as soon as possible after extraction from the fruit. Orange seed begins to lose its viability after about a week; lemon seed is hardier and will keep fairly well for several weeks. If it is desired to keep seed for a period, it is best to leave it in the fruit or in the pure juice of the fruit and not to squeeze, wash and dry it until it is required.

The seeds should be sown about ½-inch to 1 inch apart in rows about 3 inches apart. Three-quarters of an inch to 1 inch is sufficient depth at which to plant and if clean river bed sand is available this is the best medium to use for covering the seed in the rows. The top of the ground should be kept stirred occasionally to suppress weed growth and the beds kept well watered, particularly if the weather is warm and dry.

Fungous diseases such as citrus scab sometimes attack citrus seedlings, and retard their growth, particularly in the case of rough lemon seed beds, and it is a wise precaution to spray from time to time with Bordeaux mixture.

The Nursery Row.

When the young seedlings are about 6 to 8 inches high and the growth on the tops has hardened up, they are planted out about 9 to 12 inches apart in well-prepared ground in what are termed nursery rows, so that they will have more room to develop to the state where they are ready for budding.

The nursery rows may be 4 feet apart. When transplanting, the seed beds should be given a good watering the evening before, in order to facilitate the removal of the plants without excessive injury to the roots. After lifting from the seed bed, the roots should be trimmed and the tap root suitably cut back, leaving about 3 to 4 inches. The plants should then be set out in drills in the nursery rows, care being taken to spread the lateral roots so that they are not all bunched together. Weak or crippled plants should, of course, be rejected.

Budding.

When the stocks, as they are now termed, have grown sufficiently and the stems have attained a diameter of about three-eighths of an inch at the base, they will be ready for budding. In Queensland, this is usually done during the spring or autumn months, when the sap is flowing freely under the bark and the stocks are therefore in active growth.

The T method of budding is usually practised in Queensland and is performed by making, firstly, a vertical cut about 1½ inches long just through the bark without injuring the wood underneath. The bottom end of the cut may be about 2 inches from the soil surface. Next, a cut is made from left to right across the top of the vertical cut to form a T. If the knife is held at an angle and the cut made with a twist the bark at the top of the vertical cut will lift slightly and enable the bud to be inserted without quilling. The bud is held between the thumb and finger of the left hand, inserted in the bark at the top of the cut, and gently pressed down with the thumb, when, if the sap is running freely, the bark will lift and the bud will enter easily.

The T cut should preferably be made on the south side of the tree, for on that side the bud will not be so readily dried out by the sun.

Budwood should be taken only from the best trees in the orchard, which are noted for their healthy and vigorous growth and for consistent production of heavy crops and quality fruit. Budwood should be selected from trees only when they are dormant, i.e., when there is no young tender growth on the tips of the branches. The wood selected should be well rounded, about one-quarter to three-eighths inches in thickness, and preferably not more than one year old. The last growth should be discarded. The junction of the last growth and that preceding it, which is the growth to select for budwood, is readily discernible and is indicated by what is generally referred to as a joint.

After cutting the budwood, the leaves should be trimmed off, leaving a piece of the leaf stalk or petiole for each bud, so that it may be more easily handled after cutting. The bud may be cut off the bud stick, commencing either from above or below, but generally the practice is to start from the bottom of the bud and cut upwards, commencing about half an inch below the bud and ending about 1 inch above. The bud should be removed with one cut of the knife only, and should be just deep enough to remove only a very thin layer of the wood. If a very sharp, thin-bladed knife is used, the buds may be cut without difficulty.

The bud should be inserted under the bark of the stock as soon as possible after it has been cut, in order to prevent the sap from drying out. If the bark of the stock does not lift freely enough to permit the bud to be pushed down easily, the knife may be used to help loosen it. The bud should be pushed down until the top end is just level with the cross cut.

In order to bring the bud and the stock into the closest possible contact and to exclude air, they are then bound tightly together. Raffia is usually used for this purpose, but where this is not handy a piece of soft twine which will not cut into the bark may be used. Tying should commence from the bottom of the T cut and work upwards, leaving only the bud exposed. In from two to three weeks, if the operation has been successful and the bud remains green, it can be considered to have united with the stock. The tie may then be cut on the opposite side of the stock to that in which the bud was inserted.

When the budding has been done in the autumn, the trees may be left as they are until the following spring, but if they have been done in the spring the buds may be made to start into growth at once by removing a portion of the top of the stock or the stock may be cut half-way through, a few inches above the bud but on the reverse side, and it may be split up the middle and the top bent over on to the ground so that it is above the bud. In the case of buds which have remained dormant during the winter, the whole of the stock may be removed a few inches above the bud early in spring before growth starts. The few inches of the stock left above the bud may be used as a support to which to tie the young shoot from the bud, but when it is strong enough to support itself the remainder of the stock should be cut clean away with a sloping cut made just slightly above the bud. The wound will then rapidly heal over and the union will be practically a perfect one.

To those who have never done any budding previously it is suggested that they practise on young saplings growing in the bush.

PLANT PROTECTION

Pests of the Mango.

H. JARVIS, Entomologist.

LIKE other fruit trees, the mango is attacked by several insect pests, the more important of which are the mango scale, the pink wax scale, the mango tip borer, the mango weevil, and the Queensland fruit fly. The importance attached to control measures for the several insect pests which attack the mango depends entirely on the owner's interest in the trees. The vigor of the mango is considerable and temporary checks caused by insects have apparently little effect on its capacity to bear fruit. On the other hand, foliage pests may completely spoil the appearance of the trees and thus prejudice their value as ornamentals. It is not surprising therefore that control measures for the two most important scale insect enemies of the mango are used to some extent at least on young trees which can be effectively treated with the equipment available on the farm or orchard. Well-grown, tall trees could only be treated with a very elaborate spray outfit. As the better varieties of the mango yield an excellent fruit, there can be little doubt that, in the future, the need for pest-control measures will become more widely recognized than at present.

MANGO SCALE.

The mango scale* is perhaps the best known of the several insects attacking the foliage, for few trees are free from this pest. In severe outbreaks, the leaves are flecked with white spots, which are the insects themselves, and each spot is margined by a yellow discolouration of the adjacent tissues of the leaf. The discolouration caused by any single scale is slight but, if a large number of scales are present on each leaf, the tree presents a definitely unhealthy appearance (Plate 1). Premature leaf fall is also attributed to extensive infestation by this insect.

Life History and Habits.

The yellow, pear-shaped insect itself is sheltered beneath a parchment-like scale and is seldom seen. The scale of the female of this species is white in colour, about one-tenth of an inch in length, elongate-oval in shape, and tapers at one end which is characterized by the presence of a small, yellowish, hardened cast larval skin. The scale of the male is also white, but is smaller and almost rectangular in shape with two grooves along the upper surface. The life history of the insect is apparently similar to that of some better known scales. The young, yellow crawlers leave the shelter of the parent scale and wander over the plant until they find a suitable place at which to feed on the leaves, and this is usually on the under surface. They then

* *Chionaspis dilatata* Green.

begin to feed through hair-like mouth parts which are inserted into the tisue of the leaf. The limbs are lost soon after the crawler settles down and scale formation proceeds rapidly and continues until the insect reaches maturity.

Control.

The mango scale, when necessary, can be controlled by applications of a summer white oil emulsion at a strength of one in forty. In practice, however, control measures are only applied to young trees. Older trees are too large for efficient treatment with the usual type of spray equipment available.

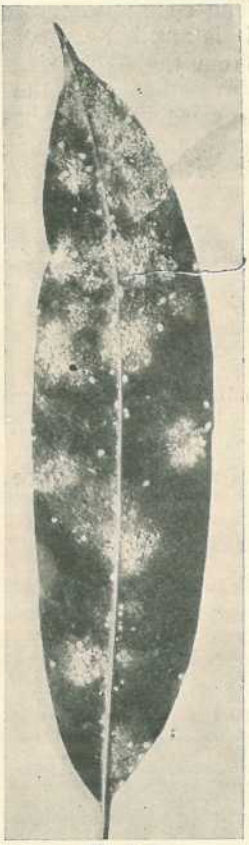


Plate 1.
LEAF INFESTED BY MANGO SCALE.

PINK WAX SCALE.

Though usually less conspicuous than the mango scale, the pink wax scale* can similarly spoil the appearance of an infested tree and, possibly also, its cropping capacity. Typically the twigs of such a tree are covered with pink globules of wax-like material which may merge together until the younger, woody growth is almost covered by the insects. On the leaves, the scales tend to settle along the main veins in more or less continuous lines. Infested parts of the tree are covered by a black, sooty mould which gives the tree an unsightly appearance. This mould growth develops on exudations secreted by the insect, but it is not harmful to the tree.

Life History and Habits.

The pink wax scale is best known as a pest of citrus trees on which its life history has been worked out in detail. Its behaviour on the mango is essentially the same. The scale is almost globular in shape, about one-eighth of an inch in diameter, and brownish-pink in colour. There are at least two generations in each year and these are initiated by the mass emergence of minute crawlers from the adult scales. These young crawlers move over the plant and select a feeding site, frequently along the main veins of the leaves. They then lose the use of their limbs and, as they grow, they secrete a constantly enlarging waxy covering.

Control.

When treatment is considered desirable, the soap-washing soda spray widely used in citrus orchards for the control of this pest should be reasonably efficient. The spray is prepared by shredding 5 lb. of good-quality laundry soap into a solution containing 12 to 14 lb. of washing soda dissolved in 4 gallons of water. After heating the mixture until the soap is dissolved, water is added to make 75 gallons of spray. Treatment should be confined to periods of the year when the young scales seen on the trees are of "pinhead" dimensions.

* *Ceroplastes rubens* Mask.

The spray is less effective against the older stages and conversely, if it is applied too soon, many of the crawlers may not yet have emerged from the protecting cover of the parent insect. The normal seasonal development of the insect is such that control measures can best be applied in November and again in early March, but treatments should, so far as possible, be timed by observations on the behaviour of the insect on the trees.

MANGO TIP BORERS.

Tip borer damage in mango trees has been recorded from North Queensland, where, in some years, the injury may be appreciable. The first sympton of infestation by these insects is a wilting of some of the growing tips on the outside of the trees, accompanied by a blackening of the leaves on such twigs. Later the affected tips die back and dormant buds on the more mature wood develop and produce a bunched type of growth. Inside each of the affected twigs is a hollow cavity containing the debris normally associated with insect larvae. The caterpillars of the tip borers may actually be found inside the twigs when they are showing the early wilting symptoms.

Life History and Habits.

The larvae of two moths are concerned in tip borer damage. The larger of these* has a wing-spread of about 1 inch and is dark-brown in colour with lighter markings across the forewings. The hind wings, however, are white with a broad, smoky-brown margin. The second moth† is smaller, being about five-eighths of an inch across the expanded wings, which are coffee-brown in colour and broken by thin, symmetrical, and somewhat paler bands. The life histories of these moths are unknown but it is presumed that the eggs are laid on the young growth —usually in spring—for the damage is then most commonly encountered. The larvae found in the young shoots are soft-bodied, pale in colour, and relatively inactive. They normally work from the tip downwards to the thicker part of the shoot. When full fed, they pupate in silken cocoons spun within the damaged shoots and from these cocoons the moths later emerge.

Control.

Tip borers of any kind are extremely difficult to control, even where insecticides can be applied without the difficulties inherent in the treatment of such a large, spreading tree as the mango. Should the application of an insecticide be required, control would probably depend on the use of an arsenate of lead spray or dust applied in late spring and early summer when growth is taking place and the effects of an attack are most serious.

MANGO WEEVIL.

The mango weevil‡ is of more interest to the nurseryman than to the owner of established mango trees. This insect is essentially a pest of the seed and its activities only become apparent when faulty strikes in propagation beds are investigated or the seed is cut to remove the kernel prior to planting. Then it is not uncommon to find that the kernel has been riddled by the larva of the mango weevil and almost completely destroyed. Frequently the weevil in its larval, pupal, or adult stages is present when the seed is cut open.

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* *Bombotelia jocosatrix* Gn.

† *Paperila euthysticta* Turn.

‡ *Cryptorhynchus mangiferae* Fabr.

Life History and Habits.

The mango weevil occurs in most tropical countries in which its host plant is grown at all extensively. The hard-bodied adult weevil is about three-eighths of an inch in length, is broad in shape and has a downwardly projecting beak. It is dark-brown in colour with oblique, lighter marks on the wing covers and a cross-shaped, light-brown mark immediately behind the head. Like many other weevils, it feigns death when disturbed. Usually the adult lays only one egg on each young fruit and the grub-like larva hatching from it bores directly through the flesh into the developing kernel. The small hole made by the larva

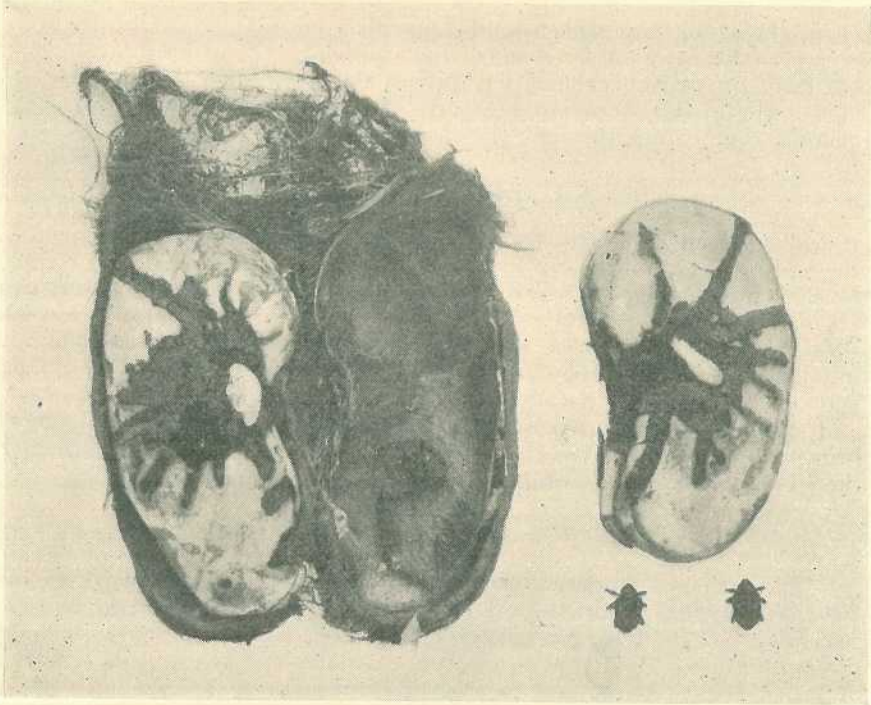


Plate 2.

MANGO WEEVIL.—Seed on left exposed to show damage with pupa *in situ*. Detached kernel on upper right. Adult weevils on lower right.

soon heals over and the flesh develops normally so that there is no outward trace of the insect feeding inside the kernel. The larva tunnels through the kernel for a few weeks (Plate 2) and by the time the fruit is ripe it is full-grown. Pupation then takes place within the injured seed and, in a week or two, the adult weevil emerges from the pupa. The newly developed weevil may remain in the seed for many weeks before it makes its way through the seed covering to escape to the open. The adults normally remain until the following season in the vicinity of the tree in which they have been reared, usually in bark crevices or some similar shelter. The dispersal of the pest must therefore largely take place through the medium of fruit and seeds carried from one district to another.

Control.

The control of the mango weevil is quite impracticable. In the propagation beds the risk of faulty strikes can be offset by planting seed far in excess of probable seedling requirements. Alternatively, if bed space is at a premium, the available seed may be shelled and only the sound kernels planted in the beds. The seed must be carefully opened by paring the ridge with a sharp knife and then the kernels must be examined to ensure that they are free from weevil infestation and otherwise sound before being planted.

QUEENSLAND FRUIT FLY.

Attacks by the Queensland fruit fly* on mango fruit are often severe. The infested fruit may ripen prematurely after first showing traces of an uneven colouration during the later stages of its development. Fruit-fall frequently occurs and fallen fruit contain many maggots burrowing through the flesh.

Life History and Habits.

The Queensland fruit fly is about three-eighths of an inch in length, the body being reddish-brown with bright yellow markings. The female lays batches of eggs through the skin of the fruit and the punctures made in doing so can later be detected by the presence of a brownish stain. On hatching from the eggs, the maggots immediately burrow into the flesh where they feed until they are full-grown. They then leave the fruit which has, by this time, generally fallen from the tree, and enter the ground, where pupation takes place inside an oval, dark-brown pupal case. From this the adult fly later emerges. In summer the life history may be completed in little more than a fortnight.

Control.

The orthodox measures used in deciduous fruit and citrus orchards for the control of fruit flies are hardly applicable to the mango, except, perhaps when the trees are very young. These control measures include luring, the use of bait sprays, and the regular collection and destruction of fallen fruit. Lures and bait sprays can scarcely be efficiently used on large trees; the destruction of fallen fruit, however, should be regularly carried out as a routine measure, particularly as it lessens the risk of severe attack in other fruits which mature later in the season.

* *Strumeta tryoni* Frogg.

"Swelled Head" of Sheep.

G. R. MOULE, Veterinary Officer, Sheep and Wool Branch.

SEVERAL disease conditions which cause a marked enlargement of the sheep's head occur in Queensland and this symptom is commonly referred to by graziers as "swelled head." As the diseases are quite distinct from one another, despite the constant feature of the "swelled head," a detailed description of each will be given in a series of *Journal* articles of which this is the first. Methods of diagnosis and control will also be dealt with. The conditions considered are blackleg, white oedema, malignant oedema, gas gangrene, photosensitisation and bottle jaw.

BLACKLEG.

Although blackleg is usually considered to be a disease specific to cattle depastured on coastal areas, recent investigations have shown that it occurs fairly extensively amongst sheep in western Queensland. The majority of cases which have been investigated have occurred in young rams of about 12 months of age, though older sheep have been affected. The disease has also been seen in ewes in Queensland but not to the same extent as in rams.

Cause.

Blackleg is caused by a specific bacteria which is fairly common in the soil. It belongs to that class of organism which thrive only under those circumstances where oxygen is not present in the surroundings—i.e., the causative organism is an anaerobe. The exact way in which the disease is reproduced is not known, but it is thought that the specific bacterium which causes the disease is ingested with the food and after gaining entrance to the blood stream through the small vessels in the intestine is carried to the muscles. When the chemical reaction of the muscle is suitable the bacteria multiply rapidly and death quickly ensues.

Symptoms.

As death is very rapid after the development of the disease, symptoms are often missed. Should they be observed they include:—

(1) "Swelled head," seen in many cases; but this symptom is not always present as its development depends upon where the blackleg bacteria become localised after circulating in the blood stream. When present the swelling is fairly firm, pits on pressure and usually extends

over the muzzle, around the eyes and to the ears, under the jaw and perhaps down the throat to the folds of the apron. The skin over the swollen area is usually discoloured, being deep purple and subsequently blackish.

(2) Lameness may be a feature of the disease and this occurs when the causative organisms become localised in the muscles of one of the limbs. Occasionally swelling of these muscles occurs and the skin over the affected area is discoloured, but there is a noticeable absence of any "crackling" under the skin, as is seen in blackleg of calves. After death the affected muscles become puffy and more swollen, and some gas develops in the lesion, but crackling to the touch is difficult to detect.

(3) Affected animals show a marked rise in temperature, are listless and segregate themselves from the flock. Breathing is rapid and is inclined to be panting and in the terminal stages or soon after death there is a frothy blood-stained discharge from the nose.

Post Mortem Findings.

Owing to the virulence of anaerobic infections it is recommended that graziers should seek the assistance of technically trained men who have had experience in carrying out postmortems of animals suffering from infections by these organisms.

The characteristic changes which will be found in the body organs include:—

(1) The tissues of the swollen areas of the head or limb muscles are hæmorrhagic and filled with a watery blood-stained exudate. The muscle fibres give the impression of having been "water-logged," as they are swollen and darkened. In cases which have been dead for some little time prior to post-mortem, there may be some gas formation which causes small circumscribed cavities to occur among the muscle fibres. When the blackleg lesion develops in limb muscles a characteristic feature is the way in which the affected muscles may be completely surrounded by apparently healthy and unaffected muscles. The lymph glands draining the affected part are enlarged and inflamed.

(2) The internal organs show changes which are fairly typical of anaerobic infections and these may be summarised as blood-stained spots on the lungs, heart muscle and sac and some enlargement of the spleen.

Diagnosis.

Diagnosis is based upon the microscopic examination of specimens collected from affected or recently dead animals and upon biological tests carried out on experimental animals in a laboratory. Accordingly, should a sheep owner suspect the presence of blackleg in his sheep he should seek technical assistance.

Control.

Blackleg is readily controlled by vaccination. The cost of the specific vaccine is about one guinea per hundred doses.

Queensland Butter Production, 1944-45.

E. B. RICE.

THE accompanying tables cover the operations of all butter factories for the year ended 30th June, 1945, and have been compiled and tabulated from monthly returns in accordance with the requirements of *The Dairy Produce Act.*

A scrutiny of the figures indicate the quantity of butter in each grade made by the respective factories, and the quantity of butter in each grade for which suppliers were paid. The official gradings column indicates the results of the gradings of butter examined officially by both Commonwealth and State officers.

The information contained in these tables is of particular interest to suppliers, as well as to factory managements and directorates.

SUMMARY OF PRODUCTION AND GRADINGS OF BUTTER FOR THE YEAR ENDED 30TH JUNE, 1945.

MANUFACTURE IN LB.

Total.	Choice.	First.	Second.	Pastry.
93,931,828	59,910,059	29,991,890	3,965,822	64,057

PAY IN LB.

93,967,063	61,355,437	29,218,213	3,383,643	9,770

OVER-RUN.

Actual	.. ..	2,926,440 = 3·21%
Paid	.. ..	2,961,675 = 3·25%

GRADINGS IN BOXES.

Submitted as :—

Choice.	Choice.	First.	Second.	Pastry.
749,719	571,119	178,118	482	..
..	76·18%	23·76%	·06%	..
First.				
445,043	..	423,527	21,391	125
..	..	95·16%	4·81%	·03%
Second.				
67,379	..	..	60,854	6,525
..	..	..	90·32%	9·68%
Pastry.				
1,411	..	..	..	1,411
..	..	..	..	100%

Percentage of Production Graded = 75·33%.

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND FOR THE YEAR ENDED 30th JUNE, 1945

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Atherton	Make	1,400,299	1,400,299	..	..	..	27,236	52,148	..
	Pay	1,425,211	1,414,424	..	10,787	..	1·98%	3·79%	
Bushy Creek	Make	40,007	..	40,007	..	..	216	379	..
	Pay	40,170	..	40,170	..	..	·54%	·95%	
Caboolture	Make	2,058,100	1,861,487	196,109	504	..	67,875	67,085	76·52
	Pay	2,057,310	1,867,132	186,023	4,155	..	3·41%	3·37%	
Eumundi	Make	2,187,760	2,010,042	177,718	..	..	68,237	68,394	91·72
	Pay	2,187,917	2,035,723	151,886	308	..	3·21%	3·22%	
Pomona	Make	1,380,688	1,294,976	83,881	1,831	..	29,731	29,201	93·41
	Pay	1,380,158	1,331,029	48,095	1,034	..	2·20%	2·16%	
Chinchilla	Make	1,697,943	889,751	524,608	268,912	14,672	39,488	42,610	95·41
	Pay	1,701,065	930,641	547,602	213,052	9,770	2·38%	2·56%	
Daintree	Make	103,763	103,670	93	..	..	2,573	2,565	..
	Pay	103,755	102,615	1,140	..	..	2·54%	2·53%	
Dayboro'	Make	74,098	..	74,098	..	..	..	..	..
	Pay	..	..	..	..	..	..	..	..
Toowoomba	Make	2,284,725	1,534,325	621,992	128,408	..	74,691	74,664	49·69
	Pay	2,284,698	1,540,004	618,672	126,022	..	3·37%	3·37%	
Clifton	Make	1,207,528	637,616	543,592	26,320	..	30,889	30,915	91·29
	Pay	1,207,554	640,632	544,360	22,562	..	2·62%	2·62%	
Crow's Nest	Make	1,396,080	1,028,720	298,928	68,432	..	37,816	37,836	95·78
	Pay	1,396,100	1,030,518	299,061	66,521	..	2·78%	2·78%	
Dalby	Make	2,924,150	969,862	1,806,784	147,504	..	84,875	84,897	89·71
	Pay	2,924,172	961,834	1,835,006	127,332	..	2·98%	2·99%	

OFFICIAL GRADINGS IN BOXES.

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Atherton	..	..	..	..	..	..	..	..	..	..	..	..	..
Bushy Creek	..	..	..	..	..	..	..	..	..	..	..	..	..
Caboolture	24,628	21,711 88·15%	2,917 11·84%	..	..	3,486	1,790 51·34%	1,696 48·65%	..	9	9 100%	..	..
Eumundi	32,783	18,423 56·2%	14,360 43·8%	..	..	3,051	2,568 84·16%	483 15·83%	..	..	..	..	..
Pomona	21,484	17,991 83·74%	3,493 16·26%	..	..	1,501	1,261 84·01%	240 15·98%	..	46	46 100%	..	..
Chinchilla	14,213	7,522 52·86%	6,691 47·08%	..	..	9,306	7,990 85·85%	1,316 14·14%	..	4,839	3,353 69·29%	1,486 30·7%	286
Daintree	..	..	..	..	..	..	..	..	..	..	..	..	..
Dayboro'	..	..	..	..	..	..	..	..	..	..	..	..	..
Toowoomba	7,707	7,433 96·44%	274 3·55%	..	..	10,492	10,423 99·34%	69 ·65%	..	2,076	2,067 99·56%	9 ·43%	..
Clifton	9,993	9,667 96·73%	326 3·26%	..	..	9,218	9,203 99·83%	15 ·16%	..	476	476 100%	..	..
Crow's Nest	17,554	11,093 63·19%	6,461 36·8%	..	..	5,284	4,793 90·7%	468 8·85%	23 ·43%	1,041	1,041 100%	..	..
Dalby	13,590	10,857 79·88%	2,709 19·93%	24 ·1%	..	30,742	30,231 98·33%	511 1·66%	..	2,517	2,074 82·39%	443 17·6%	..

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND FOR THE YEAR ENDED 30TH JUNE, 1945—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Goombungee	Make	1,754,032	979,048	771,680	3,304	..	46,217	46,116	98·57
	Pay	1,753,931	979,532	771,611	2,788	..	2·70%	2·70%	
Jandowae	Make	2,018,464	1,055,376	889,700	73,388	..	60,613	60,690	94·50
	Pay	2,018,541	1,064,816	883,308	70,417	..	3·09%	3·09%	
Miles	Make	765,240	79,408	517,048	168,784	..	26,190	26,146	84·93
	Pay	765,196	79,356	520,496	165,344	..	3·54%	3·53%	
Esk	Make	2,126,976	993,890	1,004,783	128,303	..	69,914	69,851	90·48
	Pay	2,126,913	998,182	1,028,048	100,683	..	3·39%	3·39%	
Evelyn Tableland ..	Make	237,424	237,424	..	..	..	7,870	6,849	..
	Pay	236,403	236,403	..	..	..	3·42%	2·98%	..
Gayndah	Make	1,443,213	1,032,341	335,104	75,768	..	59,830	59,440	66·50
	Pay	1,442,823	1,048,541	327,756	66,526	..	4·32%	4·29%	
Killarney	Make	1,265,784	578,452	599,020	88,312	..	30,232	30,234	78·12
	Pay	1,265,786	598,237	588,553	78,996	..	2·44%	2·44%	
Logan and Albert ..	Make	2,789,917	2,313,475	476,442	..	..	120,246	119,956	91·79
	Pay	2,789,627	2,344,585	442,902	2,140	..	4·5%	4·49%	
Maleny	Make	2,499,824	2,459,784	40,040	..	..	82,015	81,105	93·20
	Pay	2,498,914	2,470,501	27,819	594	..	3·39%	3·35%	
Biggenden	Make	1,725,135	1,322,327	402,808	..	..	70,431	71,115	43·17
	Pay	1,725,819	1,367,601	358,218	..	..	4·25%	4·29%	
Kingaroy	Make	3,751,817	3,637,633	..	114,184	..	137,950	138,525	36·5
	Pay	3,752,392	3,645,392	..	107,000	..	3·81%	3·83%	
Mundubbera	Make	2,181,578	1,905,778	192,248	83,552	..	76,274	76,071	75·94
	Pay	2,181,375	1,951,545	167,515	62,315	..	3·62%	3·61%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Goombungee	17,481	15,208 86·99%	2,273 13·0%	..	..	13,294	12,791 96·21%	503 3·78%	..	101	101 100%	..	..
Jandowae	17,686	14,770 83·51%	2,916 16·48%	..	..	14,937	14,617 97·85%	320 2·14%	..	1,442	1,388 96·25%	54 3·74%	..
Miles	413	123 29·78%	290 70·21%	..	..	8,478	7,907 93·26%	571 6·73%	..	2,715	1,954 71·97%	761 28·02%	..
Esk	17,442	15,922 91·28%	1,520 8·71%	..	..	14,817	14,693 99·16%	124 ·83%	..	2,109	2,071 98·19%	38 1·80%	..
Evelyn Tableland ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gayndah	9,566	7,609 79·54%	1,957 20·45%	..	..	6,221	5,246 84·32%	975 15·67%	..	1,352	1,169 86·46%	183 13·53%	..
Killarney	5,594	4,068 72·72%	1,526 27·27%	..	..	10,666	10,580 99·19%	86 ·80%	..	1,398	1,350 96·56%	48 3·43%	..
Logan and Albert ..	37,554	27,074 72·09%	10,355 27·57%	125 ·33%	..	8,178	6,916 84·56%	1,262 15·43%	..	..	..	..	..
Maleny	40,913	33,839 82·70%	7,074 17·29%	..	..	695	695 100%	..	..	..	..	..	..
Biggenden .. .	6,275	4,210 67·09%	2,065 32·9%	..	..	7,026	5,645 80·34%	1,381 19·65%	..	..	..	..	..
Kingaroy	22,390	21,775 97·25%	615 2·74%	..	..	100	100 100%	..	..	1,970	1,749 88·78%	221 11·21%	..
Mundubbera	24,880	17,020 68·4%	7,811 31·39%	49 ·19%	..	3,427	1,933 56·4%	1,482 43·24%	12 ·35%	1,279	1,093 85·45%	186 14·54%	..

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1945—*continued.*

Factory.	Manufacture and Payments in Lb.						Over-run.		Make Graded.
	Total.		Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Wondai	Make	2,386,966	1,909,678	413,480	63,808	..	79,841	79,260	54·74
	Pay	2,386,385	1,914,785	428,825	42,775	..	3·46%	3·43%	
Milmerran	Make	1,111,758	181,791	605,472	281,095	43,400	25,593	25,542	84·58
	Pay	1,111,707	244,435	597,335	269,937	..	2·35%	2·35%	
Nanango	Make	2,245,011	672,587	1,480,696	91,728	..	74,427	75,919	91·93
	Pay	2,246,503	957,311	1,225,824	63,368	..	3·42%	3·49%	
Oakey	Make	3,842,170	2,759,298	805,784	277,088	..	120,407	124,548	87·08
	Pay	3,846,311	2,802,316	837,027	206,968	..	3·23%	3·34%	
Bundaberg	Make	1,559,769	541,915	1,017,854	..	..	33,064	37,341	24·01
	Pay	1,564,136	550,887	1,010,296	2,953	..	2·16%	2·45%	
Gladstone	Make	913,671	207,991	697,775	7,905	..	20,902	21,918	86·70
	Pay	914,687	196,547	711,756	6,384	..	2·34%	2·45%	
Monto	Make	3,466,564	1,405,752	1,772,742	288,070	..	85,636	86,243	63·85
	Pay	3,467,171	1,429,634	1,797,609	239,928	..	2·53%	2·55%	
Rockhampton	Make	1,224,941	190,123	993,963	38,385	2,470	20,913	24,036	6·35
	Pay	1,228,064	190,920	1,002,004	35,140	..	1·73%	1·99%	
Wowan	Make	1,725,220	434,553	1,251,594	37,303	1,770	42,098	42,974	61·90
	Pay	1,726,096	424,757	1,267,393	33,946	..	2·50%	2·55%	
Biloela	Make	2,811,423	710,384	2,017,849	81,725	1,465	53,425	53,852	48·83
	Pay	2,811,850	697,411	2,048,181	66,258	..	1·93%	1·95%	
Q.A.H.S. and College ..	Make	71,211	41,778	29,433	..	..	1,458	1,457	38·53
	Pay	71,210	67,090	4,066	54	..	2·09%	2·09%	
Boonah	Make	3,258,098	1,882,377	1,209,752	165,969	..	119,159	118,921	86·79
	Pay	3,257,860	2,002,010	1,124,869	130,981	..	3·79%	3·78%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Wondai	14,669	14,005 95·47%	664 4·52	..	..	7,495	6,941 92·6%	554 7·39%	..	1,172	1,065 90·87%	107 9·12%	..
Milmerran	927	765 82·52%	162 17·47%	..	..	10,624	9,780 92·05%	844 7·94%	..	4,869	4,358 89·5%	511 10·49%	373
Nanango	9,802	8,378 85·47%	1,424 14·52%	..	..	25,508	25,060 98·24%	448 1·75%	..	1,548	1,389 89·5%	159 10·27%	..
Oakey	41,804	25,672 61·41%	16,132 38·58%	..	..	13,079	12,345 94·38%	734 5·61%	..	4,879	4,839 99·18%	40 ·81%	..
Bundaberg	363	343 94·49%	20 5·5%	..	..	6,326	6,232 98·51%	94 1·48%	..	..	..	..	..
Gladstone	911	875 96·04%	36 3·95%	..	..	13,036	13,036 100%	..	..	199	42 21·1%	157 78·89%	..
Monto	11,026	10,951 99·31%	75 ·68%	..	..	23,469	23,469 100%	..	..	5,031	5,031 100%	..	..
Rockhampton	..	..	..	..	..	237	237 100%	..	..	452	452 100%	..	351
Wowan	2,688	2,688 100%	..	..	..	15,186	15,186 100%	..	..	943	903 95·75%	40 4·25%	127
Biloela	4,433	3,657 82·49%	776 17·5%	..	..	18,381	18,311 99·61%	70 ·38%	..	1,157	1,079 93·25%	78 6·74%	274
Q.A.H.S. and College ..	..	..	..	..	..	490	446 91·02%	44 8·97%	..	..	..	..	..
Boonah	27,048	13,447 49·71%	13,601 50·28%	..	..	18,925	18,336 96·88%	589 3·11%	..	2,677	2,448 91·44%	229 8·55%	..

PRODUCTION PAYMENT AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1944—*continued.*

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Booval	Make	2,869,887	1,808,074	828,588	233,001	224	106,810	108,483	65·48
	Pay	2,871,560	1,609,433	1,053,255	208,872	..	3·86%	3·92%	
Grantham	Make	2,130,386	1,066,131	884,483	179,772	..	77,416	77,460	92·66
	Pay	2,130,430	1,105,675	872,748	152,007	..	3·77%	3·77%	
Laidley	Make	1,693,309	1,184,866	451,949	56,494	..	57,801	57,746	94·24
	Pay	1,693,254	1,216,373	427,680	49,201	..	3·53%	3·53%	
Lowood	Make	733,725	288,058	409,459	36,208	..	25,626	25,659	92·65
	Pay	733,758	298,146	403,543	32,069	..	3·61%	3·62%	
Roma	Make	651,630	20,258	421,316	210,056	..	27,546	27,546	47·16
	Pay	651,630	151,497	318,968	181,165	..	4·41%	4·41%	
Murgon	Make	2,299,617	1,463,313	832,440	3,864	..	63,267	63,248	78·82
	Pay	2,299,598	1,849,757	447,085	2,756	..	2·82%	2·82%	
Proston	Make	1,238,988	768,420	416,808	53,760	..	38,594	38,307	98·11
	Pay	1,238,701	811,715	382,997	43,989	..	3·21%	3·19%	
Kingston	Make	4,036,368	2,474,472	1,440,880	121,016	..	148,254	148,313	95·58
	Pay	4,036,427	2,619,410	1,330,654	86,363	..	3·81%	3·81%	
Woodford	Make	1,586,737	1,447,313	139,424	..	..	43,178	43,151	95·98
	Pay	1,586,710	1,445,272	141,438	..	..	2·79%	2·79%	
Allora	Make	1,459,143	981,494	471,807	5,842	..	40,849	44,176	85·29
	Pay	1,462,470	990,281	463,323	8,866	..	2·88%	3·11%	
Inglewood	Make	418,412	133,596	236,320	48,496	..	14,121	13,982	82·47
	Pay	418,273	119,466	252,667	46,140	..	3·49%	3·45%	
Mill Hill	Make	1,695,698	1,198,978	341,880	154,784	56	50,612	46,001	53·23
	Pay	1,691,087	947,219	618,171	125,697	..	3·07%	2·79%	

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Booval	14,366	8,145 56·69%	6,221 43·3%	..	..	15,183	14,787 97·39%	396 2·6%	..	4,013	3,682 91·75%	331 8·24%	..
Grantham	17,235	9,484 55·02%	7,751 44·97%	..	..	15,350	14,899 97·06%	451 2·93%	..	2,667	2,589 97·07%	78 2·92%	..
Laidley	19,638	14,413 73·39%	5,225 26·6%	..	..	7,853	7,189 91·54%	664 8·45%	..	1,005	854 84·97%	151 15 02%	..
Lowood	4,339	3,236 74·57%	1,103 25·42%	..	..	7,191	6,887 95·77%	304 4·22%	..	610	514 84·26%	96 15·73%	..
Roma	..	..	..	..	..	1,771	1,771 100%	..	..	3,717	3,574 96·15%	143 3·84%	..
Murgon	17,929	11,924 66·5%	5,971 33·3%	34 ·18%	..	14,370	14,059 97·83%	311 2·16%	..	69	45 65·21%	24 34·78%	..
Proston	13,404	8,032 59·92%	5,342 39·85%	30 ·22%	..	7,356	6,993 95·06%	363 4·93%	..	938	854 91·04%	84 8·95%	..
Kingston	42,114	32,681 77·6%	9,433 22·39%	..	..	24,464	24,302 99·33%	162 ·66%	..	2,316	2,301 99·35%	15 ·64%	..
Woodford	24,770	13,260 53·53%	11,510 46·46%	..	..	2,426	2,001 82·48%	425 17·51%	..	..	..	..	..
Allora	13,748	8,574 62·36%	5,174 37·63%	..	..	8,372	8,013 95·71%	359 4·28%	..	104	100 96·15%	4 3·84%	..
Inglewood	1,179	678 57·5%	489 41·47%	12 1·01%	..	4,118	3,884 94·31%	234 5·68%	..	865	776 89·71%	89 10·28%	..
Mill Hill	7,229	5,562 78·18%	1,557 21·81%	..	..	6,126	5,884 96·04%	242 3·95%	..	2,766	2,660 96·16%	106 3·83%	..

PRODUCTION, PAYMENT, AND GRADINGS OF BUTTER IN QUEENSLAND, FOR THE YEAR ENDED 30TH JUNE, 1945—*continued.*

Factory.		Manufacture and Payments in Lb.					Over-run.		Make Graded.
		Total.	Choice.	First.	Second.	Pastry.	Actual.	Paid.	Per Cent.
Texas	Make	148,985	101,992	31,136	15,857	..	5,231	5,220	30·85
	Pay	148,974	98,211	36,186	14,577	..	3·63%	3·63%	
Cooroy	Make	1,625,628	1,222,484	394,016	9,128	..	48,726	48,289	94·38
	Pay	1,625,191	1,310,176	310,555	4,460	..	3·08%	3·06%	
Gympie	Make	6,600,799	5,926,605	570,192	104,002	..	219,189	217,936	92·07
	Pay	6,599,546	6,064,044	453,553	81,949	..	3·43%	3·41%	
Maryborough	Make	885,267	560,094	302,213	22,960	..	30,888	27,265	..
	Pay	881,644	601,416	261,964	18,264	..	3·61%	3·19%	

No butter submitted for grading from this factory.

OFFICIAL GRADINGS IN BOXES—*continued.*

Factory.	Boxes Submitted as Choice.	Grading Result.				Boxes Submitted as First.	Grading Result.			Boxes Submitted as Second.	Grading Result.		
		Choice.	First.	Second.	Pastry.		First.	Second.	Pastry.		Second.	Pastry.	Pas. Qual.
Texas	..	..	..	..	..	539	456 84·6%	83 15·39%	..	282	155 54·96%	127 45·03%	..
Cooroy	20,560	16,442 79·97%	3,910 19·01%	208 1·01%	..	6,696	6,442 96·2%	254 3·79%	..	143	124 86·71%	19 13·28%	..
Gympie	97,391	91,502 93·95%	5,889 6·04%	..	..	9,553	7,199 75·35%	2,264 23·69%	90 ·94%	1,587	1,079 67·98%	508 32·01%	..
Maryborough	..	..	..	..	..	..	..	..	..	..	..	..	..

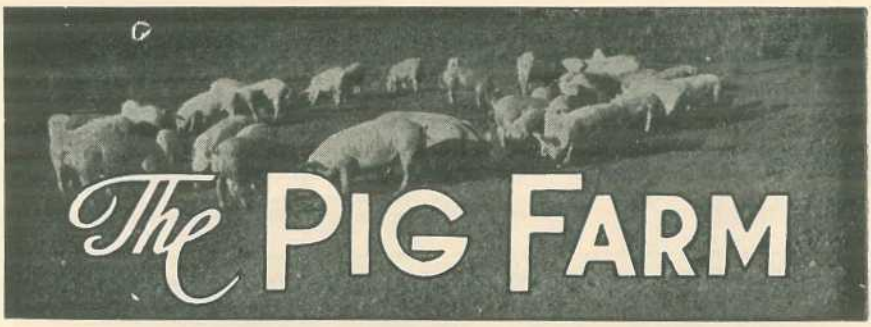
PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which qualified for entry into the Advanced Register of the Herd Books of the A.I.S., Jersey, Guernsey and Ayrshire Societies, production records for which have been complied during the month of November, 1945, (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Silver Glen Opal	V. R. Nugent, Murgon	9,172·4	329·634	Aynsley Renell
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Tara Hilda 2nd	Mrs. K. Henry, Watt's Siding	7,577·25	290·982	Murray's Bridge Pansy's Gift
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Yarranvale Phyllis	W. Henschell, Yarranlea	8,002·43	321·119	Trevor Hill Bosca
JUNIOR, 2 YEARS (STANDARD, 230 LB.)				
Tabbagong Lucy 20th	J. Crookey, Allora	8,324·34	348·662	Parkview Paymaster
Tabbagong Pet 4th	J. Crookey, Allora	8,336·81	324·585	Parkview Ensign
JERSEY.				
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Navua Desired Sunshine	F. Eager, Petrie	4,409·5	303·588	Majestic
Gem Constance (228 days)	W. Bishop, Kenmore	5,871·2	294·191	Bulby Oxford Gamboge
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Glenrandle Hazeldale	P. Kerlin, Killarney	5,384·6	345·157	Bellgarth Stylish
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Strathdean Sparkle	S. H. Caldwell, Bell	7,056·46	359·102	Oxford King's Victor
Strathdean Tassie	S. H. Caldwell, Bell	6,402·09	334·424	Strathdean Tarzan
Glenrandle Fashion Lady	P. Kerlin, Killarney	5,520·0	314·393	Bellgarth Stylish
Glenrandle Alfa	P. Kerlin, Killarney	5,346·4	296·921	Bellgarth Stylish
GUERNSEY.				
SENIOR, 4 YEARS (STANDARD 330 LB.).				
Mirabels Patch	W. A. Cooke, Maleny	7,621·12	410·412	Laureldale President
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Laureldale Vera	W. A. K. Cooke, Maleny	9,599·2	476·161	Minnamurra Topsy Sequel 2nd
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Laureldale Buttermaid	W. A. K. Cooke, Maleny	6,482·95	346·846	Minnamurra Topsy Sequel 2nd
AYRSHIRE.				
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Leafmore Miss Bell	J. P. Ruhle, Motley	6,699·51	258·573	Myola Bessemer

Plate 3.
WOOROOLIN DAIRY LANDS, SOUTH BURNETT.

Plate 4.
A WHEATLAND MILO SORGHUM CROP, KINGAROY DISTRICT.



Parasitic Diseases of the Pig.

F. H. S. ROBERTS, Division of Animal Industry.

MANY farmers have the idea that the pig prefers to live under filthy conditions. This belief is by no means uncommon and is seen in the frequency with which deplorable conditions of housing and feeding are encountered in this State. Sties with earthen floors, deep in a mixture of mud, dung, and litter, and food thrown on the ground or fed from troughs, which are rarely cleaned, are expected to produce healthy profitable animals.

Filth goes hand in hand with disease, and no disease is more favoured by insanitary conditions than that associated with parasites. Under these circumstances, parasites thrive, because favourable conditions are created for the development and survival of the eggs and larvae and access to the pig is made easy when food is thrown on the ground or fed from dirty troughs.

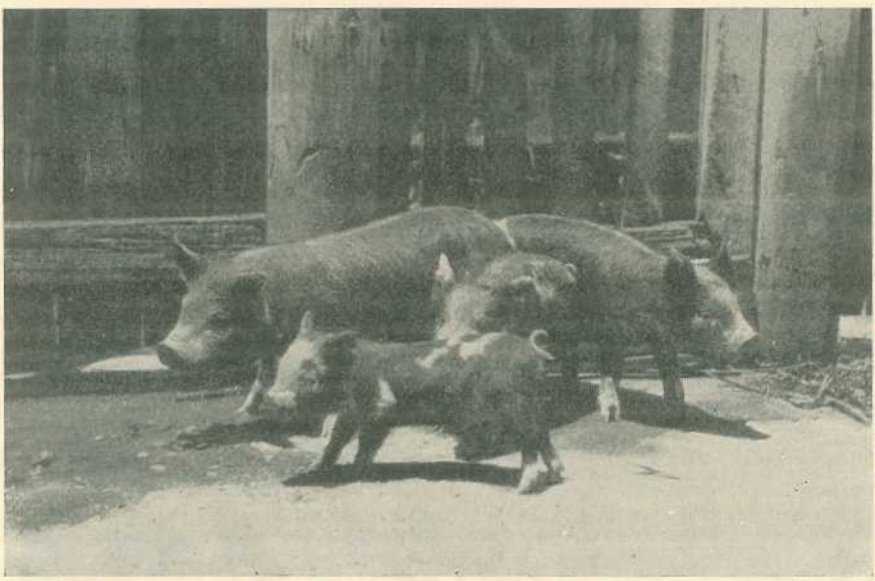


Plate 5.

THESE FOUR PIGS ARE FROM THE SAME LITTER.—The two larger animals are worm-free; the two smaller animals are infested with worms.

Unlike diseases caused by bacteria and viruses, parasitic diseases are rarely spectacular in their onset, and are, therefore, apt to be overlooked. Infested pigs may never show any marked symptoms of infestation and yet fail to make profitable weight gains. The ill-effects that occur are, as a rule, gradually accumulative and the animal, if it survives, finally becomes stunted and unthrifty (Plate 5). Such pigs may take a year and more to attain a marketable weight, despite treatment and any improvement in housing and feeding.

Furthermore, as a result of infestation the resistance of the animals to other diseases is considerably reduced. A high percentage of the losses which occur among suckling pigs is due either directly to parasitism or to other diseases which find the baby pig a suitable host because its vitality has been undermined by parasites.

In bacon factories and abattoirs, heavy losses are experienced by the condemnation of carcases and organs, which have been rendered unfit for human consumption because of parasites. Whole carcases, or parts thereof, may be condemned because of parasitic mange or extensive kidney worm infestation. No less than 60 to 70 per cent. of livers are condemned because of damage caused by the larvae of the large roundworm and kidney worm (Plate 6). The latter parasite also renders a large number of kidneys unfit for consumption.

Plate 6.

THIS LIVER IS ONE OF THE MANY THOUSANDS CONDEMNED EVERY YEAR BECAUSE PARASITES HAVE RENDERED IT UNFIT FOR HUMAN CONSUMPTION.

These losses amount to many thousands of pounds annually, and it all comes out of the farmer's pocket. The Division of Animal Industry can show him how to avoid these losses, but the actual practice of the Division's recommendations is the farmer's own responsibility. Control is not a difficult procedure nor are the measures advised in any way impracticable.

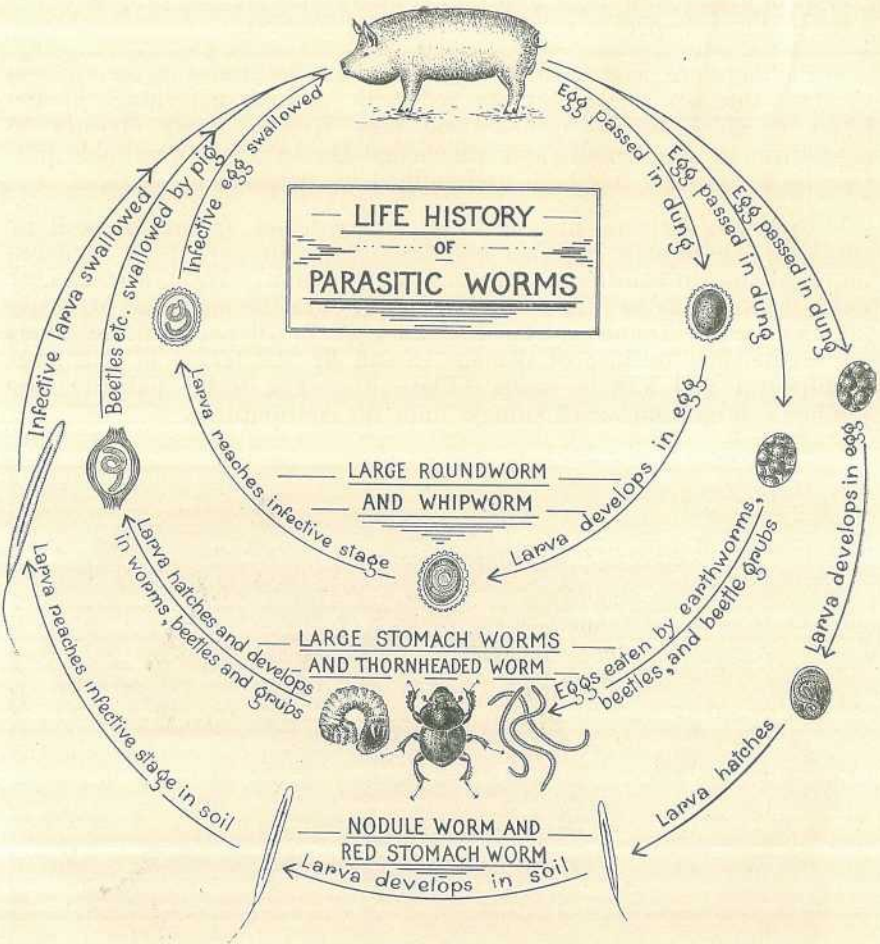


Plate 7.

[*Drawing by William Manley.*

HOW PIGS BECOME INFESTED WITH WORMS.

WORM PARASITES.

How Pigs Become Infested with Worms (Plate 7).

Unlike other disease agents, such as bacteria, worms do not reproduce within the host animal. Each individual worm represents an egg or larva picked up from the soil by the animal, usually in its food or water. Each female worm in the animal lays eggs which are carried to the exterior in the dung or, in the case of the kidney worm, in the urine. Thereafter, depending on the species of worm, development proceeds in one of the following ways:—

1. In some species a larval worm develops inside the egg. In time, the larva reaches what is termed "the infective stage." Only eggs containing infective larvae are capable of setting up an infestation. When swallowed, the egg hatches and the larva is set free and grows to maturity, when it commences to lay eggs. The large roundworm is picked up in this manner.

2. In other species the larva, after developing in the egg, hatches and lives in the soil. It feeds and grows in the soil and ultimately reaches the infective stage. Such larvae gain access to the pig when swallowed with food or water, as is the case with the nodule worm, or as with the kidney worm, they can bore through the skin.

3. Other species require the assistance of an intermediate host before they can complete their development. In the case of the pig, earthworms, dung beetles, and certain beetle grubs fill this role. The egg is eaten by the earthworm, beetles, or beetle grubs and in these the larvae develop and reach the infective stage. When the intermediate hosts containing infective larvae are eaten by the pig the larvae are set free in the pig, and grow to the adult stage.

Symptoms of Parasitic Disease.

In the early stages of parasitic disease, symptoms are not usually very prominent, and the only evidence of infestation may be that the animals fail to "do well." As the disease progresses other symptoms are observed, such as marked loss of condition, a capricious appetite, colic, diarrhoea or constipation, vomiting, coughing and laboured breathing, and sometimes nervous disorders like convulsions. The final result is an anaemic, weak, stunted animal with a dry, harsh coat and dull, sunken eyes.

Detection of Worm Parasites.

A few worms do little harm and it is only when numbers of worms are present that one is justified in holding them responsible for any symptoms that may indicate parasitism. A long experience with parasitic diseases is, then, essential before a diagnosis can be made with any accuracy. For this reason the local Veterinary Officer, Adviser in Pig Raising, or Stock Inspector should be consulted. If these officers are not available, the following steps are advised:—

1. Fresh dung samples from at least five animals should be tightly packed in separate containers made as airtight as possible. In the laboratory it is possible to find the eggs and to determine not only which species of worms are present, but also the degree of infestation.

2. Better still, kill one of the affected animals and forward the entire viscera—that is, the stomach and intestines and lungs—in a petrol tin. The viscera should be preserved in formalin (1 oz. of commercial formalin to 1 pint of water). If formalin cannot be obtained and the farm is close to the laboratory, the viscera could be liberally sprinkled with coarse salt.

3. Specimens of dung or viscera should be sent to the Animal Health Station, Yeerongpilly, Brisbane, or the Animal Health Station, Oonoonba, Townsville. Each specimen should be accompanied by particulars giving full details as to—

   (*a*) how many pigs are affected;

   (*b*) number of deaths;

   (*c*) symptoms;

   (*d*) ration fed; and

   (*e*) condition of housing and of pastures.

Frequently, in the case of the large roundworm, worms are passed in the dung or are vomited. The number seen at any one time and the frequency with which the worms are passed sometimes give an indication of the cause if the animals tend to be unthrifty.

Control.

Treatment.

No matter how efficient, treatment should always be considered as giving only temporary relief. It is of little benefit to remove worms from animals which are maintained in an environment in which reinfestation can rapidly occur. Furthermore, treatment is of no value against the kidney worm or the larvae of the large roundworm when they are migrating through the body.

There are many remedies claimed to be effective in removing worms and, frequently, the farmer is satisfied with results if he sees worms passed after treatment. It must be remembered, however, that a treated animal might pass, say, 20 worms, and still be infested by 200. It is not, then, the number of worms that are passed which proves the efficiency of any drug, but the number which the drug fails to remove. The drugs mentioned here, namely, carbon bisulphide, oil of chenopodium and phenothiazine, have all been thoroughly tested and are known to be effective, and, at the dose rates recommended, comparatively safe.

All these drugs are poisons. If there is any carelessness in measuring the dose or in administration, the animal may die. To avoid this possibility, the following points should be carefully considered:—

1. Use only the recommended dosages and carefully measure them in a glass measuring cylinder. If this cannot be obtained, the following measures may be used:—

1 teaspoonful	=	3½ cubic centimetres
1 dessertspoonful	=	7 cubic centimetres
1 tablespoonful	=	14 cubic centimetres
1 beer bottle	=	26 fluid ounces

2. The dose should be reduced by one-quarter to one-half for very weak or sick animals.

3. Divide the pigs, as far as possible, into groups according to their weight. Bulk quantities of the drug can then be prepared for each weight group.

Methods of Treatment.

Worm remedies may be given (a) in capsules, (b) as a drench, (c) by stomach tube or, (d) mixed with the food.

Capsules.—Gelatine capsules are filled with the measured dose. They are held in a special pair of capsule forceps and are passed into the throat, the mouth being held open by a gag or spreader. Carbon bisulphide is given in this manner.

Drench.—The mouth is held open with a gag and the drug is delivered over the back of the tongue by a drenching syringe. Special syringes for drenching pigs are, unfortunately, not available. Syringes for dosing sheep with phenothiazine can be used. It is advisable to lengthen the nozzle by attaching a piece of stout rubber tubing about 6 inches in length. Oil of chenopodium in castor oil, and watery suspensions of phenothiazine, are given as drenches.

Stomach Tube.—This is the safest way of treatment, but requires a good deal of experience. The stomach tube, which is made of special rubber hose, is passed through the gag, down the throat and into the stomach. The drug is poured into the tube through a small funnel or by means of a syringe attached to the tube. Carbon bisulphide, oil of chenopodium and castor oil, and suspensions of phenothiazine may be administered by stomach tube.

Mixed with Food.—This is the most convenient way of administering treatment. The drug is mixed with a small amount of food and then placed before the animal, which has previously been starved. Such treated food may be distasteful and the animal, as a rule, has to be very hungry before it will eat it. It is frequently recommended for treating groups of pigs at the one time. Owing, however, to the fact that under such conditions some animals will eat more than others, some may get an overdose of the drug and others not enough to be beneficial. The dose can be controlled better if the method is applied to individual animals. Phenothiazine is the only drug recommended to be given in the food.

Great care must always be exercised when administering these drugs, for in inexperienced hands it is very easy to deliver the drug into the windpipe, instead of the throat, and kill the animal. Pigs resent handling and the continuous squealing is a hazard which has to be watched very carefully, as it exposes the entrance into the windpipe and lungs. Capsules can quite easily be delivered into the windpipe or they may break and the drug may "go down the wrong way."

Young animals are set up on their tail and held firmly with the assistant's legs grasping the body and his hands holding the ears or forelegs. The mouth is opened with a gag. With capsules, the capsule is held securely in the capsule forceps which are passed through the gag and over the back of the tongue into the throat. The capsule is then released. Liquid drenches are delivered slowly and in small quantities over the back of the tongue, allowing the animal its own time to swallow. On no account should attempts be made to hasten swallowing.

Milk Treatment.—Many farmers who feed mainly on skim milk have noticed that animals brought on to this diet may pass large numbers of worms. This has been the subject of a recent investigation in the United States and it was shown that skim milk fed for 3 to 5 days would eliminate the majority of the worms. Protection against infestation can be secured by frequent administration of skim milk in sufficient quantities to cause scouring.

Prevention of Infestation.

The measures devised to prevent infestation are founded upon careful studies of the habits and life histories of the various parasites. The chances of the eggs and larvae developing and surviving depend mainly on adequate moisture, protection from sunlight, and, in some cases, the presence of suitable intermediate hosts.

Therefore, if housing conditions are maintained in such a way that these factors are eliminated as far as possible the chances of infestation are considerably reduced. Under normal farm practice, infestation cannot be entirely eliminated, but, with a little care, it can be reduced to a point where it is no longer harmful.

A practical system of prevention must vary in accordance with the type of husbandry employed, but the following principles apply equally well to all types of husbandry as they simply embody the main principles of good sanitation:—

1. *Housing.*—All housing should be well constructed so as to enable thorough cleansing. Concrete or well-built wooden floors are essential. Earthen floors can never be kept clean.

2. *Dung.*—Dung should be regularly and frequently removed. If desired for fertilizing purposes, it should be used only on those pastures not accessible to pigs. Otherwise it should be destroyed by burning or deep burial. Pig dung is a favoured breeding medium for the house fly, which can be not only a serious annoyance but also a major factor in the spread of disease.

3. *Drainage.*—A good drainage system to keep the sties and pastures and yards as dry as possible is necessary for good sanitation. All depressions should be filled in and mud holes eliminated. Wallows, if considered necessary, should be built of concrete and regularly cleaned out and disinfected.

4. *Feeding.*—Food should never be thrown on the ground but fed from concrete troughs built to prevent the animals climbing into them and lying in the food. Such food troughs should be surrounded with a concrete or wooden platform raised above the surface of the ground and sloping away from the trough. Troughs and platforms must be kept clean. Dry food is best fed from hoppers.

   A good balanced ration should be available. This increases the animal's resistance to infestation. It has been shown, for example, that young pigs are more susceptible to infestation when the sow's milk supply is inadequate. The farmer who feeds garbage should pay strict attention to the cleanliness of the boiler.

5. The runways and yards should be kept free of all litter. An accumulation of litter prevents the soil from drying and provides favourable conditions for the development and survival of eggs and larvae.

Losses from parasitic diseases are most frequent among young pigs, for the young animals are more susceptible to infestation. Particular efforts should then be made to provide protection for the young animals. A system of management which has produced excellent results in the United States is well worthy of consideration. The main features of this system are:—

(1) The farrowing pen should be of sanitary construction. Just prior to housing the sow, the pen should be thoroughly cleansed with boiling disinfectant (5 per cent.). The sow is washed with warm soapy water and all dirt and mud crusts removed, particular attention being given the feet and udder. It is advisable to treat the sow before she is placed in the pen. This can be done quite safely with phenothiazine given in a small quantity of food (see page 35).

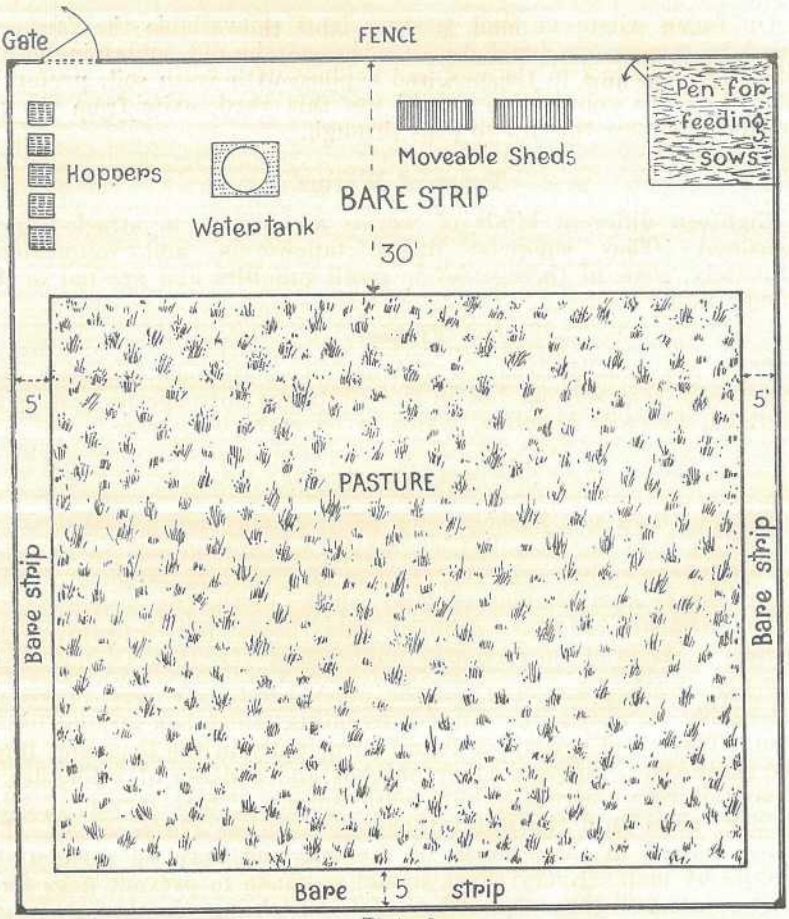


Plate 8.

PLAN OF A PASTURE FOR RUNNING SOWS AND YOUNG PIGS TO PREVENT INFESTATION.

From Farmer's Bulletin, 1787, U.S. Department of Agriculture.

[Drawing by William Manley.

(2) A few days after birth, the sow and pigs are removed to a well-drained pasture, sown with a suitable forage crop. It is best to use temporary pastures, each pasture being spelled for at least one year. Around three sides of the pasture, a bare strip 5 ft. in width, and on the fourth side, a bare strip 30 ft. in width, should be provided. Portable shelter sheds, food and watering troughs are placed close to the fence on the 30 ft. bare strip. The sow should be fed away from the youngsters (Plate 8). It is essential that all bare strips be kept clean of weed growth and litter. Most of the urine and dung is passed on the bare areas, particularly around the feeding troughs. The action of the sun and the rapid drying of the dung and urine as the moisture is absorbed into the dry soil quickly kill the eggs and larvae.

(3) On weaning, the young pigs are transferred to another temporary pasture and maintained here until ready for market.

On farms where no such pasture land is available the farmer is advised to remove the top 9 to 12 inches of the old contaminated soil in the yard attached to the pen and replace with fresh soil, preferably sand. Only the young pigs should use this yard, exits from the pen being too small for the sow to pass through.

Types of Worms.

Eighteen different kinds of worms are known to attack pigs in Queensland. They comprise flukes, tapeworms, and roundworms. Fortunately, some of these occur in small numbers and are not of any economic importance.

Flukes.

These are usually flattened and leaf-like. In some countries fluke infestation is very serious, but in this State the only species seen is the liver fluke, *Fasciola hepatica,* which is comparatively rare.

Tapeworms.

The pig does not harbour any adult tapeworms, but acts as an intermediate host for two species, which reach maturity in the dog. *Cysticercus tenuicollis* is the larval form of *Taenia hydatigena.* It has the appearance of a bladder of fluid which, in the pig, occurs in the liver or attached to the webbing that holds the intestines (the mesentery). It is of no economic importance.

Echinococcus granulosus, on the other hand, is a very important larval tapeworm, as it is the cause of hydatids, which is a serious disease in man. The larval hydatid is found principally in the liver and lungs of the sheep, cow, pig, and other animals and consists of a bladder of fluid containing numerous minute white specks. These larvae, if eaten by a dog, grow into the adult tapeworm, *Taenia echinococcus.* The eggs are passed in the excreta of the dog and may be accidentally swallowed by man. Every effort should be made to prevent dogs from becoming infested through eating offal containing the larval forms. This can be done by boiling all such offal thoroughly if it is to be fed to dogs.

Roundworms.

Stomach Worms.

Three species of worms are found in the stomach. When in small numbers they are difficult to find because they are closely associated with the wall of the stomach and are covered with a slimy mucous.

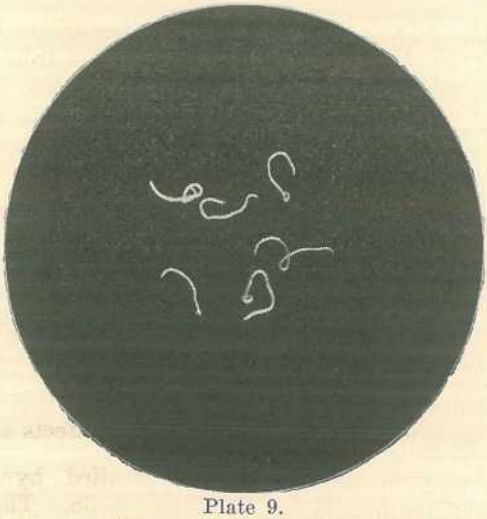


Plate 9.
THE LARGE STOMACH WORM, *Ascarops strongylina.* (Natural size).

Life History.—Ascarops strongylina (Plate 9) and *Physocephala sexalatus* are comparatively large worms, measuring up to about an inch in length. They are white to pink in colour. Both these species use dung beetles as intermediate hosts. The eggs, passed in the dung, are eaten by these beetles. The larvae on hatching from the eggs develop to the infective stage in the beetle. The pig becomes infested when it eats these insects.

The third species is *Hyostrongylus rubidus,* the red stomach worm (Plate 10). These worms are small and delicate, being no more than

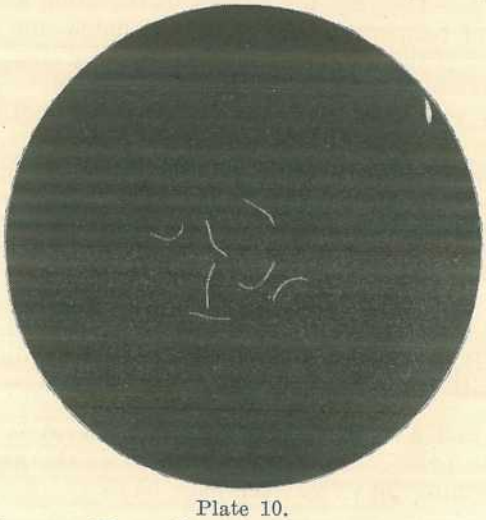


Plate 10.
THE RED STOMACH WORM, *Hyostrongylus rubidus.* (Natural size.)

one-third of an inch in length. The eggs of the red stomach worm are passed in the dung. The larva, which develops in the egg, hatches and is free living in the soil. It eventually reaches the infective stage and when swallowed by the pig in food or water becomes mature in about 2½ weeks.

Effect on the Pig.—As a result of infestation the wall of the stomach may be seriously damaged. It becomes inflamed, sometimes ulcerated, and is covered with a thick slimy mucous. Heavy infestations cause rapid loss of condition and may ultimately be fatal.

In this State, the red stomach worm is the most serious species. It is very prevalent in the northern pig-raising districts, where it is responsible for severe losses.

Control.—Carbon bisulphide is recommended for the removal of stomach worms. Pigs are starved for 18-24 hours before and for 3-4 hours after treatment. The drug is given either in capsules or by stomach tube. The dose rate is 8 to 10 cubic centimetres for a 100-lb. pig.

Carbon bisulphide sometimes causes vomiting, dizziness, and prostration, but as a rule these ill-effects are only temporary.

Infestation may be controlled by putting into operation the measures discussed on pp. 34 to 38. The eggs are larvae of the red stomach worm have little resistance to dryness or exposure to sunlight. Dung beetles can be controlled only when the source of infection, namely the dung, is dealt with.

Intestinal Thread Worms (*Strongyloides ransomi*).

These are very tiny, thread-like worms measuring about one-sixth of an inch in length. They are found in the small intestine. Special laboratory methods are necessary to find them as they are too small to be seen on casual examination.

Life History.—The eggs are passed in the dung and under favourable conditions of temperature and moisture hatch in a few hours. The larvae may develop to the infective stage, or they may grow into adult male and female worms which live free in the soil. These free-living females produce eggs which may develop to the infective stage also, or they may produce further free-living adults. The infective larvae gain access to the pig either in food or water or else by boring through the skin.

Effect on Pig.—Infestation is acquired very early in the life of the pig. Threadworms are extremely common parasites and heavy infestations are prevalent. Diarrhoea and loss of condition are the most pronounced symptoms. Young pigs may be seriously affected. The wall of the intestine is damaged and bacteria may enter the body from the intestine, with serious consequences.

Treatment and Control.—No efficient treatment is known for these tiny parasites, so preventive measures become of the highest importance in keeping the young pigs free (see page 34).

The Large Roundworm (*Ascaris lumbricoides*). (Plate 11.)

This parasite, which occurs in the small intestine, is one of the largest roundworms known. It may attain a length of 15 inches and the thickness of a lead pencil.

Life History.—The eggs laid by the female worms pass out in the dung, and under suitable conditions of temperature and moisture become infective in about 18 days. These infective eggs when swallowed

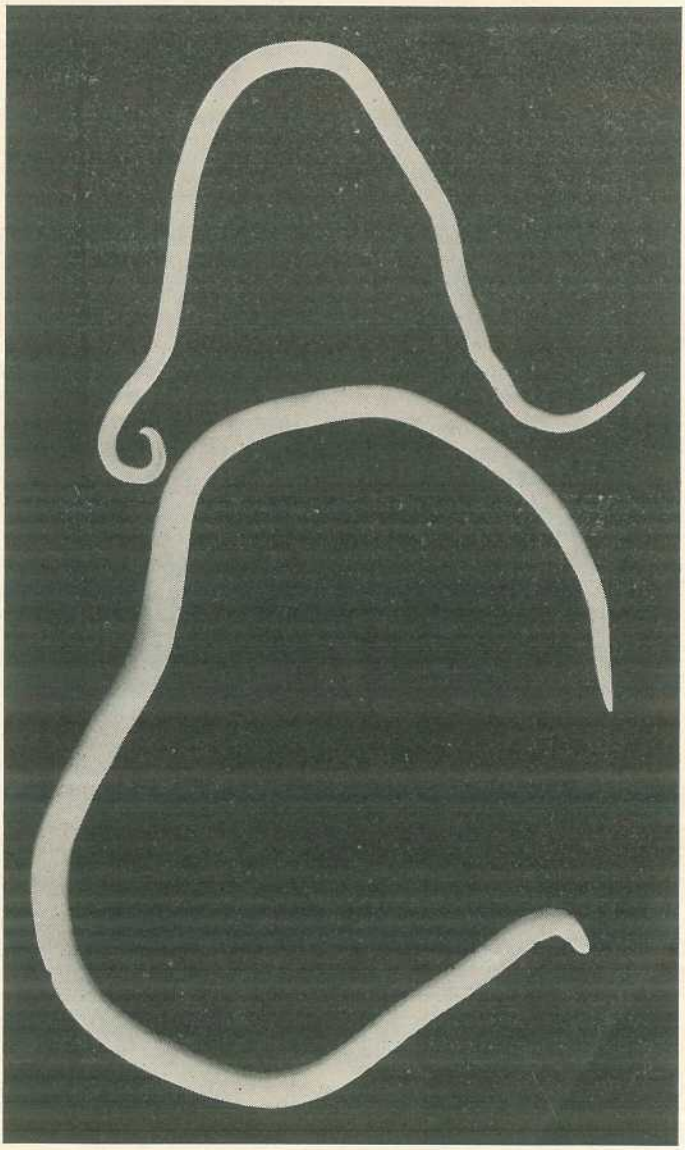


Plate 11.

THE LARGE ROUNDWORM, *Ascaris lumbricoides*. (Natural size.)
The male is smaller than the female and has a curled tail.

by the pig hatch and set free the young larvae which immediately bore into the intestinal wall. From there they are carried in the blood stream to the liver. Continuing their migration, the larvae reach the blood capillaries, and are moved on to the heart, and from there to the lungs. About ten days after hatching, the larvae leave the lungs, move up the windpipe into the mouth, are swallowed, and reach the small intestine again. They now settle down and grow to maturity in about two months.

Effect on the Pig.—The large roundworm is the most common and most harmful parasite of pigs in Queensland. It occurs in all the pig-raising districts and the success or otherwise of many pig-raising enterprises depends largely on its control.

Young pigs up to four or five months old are most seriously affected. Older pigs are more resistant to the parasite. They may, however, carry the adult worm and constitute a source of infection for the younger animals.

The parasite causes severe damage in the larval stages, when the worms are migrating through the liver and lungs. The liver tissue is destroyed and replaced by useless fibrous material which forms the so-called milk spots in infected livers (Plate 6). In the lungs, the larvae destroy the lung tissue and may cause pneumonia. Pigs which survive may breathe in a laboured and bellows-like way and they may cough frequently. The cough common to many young pigs, which is usually passed off by the farmer as a cold, is largely due to these larvae. The adult worms rob the pig of food and cause obstructions in the intestine. Animals become stunted, with a dry harsh coat giving them a hidebound appearance. Vomiting, diarrhoea, or constipation may be evident. Sometimes nervous disorders occur.

Treatment and Control.—While the large roundworm is most common in young pigs, the importance of treating the sow should not be overlooked. A few worms in a sow do not give rise to any symptoms but are a great danger as a source of eggs to infect the suckers.

Two drugs may be used against this parasite, namely, oil of chenopodium and phenothiazine.

Animals to be treated with oil of chenopodium are starved for 18 to 24 hours before and for 3 to 4 hours after treatment. The drug is given at the rate of 1 cubic centimetre in 1 fluid oz. of castor oil for every 25 lb. of live weight. A pig weighing 100 lb. would receive 4 cubic centimetres of oil of chenopodium in 4 fluid oz. of castor oil. The oil of chenopodium is thoroughly mixed with castor oil and given either with a drenching syringe or by stomach tube.

Phenothiazine is a fine greenish powder, insoluble in water, but capable of being suspended in water and given as a drench. Suspension is improved if the powder is rubbed through a fine sieve to remove all lumps. It is by no means as effective as oil of chenopodium and should be used only when chenopodium is not available. The dose rates are as follows:—

Pigs up to 25 lb. weight	$\frac{1}{6}$ oz.	phenothiazine
Pigs 25 lb. to 50 lb. weight	$\frac{1}{4}$ oz.	,,
Pigs 50 lb. to 100 lb. weight	$\frac{1}{2}$ oz.	,,
Pigs 100 lb. to 200 lb. weight	$\frac{2}{3}$ oz.	,,
Pigs over 200 lb. weight	1 oz.	,,

Based on these dose rates, 1 lb. of phenothiazine is sufficient for—

96 pigs up to 25 lb. weight.
64 pigs 25 to 50 lb. weight.
32 pigs 50 to 100 lb. weight.
24 pigs 100 to 200 lb. weight.
16 pigs over 200 lb. weight.

Phenothiazine may be given as a drench suspended in water or it may be mixed with food. In either case, the animals are divided into groups according to their weight. The amount of phenothiazine for each weight group is computed and accurately weighed out.

To be used as a drench.—The bulk quantity of phenothiazine is first rubbed into a paste with a little water. The amount of water is gradually increased, and the mixture stirred until a good even suspension is secured. The amount of water added should be such that animals up to 25 lb. weight receive ½ fluid oz. of the suspension (containing ⅛ oz. phenothiazine) and animals over 200 lb. 2 fluid oz. (containing 1 oz. phenothiazine). The suspension is not very lasting and requires frequent stirring. It is advantageous to have one man stirring and one man drenching.

No starvation is required either before or after treatment.

To be given in food.—Treatment with phenothiazine in the food may be adopted for individual animals or it may be employed to treat a group of pigs together. In either case, the animals must be starved for about 24 hours to make them sufficiently hungry to eat the treated food, which the phenothiazine renders somewhat distasteful. The dose is mixed with about four times its weight of pollard or some similar food, which is dampened with water.

Results comparable to drenching with phenothaizine are obtained when individual pigs are treated in this manner, provided all the prepared food is consumed. Efficient results cannot be expected when a number of pigs are treated simultaneously. Some will eat much more than others. Some pigs may not, therefore, receive enough phenothiazine to be effective, whilst others may get an overdose which may cause ill-effects. If the method is adopted, care should be taken that each pig is allowed ample space at the trough.

It would be best to drench all pigs that can be handled. Animals too large to be handled could be confined separately and given a mixture of phenothiazine and food.

For a few days after treatment with phenothiazine the urine is stained red, but this is of little consequence.

Under certain circumstances, at present obscure, ill-effects may follow the use of this powder. In such cases, the pigs may develop a wobbly gait and lose their appetite for varying periods. Sometimes the eyes are affected and skin rashes appear. Some of these ill-effects are thought to be in some way associated with exposure to sunlight.

Prevention of Infestation.—During its lifetime, each female worm lays up to 27,000,000 eggs. These are very resistant to dryness, sunlight, and other adverse conditions and may survive in yards and pastures for at least four years. In time, the soil becomes so heavily contaminated that no young animal can escape infestation. The cycle from the pig to the soil and from the soil to the pig can be broken

only by putting into practice the preventive measures discussed on pages 34 to 38. The pasture method of control mentioned on page 37 was originally designed to give protection against the large roundworm and, wherever it has been employed, excellent results have been obtained.

The Thornheaded Worm (*Macracanthorhynchus hirudinaceus*). (Plate 12.)

The thornheaded worm also occurs in the small intestine, and is a large species, growing up to 16 inches in length. It is white in colour and the head is provided with a thorny proboscis by which the worm attaches itself to the wall of the intestine.

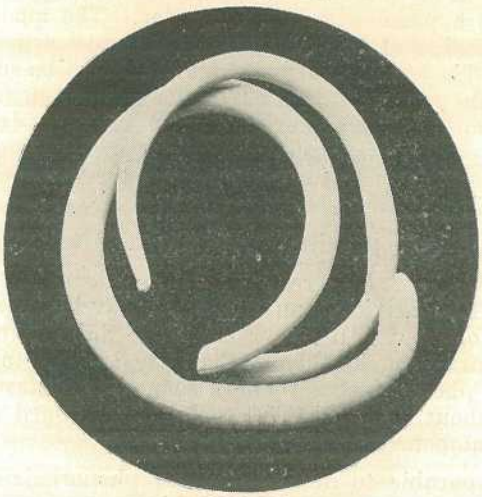


Plate 12.

THORNHEADED WORM, *Macracanthorhynchus hirudinaceus*. (Natural size.)

Life History.—The eggs are passed in the dung. Before further development can proceed the eggs must be eaten by certain beetle grubs. The larva hatches in the grub and develops to the infective stage. The pig when rooting in the soil eats the grubs and so becomes infested.

Effect on the Pig.—The thorny proboscis of this parasite causes a conspicuous wound in the delicate intestinal wall. The worms are continuously moving about and each new attachment produces a fresh wound. Sometimes, the proboscis penetrates so deeply that the wall is pierced. Peritonitis and death are the sequences in such cases. The wounds may be invaded by bacteria and ulcers formed.

Control.—No drug is available for the removal of these parasites. Prevention is therefore of the highest importance (see pages 34 to 38). Measures which will prevent the pig from rooting in the soil to find beetle grubs should be considered.

The Nodule Worms (*Oesophagostomum* spp.). (Plate 13.)

These worms are found in the large intestine. They measure at most about half-an-inch in length and are white to grey in colour. Nodule worms are very common parasites and are distributed throughout all the pig-rearing districts. The name "nodule worm" is derived from the nodules which the immature stages cause in the bowel wall.

Life History.—The eggs reach the exterior in the dung. If conditions are favourable, they hatch in a day or two. The larvae which are set free develop to the infective stage in about a week. These infective larvae are then swallowed by the pig. On reaching the large intestine the larvae burrow into the wall, causing the formation of small nodules. They remain here for varying periods, but eventually break out of the nodules and lie free in the intestine. About two months after being swallowed by the pig the worms commence to lay eggs.

Effect on the Pig.—The damage the larvae cause to the bowel wall when they invade it interferes with its normal movements and functions. The adult worms contribute to these ill-effects and, as a result, heavily infested animals become weak and unthrifty.

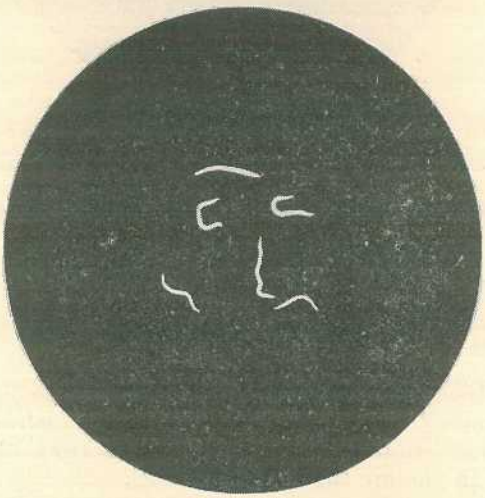


Plate 13.
NODULE WORM, *Oesophagostomum* sp. (Natural size.)

Treatment and Control.—Phenothiazine is the only drug which is effective against nodule worms. It has a high efficiency against this species. The dose rates and methods of administration are the same as those recommended for the large roundworm (see page 42).

Reinfestation is reduced to a minimum when the principles of sanitation are applied (see pages 36, 37).

Whipworm (*Trichuris trichiura*). (Plate 14.)

This parasite gets its common name from its resemblance to a whip, the anterior portion being thin and thread-like, and the posterior portion comparatively stout. It is found in the caecum or blind gut and adjoining portion of the large intestine and may measure from 1½ to 2 inches in length.

Life History.—The eggs laid by the females pass out in the dung, and under suitable conditions of temperature and moisture eventually reach the infective stage. On being swallowed by the pig, these infective eggs hatch, and the young larvae, making their way to the caecum and large intestine, reach maturity in 16 to 20 days.

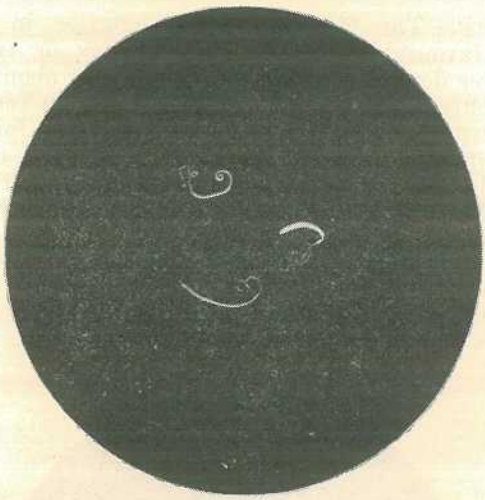


Plate 14.
WHIPWORM, *Trichuris trichiura.* (Natural size.)

Control.—The whipworm is an exceedingly common species, and a heavy infestation is harmful. Repeated treatments with oil of chenopodium or with phenothiazine may give results; but, owing to its location so far back in the alimentary tract, the worm is difficult to reach with vermifuges. The sanitary measures recommended on pages should be applied for whipworm control.

Lungworms (*Metastrongylus* spp.). (Plate 15.)

Two species of lungworms are known—*Metastrongylus apri* and *M. pudendotectus.* Both are thread-like worms from 1½ inch to 3 inches long occurring in the air tubes of the lungs.

Life History.—The eggs when laid by the females contain active embryos which are passed out in the dung. Before its development can be completed the larva, after hatching, must be swallowed by an earthworm, the pig becoming infected when it eats the earthworm.

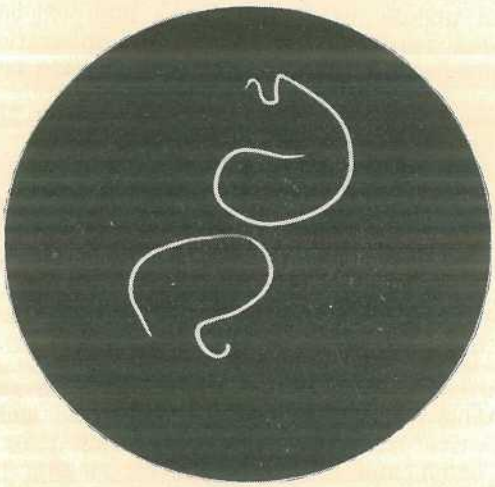


Plate 15.
LUNGWORMS, *Metastrongylus* sp. (Natural size.)

Effect on the Pig.—A light infestation causes no appreciable harm, but when in numbers, and especially in young pigs, the worms may cause a bronchitis characterised by a short, husky cough and laboured breathing. This is sometimes followed by pneumonia. The infested animals rapidly lose condition and, if bacterial complications arise, may die.

Control.—Should an outbreak occur, the affected pigs should be removed and given clean water, nourishing food, and warm quarters. Good nursing is the best treatment for lungworm infestation. All conditions permitting the presence of earthworms must be attended to, and sanitation again is necessary for an efficient control of these parasites.

Kidney Worm (*Stephanurus dentatus*). (Plate 16.)

This parasite is given the popular name of kidney worm because it is found in the vicinity of the kidneys. Mature worms are seen in the flare fat and occasionally in the kidneys themselves, and young stages of the parasite, whilst most prominent in the liver, may occur in the lungs and various other parts of the body. The mature kidney worm has a very distinctive, mottled appearance, is relatively stout, and may grow up to 2 inches in length.

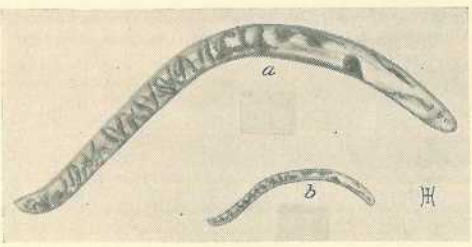


Plate 16.
KIDNEY WORM, *Stephanurus dentatus*.
((*a*) 3 x natural size; (*b*) natural size.)

Life History.—Only those females inhabiting the kidneys or kidney fat are sexually mature, and these lay eggs which eventually reach the exterior in the urine. The eggs hatch in one to two days, and five to eight days after hatching the young larvae are ready to infest the pig. As in the case of the nodule worm, the infective larva is enclosed in a sheath. The pig becomes infested by swallowing these infective larvae, or infection may occur when the larvae burrow through the skin. In either case, the young worm eventually reaches the liver, where it remains for some months. After a period of five or six months the worms are mature and, leaving the liver, migrate to the kidney fat, where, if females, they commence to lay eggs.

Effect on the Pig.—The kidney worm is one of the most widespread parasites of the pig in Queensland and is a cause of serious wastage. Heavy infestations result in an unthrifty animal, owing mainly to the extensive damage to the liver caused by the young worms. The condemnation of pigs' livers and sometimes of infested carcases, and the unthriftiness of infested pigs, are regarded as among the most serious economic losses in the pig industry in Queensland.

Control.—Owing to their location in the vicinity of the kidneys, these parasites cannot be removed by drugs given through the mouth and preventive measures must be relied on to bring about satisfactory control.

As the eggs and larvae are rapidly killed by sunlight and dryness, yards and sties should be drained thoroughly and kept as dry as possible.

All depressions and mud holes, especially those in the shade, should receive attention. Sties should be built of concrete, and sties and yards must be kept clean.

Good control has been obtained in other countries where the pastures are surrounded by bare strips. Kidney worm eggs and larvae are very susceptible to sunlight and dryness. Urine passed on to dry, bare soil very rapidly dries out and the eggs and larvae are killed. The main feature in kidney worm control is good drainage, which includes elimination of earthen floors, mud holes and depressions in the ground. Yards and sties spelled for six months may be used with safety, as larvae cannot survive for this period.

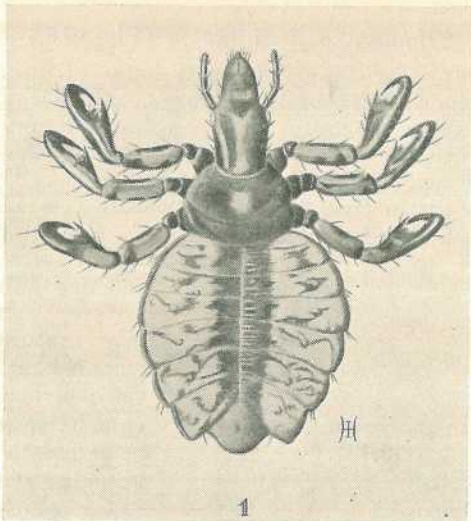


Plate 17.

THE PIG LOUSE, *Haematopinus suis*. (5 x natural size.)

EXTERNAL PARASITES.

The principal external parasites of the pig include lice and mites, the latter being responsible for mange.

Lice (*Haematopinus suis*). (Plate 17.)

Pig lice, *Haematopinus suis*, are found everywhere in Queensland where pigs are raised. The species is one of the largest lice known and may measure up to one-quarter of an inch in length. The mouth parts are constructed in such a way that the louse is able to pierce the skin and suck up blood. This continual puncturing of the skin causes considerable irritation, which in time lowers the vitality of the animal to such a degree as to produce an unthrifty condition and render it more susceptible to attack by other parasites and diseases.

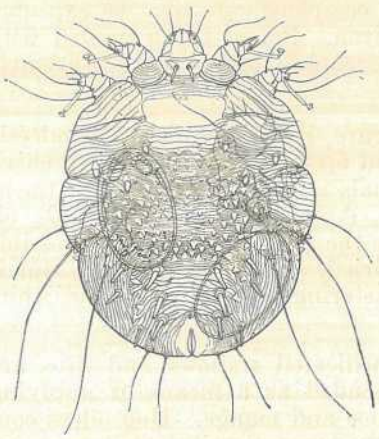
Life History.—Eggs deposited by the females are glued to the bristles of the pig and hatch in from 12 to 20 days, usually in about 14 days. The young louse is very similar in appearance to the adult, differing mainly in size. After hatching, the young lice commence feeding immediately, and after 10 to 12 days become mature. Lice may live as long as 35 days and during her lifetime the female lays about 90 eggs.

Mange Mites.

Two species of mange mites infest the pig; one species causes sarcoptic mange; the other demodectic mange.

Sarcoptic Mange (*Sarcoptes scabiei suis*). (Plate 18.)

Sarcoptic mange or common mange is caused by the mite *Sarcoptes scabiei suis*. This mite is very small, at most only one-fiftieth of an inch long, and whitish in colour. The body is rounded with four pairs of short, thick legs, and provided with a number of short, backwardly projecting spines on its upper surface. The parasites live in minute tunnels under the skin in which the female lays her eggs. These eggs hatch in 3 to 10 days, and after another 10 or 12 days the young mite becomes sexually mature.



[*After Hirst.*

Plate 18.
SARCOPTIC MANGE MITE.
(104 x natural size.)

Symptoms of Sarcoptic Mange.—The burrowing of the mites through the skin causes it to become inflamed and swollen. At first, these inflamed areas are very minute, but in time become very conspicuous and, as the mites increase, the lesions gradually coalesce. The irritation causes the animal to rub itself against any convenient object, the areas become raw and bleeding and large scabs are formed. The movements of the pig cause a continual breaking of the scabs, and blood and serum ooze out from the cracks. The bristles on the affected area fall out and eventually none, or only a few, remain. Later the skin becomes hard, thickened, and thrown into folds. In severe cases, the animals affected become weak and emaciated and, unless treated, may die.

In the early stages of the disease the lesions occur usually on the head, around the eyes, ears, and nose, and from here the disease spreads along the neck and shoulders until the entire body may be affected.

Demodectic Mange (*Demodex phylloides*). (Plate 19.)

This type of mange is caused by a very minute worm-like mite, *Demodex phylloides*. It is less common than sarcoptic mange. The mites of demodectic mange are microscopic in size, measuring only one-hundredth of an inch. They spend their entire life in the hair follicles and sweat glands and, when in numbers, cause well-marked lesions. These lesions may appear first on the snout or around the eyelids, and from there spread slowly over the throat, breast, abdomen, and other parts of the body where the skin is soft and thin. The affected skin becomes reddish and scurfy, with numerous small hard nodules. These nodules eventually break and discharge a creamy pus, and many of them may run together to form suppurating cavities.

Diagnosis of Parasitic Mange.

The pig may be subject to many kinds of skin diseases. When sarcoptic or demodectic mange is suspected samples of scrapings from the affected skin should be submitted for examination. The scrapings, to include the mites, should be taken from the more recent lesions, and should be made deep enough to cause bleeding. They are then placed in a tightly-corked tube or bottle and forwarded for examination.

Control of Lice and Mange.

Crude oil or fuel oil will be found satisfactory for the control of lice and mange. The oil may be applied by hand, and in view of its adhesive and spreading qualities only comparatively small quantities are required. In the case of lice, a second application is desirable after 15 days. For severe cases of sarcoptic mange frequent dressings are necessary; but tests have shown that a complete cure may be expected if careful and persistent treatment is given. Before being treated with the oil, the affected animal should be scrubbed thoroughly with warm soapy water.

[*After Hirst.*

Plate 19

DEMODECTIC MANGE MITE.

(328 x natural size.)

No specific cure is known for demodectic mange, but frequent applications of crude oil check the disease. Animals not responding to treatment should be killed. Animals oiled with crude oil should be kept in the shade as much as possible until the oil has dried, as contact with the sun is likely to cause blistering, especially in the white breeds.

Hog oilers, medicated wallows and dips are sometimes recommended as a means of applying the oil to control lice and mange. Hog oilers consist of posts wrapped round with oiled ropes or sacking and placed at some convenient spot, the idea being that the pigs will rub themselves against the post so that a small quantity of oil is deposited on or near the area of skin being rubbed. These devices tend to lessen the spread of lice and mange, but are not to be depended upon to effect eradication or prevent the losses caused by heavy infestations.

By taking advantage of the pig's natural tendency to wallow in water, especially during warm weather, the use of crude oil on the surface of the water has been found satisfactory for the control of external parasites. The wallows are constructed of concrete, and the water, with its film of oil, is just deep enough to permit the nostrils being kept above the surface of the liquid. For pigs of 40 to 80 lb. weight the depth should not exceed three inches, six inches being the maximum for the largest pigs. If the depth is too great the animal will be afraid to lie down. The wallow is roofed over to prevent the water becoming too hot. It should not be kept oiled continuously, but for short periods every ten days, until the desired results are obtained.

Dipping is one of the most effective treatments for lice and mange. For this purpose a concrete bath 40 to 48 inches deep with a total length of at least 7 yards, constructed on the same general principles as a cattle dip, is used. The dip is filled with water, on which crude oil is poured to a depth of four to five inches. Spraying haphazardly with oil cannot be expected to be very efficient.

Attention should also be paid to sanitation. As lice will not live for more than three days off the pig, it is not considered that sties which have housed infested pigs would, as a rule, be a source of danger under sanitary conditions. It is always safer, however, to clean and disinfect the sties before clean pigs are placed in them.

Mange is highly contagious, and pigs showing symptoms should be isolated immediately. Visible lesions of sarcoptic mange may develop in 14 to 15 days; so animals in contact with affected pigs should be isolated for 2-3 weeks. All litter and manure should be cleaned up and burnt and the sties given a thorough disinfection. It should be remembered that sarcoptic mange is transferable to man; so it is advisable, after handling affected pigs, to bathe and have a complete change of clothing.

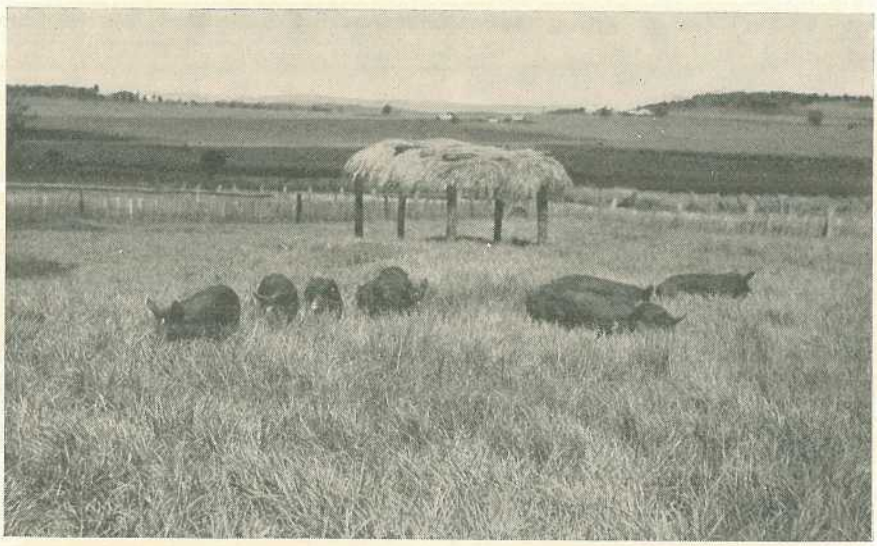
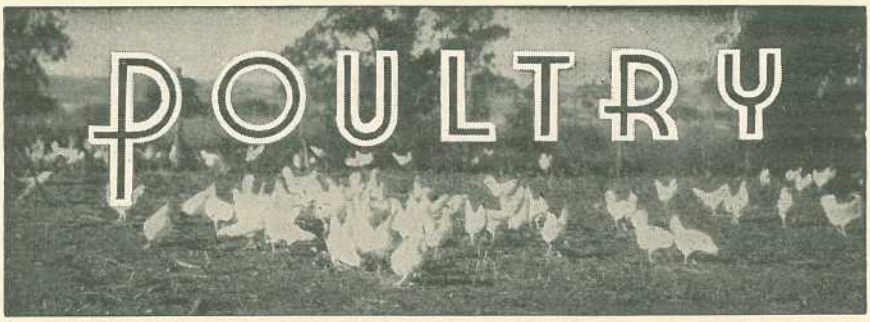


Plate 20.

A CORNER OF A PIG'S "PARADISE," NEAR KINGAROY.



Transport of Poultry to Market.

P. RUMBALL, Officer in Charge, Poultry Branch.

THE conditions under which poultry are transported to market leaves room for improvement, both from the humane and the commercial point of view. From the humane point of view, crates used should be high enough to allow the birds sufficient head room, and have sufficient floor space for the number and variety to be consigned. The crates also should be well ventilated and have receptacles for water or food attached to the corner posts.

Crates for fowls and ducks should be at least 18 inches high; for turkeys and geese 30 inches high; this permits the birds to stand erect in their respective crates without injury. The area of the floor space in a crate depends on the class of birds, and the number crated at the one time. It is not desirable to have too large a crate. Crates 4 feet long by 2 feet 6 inches wide with a partition in the middle are sufficiently large for general purposes; the partition is to prevent the birds crowding to one end. Smaller crates are easier to handle.

To save freight, crates should be made of light timber, but should be well braced in order to make them sufficiently rigid so that other crates may be stacked upon them.

Most birds marketed today are sold by weight. Shrinkage or loss of weight naturally occurs when a bird is taken from its usual comfortable surroundings and regular feeding. Good crating may assist in reducing this loss of weight, and the greater the care and attention to the feeding of the bird in transit the higher will probably be the return.

According to some authorities, in preference to supplying birds in transit with water, they should be given a required quantity of grain which has been well soaked. This may be the best means of supplying both feed and drink during the journey, as hard grain scattered on the floor of the crate soon becomes soiled and distasteful to the bird, and water placed in containers may be spilt, merely wetting the floor of the crate. The quantity of grain supplied depends obviously on the length of the journey. On delivery at the slaughtering premises, crop and intestines should be empty. Only sufficient feed should be provided for the journey so that the birds shall arrive at the place of slaughter in this condition.

Recently, tests have been conducted to ascertain the shrinkage which occurs during rail journeys of varying distances, and of birds crated and held on a farm for given periods. Results of these tests are set out in the following table:—

REPORT OF TESTS TO DETERMINE THE LOSS OF WEIGHT OF POULTRY IN TRANSIT BY RAIL

Distance Travelled.	Crate Mark.	Net Weight of Fowls at Sending Station.	Net Weight of Fowls at Brisbane.	Number of Fowls in Crates.
		Lb.	Lb.	
21 Miles ..	Y	147	135	23
	13	81	75	19
	12	84	80	15
	18	70	67	16
	3, 14, X, Z	316	296	59
	..	698	653	132
106 Miles. ..	A	90	87	16
47 Miles ..	B	48	45	10
	C	52	50	10
	D	49	47	10
	E	49	48	10
	F	51	49	10
	G	53	51	10
	H	52	50	10
	..	354	340	70

LOSS OF WEIGHT OF POULTRY CRATED AND HELD ON FARM.

Period of Crating.	Crate Mark.	Net Weight on Crating.	Net Weight End of Crating Period.	Number of Fowls in Crate.
		Lb. oz.	Lb. oz.	
12 hours ..	A	26 8½	25 6	4
12 hours ..	B	28 5	27 6	4
18 hours ..	C	26 8½	24 13	4

Excreta recovered crate A after 12 hours averaged 2 oz. per bird.
Excreta recovered crate B after 12 hours averaged 2 oz. per bird.
Excreta recovered crate C after 18 hours averaged 2.5 oz. per bird.

Note.—In the recovery of the excreta the more liquid type had spread over the iron catchment surface and was not recovered. No allowance was possible for evaporation from the more solid excreta.

TABLE SHOWING LENGTH OF JOURNEY, AVERAGE LOSS OF WEIGHT PER BIRD, AND THE PERCENTAGE LOSS OF WEIGHT PER BIRD.

Distance Travelled.	Average Loss per Bird.	Percentage Loss per Bird.
Miles.	Ounces.	Per cent.
221	5·99	7·0
106	3·0	3·3
47	3·2	3·95
*Held on farm 12 hours..	4·19	3·84
*Held on farm 18 hours..	6·87	6·47

* These birds were crated at 6 p.m. and had fed.

It will be noticed that birds held on the farm for eighteen hours lost 6·47 per cent., whilst those on a train journey of 221 miles which occupied 21 hours lost 7·0 per cent. It is reasonable to expect that the percentage loss in the weight of light breeds (being smaller birds), would be greater than was the case with these tests, in which most of the birds were of heavy breeds.

Plate 21.
LOADING PEANUTS FOR THE THRASHER ON A KINGAROY FARM.

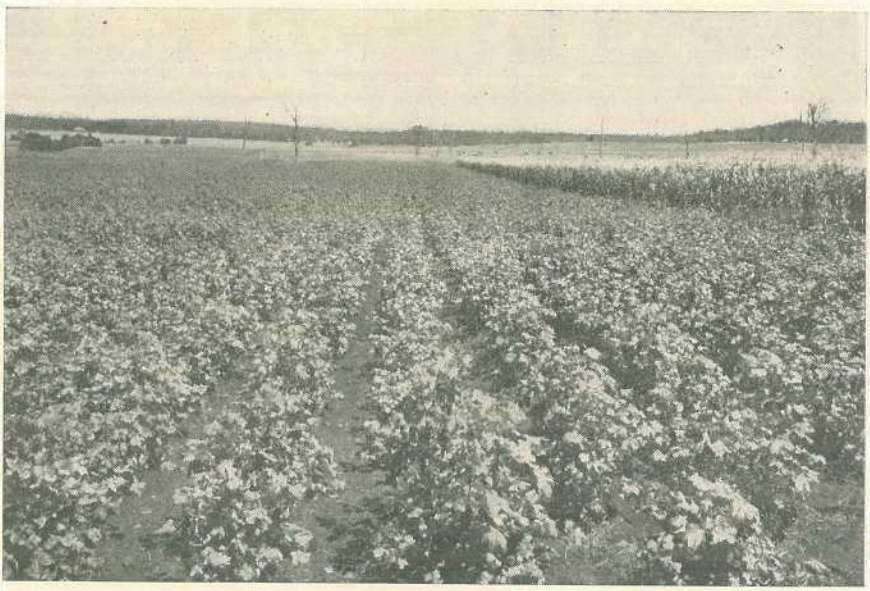


Plate 22.
A COTTON-BREEDING PLOT NEAR KINGAROY.

GENERAL NOTES

Staff Changes and Appointments.

Mr. J. C. J. Maunder, B.V.Sc., Divisional Veterinary Officer, Department of Agriculture and Stock, Brisbane, has been appointed temporarily to act as Chief Inspector of Stock.

Mr. A. F. S. Ohman, M.V.Sc., Divisional Veterinary Officer, who has been serving with the A.M.F. and has returned to duty, will be attached to Brisbane.

Mr. R. D. Chester, B.V.Sc., Government Veterinary Officer, has been transferred from Rockhampton to Brisbane.

Mr. E. Widdup, Cotton Grader, has been appointed Adviser in Agriculture, and will be transferred from Gayndah to Rockhampton.

Mr. A. F. Moodie, Dairy Officer, who has been serving with the R.A.A.F., will be attached to Rockhampton.

Greetings Received.

Seasonal Greetings have been received from—

The Chairman and Members of the Soldiers' Homes Committee (''Kingshome''); the Hon. T. L. Williams, M.L.A.; the Hon. T. A. Foley, M.L.A.; the Fathers, Brothers and Students of St. Vincent's Mission Seminary, Marburg; Mr. W. C. Haigh, Ipswich; the Officers and Members of the Ipswich Workshops Educational Association; the Army Education Service; the Council of Agriculture; the Commissioner of Main Roads and Staff; the Butter Board; the Cheese Board; the Brisbane Milk Board; the Acting Under Secretary and Officers of the Department of Labour and Employment; the Under Secretary for Agriculture and Staff of the Western Australia Department of Agriculture; ''Queensland Country Life''; A.C.F. and Shirleys Fertilizers, Limited; E. G. Eager and Son Pty. Ltd.; Dunlop Rubber Australia Limited; Thermax Electric Water Heaters Pty.; Queensland Pastoral Supplies, Ltd.; Graham Book Company; Gestetner Pty., Ltd.; Australian Potato Commitee; Goodyear Tyre and Rubber Co. (Australia), Limited; Committee of Direction of Fruit Marketing; International Harvester Company of Australia, Limited.

All greetings are cordially reciprocated.

Carcasses Control by Northern Pig Board.

Notice has been given of the intention of the Governor in Council to make an Order in Council under *The Primary Producers' Organisation and Marketing Acts* to extend the provisions of such Acts to the carcasses of pigs grown in the area of the Northern Pig Board and to place such carcasses under the control of the Board. A petition for a poll on the question of whether or not such Order in Council shall be made may be lodged with the Department of Agriculture and Stock on or before 7th January, 1946, and must be signed by at least 50 persons who are keepers of pigs within the Northern Pig Board's area, and who delivered at least ten pigs to the Board in the six months ended 30th June, 1945.

Pasteurization Plant at Rockhampton.

An Order in Council has been issued under *The Milk Supply Act of* 1938, authorizing the Port Curtis Co-operative Dairy Association Ltd. of Gladstone, to establish and carry on a pasteurization plant at Rockhampton and to supply pasteurized milk and cream within the area of the City of Rockhampton.

Following on the recent ballot of dairymen which, by a 90 per cent. majority agreed to the setting-up of a compulsory organisation for the dairying industry under section 30 of *The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1941, an Order in Council has been issued making the necessary modifications and additions to section 30 of the abovenamed Acts, authorising the establishment of a statutory organisation, which will now be proceeded with by the Department of Agriculture conducting elections of district councils within the nine prescribed districts.

Rural Topics

Science Sees the Farmer Through.

The steady decrease in farm population is something to think about. Many farmers are actually ceasing to farm, and are moving to swell the ranks of the city workers and eaters. This movement from the land was especially noticeable while the war was on, and, of course, there were many obvious reasons for it—higher wages in munition industries, for instance. Yet, it would seem that as Australia is planning for many more mouths to feed, the farm population should also increase, instead of going into reverse. Something must be out of joint or alignment. Still there is another side to the question. Ideas about farming are changing with the extension of agricultural science and the use of agricultural machinery. A new-type farmer is evolving and this new-type farmer is the joker in the pack, and in the logic. This new sort of farmer has learnt how to increase his crops and dairy output without increasing the number of hands to do the work. He knows how—which is to say, he is scientific.

The work of the new-type farmer has been gradually revolutionising the farm, and even re-modelling the man behind the plough and the herd. The new-type farmer has struck up a very friendly acquaintance with the soils of his farm; he has dosed the sour sods with lime, jacked up others with salts, fed them with cowpeas and other green manuring material so as to give his roots and grains and grass a better go. He has developed a better kernel in the cob and a better ear on the stalk and has standardized his spuds in convenient kitchen size and higher quality. He goes after bugs, beetles, and borers with poison dusts and sprays. He feeds his stock with the right stuff for selling weights. He has turned his eyes and testing tubes on to his dairy herd, and sacked the star boarders. He pets the bucket fillers, feeds them according to formula and watches the figures expand on his monthly cream cheque.

In short, whatever the crop, whatever the animal, this new type of farmer knows how to breed it, feed it, and sell it. His theory is that neither luck nor tall tales can take the place of knowing how to farm. He has scrapped the old hand tools and put in machinery—the tractor, the combine, the milking plant, and so on. Moreover, the more he knows his job, the better he likes it. Getting close to his problem stirs his brain power into action and his job of farming takes on all the aspects of a challenging competition—the man against the elements, the farmer against the market manipulators.

It is nothing new of course that science is going into farming, that science and practice are working in double harness. But we have not all realized yet the meaning of this movement—that the old farming with ordinary skill will soon have passed into history as a tale that is told. This is, naturally, no discredit to the old-type farmer who in his day did a great job; he was a very fine man who very often started behind scratch on a scrub selection with a brush hook, a "Black Kelly" axe, a file, and a grindstone his only tools; a bag of flour, a sugar bag of sundries, and what he could get with a gun his only tucker; and a hand planter and an "Invincible" corn sheller his only machinery. It was his kind, the men and women who were game to pioneer in the rough and tough places and build happy homes in the wilderness, who made the nation. But one of these new farmers knows how to produce twice as much as he did.

Will our farm population, then, continue to decline? Well, it may continue to decline to a point where effective scientific farming may produce all that is needed. However, that is not the end of the story.

The changes occurring in farming practice are largely in relation to crops, but the progressive farmer is convinced that the same scientific principles and improved technical methods he has learnt to apply in running his farm can be used in getting over his other difficulties. The farmer's living conditions, for instance—community

institutions, social status, opportunity for enjoying life in equal measure with those in other occupations, whether skilled crafts or professions—have not always been commensurate with the importance of his calling.

Science is penetrating through every phase of farm life. The new-type farmer knows that men make their own living conditions, and that human elements can be combined in the establishment of needed institutions. He will not listen to people who tell him of the difficulties in the way of his getting whatever the average city man has in the form of services and amenities—refrigeration, electric light and power, for example. If anyone thinks that the new sort of farmer will confine his acceptance of science to crop production he should think again, for the farmer will insist on a full share of the social amenities in a well-organised national life. And among other things, he will insist on full educational opportunities for his children. The farmer of to-day knows how the country is governed, how public business is managed, how sound economic institutions are built, how living standards can be improved, how far the co-operative idea can be extended and its principles applied. He is a believer in the gospel of good farming, and of good living, and of good family life, and he is looking to science to see him through.

Farming in America—Some Highlights and Sidelights.

Here are a few general impressions of farming in the United States gathered, with a lot of other interesting information, from a farmer who was over there recently on an official visit:

Family farming, which is more frequently the practice in the Eastern States and the Middle West, is considered to be the backbone of American agriculture. With modern machinery and well-planned farm buildings, the family farm in area ranges from 160 to 320 acres. Erosion, the result of years of over-cropping and periodical droughts, has caused many difficulties in some districts. Much has been done, however, in recent years to counteract erosion by contour ploughing, strip cropping and proper rotations. In the North, in parts of Wisconsin particularly, loss of topsoil resulting from periods of very heavy rainfall, causes many problems. There, again, strip farming is practised to prevent the surface soil from being washed away and uncovering sandy subsoil.

American farmers, like ourselves, depend to a great extent on seasonal labour.

Farmers' co-operative societies have a big say in the marketing of the United States farmers' products and supplying their crop and harvesting requirements, especially in regard to fruit, dairy and poultry production. Many of these co-operative societies own and operate refrigerating plants with canning and packing departments, and they are great believers in an attractive get-up of farm products as a principle of profitable marketing. The co-operative societies and other farmers' organisations over there work in well together; if a farmer trades through a co-operative society, he automatically becomes a member of the National Farmers' Union.

In the United States, there are three main farmers' organisations—the National Farmers' Union, the Grange and the Farm Bureau. There are approximately 30 millions of people (roughly a quarter of the whole population of the States) engaged in food production.

A thing which impresses a visitor is the American farmers' keen interest in and care of his livestock. We saw a lot of evidence of this at the cattle show in Brisbane last August, at which the attendance was made up so largely of farmers among the United States Forces then billeted around Brisbane. The American farmer has developed excellent types of beef and dairy cattle, and his care and good management is shown in his selection and breeding of livestock generally. In his herd, there is generally a low incidence of disease, showing his initiative and thirst for knowledge of the latest and best methods of management.

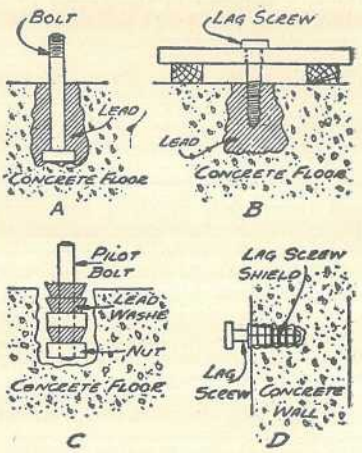
In regard to Government measures to assist farmers, it seems that the New Deal we heard so much about had a somewhat mixed reception. The "parity" payments it provided for in return for restricted output in years of surplus production were all right for the small farmer, but not for the larger farmer who had no desire to be dependent on subsidies.

The United States Soil Conservation Service organizes farmers in soil conservation areas, carries out research in erosion control and arranges field demonstrations on what to do about it—methods, devices and so forth.

GADGETS AND WRINKLES

ANCHOR BOLTS IN CONCRETE.

Here are four handy methods of anchoring machines or timbers to concrete floors or walls. The first method (A) shows the usual method of fastening sills to concrete floors with ordinary machine bolts with the heads embedded either in the fresh concrete or in holes filled with lead. There should be no water or oil in the holes to make the hot material spatter. Machines are often fastened to concrete floors by drilling an irregular hole. (B) Setting in a lag screw, and then pouring lead in around it. The lag screw can then be unscrewed and tightened as desired. Timbers and machines may also be fastened to concrete walls and floors. (C) By using lag screw expansion anchors put into a hole in the concrete and expanded as the lag screws are turned into them; or (D) by putting an ordinary nut on the end of a pilot bolt, slipping lead washers over the bolt and spreading them with a loose nut and a short piece of pipe until firmly wedged. Then the pilot bolt is turned out and a machine bolt of the desired length screwed in.

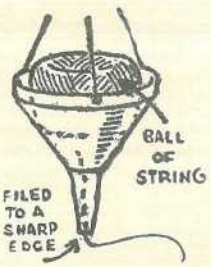


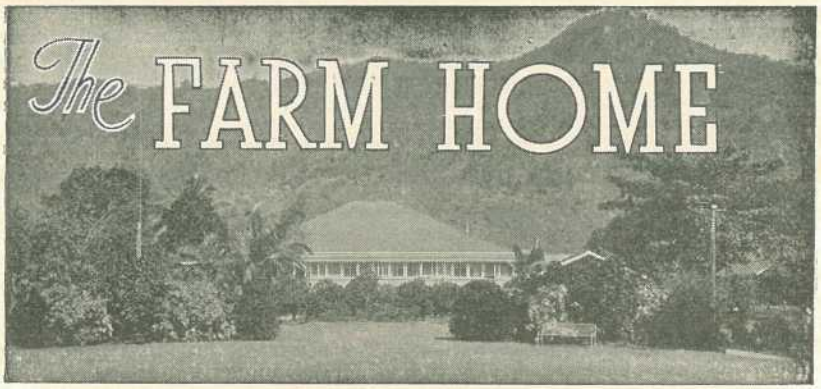
BARBED WIRE ROLLER.

For easy handling of barbed wire, take two pieces of 2 x 4, about 4 feet long, space them 12 inches apart, bore a ½-inch hole in the bottom, and insert a rod to hold the wire spool in place so that the wire will unroll from the bottom. Start pulling as shown in drawing and you will lay your wire out without anyone getting scratched or hurt. It is much better than two men unrolling the spool on a pole.

OLD FUNNEL FOR TWINE.

One of the most convenient places to store a ball of cord is an old funnel suspended from a suitable hanger. File the end of the funnel spout to a sharp edge, letting the free end from the inside of the ball extend through the spout.





Care of Mother and Child.

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

FATHERCRAFT.

MANY fathers are now, or soon will be experiencing the joys as well as the problems of their relationship for the first time. Not because a new baby has just arrived into the family circle, but because of the breaking up of home life inseparable from war time conditions, their small children have spent several years solely in the care of their mothers.

Now is the time for the father to realize how much care and tact are needed to adjust little sons and daughters to the change of having two parents, instead of only one.

Delighted though the children may be to have father home—a real person instead of just a picture—they may in some cases find it rather hard to have that same father taking so much of their mother's time and attention, which has so far been given solely to them and their special demands.

Where an only child is involved, the "hurt" may be greater, and if behaviour problems and inhibitions are not to result, both parents should try to understand the child's point of view, and endeavour to tide over this difficult period with loving tact.

Most people are familiar with the word "mothercraft" and understand in a general way what it means. With the word "fathercraft" they are not so familiar, but in England and other countries the fathercraft movement, as it is called, has been in existence for some years. It is realised by welfare workers that although much of the actual care and handling of the young child is the province of the mother, the training of the child's mind should be shared by both parents, even from the earliest days.

For this reason, in England and America, fathers' groups have been formed in connection with child welfare centres in order to interest and educate fathers in maternal and child welfare, and teach them to take their rightful place in the parent-child relationship. Fathers belonging to these groups meet and discuss problems associated with their children's upbringing, and lectures are given by specialists on the various aspects of child care and development.

Opportunities are provided for personal interviews in regard to children whose nutrition or management had proved difficult, and experience has shown that these interviews are of the greatest value to young fathers.

It is essential that the father should understand the responsibilities of motherhood and should appreciate the mother's outlook in order that he may give her the support which is necessary for the harmonious working of the household.

In regard to the children's behaviour, much will depend on the extent to which companionship and goodwill exist in the home and even though a father may need time and patience in readjusting himself to civilian life, he must not be unmindful of his responsibility to the children at the same time.

Although fathers' clubs have not been formed in Queensland yet, the Maternal and Child Welfare Service which has been helping the mothers bear their burdens during the war years is now just as ready to help returned fathers to deal with their new relationships. Telephone or write to the *Medical Director, Maternal and Child Welfare,* 184 *St. Paul's Terrace, Brisbane.*

IN THE FARM KITCHEN.

Salads.

Cauliflower Salad.

One large, firm cauliflower, 2 lettuces, 1 tablespoon chopped parsley, 2 hard-boiled eggs, 6 small tomatoes, salad dressing. Boil cauliflower head in salted water about 20 minutes, till tender but not broken. Drain and place when cold upright in a salad bowl. Round it arrange lettuce leaves (uncut and standing upright) and saturate with dressing. Sieve egg yolks and chop parsley. Cut a cross on top of cauliflower to form four divisions; in two sprinkle chopped parsley and in the other two the egg yolks. Arrange tomatoes among the lettuce leaves; the egg whites are not required.

Cabbage Salad.

Salad made from an old cabbage is delicious if treated in this way: Shred finely the heart and place in a deep bowl. Pour over sufficient boiling water to cover completely. Stand for an hour and then drain, squeezing out all surplus water. This does away with the excessively "raw" flavour. The cabbage may then be dressed and garnished to taste.

Boiled Salad Dressing.

Take 2 eggs, 1 cup sugar, 1 teaspoon mustard, ½ teaspoon salt, 1 tablespoon butter, almost 1 cup milk, 1 small cup vinegar. Beat eggs, mustard, salt, and sugar together, then add vinegar and lastly milk. Melt butter separately, add to other ingredients. Simmer until thick, stir well, but do not boil. Keeps well.

Egg and Green Pea Salad.

Poach eggs hard (one per person) and leave till cold. To every 4 eggs allow 1 cup cooked green peas, with enough mayonnaise to bind. Season with pepper, salt, and a pinch of sugar. Place a crisp lettuce leaf for each egg on a salad dish, put an egg in the centre of each leaf, heap a few green peas on top of the eggs and spread a little more mayonnaise over all. Garnish with cress or tiny bits of radishes and serve as cold as possible.

Salad Dressing Without Eggs.

Quarter pint milk, ½ teaspoon mustard, ½ teaspoon sugar, 2 teaspoons vinegar, 1½ teaspoons cornflour, ¼ teaspoon salt, pepper to taste. Mix the cornflour to a smooth paste with a little water. Bring milk to the boil. Stir in the creamed cornflour, and cook for three minutes, stirring constantly. Remove from the stove. Cool slightly. Mix the mustard, salt, sugar, and pepper to taste with the vinegar and stir into the sauce. Use for dressing any cooked vegetable salad or for tongue, corned beef, or ham and potato salad.

Mixed Vegetable Salad.

Swede turnip (raw, grated), piled in centre of plate. Slice ripe tomatoes in halves and pile with grated white turnip. Place in lettuce leaves and arrange round swede. Garnish with cress.

Potato Salad.

Take several potatoes, parsley, onion, and mayonnaise. Cook the potatoes and then slice them in neat pieces. Mix chopped parsley and onion together with the mayonnaise. Toss the potatoes into the mixture and pile it into dishes.

Apple and Celery Salad.

Core and peel apples and cut in strips the size of matches. Have equal quantity of celery cut same size, sprinkle with salt and mix lightly together. Cover with mayonnaise dressing and serve in individual quantities on lettuce leaves or alone.

ASTRONOMICAL DATA FOR QUEENSLAND.

FEBRUARY.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	5.21	6.42	Cairns	41	16	Longreach	40	30
6	5.24	6.40	Charleville	29	25	Quilpie	34	36
11	5.28	6.36	Cloncurry	57	42	Rockhampton ..	15	5
16	5·32	6.32	Cunnamulla ..	28	30	Roma	18	16
21	5.35	6.28	Dirranbandi ..	18	20	Townsville	34	16
26	5.38	6.23	Emerald	24	14	Winton	46	34
28	5.39	6.21	Hughenden ..	42	27	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	3.59	6.11
2	4.58	6.58
3	5.59	7.40
4	7.01	8.20
5	8.03	8.58
6	9.05	9.34
7	10.06	10.11
8	11.09	10.49
	p.m.	
9	12.13	11.30
10	1.18	..
		a.m.
11	2.23	12.16
12	3.26	1.07
13	4.26	2.04
14	5.21	3.04
15	6.09	4.06
16	6.52	5.08
17	7.29	6.09
18	8.04	7.07
19	8.36	8.03
20	9.07	8.57
21	9.38	9.50
22	10.11	10.42
23	10.46	11.35
		p.m.
24	11.24	12.29
25	..	1.23
	a.m.	
26	12.06	2.17
27	12.54	3.10
28	1.46	4.01

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

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

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	28	11	44	26	19	1	52	29
6	20	19	36	35	11	10	42	41
11	12	27	27	42	1	18	29	50
16	13	26	29	42	3	17	32	49
21	23	16	39	32	14	8	44	36
26	27	11	43	25	18	0	51	28
28	29	11	44	25	19	0	52	28

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	51	6	65	35	49	21	42	8
3	46	13	61	40	46	25	37	14
5	37	23	55	46	40	31	31	21
7	26	34	48	54	33	38	22	29
9	15	43	41	59	26	45	15	36
11	8	47	37	62	21	47	8	39
13	6	51	36	64	20	50	7	43
15	10	48	38	62	23	48	10	40
17	18	42	43	58	28	44	17	35
19	28	33	50	53	34	38	24	28
21	37	22	55	45	40	30	31	20
23	45	13	61	40	45	25	37	14
25	49	7	63	36	48	21	40	8
28	52	5	66	34	50	20	43	7

PHASES OF THE MOON.

New Moon, February 2nd, 2.43 p.m.; First Quarter, February 9th, 2.28 p.m.; Full Moon, February 16th, 2.28 p.m.; Last Quarter, February 24th, 12.36 p.m.

On February 26th the Sun rises and sets 10 degrees south of true east and true west, respectively, and on February 6th the Moon will set true west.

Venus.—At the beginning of the month, in the constellation of Capricornus, and at the end of the month, in the constellation of Aquarius, Venus will be too close in line with the Sun for observation. It will be at superior conjunction with the Sun on February 1st.

Mars.—This planet during this month, in the constellation of Gemini, will rise before sunset and will be a brilliant object in the eastern sky in the early evening. At the beginning of the month it will set between 3.15 a.m. and 4.15 a.m., about 28 degrees north of true west. At the end of the month it will set between 1.15 a.m. and 2.15 a.m.

Jupiter.—At the beginning of February, Jupiter, near Spica in the constellation of Virgo will rise between 10.15 p.m. and 11.30 p.m., about 10 degrees south of true east. At the end of the month it will rise between 8.30 p.m. and 9.30 p.m.

Saturn.—Saturn will still be close to Mars, rising before sunset, and setting in the early part of the month between 3.30 a.m. and 4.45 a.m., about 25 degrees north of true west. At the end of the month it will set between 1.45 a.m. and 3.00 a.m. At 7 p.m. on the 13th this planet will be 2 degrees south of the moon with Mars about 4 degrees to the northward.

OUR CALENDAR.

In the October issue it was mentioned that in the tropical year of 365.24219 days, on which our calendar is based, the seasons alway occupy the same place with respect to its commencement. In the earliest calendars attempts were made to fit the lunar month into this year, but as the number of days in a lunation (29.5306) does not divide evenly into the number of days in the year, frequent corrections to the calendar were required to keep it in step with the seasons. Either through neglect or ignorance on the part of those whose duty it was to attend to such matters, the adjustments were most irregular until in 46 B.C. Julius Caesar, with the help of Sosigenes of Alexandria, put an end to such disorder. He abolished the use of the Lunar year and regulated the civil year entirely by the Sun. In the calendar which he introduced, and known as the Julian calendar, 3 successive years were made to consist of 365 days each and the 4th of 366 days, making the mean length of the year 365¼ days. However, the error from adopting 365¼ days as the length of the year, in 400 years amounts to 3 days too much, and in 1582 Pope Gregory XIII. besides adjusting the error that had arisen through the use of the Julian calendar, introduced the calendar which we use to-day—the Gregorian calendar. Whereas in the Julian calendar every 4th year is a leap year, Gregory added the restriction that only those century years which can be divided evenly by 400 were to be leap years, thus the years 1700, 1800, and 1900 were years of only 365 days, but the year 2000 will be a leap year of 366 days. By this arrangement the mean length of the calendar year is 365.2425 days and in 3,000 years the calendar will be only 1 day out of step.

QUEENSLAND WEATHER IN DECEMBER.

A series of useful rains in the North-west resulted in an aggregate over average 3 to 6 inch-distribution south from Burketown and Normanton to Urandangie and Cloncurry, with some lighter amounts south-east to Winton. Moderately heavy daily seasonal falls also were registered in restricted Cairns, Tully coastal areas. Apart from the Upper-west however all inland pastoral districts showed discrepancies. Rainfall was of the variable thunderstorm type, with temporarily useful amounts confined mainly to eastern sections of the Central Highlands and parts of the Warrego and Maranoa. Although there were one or two storms in the South-West and along the Southern Border, most of the east Carpentaria, Central, and Southern Interior districts urgently required a good soaking monsoonal rain to offset the previous four-month dry period. The South-east districts fared better in the thunderstorm conditions, with best normal results of 2 to 4 inches in the Eastern Downs. In the South Coast sections average seasonal conditions should be maintained, except in some of the drier areas. There were also only very light amounts registered over the southern half of the Central Coast Division.

Temperatures.—Maximum and minimum temperatures at Longreach and Thargomindah were above average, 2.4 degrees and 1.0 degrees the former and 3.6 degrees and 3.0 degrees the latter. Other districts were about average, but during the first half of the month high temperatures were general inland. During the last two weeks cooler conditions prevailed, especially in coastal sections where temperatures were below normal for several days. Highest maximum—112 degrees at Thargomindah, 14th and 15th, and Windorah 15th. Consecutive days over 100 degrees—Boulia 15, Cloncurry 10. Number of days over 100 degrees—Cloncurry and Longreach 20, Boulia 19.

Brisbane.—Mean Pressure $\frac{9+3}{2}$ 29.973 (normal 29.887). Temperatures—mean maximum 81.8 degrees (normal 84.7 degrees), mean minimum 64.4 degrees (normal 67.4 degrees), mean temperature 74.1 degrees (normal 76.1 degrees). Temperatures under normal from 18th to 31st except 28th. Rainfall—532 points on 14 days (normal 505 on 12 days). Sunshine—266.9 hours (normal 252.6 hours). Wind gust—46 miles per hour (south) at 2110 hours 4th.

The rainfall position is summarised below—

District.	Normal Mean.	Mean Dec., 1945.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	702	484	31 below
Peninsula South	605	379	37 ,,
Lower Carpentaria	392	344	12 ,,
Upper Carpentaria	377	126	66 ,,
North Coast, Barron	690	747	8 above
North Coast, Herbert	690	376	46 below
Central Coast, East	454	138	69 ,,
Central Coast, West	333	191	43 ,,
Central Highlands	316	162	49 ,,
Central Lowlands	221	57	74 ,,
Upper Western	184	315	71 above
Lower Western	137	54	61 below
South Coast, Port Curtis	455	210	54 ,,
South Coast, Moreton	509	394	23 ,,
Darling Downs East	351	353	1 above
Darling Downs West	277	173	37 below
Maranoa	258	214	17 ,,
Warrego	215	137	36 ,,
Far South-West	155	65	58 ,,

Commonwealth of Australia, Meteorological Bureau, Brisbane.
Brisbane, 4th January, 1946.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

NOVEMBER RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.,	No. of years' records.	Nov., 1944.	Nov., 1945.		Nov.,	No. of years' records.	Nov. 1944.	Nov. 1945.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	2·60	42	0·60	1·74	Gatton College ..	2·87	44	3·08	..
Cairns	3·81	61	1·14	3·39	Gayndah	2·97	72	0·57	1·70
Cardwell	4·14	71	0·25	3·07	Gympie	3·33	73	2·81	1·17
Cooktown	2·45	67	0·02	0·15	Kilkivan	2·66	62	3·31	0·84
Herberton	2·68	57	0·48	2·02	Maryborough ..	3·20	72	3·69	1·05
Ingham	3·75	51	0·07	1·69	Nambour	4·21	47	3·33	4·16
Innisfail	6·25	62	0·62	2·72	Nanango	2·86	61	1·38	2·98
Mossman	5·75	19	0·89	2·09	Rockhampton ..	2·48	72	0·86	2·28
Townsville	1·87	72	0·33	0·21	Woodford	3·29	55	3·38	4·00
Central Coast.					*Darling Downs.*				
Ayr	1·67	56	Nil	0·32	Dalby	2·80	73	3·08	3·93
Bowen	1·24	72	0·48	0·09	Emu Vale	2·81	47	1·70	1·68
Charters Towers ..	1·43	61	Nil	1·54	Jimbour	2·50	64	1·30	4·36
Mackay	3·05	72	0·59	1·63	Miles	2·58	58	0·67	3·91
Proserpine	2·82	40	0·07	1·14	Stanthorpe	2·76	70	2·04	1·37
St. Lawrence ..	2·40	72	0·18	1·67	Toowoomba	3·33	71	2·49	4·11
South Coast.					Warwick	2·66	78	1·86	1·78
Biggenden	2·90	44	1·33	1·86	*Maranoa.*				
Bundaberg	2·79	60	1·88	0·70	Roma	2·17	69	0·65	1·91
Brisbane Bureau ..	3·77	93	3·77	4·64	St. George	1·75	62	0·21	0·74
Caboolture	3·51	67	7·08	4·23	*Central Highlands.*				
Childers	2·81	48	1·35	0·94	Clermont	2·15	72	0·07	0·61
Crohamhurst	4·55	50	5·22	2·86	Springsure	2·39	74	2·40	2·09
Esk	3·25	56	2·93	4·19					

CLIMATOLOGICAL TABLE FOR NOVEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure at Mean 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	86	71	89	5, 19, 20, 23, 25	68	4, 7, 27	339	9
Herberton	..	82	61	88	16	53	13	202	6
Townsville	..	86	73	92	21, 22	66	4	21	7
Rockhampton	29·98	88	65	97	30	53	6	228	7
Brisbane	30·02	81	65	90	30	60·5	1	464	15
Darling Downs.									
Dalby	..	87	59	95	6	52	1	393	6
Stanthorpe	..	79	53	86	6	42	12, 22	137	6
Toowoomba	..	79	56	89	6	46	15	217	7
Mid-Interior.									
Georgetown	29·89	99	71	102	18, 22	57	13	12	2
Longreach	29·95	96	68	107	16	58	1	16	2
Mitchell	29·96	89	61	98	17	46	1	159	7
Western.									
Burketown	..	94	72	102	23	62	14	154	3
Boulia	29·88	96	66	108	25	57	1, 12	9	1
Thargomindah	29·93	92	65	105	27	53	11	Nil	..

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RAINFALL IN THE AGRICULTURAL DISTRICTS.

DECEMBER RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.,	No. of years' records.	Dec., 1944.	Dec., 1945.		Dec.,	No. of years' records.	Dec., 1944.	Dec., 1945.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	7·02	42	11·25	5·98	Gatton College ..	3·89	44	4·04	Nil
Cairns	8·53	61	4·14	12·31	Gayndah	4·21	72	4·04	1·83
Cardwell	7·95	71	4·60	5·35	Gympie	5·40	73	5·67	2·91
Cooktown	6·53	67	8·90	6·88	Kilkivan	4·61	62	4·96	2·36
Herberton	5·64	57	7·67	3·21	Maryborough ..	5·05	72	5·69	3·12
Ingham	6·77	51	2·33	4·15	Nambour	6·65	47	4·96	8·04
Innisfail	11·16	62	8·86	5·90	Nanango	3·86	61	5·04	2·59
Mossman	8·00	19	10·14	10·09	Rockhampton ..	4·67	72	4·22	1·98
Townsville	5·33	72	2·91	1·01	Woodford	5·34	55	3·03	3·62
Central Coast.					*Darling Downs.*				
Ayr	4·20	56	5·50	2·33	Dalby	3·49	73	1·61	3·27
Bowen	4·49	72	3·47	1·42	Emu Vale	3·52	47	2·71	2·25
Charters Towers ..	3·26	61	8·26	2·35	Jimbour	3·44	64	2·62	2·23
Mackay	6·86	72	2·56	2·00	Miles	3·17	58	1·84	2·69
Proserpine	7·72	40	3·93	2·41	Stanthorpe	3·56	70	3·26	3·60
St. Lawrence ..	4·67	72	3·28	0·33	Toowoomba	4·53	71	2·40	4.43
South Coast.					Warwick	3·50	78	2·74	2·86
Biggenden	4·85	44	5·62	4·92	*Maranoa.*				
Bundaberg	5·10	60	3·84	1·12	Roma	2·59	69	1·26	2·35
Brisbane Bureau ..	5·05	93	3·47	5·32	St. George	2·09	62	0·30	1·36
Caboolture	5·48	67	4·02	2·91	*Central Highlands.*				
Childers	5·80	48	4·57	1·48	Clermont	3·77	72	2·94	1·13
Crohamhurst	7·19	50	2·66	5·14	Springsure	3·28	74	5·96	1·53
Esk	4·76	56	1·83	7·74					

CLIMATOLOGICAL TABLE FOR DECEMBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric Pressure at 9 a.m. Mean	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	89	73	93	20	66	30	1231	11
Herberton	..	..	..	..	..	..	..	..	..
Townsville	..	87	75	89	1, 20, 24	69	21	101	8
Rockhampton	29·93	90	69	96	13	63	22	198	7
Brisbane	30·01	82	66	92·6	13	62	7	532	14
Darling Downs.									
Dalby	..	87	62	97	13	54	21, 26	327	7
Stanthorpe	..	80	56	92	13	48	1	360	6
Toowoomba	..	80	59	95	13	51	26	443	8
Mid-Interior.									
Georgetown	29·85	97	73	102	2, 3, 4, 5, 15	64	28	149	3
Longreach	29·89	101	72	110	14	63	1	50	2
Mitchell	29·93	92	67	104	13, 14	53	29	295	5
Western.									
Burketown	..	94	75	104	1	70	1	640	13
Boulia	29·79	101	74	109	15	66	3, 29	72	2
Thargomindah	29·84	99	74	112	14, 15	64	1, 8, 28	85	3

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