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Contents

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Event and Comment.

The Case for Queensland Wheat.

ON his return from the recent conference at Canberra, at which State Ministers for Agriculture and the Federal Minister for Commerce and Agriculture considered plans for the stabilization of the Australian wheat industry, the Queensland Minister (Hon. T. L. Williams) said that the case for the wheatgrowing interests in this State and the future of the industry here had been kept well to the forefront of discussion. He added that the scheme proposed would ultimately be based on the joint legislative powers of the Commonwealth and the States to take the place of the present wheat stabilization scheme when the operation of the *National Security Act* is discontinued, presumably in July next. The stabilization scheme agreed to in principle for submission subsequently to the Premiers' Conference provides mainly for a guaranteed minimum price for all wheat of 5s. 2d. a bushel for fair average quality grain or its equivalent f.o.b. at ports for a period of five years.

Continuing, Mr. Williams said that after considerable discussion, in which he strongly pressed the Queensland scheme for consideration in the direction of having this State's wheat pooling system, with its special wheat classification and hail insurance provisions, preserved and included within the wider scheme, the conference finally agreed to the proposal. An additional advantage which he hoped he had gained for Queensland followed his advocacy of this State's capacity to expand its wheat production by the planting of larger areas, with the result that an assurance was given without hesitation by the Federal Minister for Commerce and Agriculture that Queensland would be conceded a system of licensing which would eventually permit of a million acres of wheat being planted in this State.

Regulation of production as an integral part of the scheme and a natural corollary to the guaranteed price led also to considerable discussion. Such a scheme, it was pointed out, would be designed to take its place within a world-wide plan to be set up under an international wheat agreement. Consequently, said Mr. Williams, if the proposed stabilization scheme is approved in principle, the details will subsequently be worked out by Commonwealth and State officers, and legislation by the States will be necessary to provide for the regulation of production.

Fodder Conservation.

A SILO is a definite asset on any farm, and it is doubtful if the outlay involved could be expended on any other improvement with greater financial benefit. In Queensland, increased butter production alone from cows fed on silage during the dry winter and spring months of normal years would compensate for the cost involved. In addition, a well-filled silo is an effective and immediately payable drought insurance at a time when fodder necessary to keep cows in full profit is unprocurable from outside the farm fence.

Although conservation of fodder in the form of silage has been practised in Queensland for many years, the aggregate amount stored annually has been far below ordinary winter requirements, apart altogether from its value as a drought reserve which should, as a matter of common prudence, be stored in years of abundance. Soil and climatic conditions throughout the agricultural districts of the State are generally very favourable for the growing of many summer fodder crops, which provide a great bulk of material suitable for silage making.

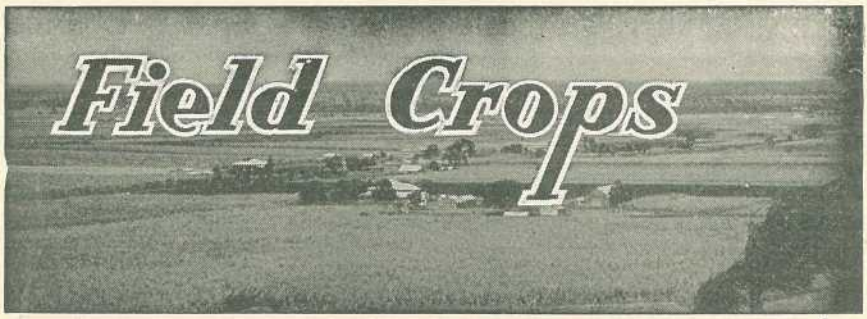
The gradual decline in the carrying capacity of even the richest lands through the lowering of soil fertility, through impaction by heavy stocking and through old pasture swards becoming root-bound has made fodder conservation a necessity on most farms in dairying districts. A similar condition has developed in respect of native pastures, largely as a result of over-stocking. Animals naturally eat out the more nutritious and palatable of native grasses.

With financial assistance and expert guidance available, there is no reason why fodder conservation should not be a regular practice on every stock farm in the State. It is obvious that intensive education on the principles and practice of fodder storage must be continuous. If it were more widely appreciated how effectively and cheaply silage can be conserved in the less costly silos there, surely, would be no necessity for an educational campaign.

Livestock must return a profit for the food eaten. If fodder has to be bought at drought prices for any length of time, few classes of stock would repay the outlay. It so happens, however, that the fodder necessary to keep farm animals in health and condition is usually the cheapest to grow and conserve.

Fodder conservation may be divided broadly into two sections:—Storage of enough cheaply-grown fodder to maintain stock in health; and storage of enough high-quality fodder to provide both a maintenance and production ration.

Perhaps, the solution of our recurring fodder shortage problem may lie in co-operative effort among groups of farmers and co-operative use of suitable labour-saving machinery for fodder crop cultivation, harvesting, and conservation. In the extension of the co-operative idea, State departments will assuredly assist.



Soil Conservation and Erosion Prevention.

R. E. HASELER, Adviser in Agriculture.

EROSION, or wearing away of the earth's crust, has gone on ever since wind blew and rain fell. It is evident that any agency which moves across or through loose or lightly anchored matter must tend to cause it also to move. Even before man removed the anchors and increased the looseness of the earth's crust, the more or less granular surface of disintegrating rock, especially on sloping surfaces with the absence of other holding agencies, moved in the direction of gravitational pull, and other forces such as wind and flowing water moving over this lightly anchored matter tended to accelerate its movement. Therefore erosion, or wearing away of the earth's loose crust, is a natural phenomenon and in itself nothing to cause astonishment or concern. It is necessary, however, to formulate a plan which will stop or lessen soil damage or loss, while still allowing cultivation—that drastic loosening of the earth's crust. In studying what may be termed pre-cultivation-era erosion, it becomes obvious that in Nature nothing is left bare, for when scars are caused on the earth's surface Nature very soon draws a mantle over the bare patches.

Vegetative Cover.

Vegetative cover seems to be the only solution of erosion problems. When water runs down sloping ground during heavy rainfall, according to the volume of water and the degree of slope, there will be lesser or greater movement of matter in the pathway of this running water, and so there will be displacement of soil.

It has to be learned why under natural conditions the damage from running water is not greater, and how natural scars are healed by natural methods. In the natural scheme, the potential danger in all natural phenomena has been allowed for and provision obviously has been made to counter these possibilities. Thus we have the remarkable and astonishingly efficient soil protectors and builders, natural flora, grasses, shrubs and forests. This natural cover acts as an anchor. It is easy to conceive what would happen under torrential rainfall, even without man's complicating efforts, if there were not this natural cover. There possibly might remain torrent-riven flats, but uplands would remain nothing but bare-faced rock. This vegetative cover acts also as a cushion to take the force of heavy rainfall and to ease it on to the ground surface. It is also an obstacle to running water, thus decreasing velocity and acting as a diffuser. Also to be noted is the

efficiency with which Nature can guard against serious damage while allowing natural processes to continue. The runways down from the mountains are not smooth channels, but tortuous rock, and tree-strewn drains that ease fast-moving water into less-inclined channels, and so to the river-ways and the sea; or are wide shallow runways that are protected by a cover of grasses and other growths and over which the water flows with little or no harm to the underlying earth. This is a picture of the natural vegetative cover protecting and conserving the soil layer.

However, since it has been shown that even under natural conditions there is soil loss by erosion by running water, even in spite of the striking efficiency of the natural cover, it remains to be learned how these losses are made good. Again the vegetative cover becomes the agent. Under the forest, there is a build-up of soil-improving material such as leaves and other forest debris, thus balancing what might have been lost. Under other types of cover the same action goes on. The non-perennial growths die, decompose and become incorporated in the soil. On the open lands the grass cover serves the same end and replaces material lost and builds up the soil. This, then, is the natural method of soil conservation and erosion prevention.

Renovation of Farm Lands.

All available evidence indicates that a solution of the problem of renovation of our farm lands can be achieved only by methods based on Nature's way.

A plan has been devised by the agricultural authorities of the U.S.A. and other countries on these natural principles, and the methods used are now accepted as the best solution of the problem of soil loss and farm defacement.

It will be readily appreciated that whatever the slope, the cleaner and smoother the surface the faster the run-off. Apart from the fact that running water causes erosion, the faster water moves over the ground surface, the proportionately lesser amount of moisture enters the soil, so the primary requirement is that the rate of movement of flowing water on sloping ground be reduced. To do this presents no very great difficulties. The problem is how to do it in a way which will least interfere with the present productive capacity of a given piece of ground, a farm, a locality, or a country. Since, by the nature of tillage requirements, it is not possible to solve our problems the perfect way—by complete and permanent vegetative cover—methods have to be formulated which may be expected to give the desired results.

The first endeavour should be to protect existing cultivated fields from water flowing from slopes above the tilled area. Without this primary work, work that had been put down in the field itself might easily become badly impaired, if not destroyed, by onrush of water from above. Since, to prevent erosion, the chief concern is lessening the velocity of running water, the logical point for commencing work is as close to the top of the slope as is practicable. Here the terrain and topography will decide the best set-out for any work. In light and moderate rainfall regions it will be apparent that the chief requirement is that as great a proportion as possible of the total fall penetrates into

the ground and efforts should be directed more to slowing down than to diverting run-off. The work to be done on slopes can be considered as a series of hurdles placed in the path of running water to slow it up, but not to stop it. Since, however, there are periods of rainfall of such intensity that the ground surface is incapable of absorbing more than a small proportion of the total fall, provision invariably has to be made for handling this surplus run-off.

Prevention of Rapid Run-off.

The details of a plan for any particular farm can be worked out only on the spot, but anyone with a knowledge of the principles involved and recognising the necessity of adhering to these principles, can attack most problems with confidence. The aim should be to plan for the period of greatest intensity of rainfall; devise the works that will best cope with the flow at this period; construct checking and stopping works so strongly that there will be no fear of break, and to construct diversion ditches to such a capacity that there will be no doubt that they will carry the flow at the heavy rainfall period.

It is necessary to consider again the sloping country above cultivated land. From as near to the top of the slope as appears necessary checking works, called contour furrows, may be ploughed, and continued at intervals, the spacing to be decided by the degree of slope to the head of the cultivated field. These artificial low ridges will not only have the effect of considerably slowing down flow, but will also increase surface absorption, thus giving a twofold benefit.

Besides this hillside work, it may be necessary to construct further work for the protection of the field below. This should be designed to divert flow by a diverson ditch. Dimensions will be according to amount of water which is to be checked and diverted. As actual risk is involved in any work designed to stop and divert flow of water, this phase of the general rehabilitation plan requires careful consideration. When setting out this type of work, the possibility of danger from the new work needs to be kept clearly in mind. Under natural conditions, as has been shown, there is not only minimum velocity of flow, but there is also most efficient diffusion. When the natural cover is removed the velocity of flow not only is increased, but diffusion is reduced to the extent that the water moves in channel-cutting streams. Thus in the matter of diverting flow, water that moves more or less on a "face" of greater or lesser width is directed into a stream. There is no great risk in doing this, provided, firstly, the ditch structure is of dimensions which the rainfall intensity demands and can be depended on to carry the anticipated volume; and, secondly, that the ditch has been graded to allow only slow movement to the outlet. The questions then arise: how far can this easy grade be carried; and to what point is it intended to carry the water? These two questions indicate the risk inherent in any plan which requires diversion of flow. If care is not taken to plan the whole work, preferably starting from the proposed outlet, and making sure of complete control over flow from the diversion point to final outlet, trouble greater than that which it was desired to avert may easily arise.

Soil Conservation.

Means have to be considered for preventing or lessening soil loss and increasing moisture penetration on sloping cropped land. It is assumed that full protection from outside run-off has been provided. A plan has to be formulated for the management and working of sloping ground which will best ensure the conservation of soil and fertility. Since it is recognised that permanent vegetative cover provides the surest method of holding the ground surface, any system for using and cropping sloping ground should have this fact as the basis of the plan. There obviously has to be a modification of the permanency aspect where land is to be tilled and cropped, but the modification, although away from permanency of cover, should, in any substitution, have some capacity for performing the functions of the displaced permanent cover. Without this, there can be no great efficiency in any conservation plan.

Plans for different topographical and climatic conditions obviously will differ in some details, but with the exception of districts which have a heavy rainfall the principles will remain the same. Again, the directing factors will be the volume of flow at the time of greatest intensity of rainfall; the grade of slope which has to be protected from this volume of flow; and the soil type and its condition. As these factors vary so will the method of tillage, the system of cropping, and the kind of engineering work differ; but the conservation plan must be such that the flow of water is so checked that there is only a minimum displacement of soil.

American experience has shown that where it is necessary to loosen the ground on slopes for the growing of crops, systems of tillage and cropping in themselves are not sufficient to ensure the required degree of conservation. Works of an engineering nature are necessary and check-banks or "terraces" across sloping ground should be devised.

Terracing.

Terracing has long been practised in the older countries, and the dimensions and structure of terraces have not altered much in their evolution. Terraces have proved of high value and, it would seem, are indispensable on sloping ground which is cropped. Modern use has indicated that there needs to be a definite relation between spacing of terraces and the degree of slope on which they are placed. Terracing then becomes part of permanent cover to check flow. Terraces should, however, do more than check; they should stop flow. This is the reason for the necessity of a calculated spacing as the height of the bank and the space between banks should take care of the amount of water which falls during heavy downpours. Certainly, crops growing on the inter-spaces will contribute their assistance, but the margin of safety is greater if calculations are made without taking growing crops into account. It is most important not to have ground in bare fallow at time of known wet periods.

Spacing of Terraces.

As already indicated, spacing of terraces is relative to rain intensity, but experience in other countries shows that there is a reasonable margin of safety, especially when care is taken to have

the land under crop at the time of heaviest rainfall, if the following spacings are made:—On a 5 per cent. slope (5 ft. in 100 ft.), a terrace is required each 3 ft. drop, that is 60 ft. apart; a 10 per cent. slope a terrace is required at 4 ft. drop of slope, or 40 ft.; and on a 15 per cent. slope spacing of terraces is at each 5 ft. drop, or at 33 ft. intervals. The terrace placed according to this rule need be no more than 12 to 15 ft. wide and at its ridge 12 to 15 in. in height. For the greatest degree of efficiency, all future work of cultivation and cropping should conform to the line of the terraces; but if it is inconvenient to do this and it is found necessary to cross the terraces, great care should be taken to see that the form and height of the terrace is not impaired, or if impaired is quickly repaired. This form of protection of sloping fields, if the works are laid down with the necessary care and are as carefully maintained, can give most gratifying results in comparison with those obtained when working the field as a smooth plane, even if tillage and cropping methods remain the same as were practised on the smooth slope.

Without some additional care, however, full protection is not assured. The primary idea of terracing is to guarantee that, as probably was the case when the slope had its natural cover, there shall be no run of water down the full length of the field. The whole idea of terracing is defeated if this has not been achieved. But it will become apparent that on the slope between the embankments there will be movement of water after heavy rain and that there will be some movement of soil particles. Therefore, it is strongly recommended that tillage and cropping methods be used which will reduce this soil movement as much as possible. The ground should be worked and planted to conform with the line of the terraces. In other words, contour farming should be practised. Following the contour in working and planting means that lines of small dams are always across the path of moving water, thus water as well as soil is held in the position where it will do most good. As well as planting all row crops on the contour, strips of broadcast crops should be planted at intervals.

Crop Planting.

In preparing ground for planting, it is wise to leave the surface on the rough side, and if the seed requires a fine seed-bed the reduction to fineness should be delayed as long as practicable.

Plant residues such as trash and stubble should not be destroyed or completely covered. Where there is a high content of organic matter in the surface layer or on the surface there will be greater absorption of water, and the greater the absorption the less the run-off. This organic matter content of the soil is as important in the erosion prevention scheme as it is for the building up of fertility, and a rotation including a crop to be ploughed in should be in the cropping plan.

The idea of bringing a plan for soil conservation into action need arouse no misgivings in the mind of any farmer of sloping land. The smallest effort, if done with proper care, will give immediate benefit, and if the work is directed to tilled fields so that further wastage of these fields is stopped, the tale of worn-out farms will come to have no meaning.

The Use of Borax on Waltham Cross Grapes in the Stanthorpe District.

F. A. L. JARDINE, Adviser in Horticulture.

ONE of the most important troubles with which viticulturists in the Stanthorpe district have to contend is the failure of many vines to set bunches of normally sized fruits. The type of trouble is, of course, by no means confined to the growers in this area and, indeed, in many grape-growing countries such failures are a major factor, particularly in certain seasons. This failure to set normal fruit is sometimes associated with disturbed weather conditions at or near blossom time. For example, continued rain or a sudden change in temperature at time of setting will often be followed by a reduction in the number of normally developed bunches of even-sized berries. At the same time the damage caused by insects, such as thrips, may have far-reaching effects on the subsequent history of the bunch.

Whilst any variety may be affected in this way some are obviously more disturbed by adverse conditions than are others, and thus such well known and potentially valuable varieties as Black Prince, White Wax, and Henab Turki have virtually disappeared from Stanthorpe vineyards, so regular has been their failure to produce bunches which can command a reasonable price on the fresh fruit market.

HEN AND CHICKEN DISORDER.

Apart from the type of failure of which the cause can be found in climatic or more or less obvious factors there is one in particular in the Stanthorpe district which cannot be attributed to such causes. This condition, known locally as "hen and chickens," is a most serious disorder in certain varieties, particularly the Waltham Cross. This variety is one of the most popular table grapes grown in this State and the frequency with which many vines fail to produce normal bunches is of great concern to Stanthorpe growers. In place of the normal bunch of large, evenly developed berries, many vines habitually produce a large proportion of "hen and chickens" bunches. This term aptly describes the affected bunches as will be seen by reference to Plate 23. In this plate is shown a badly affected bunch carrying a small number of normal-sized berries ("hens"), whilst the bulk of the bunch is made up of undersized worthless fruits ("chickens") resembling currants and most of which are less than half the size of normal fruit. The whole bunch ripens normally but, of course, its market value is always seriously reduced.

Early Experimental Work.

In endeavouring to find the cause of the trouble the Waltham Cross variety was selected for the experimental work and trials with this variety were carried out over a period of some eight years. These trials included examination of the effects of various fertilizer dressings, application of lime, the raising of atmospheric temperature in the vicinity of individual vines during and just prior to the blossoming period, and the protection from sudden changes in temperature by encasing the bunches in cellophane bags. The effects of cincturing and various methods of pruning were also examined. However, the results of none of these gave any indication as to the cause of the trouble.

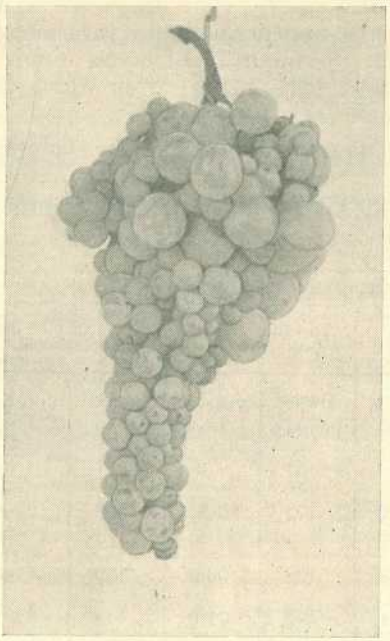


Plate 23.
Showing a Badly Set Bunch, Unsuitable for Market.

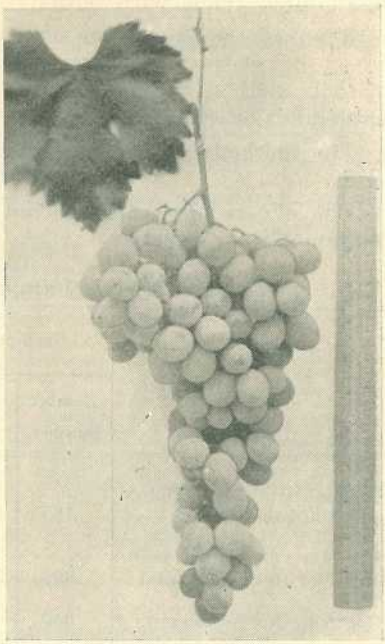


Plate 24.
Showing a Perfectly Set Bunch of Waltham Cross Variety.

Trials with Borax.

By 1937 it had been established that a number of other species of fruit trees in the district were suffering from deficiencies of certain trace elements, and it was clear that the soils of the district, all of which are of the same granitic origin, were markedly low in several of these trace elements. It was, therefore, decided to test the effects of applications of some of these on the setting and development of Waltham Cross grapes. Accordingly, in September of that year borax was applied as a soil dressing to vines of this variety which had persistently set "hen and chicken" bunches over a period of years. Vines growing in each of several types of soil were selected and each vine received an application of 7 oz. of powdered borax spread evenly and chipped into the soil, covering the root spread in each case. This dosage proved excessive, for in those instances where there was abundant soil moisture the vines

were so badly injured that they eventually died, whilst those on dry slopes were also severely damaged and lost most or all of their foliage. Nevertheless, the treatment at once showed promise for where bunches appeared they were composed wholly of normally sized fruit.

The following year and each successive summer, including the 1943-4 season, the vines that survived the initial application of borax set bunches of normally sized berries of high market value.

In the second season following the initial application it became evident that borax as a soil dressing had a marked beneficial effect on the setting of Waltham Cross grapes in the vineyards of the Stanthorpe district, and consequently it was decided to lay down more extensive and detailed trials with borax.

The specific points on which it was hoped to obtain information were:—(1) methods of application; (2) the quantity of borax required for each method of application; and (3) the period over which the treatment is effective.

The methods of application and amounts appear in the Tables 1 and 2.

The effects of treatments on yields of twenty-four (24) vines of Waltham Cross variety.

TABLE 1.

FOLIAGE SPRAY (MINIMUM STRENGTH) AND SWABBING.

—	Unaffected.		Less than 50 Per Cent. Affected.		More than 50 Per Cent. Affected.	
	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.
1. Foliage Spray (1 lb. Borax to 100 galls. water) ..	785	524	171	86·5	103	27·5
2. Swabbing Mixture (1 lb. Borax to 100 galls. water)	638	438	188	96·0	189	43·5
3. Control—No Treatment..	659	471	143	77·0	148	32·0

TABLE 2.

SOIL TREATMENT AND FOLIAGE SPRAY (MAXIMUM STRENGTH).

(The Effects of Treatments on Yields of 24 Vines of Waltham Cross Variety).

—	Unaffected.		Less than 50 Per Cent. Affected.		More than 50 Per Cent. Affected.	
	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.	Number of Bunches.	Yield in Lb.
1. Soil Dressing (1 oz. Borax per Vine)	527	205·5	8	2·0	0	0
2. Soil Dressing (3 oz. Borax per Vine)	606	242·5	5	2·5	0	0
3. Foliage Spray (1 lb. Borax to 20 galls. Water) ..	695	283·0	6	2·0	0	0
4. Control—No Treatment..	452	158·5	58	17·5	35	6·0

Plate 25.
Showing an Untreated Waltham Cross Vine, the Crop Ruined by Faulty Setting.

Notes on Treatments and Results.

Foliage Spray.

The spray was applied as a fine mist at high pressure covering as much as possible of the leaf surface of the vine. This treatment, with minimum strength (1 lb. to 100 gallons), produced results immediately following application on 29th October and was effective for one season only. Sprays of maximum strength showed results during the season following the application on 21st October and were effective for one season only.

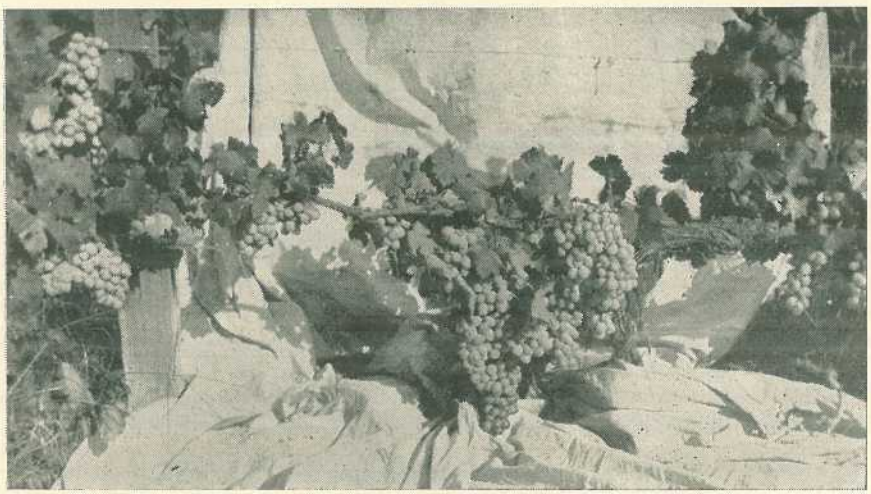


Plate 26.
Showing a Waltham Cross Vine that Received a Soil Dressing of 2 oz. of Borax.—Note the well-filled bunches.

It will be noted that the more concentrated borax solution used in the experiment recorded in Table 2 produced a far more effective control than the weaker solution used in the other experiment recorded in Table 1.

Soil Treatment.

In the case of the experimental plots, the borax was worked into the soil by means of a hand hoe. Where larger areas of vines are to be treated, however, a scuffler or harrows would be more suitable for the purpose. This treatment produced results during the season directly following the application applied on 9th September. It will be noted that 3 oz. of borax gave only slightly better results than 1 oz. per vine. One-half of the amount of the borax was applied to each side of the vine in an area commencing 1 foot from the trunk of the vine and extending to the centre of the avenue.

This treatment will probably remain effective for at least three years, but further information on how long this treatment is effective has yet to be obtained.

Swabbing.

The solution was applied by means of a small mop to the freshly-made cuts directly a vine had been completely pruned.

The results of this experiment showed no evidence that swabbing with a solution of borax at a strength of 1 lb. to 100 gallons of water produced a satisfactory degree of control. However, further investigations into swabbing with more concentrated solutions are required before it can be determined whether the swabbing method is unsatisfactory.

Though none of the borax treatments has completely controlled the disorder of "hen and chickens," there is evidence of effective control with foliage sprays and soil treatments with borax, although there appears to be no significant difference between these two treatments.

Recommendations.

In view of the possibility of rain falling shortly after spraying, thereby necessitating a second treatment, soil dressings of borax are preferred to sprays for the control of the "hen and chickens" disorder in Waltham Cross grapes. In the Stanthorpe district, powdered borax, as a soil dressing, at the rate of 1 oz. to 2 oz. per vine, according to the age of the vine, is recommended and it should be applied, preferably, during the month of August.

Where a foliage spray is favoured by the grower, a solution of 1 lb. of powdered borax in 20 gallons of water is recommended, and it should be applied approximately three weeks prior to blossoming. This will normally occur in early November, but will vary with seasonal conditions, location, date of pruning, &c.

Warning.

It is particularly stressed that borax used in excess quantities is toxic to the vines and, therefore, growers are warned against using quantities greater than those recommended.

Acknowledgments.

For their helpful co-operation in making vines available for test purposes thanks are due to Messrs. J. Blanch, N. Collins, J. Ferris, H. Nahrung, and W. Sandison, growers in the Glen Aplin area.

PLANT PROTECTION

Lucerne Pests.

H. JARVIS, Entomologist, and J. HAROLD SMITH, Officer in Charge, Science Branch.

LUCERNE is a valuable fodder crop which is grown extensively in Queensland both with and without irrigation. Many farmers are therefore familiar with at least some of the insects associated with it, chief among which are cutworms, leaf roller, jassids, corn earn worm, crown borer and seed wasp. The importance of these pests varies from district to district according to the farming practices in each and they may claim the attention of the farmer at any time from planting onwards.

CUTWORMS.

A critical period in the life of the lucerne crop occurs during the first three months after planting. In some parts of the State, particularly in the far north, partial or complete failure of the young stand may be encountered and, when investigated, cutworms may be found to be the primary cause of the failure. The damage appears shortly after germination, the death of seedlings in patches throughout the field

Plate 27.
BROWN CUTWORM × 2.
[*Drawing by William Manley.*

being a typical symptom. The cutworms (Plate 27) can then be located in the soil, and are particularly numerous around plants at the margin of the affected areas. The seedlings show both leaf injury and damage to the stem just below ground level and the affected areas extend very rapidly.

Life History and Habits.

A number of large, heavy-bodied moths* are implicated in cutworm damage to lucerne. These have similar habits, and the most important of them, the brown cutworm†, may be regarded as a typical example. The parent moth of this species has a wing-spread of one and a-half inches, the forewings being dark-brown in colour with blotched, darker areas. The hind wings are light-grey and tend towards brown at the margins. These moths usually lay small, globular eggs in groups on the soil and sometimes on the stems and leaves of low-growing plants. From these eggs, small whitish caterpillars emerge and commence to feed on weeds and cultivated plants. The very young cutworms feed

* *Euxoa radians* Gn., *Agrotis ypsilon* Roth., and *Remigia frugalis* F.
† *Euxoa radians* Gn.

principally on the leaves of seedlings but the older stages attack the stems below ground level; sometimes, the full-grown larvae move above ground and attack the foliage of well-established plants. Feeding generally takes place at night, the larvae sheltering in the ground during the day, hence cutworm activity is seldom detected until the plants are dying and a search is made for the insects. In about four weeks, the larvae are full-grown, greyish-green in colour and approximately one and a-half inches in length. Pupation follows and takes place in earthen cells constructed just below the surface of the ground. About two weeks later, the adult moths emerge from the brown-coloured pupae.

The life cycle of the pest may be completed during the summer months in as short a period as five weeks and several generations occur each year. Outbreaks have been recorded in many crops but they usually attract attention in lucerne during late autumn in North Queensland; elsewhere in the State where the crop is sown in cooler weather, cutworms are of negligible importance. Weed growth is common in fallow ground during the summer months and both the eggs and larvae of the cutworms may be associated with it. When such land is cultivated in the course of preparing the seed-bed for lucerne, the immature stages of these pests are deprived of sustenance by the destruction of the weeds and they remain in the soil until the newly-sown crop germinates. Feeding may then immediately take place on the seedlings and, as many of the surviving larvae are already half-grown, they can cause a considerable amount of damage in a relatively short time.

Control.

In dealing with potential cutworm outbreaks, the lucerne grower is faced with a number of alternatives in northern districts; he may keep the areas to be planted free from weeds for some weeks before the crop is sown and thus minimize egglaying, he may apply a cutworm bait to the areas before planting and thus destroy any cutworms which may be present in the soil, or he may apply the poison bait as soon as signs of damage are observed in the field. A weed-free fallow is an excellent preparation for lucerne but it is not easy to achieve during the summer months. It is wise therefore to examine any weed-infested parts of the paddocks before seed-bed preparation begins in order to determine whether or no cutworms are present in the soil. If they are found, the bait should be distributed over the infested areas about one week before the lucerne seed is sown, a single application of the bait usually being sufficient to destroy most of the larvae. If the above precautions have not been taken, the germinating crop should be examined at intervals of two or three days during the first few months of its life and, when symptoms of cutworm activity are noticed, the poison bait must be applied immediately; a delay of even a few days can lead to a considerable extension of the affected area.

The cutworm poison bait is prepared by thoroughly mixing 25 lb. of bran and 1 lb. of Paris green. One quart of molasses is then mixed with one pint of boiling water, the mixture being thinned down to two gallons with cold water, and then added to the poisoned bran, the two being worked together until the mix gives a moist, crumbly mash which trickles easily through the fingers. The bait is broadcast over the parts of the field showing cutworm damage and also over marginal strips 20 ft. wide around them. The materials required for the work can be

calculated on the assumption that the bait made from 50 lb. of dry bran will be sufficient for the treatment of one acre of ground. As the cutworms feed at night, the poisoned bait should be broadcasted during the late afternoon in order that it will be moist when the larvae are active. Lucerne is not normally grazed for some months after sowing and, though cutworm baits are poisonous, standard methods of managing the crop should eliminate any risk of injuring stock.

LEAF ROLLER.

The leaf roller is the larva of a moth* which can be found in lucerne at almost any time of the year. Normally, this pest causes little damage until shortly before flowering commences when the leaves may be tied together in clusters, each of which provides shelter for a leaf-eating, greenish caterpillar. If the outbreak continues unchecked,

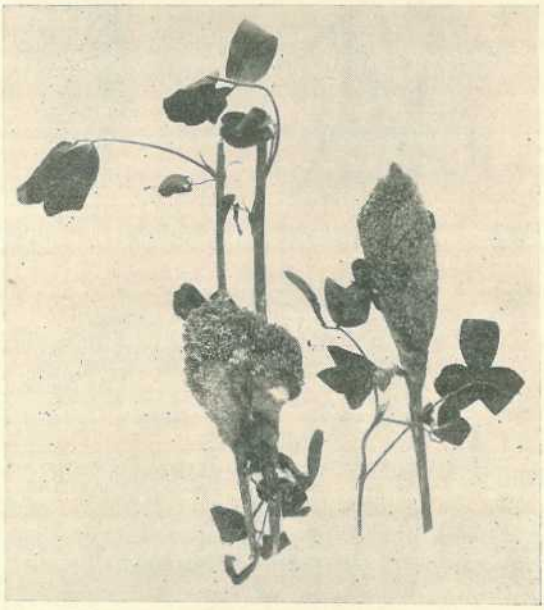


Plate 28.

Leaf Roller.—Larval shelters in which most of the leaves have been destroyed and only webbing remains.

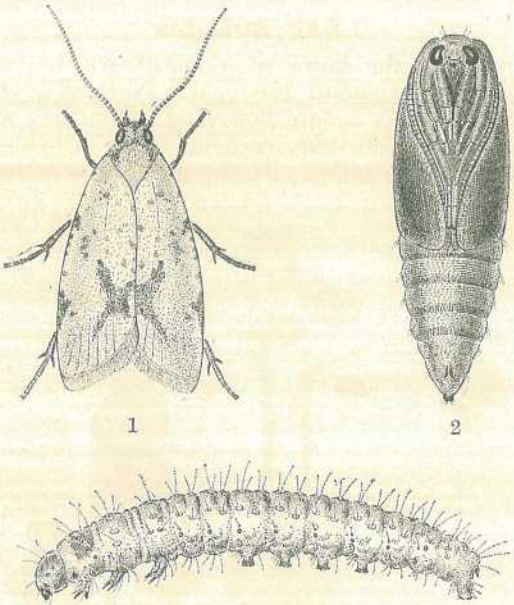
more and more leaves are built into the existing shelters and new ones are begun until finally little but bare stalks with numerous pear-shaped webs (Plate 28) remain in the field. Seed production may be unsatisfactory if the pest is active for faulty flowering and seed setting occur and the seed harvested may not warrant the necessary expenditure on cleaning and grading.

Life History and Habits.

The parent moth (Plate 29, fig. 1) of the leaf roller measures about five-eighths of an inch across the forewings, which are "U"-shaped in outline and light-yellow in colour with irregular, dark markings; the hind wings are pale-brown. The moths usually appear in the crop when

* *Tortrix divulsana* Walk.

it is about half-grown and lay their minute eggs in groups on the upper surfaces of the leaves. These eggs are flat, round, almost yellow in colour, and overlap like scales. Small, whitish-yellow larvae emerge from them in a few days and each rolls a few leaves into a shelter within which it feeds. The larvae subsequently enlarge these shelters by the addition of further leaves and in four or five weeks, depending on the time of the year, they are full-grown and uniform, deep-green in



1 2

3

Plate 29.

LEAF ROLLER: Fig. 1—Moth × 5; Fig. 2—Larva × 6; Fig. 3—Pupa × 7.

[*Drawings by William Manley.*

colour (Plate 29, fig. 3). They then spin flimsy cocoons—one within each shelter—and pupate, the pupae being about half an inch in length and brown in colour though they gradually become darker until, just prior to the emergence of the moths, they are almost black (Plate 29, fig. 2). The pupal period lasts approximately one week during the summer and the moths emerging from the pupae escape to the open where they mate and recommence the life cycle of the insect.

This pest is particularly common in well-grown lucerne shortly before and during flowering. Severe attacks may occur in crops which, after first growing rapidly, encounter adverse conditions such as those induced by dry weather. The leaf roller is therefore more important in non-irrigated than in irrigated crops for the latter are less affected by drought or semi-drought conditions.

Control.

In lucerne, only cultural measures deserve consideration for controlling the leaf roller. In non-irrigated crops, proper management of the lucerne paddocks will suppress competing weeds, keep the soil open and permit the greatest possible utilization of the available rains, all of which tend to bring the crop to maturity before the pest gets out of hand. Where irrigation facilities are available and water is applied when the crop needs it, leaf roller should not be a serious

pest if the lucerne is cut in the early stages of flowering. When a major attack does occur, the lucerne should be cut immediately even though it has not commenced to flower. Alternatively, the crop may be judiciously grazed; stock feeding on the infested lucerne destroy many of the larvae. When the leaf roller becomes less active and conditions seem favourable for rapid growth, the paddocks may be closed to stock and reserved for a hay crop.

JASSIDS.

The insects known as jassids occur on a number of crops and are commonly referred to by the farmer as "hoppers" or "fleas," names which emphasize the distinctive jumping habit of the adult stage. They may be numerous in lucerne without attracting a great deal of attention or causing any appreciable amount of damage. Not infrequently, however, jassid populations become so high and the effects of their feeding so serious that the rate of crop growth is greatly reduced and yields of hay are below reasonable expectations. Infested plants have small, white flecks on the leaves, the markings being most numerous in the more sheltered parts of the plant. Each of these white flecks marks a feeding puncture made by either an adult or immature jassid and the discoloured area of the leaf is dead or, at best, functioning very inefficiently. When most of the leaf surface is flecked, the leaf dies and falls from the plant. Severely-injured lucerne crops are stunted and have little foliage, the loss of leaf being greater in non-irrigated than in irrigated crops which continue to make growth—in spite of the presence of pest—when water is regularly applied. In the latter case, the new leafy growth compensates to some extent for the loss of foliage caused by the insects but, even so, the cut may be light. Outbreaks of jassids are more common during the spring and early summer months than at other periods of the year.

Life History and Habits.

Several species of jassids can be collected from a lucerne crop but those generally known as the lucerne jassid* and the tomato jassid† are by far the most numerous. Both are similar in appearance and habits and the following outline of the life history and habits of the tomato jassid (Plate 30) may be considered representative of the species found in lucerne. The adults are small green leafhoppers with roof-shaped wings and measure about one-sixth of an inch in length. They are very agile, and when infested plants are disturbed, hundreds of the adults catapult into the air and then settle back into the foliage within a yard or so of their original positions. The elongate-oval eggs are laid in the upper part of the stem, in the leaf stalks and the main veins of the leaves, each being placed inside the plant tissues and hidden from view. The eggs hatch in about ten days, and small, wingless nymphs

Plate 30.
TOMATO JASSID × 15.
[*Drawing by William Manley.*

* *Empoasca alfalfae* Ev.
† *Empoasca terra-reginae* Paoli.

force their way to the surface, leaving membranous scales at the points of emergence. Feeding takes place on the foliage from which the sap is extracted by the insect through a long beak. A white discolouration later appears at each feeding puncture and these, together with those caused by the adults, produce the typical symptoms of jassid injury. Growth proceeds through a series of moults and nymphal development is completed in approximately two weeks during warm weather, when insects grow very quickly and populations rapidly increase.

The incidence of the two more important jassids in the lucerne crop depends largely on the availability of their favoured host plants in the district. If legumes are grown extensively, the lucerne jassid will probably predominate; if, on the other hand, potatoes or tomatoes are the principal crops in the locality, large numbers of the tomato jassid may spill over from these into adjacent lucerne when the crops in which they normally occur have ceased to grow. Most species of jassids found in lucerne can subsist on a wide range of host plants.

Control.

The use of insecticides on an economic scale in jassid-infested lucerne is quite impracticable and methods of handling infested crops are essentially cultural. When the damage is already extensive, the crop may be cut for hay or grazed in order to use the fodder before further deterioration occurs; the regrowth may then escape severe infestation if rain falls and stimulates the growth of both the lucerne and any weeds in adjacent areas on which the jassids feed. When the farm is equipped with irrigation facilities, frequent applications of water will speed up the growth rate of an infested crop and minimize the damage by distributing the insect population over a greater number of leaves. In this way the lucerne may be held in reasonable condition until it has commenced to flower and is ready to cut. Jassid infestation originating in crops such as potatoes can be offset to some extent by cutting the lucerne before it shows signs of serious injury. During the spring and early summer months when jassids tend to be active in lucerne, cutting dates may need to be adjusted to the pest position rather than to the stage of growth reached by the crop, for it is better to harvest good quality hay than to defer cutting until the crop has flowered and lost most of its foliage through jassid attacks.

CORN EAR WORM.

One of the best known pests of lucerne, the corn ear worm*, also attacks crops such as tomato, tobacco, cotton, and maize. The damage is perhaps less serious in lucerne than in these other host plants because lucerne is a perennial fodder crop which recovers rapidly from even severe attacks. Outbreaks of the pest, however, may nullify attempts to produce seed for lucerne is very attractive to the pest and many crops in the flowering stage are infested by destructive larval populations. Attacks normally occur when the crop begins to flower and the larvae may then be seen feeding on the rapidly developing shoots, where they destroy the leaf and flower structures forming in the tips. If the larvae are numerous, the stems are also attacked. The most spectacular outbreaks occur in crops which are being held for seed as flower and pod damage may then be so severe that little seed sets and matures. Occasionally, the parent moths are active when alternative hosts are not available

* *Heliothis armigera* Hb.

or are very few in numbers and egglaying may then take place on non-flowering crops of lucerne. The subsequent damage may be extensive. It is from such areas that migratory swarms of the corn ear worm sometimes develop and invade other crops such as cotton, maize, and sorghum where they cause a considerable amount of injury.

Life History and Habits.

The corn ear worm (Plate 31) is the larva of a stout-bodied moth which is not infrequently noticed in lucerne as the farmer walks through the crop. It is about one and a-half inches across the outstretched wings which are greenish-grey in colour and often tinged with red. The hind wings are creamy-yellow with a broad, smoke-coloured margin. Egglaying takes place at dusk, the eggs being placed singly on the terminals and flowering parts of the plant although

Plate 31.
Corn Ear Worm × 2.

[Drawing by William Manley.

if the moths are numerous, they show little preference for particular sites and eggs may be laid even on the older leaves. The globular egg is approximately one-half the size of a pin head and hatches in three to six days. If the plant is in an advanced stage of growth, the young larva feeds on the flowers and seed pods; in younger plants, stems, leaf stalks, and leaves may be attacked. Growth takes place through a series of moults until the larva is full-grown and approximately one and a-half inches in length, the colour being variable but usually green with brown, yellow, and black markings. Light and dark coloured individuals may be present on the same plant. Larval development is completed in twelve to twenty-one days during warm weather. Before pupating, the larvae descend to the ground where they construct earthen cells one or more inches below the surface and transform to the pupal stage. Later—the duration of the pupal period depends on both temperature and rainfall—the adult moths emerge. Under favourable conditions, the life cycle can be completed in four weeks and at least five generations are recorded in coastal and sub-coastal Queensland each year. Those which occur during the spring and early summer months are potentially the most dangerous to the lucerne grower.

Control.

Should an outbreak of corn ear worm occur and the larvae appear numerous enough to damage the lucerne, the crop should be cut immediately for hay; delays of any kind can only result in lower yields and inferior produce. Even though the cut may be light, the loss in weight should be counterbalanced by yields from the subsequent crop which will, in all probability, escape an attack. When it is impracticable to

cut the crop for hay the farmer may graze the lucerne; cattle kill many of the larvae and their characteristic habit of cropping the tips of the plants makes the lucerne much less suitable for the insect than it would otherwise be.

CROWN BORER.

The crown borer* is present in many fields of lucerne though the damage caused by this insect seldom attracts attention until it assumes serious proportions. Typically, single plants here and there in the paddock wilt and die after abortive attempts to throw out new shoots. When these plants are cut open for examination, one or more stout-bodied larvae are seen in the crown and, even if larvae are absent, tunnels filled with excreta indicate that they were present at an earlier date. Sometimes the injury caused by the pest is aggravated by rot organisms which invaded the plant when the insect damage had already become extensive. As long as only odd plants in the crop are attacked the stand is not greatly impaired. Sometimes, however, plant failure caused by the crown borer assumes more serious proportions and extensive bare patches, which soon become overgrown with weeds and unwanted grasses, appear in the field. Normally, outbreaks of the lucerne crown borer are restricted to stands which are two or more years old.

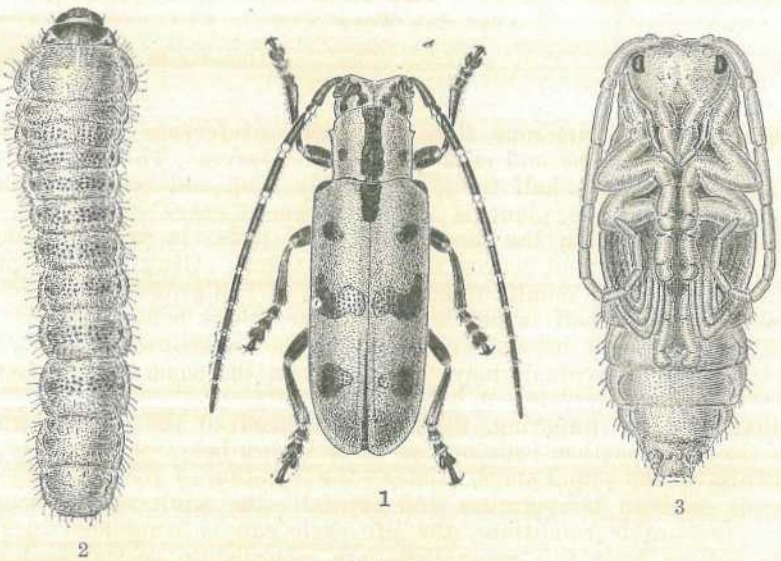


Plate 32.

CROWN BORER: Fig. 1—Adult beetle × 4; Fig. 2—Larva × 5; Fig. 3—Pupa × 5.

[*Drawings by William Manley.*

Life History and Habits.

The crown borer is a longicorn beetle (Plate 32, fig. 1) which measures approximately five-eighths of an inch in length. The wing-covers are light orange in colour with a number of black spots that sometimes merge into transverse bands in some individuals. The long antennae and legs are jet black. The eggs are presumably laid on or

* *Zygrita diva* Thomps.

in the lower part of the stem for young larvae have been found burrowing downwards through the pith. Development is slow and three or more months may elapse before the larvae are full-grown, at which stage they are white in colour and elongate in shape with the body segments separated by deep constrictions (Plate 32, fig. 2). They have the distinctive, large, rounded head of longicorn beetle larvae and are invariably found in the crown of the plant. Pupation takes place in an oval cavity at the end of the larval tunnel where the pupa (Plate 32, fig. 3) transforms into the adult beetle which finally cuts its way to the surface and escapes. The whole life cycle extends over many months and it seems unlikely that there is more than one generation each year. However, larvae of different ages can be collected from plants in the one field, and this suggests that there is no marked seasonal behaviour on the part of the insect. Though best known as a pest of lucerne, the crown borer has frequently been recorded from soy bean and two leguminous weeds, Sesbania and Crotalaria. In these hosts, larval development takes place principally in the stem, though the lower part of the feeding tunnel may extend below ground level.

Control.

Outbreaks of the crown borer are rarely sufficiently serious to warrant the consideration of insecticidal control measures. If relatively large areas in a paddock are affected, it is better to plough the lucerne out and sow another crop in the farm rotation than to attempt reseeding the bare areas. Reseeding is rarely satisfactory for the bare patches in a lucerne paddock are usually so placed that they cannot be worked down to a seedbed in which a reasonable strike can be expected.

SEED WASP.

The damage caused by the lucerne seed wasp* can be observed when the seed is being examined during threshing, for the emergence holes of the wasp are then conspicuous in many seeds while others show sunken areas which indicate that a larva is feeding inside (Plate 33). The seed wastage caused by this pest varies a great deal from year to year in those parts of Australia where the production of lucerne seed is an important industry. The insect is present in Queensland but, as lucerne is grown in the State mainly for the production of hay or for grazing, the seed wasp is of interest principally because of its bearing on the viability of seed purchased for sowing. If badly-infested seed is used when the crop is planted, the stand may be thin and patchy. The lucerne seed wasp occurs in most countries where its host plant is grown at all extensively. Clover seed may also be infested and it is possible that the insect can attack the burr clovers that are native to Australia.

Life History and Habits.

Innumerable flying adults occur in lucerne crops which have passed the flowering stage, particularly if pod formation is well advanced as would be the case in crops which are being held for seed. The wasps measure about one-sixteenth of an inch in length and are jet black in colour. The female wasps insert their pointed ovipositors through the pods and into the developing seeds where the eggs are laid. Within a few days, white, legless larvae emerge from the eggs and commence to feed inside the seeds. Larval development is completed within two

* *Bruchophagus gibbus* Boh.

or three weeks and pupation takes place inside the seed. At the close of the pupal stage, the adults emerge, bite their way through the seed coat and, if necessary, through the pods. In summer, the whole life cycle can be completed within three weeks. Larval development, however, may be slowed down when the crop is cut but may be resumed again if the unthreshed crop or the threshed seed is stored under suitably warm and moist conditions.

Control.

The seed wasp reproduces very rapidly and attacks by the insect are seldom recognized when they occur in the field. Precautionary measures should therefore be taken by farmers who are holding lucerne crops for seed. These measures include early cutting of the seed crop and the systematic destruction of thresher screenings. Early cutting, i.e., cutting before the later-set pods are mature, tends to give good

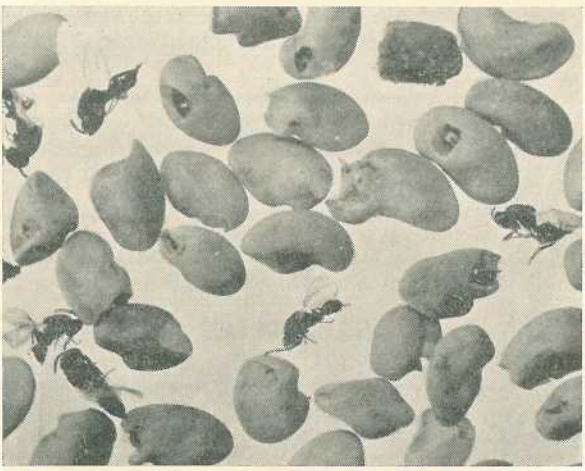


Plate 33.

LUCERNE SEED WASP.—Infested seed showing circular emergence holes of the insects and the wasps themselves × 6.

quality seed that is reasonably free from wasp damage and this is some compensation for the lighter yield obtained when the practice is adopted. The destruction of thresher screenings is a routine hygienic measure designed to destroy the very many larvae present in them.

Cleaned seed should always be used when planting a crop of lucerne for, if sown in properly prepared land under suitable conditions, a reasonable strike is assured. Modern cleaning machinery, with a properly controlled air blast, separates most of the wasp-damaged from the sound seed. Uncleaned seed or seed that has been cleaned with inferior equipment, may have been infested by the lucerne seed wasp and, if used without the guidance of a germination test, may be responsible for faulty strikes in the field. It is therefore sound practice to purchase seed with guarantees of purity to type and viability.

MINOR LUCERNE PESTS.

Apart from the more important insects so far discussed, there are a number of others which occasionally attract attention.

The cotton web spinner* is an active, greenish caterpillar that is often found in association with corn ear worm, particularly when attacks by the latter species occur in non-flowering lucerne. This pest can be distinguished from the more important species by its habit of spinning a great deal of webbing. Control measures are the same as those outlined for the corn ear worm.

A leaf-eating beetle† sometimes causes injury to the foliage of lucerne crops in the central district. This insect is greenish-bronze in colour and about one-quarter of an inch in length. Though the pest is quite common, severe outbreaks in lucerne are rare and they seldom require any attention from the farmer.

The grass blue butterfly‡ is frequently seen flying over lucerne which is approaching or has reached the flowering stage. The larvae of this insect attack cultivated beans as well as lucerne and feed on both the terminal growth and the developing pods. They are light-green in colour and slug-like in appearance. Control measures are not required in lucerne.

One of the giant mealy bugs§ may form dense colonies at the base of the stem of lucerne and sometimes moves upwards into the leafier parts of the plant. The lucerne may die under such a concentrated attack but only occasionally is the outbreak severe enough to affect the stand.

GRAZING PRECAUTIONS.

In the foregoing account of insect pests which attack lucerne, it will be noted that the efficient use of the crop frequently involves judicious grazing. Farmers who are accustomed to grazing cattle on lucerne are well aware of the risks involved in so doing and take all necessary precautions to avoid an excessive intake of the green feed which may lead to "bloat" and even death among valuable animals. As a general rule, cattle should not be grazed on wet lucerne. In any case, the herd should always be grazed under supervision and removed from the paddock as soon as any of the animals show an inclination to lie down.

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* *Loxostege affinitalis* Led.
† *Colaspoides foveiventris* Led.
‡ *Zizina labradus* God.
§ *Steatococcus nudatus* Mask.

"Swelled Head" of Sheep.

(Continued from January issue.)

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

MALIGNANT OEDEMA, WHITE OEDEMA AND GAS GANGRENE.

MALIGNANT oedema, white oedema, and gas gangrene are three conditions which are recognised as being quite distinct, but which may cause similar symptoms of swelled head in sheep when the infection occurs in that part of the animal.

Causes.

The three conditions are caused by bacterial infection of a wound, and the organisms which have been incriminated all belong to the anaerobe family—*i.e.*, they do not thrive and multiply in an atmosphere containing oxygen. The resting or spore stage of the bacteria which cause these conditions is to be found in the soil, and the spores appear to be particularly plentiful in areas which are contaminated with animal manure, such as old sheep yards and shearing sheds. On gaining entrance to the animal body through damaged skin surface the bacteria multiply and form a very powerful poison which damages the tissues. On spreading through the body these poisons set up a characteristic soft swelling which pits on pressure, and which extends from the original seat of infection. Naturally, any wound on any part of the body is liable to infection by any or all of the particular bacteria which cause these diseases, but very often wounds which occur on a ram's head as the result of fighting provide the portal for infection and typical symptoms of swelled head follow.

As the swelling develops the bacteria which cause malignant oedema and gas gangrene invade the damaged tissues, and in this way the condition spreads. The bacteria which cause white oedema, however, remain localised at the original seat of infection, and as the poison they make spreads, so does the symptom of the swelling increase.

Symptoms.

The characteristic symptom most commonly noticed is a swelling involving the head and neck of the affected animals. This swelling usually involves the lips and nose, the area under the jaw, and extends down the animal's "apron." The ears and eyelids may also be swollen, and when this takes place these parts tend to droop.

The colour of the skin over the swollen area varies with the type of infection—in malignant oedema and gas gangrene it is dark-red to blackish-purple, while in white oedema it is blanched and pale white.

The swellings are "putty like" to touch and they pit on pressure, but the swellings of malignant oedema and gas gangrene are, except in the terminal stages of the disease, fairly warm to touch, while that of white oedema is inclined to be cooler than the rest of the animal's body. In addition, the bacteria which cause gas gangrene have the capacity to form some gas throughout the swelling, and when this is present a faint crackling sensation may be experienced when the swelling is manipulated. As the condition advances there may be an exudation of a blood-stained fluid from the skin surface, and the wool or hair over the affected part plucks easily and in places whole pieces of skin may tend to peel.

Affected animals segregate themselves from the rest of the flock and show the usual symptoms of depressed appetite and lassitude associated with fever.

The heart is inclined to be tumultuous in its action and the pulse is accelerated. The breathing becomes rapid and there may be some embarrassment as the result of the swelling of the soft tissues of the nose. In addition, there is sometimes a frothy blood-stained discharge from the nostrils of animals affected with malignant oedema or gas gangrene.

The usual termination of these diseases is death, and this takes place most commonly within 48-60 hours after the first symptoms are noted.

Post-Mortem Findings.

Post-mortem findings consist mainly of marked swelling, up to 2 or 3 in. thick, of the tissues under the skin, and the affected area is either dark or blood stained or clear and white in colour depending on the type of infection. There are other internal changes, but because of the virulence of the causative organism graziers are advised to refrain from carrying out post-mortems.

Treatment.

Treatment of affected animals is difficult owing to the potency of the poisons produced and to the invasive powers of the bacteria which cause these diseases. A specific antiserum can be used against each type of infection, but under field conditions it is often found that more than one kind of organism is present in the infected wound—for instance, the bacteria of malignant oedema and gas gangrene may exist together. As the work of identifying the bacteria concerned is fairly laborious, and as the animals have to be treated quickly, the antiserums are mixed in the hope of combating all three types of infection. This makes the product fairly expensive (about 8s. to treat a ram), but it is worth while when valuable stud animals are involved. In addition to the antiserum treatment, constant bathing of the affected parts with warm water is helpful.

Prevention.

When mortalities, with which swelled head of the sheep is associated, occur it is recommended that graziers seek technical assistance. It is possible by detailed laboratory tests to determine which organisms are responsible for the diseases and to vaccinate susceptible sheep. The cost of the vaccine varies, depending on the type of infection, from a little over one penny to a little over four pence per sheep.

Milk Supplies and Cheese Quality.

L. E. NICHOLS, W. J. PARK, G. R. SIGLEY, and V. J. BRIMBLECOMBE,
Division of Dairying.

SINCE 1938 an intensive campaign has been waged with a view to improving the quality of cheese manufactured in Queensland. The results of tests made of cheese factory milk supplies in the first year's work in 1938-39 have already been published (see 1 and 2 at end). Almost all cheese factories in the State have since been rebuilt or renovated, their equipment renewed, and manufacturing technique improved. At the same time, milk supplies have been regularly tested for bacteriological quality on receival at factories; field instruction also has been intensified. In 1941, action also was taken to expand cheese production in compliance with a request from the British Government for increased cheese exports from Australia. This necessitated the enlargement of many factories and the building of entirely new units in some districts, and production was almost trebled in comparison with its pre-war level.

In 1938-39, Queensland cheese factory output was approximately 5,500 tons, produced from milk supplied by 700 dairy farmers; while in 1942-43, production was 15,000 tons and the number of suppliers to factories had risen to 1,700. Since that year, there has been some diversion of supplies from cheese factories to butter factories, and the present number of suppliers is about 1,400. The production for 1944-45 was 10,100 tons.

Milk Quality.

In Table 1 the results of all methylene blue tests are subdivided into five categories, viz.:—

Quality.	Meth. Blue Test.
Poor	less than ½ hour
Unsatisfactory	less than 2 hours
Fair	less than 3½ hours
Satisfactory	less than 5½ hours
Good	over 5½ hours

This classification has been used by field officers for advisory work among producers.

TABLE I.

Modified Methylene Blue Tests on Mixed Milk Samples.

Year.	Milk Samples.	Methylene Blue Test.				
		Under ½ Hour.	Under 2 Hours.	Under 3½ Hours.	Under 5½ Hours.	Over 5½ Hours.
1940–41 ..	6,417	687 10·7%	1,402 21·9%	1,652 25·8%	1,691 26·2%	985 15·4%
1941–42 ..	4,323	291 6·7%	942 21·8%	1,151 26·6%	1,374 31·8%	565 13·1%
1942–43 ..	2,974	175 5·8%	811 27·3%	772 26·0%	803 27·0%	413 13·9%
1943–44 ..	2,355	130 5·5%	543 23·0%	659 28·0%	664 28·2%	359 15·3%
Total Tests, 1940–44	16,069	1,283 8·0%	3,698 23·0%	4,234 26·3%	4,532 28·2%	2,322 14·5%

It will be noted that there has been an improvement in the proportion of milk classified in the higher grades between 1940-41 and 1943-44.

Milk Quality and Cheese Quality.

Table II. gives a comparison of the respective milk grades and official cheese grades. Milk giving a methylene blue test of two hours or more is considered as first grade milk.

TABLE II.

Comparison of Milk Quality and Cheese Grades, 1940–41—1943–44.

Year.	Approximate lb. Cheese Graded.	Choice and First Quality.		Second and Third Quality.	
		Milk.	Cheese.	Milk.	Cheese.
		Percentage.	Percentage.	Percentage.	Percentage.
1940–41	6,000,000	67·4	63·36	32·6	36·64
1941–42	12,000,000	71·5	73·2	28·5	26·8
1942–43	15,825,000	66·9	73·17	33·1	26·83
1943–44	12,000,000	71·5	75·65	28·5	24·35
Total	45,825,000	69·0	73·42	31·0	26·58

Although for the purpose of advisory work among producers five methylene blue test groupings were used, a reduction period of two hours was adopted in the methylene blue test for relating milk quality to cheese quality. All milk which gave a methylene blue test of not less than two hours was considered to be capable of being manufactured into cheese of either choice or first quality, while milk with a methylene blue test of less than two hours was regarded as being only suitable for manufacture into cheese of lower than first grade. All tests were carried out on samples of the mixed morning's and evening's milk on receival at the factory platform.

It will be noted there is a reasonably good agreement between the two sets of figures.

It is believed that the large number of tests, totalling 16,069 over a four-years' period, furnishes sufficient data on which to draw the conclusion that there is a definite relationship between the quality of milk, as assessed by the methylene blue test, and the quality of cheese. As a practicable standard for grading cheese factory milk supplies under Queensland conditions, a methylene blue test of at least two hours, made on mixed morning and night milk, may be tentatively fixed as a minimum standard for first grade milk.

The grading results of all cheese officially examined by State and Commonwealth grading staffs for the four years period, as shown in Table II. testify to a steady decrease in the percentage of second and third grade, with a corresponding improvement in choice and first grades. Generally cheese quality showed a slightly higher increase than milk quality over the period under review. This may be attributed to improved factory buildings and equipment and more efficient factory technique. This result, achieved with a rapidly expanding production, is creditable and indicates the support given by both factory managers and producers to the drive for higher quality.

Paying on the Basis of Bacteriological Quality.

As an encouragement to suppliers of good quality milk and as an incentive to other suppliers to improve the quality of milk produced by them, there is need for a system of payment for cheese factory milk supplies according to bacteriological quality. Such a system, if introduced in Queensland, would have a marked influence on cheese quality. The data furnished in Table II. may be construed as indicating the modified methylene blue test to be sufficiently accurate to be used as a grading test for determining the quality of milk intended for cheese manufacture. In view of the climatic conditions in this State, it is suggested that differing standards may be desirable for winter and summer months. In Table III. grade standards are suggested.

TABLE III.

SUGGESTED STANDARDS FOR GRADING CHEESE FACTORY MILK SUPPLIES.

Period.	First Grade Methylene Blue Test.	Second Grade Methylene Blue Test.
Summer (October–March)	Not less than 2 hours	Less than 2 hours
Winter (April–September)	Not less than 3 hours	Less than 3 hours

Influences on Milk Quality.

The influences of milking machines and season of the year on milk quality and, consequently, cheese quality, warrant reference in this paper.

Hand v. Machine Milking.

Table IV. summarizes the comparative percentages of farms employing hand and machine milking, respectively, in the years 1938-39 and 1943-44.

TABLE IV.

Years.	Hand Milking.		Machine Milking.	
	Number.	Percentage.	Number.	Percentage.
1938–39	381	58·35	272	41·65
1943–44	481	28·30	1,219	71·70

It will be noted that the proportion of farms on which milking machines were used among suppliers to cheese factories increased from 41.65 per cent. in 1938-39 to 71.70 per cent. in 1943-44. This increase was chiefly due to—

(*a*) The shortage of farm labour necessitating the installation of milking plants in an endeavour to maintain production;

(*b*) The change-over from butter to cheese production which, because of the large number of producers involved, considerably affected the proportion of hand and machine milking farms; and

(*c*) The effort to increase production on some farms.

The bacteriological quality of the milk on farms employing hand milking and those using milking machines is shown in Table V.

TABLE V.

Result of Methylene Blue Tests of Machine and Hand Produced Milk.

Period 1940–41 to 1943–44.	Tests.	Second Grade.		First Grade.		
		Under ½ Hour.	Under 2 Hours.	Under 3½ Hours.	Under 5½ Hours.	Over 5½ Hours.
Hand Milked..	5,880	404 6·9%	1,209 20·5%	1,548 26·3%	1,771 30·2%	948 16·1%
		27·4%		72·6%		
Machine Milked	10,189	879 8·6%	2,489 24·4%	2,686 26·4%	2,761 27·0%	1,374 13·5%
		33·0%		66·9%		
Total ..	16,069	1,283 8·0%	3,698 23·0%	4,234 26·4%	4,532 28·2%	2,322 14·4%
		31·0%		69·0%		

The figures in the above table suggest that the hand-produced milk was slightly superior to the machine-produced milk. This was also revealed in the earlier investigation already referred to.

Season of Year.

For the purpose of this part of the survey summer and winter periods were in conformity with the *Dairy Produce Acts* which specify the summer period to be from 1st October to 31st March and winter period from 1st April to 30th September.

Table VI. shows that milk produced in winter is of much higher quality than summer-produced milk. Both summer and winter results were treated separately for the purpose of revealing the improvement in quality which takes place when cool conditions prevail. The necessity for the installation of efficient cooling facilities on farms, as an important step in attaining high-quality milk for cheese manufacture, is clearly evident. Methods of cooling milk for cheese factory milk suppliers were discussed in the October, 1945, issue of this Journal.

TABLE VI.

EFFECT OF SEASON ON METHYLENE BLUE TESTS.

Period.	Grade Classification.	Method of Milking.	
		Hand.	Machine.
		Percentage.	Percentage.
Summer	First	61·9	54·0
	Second	38·1	46·0
Winter	First	84·0	86·0
	Second	16·0	14·0

Quality Improvement.

A steady improvement in both milk and cheese quality has been noticeable over the past seven years. The foregoing tables show that much of the milk received and the cheese manufactured are in the borderline classification and the future affords an opportunity of lifting these products to a higher level of quality. Present world food shortages resulting from recent wartime conditions have greatly strengthened the demand for dairy products. With the lifting of the war clouds and the return to full production by dairying countries, it will be imperative for the best quality commodity to be manufactured if we are to compete successfully on the overseas markets. By herd and pasture improvement, particular care and attention to cleanliness in production, and the provision of suitable cooling and sterilizing facilities, the producer can deliver a high-quality milk. By the adoption of improved factory hygiene, the maintenance of equipment in an efficient working condition, provision of sufficient water and boiler power, thorough whey treatment, serious consideration of refrigeration, and improved factory technique, cheese factory associations can play a vital part, also, in raising cheese quality.

The services of the Officers of the Division of Dairying of the Department of Agriculture and Stock are available for instructional and follow-up work in connection with both milk and cheese quality, and associations and suppliers are requested to avail themselves fully of this service.

Summary and Conclusions.

From an examination of the results of an exhaustive survey of milk quality, assessed by the methylene blue test and official cheese gradings, the following conclusions are drawn:—

(1) There is a direct relationship between milk quality and cheese quality.

(2) There is the necessity for further improvement in milk quality as the primary factor in cheese quality.

(3) The methylene blue test may be used as a practical factory test for the determination of the quality of milk for cheese manufacture.

(4) The quality of milk and cheese produced in winter is superior to that produced in summer.

(5) The quality of milk and cheese produced in summer could be considerably improved by the adoption of efficient milk cooling on the farm and the thorough cleansing and sterilizing of all milking plants.

(6) The bacteriological standards suggested would form the basis of a system for differential payments for milk according to quality.

That both milk and cheese quality have shown improvement over the past few troublous years is a tribute to all concerned, but the future calls for further improvement which can only be attained by full co-operation between the producers, dairy associations, and departmental officers.

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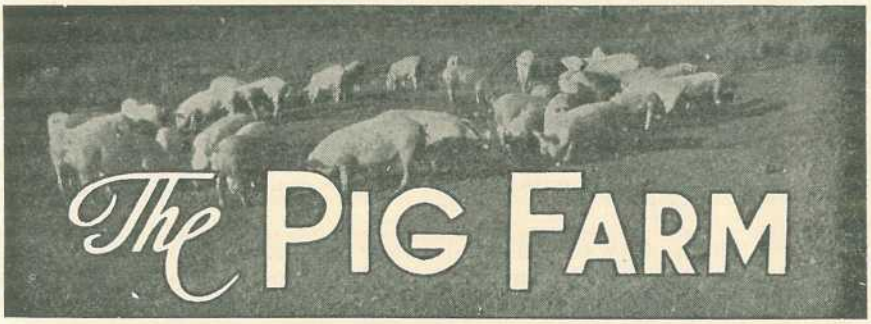
OATS FOR POULTRY.

Because of scarcity of supplies and the high cost usually as compared with other feeding grains, oats have not been used to any extent as a poultry food in Queensland. As a grain, fowls prefer wheat, going on a recent experiment, in which the birds were allowed to help themselves to any grain they liked. In the test 3,632 lb. of grain were consumed by 60 hens over a period of twelve months. Of that quantity of grain eaten, wheat made up 37 per cent., oats 24 per cent., maize 20 per cent., and barley 19 per cent. This suggests that very little if any difficulty would be experienced in inducing poultry to eat, to them, a strange grain.

Apart from the likes or dislikes of poultry, oats have a very good feeding value, and may be used either whole, crushed, or in mashes. As a grain oats may be used to the extent of 33 per cent. of the grain supply, or in the mash as ground oats, to the extent of 25 per cent. As a grain, however, oats should not be fed to chickens under 6 to 7 weeks old.

Oats have been proved a corrective of the vice of feather picking, which leads frequently to cannibalism, which may be a cause of great loss in the poultry pen. Feather picking seems to be more prevalent when rations do not contain sufficient bran and pollard, both of which are still difficult to obtain; most rations are consequently deficient in these ingredients.

Crushed oats may be used to build up all mashes for poultry over six weeks old.



Management of Pigs in Relation to Disease Prevention.

A. L. CLAY, Divisional Veterinary Officer.

IT is probably impossible to even estimate the percentage of pigs farrowed in Queensland which do not reach a marketable age. All competent observers, however, appear to be in agreement that the percentage is high. At all events, it can be stated definitely that it is considerably higher than it should be, and, moreover, higher than the pig industry can afford if production is to be pursued at reasonably profitable levels.

The losses, taken by and large, are invariably put down to disease; while this is largely true, it would be more correct to say that they are due indirectly to disease, and directly to errors in management. Diseases of pigs are, for the most part (more so than with any other class of stock), preventable; therefore, it can be truthfully stated that they are very often the result of faulty management. Diseases are more easily preventable by reason of the fact that pigs are marketed at a much earlier age than other classes of stock, and also because they are under direct observation at least twice daily.

Management includes all matters relating to breeding, feeding, and accommodation. Too often farmers fail to appreciate that these three things are intimately related, so much so that excellence in one department is almost useless in the absence of adequate attention to either or both of the others. It is not enough to have a "good" boar and "good" sows. Excellent as they may be, losses will occur if the feeding and/or accommodation are at fault.

BREEDING.

Having made up his mind whether he is going to cater for the pork or bacon market, and having selected a breed suitable for either purpose, the farmer should devote all his talents to obtaining and maintaining animals which are vigorous, thrifty and endowed with good constitutions.

It should be firmly realized that it is generally bad practice to buy weaners or store pigs for fattening purposes. It is a questionable practice on economic grounds; but, apart from this aspect of the matter, disease is often introduced among otherwise healthy pigs, as many a farmer can testify, to his sorrow. It is far safer to aim at keeping a clean piggery and rearing one's own pigs. If, for some reason, store

pigs must be purchased, then unquestionably they should be isolated for three weeks before allowing them to run with pigs already on the farm.

Service of the Sow.

Sows are commonly served at 6-7 months. This is too early an age, and, although often no trouble apparently results, the practice can and does sometimes lead to difficulties in breeding later on in the life of the sow. Deformed or dead piglets also are sometimes seen as the result of service at too early an age, especially, be it noted, if the feeding is at fault; growth of the live pigs in the litter may be slow with resultant below-average live weights at weaning time and backward pigs thereafter. Sows should, as a general rule, not be served before 8-12 months old, depending on their development, this despite the fact that they will take the boar (if permitted) at about five months. There is no scientific evidence to support the view that fertility will be impaired by restricting breeding for a few months after the sow first becomes capable of breeding; on the contrary, the only effect on fertility is improvement.

The "heat" exhibited by sows lasts 2-3 days and its first appearance precedes the most favourable time for joining with the boar by 24-36 hours. Consequently, sows should not be served until the second day of "heat." If still in "heat" on the third day, they may be given a second service with possible advantage. Sows may exhibit "heat" about three days after farrowing, but usually do not until 3 or 4 days after their pigs are weaned; matings should be delayed until this second occasion, as heavier and healthier litters can be expected.

Maternal Qualities.

Nowadays, much more is heard than previously about sows which are good mothers, yet fail to yield sufficient milk for the needs of their offspring; also of sows which are difficult to get in pig, or which deliver small litters in which are some dead or deformed pigs. Stud-masters who have concentrated on success in the show ring must accept much of the blame for this state of affairs; although, as will be seen later, haphazard methods of feeding also are involved. The milking qualities of a brood sow are of the first importance to the health of a litter. Young sows intended for breeding should be selected from among the progeny of a capable milk-producing sow; the evidence of this is a number of large healthy litters attaining an average individual live weight of about 40 lb. at weaning time. The young sow selected should have not less than 12 well-placed teats, but should not be permitted to rear more than 8 pigs in her first litter and 12 in subsequent litters. Any pigs in a litter over the numbers stated should be destroyed or put to a foster mother. The size of a litter is in a large measure hereditary, which makes it especially important that only sows from among the offspring of stock normally producing large healthy litters be used.

Hereditary Influences.

There is a variety of reasons for sows giving birth to dead and deformed pigs, but heredity again is an important influence, and it is well, if no other explanation can be found, not to breed from the offspring of such sows. The boar also may be implicated; if suspect, he can be test mated with five or six of his own daughters. This will prove him one way or the other.

If a sow is prolific and a good mother, she will pay her way up to 5 years old, so it is worth while giving a fund of care and attention to her selection in the first place.

Physical Capacity of the Boar.

The boar also is an ever-increasing source of concern to pig farmers, because of his oft-observed failure to get sows in pig, or even complete indifference to his normal role. A form of sterility in boars in which there is a certain physical inability seems likely at least in a percentage of cases to be hereditary, but most manifestations of sterility in boars can be put down to faulty management.

Boars are ready to serve at 8 months old, but only very few sows should be allowed him until he is over 10 months old. Boars are at their best from 1½ to 4 years old. Too early and too frequent service results in lack of interest, or if service is carried out, in unsuccessful matings. They vary in their vigour and number of sows which they can serve without detriment to their usefulness as breeding animals. A 12-months old boar should not have served more than 10-15 sows and never more than one in a single day. In his second year a boar may serve one sow daily, with occasionally two during a short "season." If required for service twice in one day, the first sow should be served fairly early in the morning and the second late in the day. Always use boars before feeding. They should be housed apart from sows, be well fed and exercised, for if allowed to become fat their breeding powers become seriously impaired.

If a long period of complete abstention from breeding occurs, or if only very infrequent services can be arranged, then there is some evidence to suggest that a boar's fertility may be impaired. In such cases, it may be wise to allow the boar to serve sows intended for marketing and which happen to be in "heat" shortly beforehand.

Breeding Troubles.

Finally, in regard to breeding troubles in both boars and sows, it is unfortunately necessary to give consideration to the disease known as brucellosis of swine. A similar condition in cattle is well known as contagious abortion, but this name is not suitable for the disease in pigs as actual abortion is not the most common symptom. A much more common symptom is failure to breed; sows return several times to the boar, and an affected boar may be impotent for lengthy periods. This may change from a temporary to a permanent condition with some pigs. Physical signs of the presence of this disease may be completely lacking or be restricted in sows to a whitish discharge, and in boars to an enlargement of either one or both of the testicles. There is often death from scours early in life of a large proportion of piglets in what may have appeared to be a normal litter at birth. Prevention of brucellosis requires that a farmer breed his own stores and not purchase them from other farms, unless such farms are certified as brucellosis-free. Sows should not be "sent out" for service, nor should sows be accepted for service.

This is not the whole story, but if the points mentioned are scrupulously observed, then the risk of introducing the disease into a clean herd will be reduced to a minimum. Once the disease is introduced into a herd, it can only be satisfactorily dealt with by slaughter and burning or boiling down all affected animals; these can only be determined by the application of a "blood test."

FEEDING.

It is not intended in this section to deal with what should be fed to pigs except in so far as the prevention of disease is concerned, but rather in a general way to discuss feeding methods. On the average farm, it is safe to say that the staple food for pigs is skim milk given in troughs made from hollowed-out logs. Most farmers sense, without having to be told, that such troughs are not all they might be. Despite this they often do not improve matters, countering all criticism with the statement that they cannot afford anything better. The answer to this is that they really cannot afford to be without a type of trough which represents a vast improvement on a hollowed log.

Feeding Troughs.

The hollowed log is a type of trough which is difficult to clean even when new, but with increasing age the presence of numerous cracks and crevices greatly increases the difficulty. Milk and swill soak into the gaps, putrefy and form an excellent medium for the development of germs. Some of these germs can and do produce disease, and as they mix with milk each time it is poured into the "trough," the objections are obvious. Moreover, as pigs will, if not prevented, get their feet into troughs and often deposit dung and urine therein, further objections are raised, as disease-producing agents are commonly distributed as a result. Over and above these considerations, if a farmer places a reasonable value on his labour, he will be greatly surprised at the cost of a hollowed-out log.

What then is to take the place of a hollowed log? The designs and recommendations are numerous and only broad general principles can be discussed here. Obviously, to approach the ideal they must be constructed of some impervious material, have no cracks or crannies, be capable of easy and effective cleansing, and be so designed as to prevent pigs getting into them. Concrete is undoubtedly the best material to use, but it must be well made and well finished off (smoothed), and as milk (particularly if sour) has a very destructive action on it, the trough should be treated with silicate of soda in order to resist this action. A bung hole is usually provided at one end, but as this frequently gets out of order as the trough ages, it is perhaps better to dispense with it altogether and instead have the end of the trough curved or scooped inside so that food remnants can be easily removed with a brush or broom. Wrought iron troughs also are excellent, but expensive. Galvanized iron troughs are too light and have but a limited life.

Wooden troughs can be made so as to be fairly satisfactory, provided that machine-sawn hardwood is used and they are well jointed and tarred thoroughly before use. The best of them is, however, difficult to clean, because of the absence of rounded ends.

A type of trough which is especially desirable is one in which thick curvey glazed earthenware is inset into a concrete "bed."

Whatever be the material the troughs are made from, they should be put on platforms projecting three feet either side, and have the platform, in turn, mounted on skids made of 6 x 4-inch timber so that the whole thing can be moved about from time to time. In this way, the ground in the immediate vicinity can always be kept reasonably sweet and clean. An overhead batten made of 4 x 1-inch timber, and suspended at a height of 8 to 12 inches by means of uprights at either end, will effectively keep pigs out of the trough.

Skim Milk-Feeding.

All troughs should be swilled out with cold water shortly after skim milk has been consumed by pigs. More milk than the pigs can consume in quick time should never be placed in troughs, because any surplus remaining in the troughs may quickly become sour and unhealthy.

In the handling of skim milk, the usual practice is to run off the milk from the separator into drums or vats, which often are not washed out, and rarely, if ever, properly cleansed. They become coated thickly with a most disagreeable and unhealthy scum. The milk becomes not only tainted, but often actually putrid. No farmer would think of feeding such milk to calves or to orphan foals or lambs, but for some obscure reason the pig is believed well able to withstand such an outrage on its digestive system. If farmers could only see and appreciate the extent of gastritis and bowel troubles in pigs fed on such material, they would very quickly change their ideas on the subject. There is no objection to sour milk for pigs if it has been allowed to sour under sanitary conditions, but even so, for pigs before and soon after weaning, skim milk is better if fed fresh. For older pigs, if sour milk is going to be fed it should be fed always and not mixed with fresh milk, otherwise scouring is apt to occur.

If a farmer is not prepared to clean and scald his drums, vats, buckets and troughs at regular intervals, digestive disturbances must be expected and there need be no mystery as to why the pigs are not doing as well as they might be.

Because of the great palatability of skim milk, young pigs up to a weight of about 65 lb. are apt to take more (if the supply is uncontrolled) than they can digest. One result is scours, and if the conditions are repeated, a more or less chronic state of indigestion. It is important from the standpoint of preventing scours, that skim milk be fed at regular hours and that the milk be the same "age" or degree of sourness from day to day. As a general rule, it is not advisable to feed concentrates (meat meal, maize meal etc.) and skim milk together as a slop: the milk is best fed separately and the concentrates given dry from a self feeding hopper.

One other aspect of skim milk feeding is its value as a feed in relation to disease prevention. Skim milk is an unbalanced and even troublesome food for pigs when fed alone, that is, quite apart from any consideration of the hygienic conditions under which, as has already been pointed out, it should be fed. It is too watery, (does not contain enough solid matter, excellent though the quality of that may be). The result is that in an effort to satisfy their appetites, pigs will take in much more liquid than that for which their digestive systems are designed. "Pot bellies" result, and the pigs do not make rapid gains. Feeding skim milk alone also is a wasteful practice and amounts to

throwing money away, by reason of the fact that it contains more protein (belonging to the more expensive class of stock foods) then the pig requires. Most farmers would probably be greatly surprised to learn that skim milk, when fed alone to pigs, may only return them as little as ½d. a gallon, but when fed in combination with other appropriate foodstuffs it may return, under favourable conditions, as much as 3d. a gallon.

It is necessary to remember that skim milk is lacking in vitamin A (which has been removed with the cream) and has only traces of vitamin D. The former is essential for growth, and the latter for bone formation.

Vitamin Requirements.

The pig is a rapidly growing animal and unquestionably requires comparatively large supplies of vitamin A. Lack of this vitamin does not produce immediate effects, but after a period an astonishing array of symptoms may occur. This is restlessness, lack of muscular control (particularly of the limbs), stiffness, humped backs, convulsive fits, miserable appearance, cessation of growth, and eventually death; eye troubles commonly seen in other animals suffering from a deficiency of this vitamin, are infrequent. Some cases of paralysis of the hind quarters are caused by a deficiency of this vitamin. With sows, after a series of pregnancies there is irregularity in the appearance of "heat," difficulty in breeding, and perhaps abortion or the birth of dead pigs at farrowing time. Some of the dead pigs may not be delivered, but retained in the womb where they undergo partial resorption and cause subsequent sterility. Vitamin A also has an important bearing on disease of the respiratory system, e.g. pneumonia, coughs and colds, and probably also worms. Adequate amounts of this vitamin in the food renders pigs (in common with other animals) less susceptible to such complaints.

Plenty of vitamin A is present in fresh green pastures, so that if pigs are allowed access to such pastures an important step in a campaign for disease prevention will have been taken. If it is not practicable to run pigs on pasture, then fresh greenstuff (or lucerne hay) should be cut and given whenever possible. Yellow corn (but not white corn) also supplies vitamin A, but even when this is being fed, greenstuff is probably still required for best results, especially when the corn has been in store for lengthy periods.

Vitamin D has a bearing on "stiffness of the hind legs," and, in some cases, paralysis of the hindquarters. It is related to the utilization by the body of the important bone forming minerals, lime and phosphates, particularly if these, as is often the case, are not fed in proper proportion to each other. The immediate cause of many cases of paralysis of the hindquarters is now known to be fracture of a bone towards the hindmost end of the spinal column. The exciting cause is weak bone caused by a ration low or ill-balanced in minerals and vitamin D. The bones in the spinal column in such an event are unable to withstand the contraction of powerful back muscles when these are suddenly brought into play, as happens when the pig either slips, or recoils in fright.

Vitamin D is supplied to the pig by the action of the sun's rays on certain substances in the skin. It is present, though in very variable amounts, in lucerne hay, but be it noted, is lacking in fresh green pasture. In ordinary circumstances a deficiency of this vitamin need not be anticipated, particularly if the supply of minerals is adequate. In certain parts of Queensland (notably the Atherton Tableland), however, there are periods of the year when there is very little direct sunlight for weeks on end. Under such conditions, cod liver oil which is a rich source of vitamin D could with decided advantage be given in the milk, more especially to young pigs before and shortly after weaning. High-grade cod liver oils have unfortunately more than doubled in price in recent times, and moreover are now difficult to obtain in any quantity. Good quality sun-cured lucerne and clover hays are the only practicable substitutes.

Mineral Needs.

Skim milk is comparatively rich in minerals, but because of the pig's requirements of these substances the provision of a lick is notwithstanding desirable. A ration of skim milk alone, in addition to other deficiencies already mentioned, may be below desirable levels for lime. Sows which are maintained through several successive litters on a ration deficient in lime, may eventually have difficulty in farrowing and be very weak for some days afterwards. Their milk flow is poor and their udders flabby in appearance. The pigs in the litter may have rough skins and may be subject to rickets; many of them die before weaning and those which survive may always be backward. Some cases of trembling and shivering also may be traced to lack of lime.

A deficiency of lime in weaned pigs results in lack of appetite, unthriftiness, loss of perfect control over movements (leading eventually to paralysis) poor growth and poor utilization of food supplied.

For pigs, lime is more important than phosphates in a lick, largely because of the relative abundance of phosphates in cereal grains (corn, wheat, barley). In addition, cereals and mill offals (bran and pollard) are acid forming; and as the "ideal" diet should be either neutral or alkali forming, limestone (an antacid) also is valuable on that score.

Salt, contrary to popular belief, is advisable for pigs, except where swill forms the basis of the ration. It is a valuable aid to digestion and assists in the well-being of the body as a whole. A suitable mineral mixture for brood sows and growing pigs is ground limestone 4 parts, common salt 1 part, or, (if no grain or only very little is in use) ground limestone 2 parts; sterilized bone meal 2 parts; salt 1 part. If desired, it can be given in the food; for pregnant sows; one heaped dessertspoonful daily. For young pigs, the addition of clear lime water to skim milk at the rate of ½ pint to 1 gallon is excellent. It aids digestion, helps to prevent scouring and assists in the development of healthy and normal bone formation.

Rations for Pigs.

The common ration for pigs in many part of Queensland, skim milk and maize, can be improved by the substitution of meat meal for a proportion of the skim milk. This applies particularly at the time of the year when skim milk is not available in abundance. The palatabiilty

of the ration is improved, resulting in higher consumption. Important also, is the fact that the supply of lime and phosphates is more adequate, and that there is, generally, a wider variety of nutrients.

A ration of maize and meat meal is improved by substituting skim milk for portion of the meat meal. There is here again greater palatability and a wider range of nutrient materials. Pigs given maize and meat meal alone may become stiff and lame, especially during winter. Access to pasture or the feeding of lucerne hay will correct this condition.

CARE OF SUCKLING PIGS.

A ration of maize alone is hopelessly inadequate either for growing or fattening pigs. It is just as unsatisfactory for pregnant sows. Even the addition of minerals does not make the ration a good one; some protein is essential.

The suckling time, often a period of prodigious losses, should, if the management of a piggery is efficient, be virtually trouble-free. For the first 24 hours after farrowing, only water should be given to the sow; she should then be gradually brought on to full feed, taking 7-10 days in the process, the idea being to bring on the milk flow in easy stages and not suddenly. This at the one time helps to prevent milk fever in the sow and scours in the sucklings (from over feeding). Suckling pigs generally draw nutriment from the same teat until weaned, so on the first day the smallest in the litter should be put to the front teats, because these secrete more milk than the teats further back. As a rule, the number of teats which remain in milk during the suckling period does not exceed the number of suckling pigs. At first, sucking is very irregular, but quite soon becomes fairly regular; about every 2 hours during the day and every four hours during the night. It may be advisable to remove the tips of the "wolf" teeth or temporary tusks which are present in newly-born pigs, as these are likely to injure the sow's udder and perhaps indirectly cause mammitis; retaliation by the sow on the offending sucklings also is avoided. The operation, if it may be so called, is easy with the cutting edge of a pair of pliers.

Young males should be castrated at 4-6 weeks in order that they will have some time to recover from the effects of the operation before being weaned. The double setback of castration and weaning at the same time should be avoided. If the pigs have to be weaned, or for some reason have not been castrated, then the operation should be delayed until a fortnight after weaning.

Food Demands of the Litter.

When about three weeks old, depending on the milk production of the sow and the average weight of the suckling pigs at birth, the demands of the litter frequently exceeds the sow's capacity to supply. Very often the sow's trough is the only source of additional supply for the sucklings. This will be empty (and should be so) except for a few minutes at each feeding time. The stomach capacity of suckling pigs is very small and therefore needs "a little and often." From three weeks onwards, a mixture of cracked grain and meat meal should be made available to the sucklings in a creep inaccessible to the sow. Needless to say, strict hygienic precautions should be taken. The trough in the creep should not be allowed to remain empty for long, otherwise gorging will occur when the trough is eventually replenished.

The live weight at weaning time is very important to the welfare of the pig in after life, much more so than is commonly realized. Creep feeding will make the desired average of 40 lb. much more easily attainable; moreover, any setbacks at weaning time will be only fleeting. Newly-weaned pigs should always be fed three times daily at first; this practice (whenever possible) should be continued until the pigs are 3-4 months old.

Health Points.

Anaemia of suckling pigs is only seen when the sow and her litter have been confined in concrete pens or wooden huts away from contact with soil. Affected pigs have poor appetites, are weak and inactive, and their breathing may be laboured; scouring also may be present. In white pigs, the usual pink colour of the ears and nose is lacking. The simplest thing to do is to turn the sow and litter out into clean pasture, as the sucklings will then eat small quantities of earth and speedily correct the trouble. If this is impracticable, small quantities of fresh soil may be put in the pen daily, or the sow's udder may be swabbed daily with a solution of commercial sulphate of iron. The solution is made by dissolving 4 oz. of the sulphate in 1 pint of warm water and adding a little treacle or molasses.

ACCOMMODATION.

Bad accommodation is often associated with incorrect feeding as a cause of disease among pigs. Under natural conditions, pigs graze at will over large areas; they drink and bathe in running streams and have ample shade when required. Compare this state of affairs with that to which domestic pigs are obliged to conform! Often they are enclosed in small yards in low-lying situations; there is little or no facility for exercise; and in wet weather the yard may become a quagmire. In addition, the dung and urine voided daily by the enclosed pigs is allowed to accumulate and, in course of time, grossly contaminate the ground. Many of the agents which cause disease are present in the excreta (this applies particularly to parasitic diseases), so that the importance of contaminated ground is obvious. Too often the same yards have been in continuous use for 20-30 years, and in such circumstances there should be no cause to wonder why pigs do not do well.

The present-day pig has for so long been reared under artificial conditions that he has lost much of his former constitution and vigour, and is accordingly affected adversely by dampness, draughts, excessive heat or cold; and more particulary by sudden changes in temperature (i.e. changeable weather). Pigs therefore require carefully planned shelter if diseases such as pneumonia, catarrh, rheumatism and paralysis are to be avoided.

Piggery Layout.

In regard to the general layout of piggeries there is not the slightest doubt that, while farmers continue to hold the view that they cannot afford the time and labour necessary to keep semi-intensive piggeries in a sanitary condition, the only solution is to give over-much larger areas to the raising of pigs than is the general custom at the present time. The grazing or paddock system represents a partial return to native conditions and has much in its favour from a hygienic point of view. There is not the same tendency for dung and urine to contaminate

the ground as is the case with the semi-intensive system, so that the pigs enjoy comparative freedom from parasites; and, in addition, benefit greatly from the continuous supply of green feed. A sufficiency of exercise (particularly important with dry sows if farrowing troubles are to be avoided) also is provided. It is, however, essential to have paddocks large enough to be always well grassed, and to enable a paddock to be rested from time to time (i.e. rotational grazing). The number of pigs which can be run to the acre and allow of these considerations being fulfilled can only be determined by local experience. Wherever possible, the use of cultivated crops in addition to grass pasture should be seriously considered.

The equipment used in the paddock system should be movable by mounting the troughs and sheds on skids which can then be moved about from time to time, the ground in their immediate vicinity being in this way prevented from becoming bare and contaminated.

Where it is not possible to run pigs on the paddock system and they are perforce confined to small yards, increased attention and labour are necessary if the yards are to be kept in a sanitary condition. There should be a sufficient number of yards to enable at least one to be kept empty at all times. Under this system, when a yard becomes bare and foul from constant use it can be ploughed or dug up, limed (with advantage) and a suitable crop sown. This has the two-fold effect of purifying the soil and providing good food.

A Common Fault.

A common fault with piggeries of the semi-intensive type is to have them in level or low-lying situations. In most of these instances, the farmer has obviously allowed closeness to the dairy to be the prime consideration in selecting the piggery site.* Admittedly with piggeries of this type, proximity to the separator-room is an important consideration, but it should not be allowed to outweigh the necessity for a site which will give good drainage and thus eliminate the risk of disease from mudholes and quagmires. This does not mean that a piggery should be built on the top of a hill (the pigs would be exposed to every wind that blows), but rather on sloping or rising ground. The slope of the selected site should face in the opposite direction to that from which come the prevailing winds—e.g. on the Atherton Tableland all the weather comes from the south-east, so that there it would be a distinct advantage to be on a slope having a north-easterly aspect.

Sheds and Flooring.

The sheds used should face north-east and have an open front, allowing the morning sunlight to penetrate inside the shed. Sunlight is an effective "disinfectant." Floors should be impervious to moisture. On the average farm this is rarely the case. Earth floors are commonly used, but have many serious disadvantages. They cannot be kept level, and develop hollows which serve as receptacles for moisture and filth. They are often cold and nearly always damp, and are impossible to effectively disinfect and keep clean. In short, they are not conducive to the success in the prevention of disease.

* One hundred and fifty feet is the shortest distance allowed by law between a dairy and a piggery.

Wooden slabs laid on the ground are little better than earth floors. A floor made of machine-sawn hardwood is, however, quite satisfactory if closely jointed and tarred. Concrete makes the most sanitary floor, but as it is cold and hard necessitates a wooden sleeping platform.

Walls of sheds should be draught-proof with a ventilation space all round under the roofing to ensure the circulation of plenty of fresh air.

Too often the oldest timber about the farm is used in the construction of pig houses. This is false economy. Such timber provides harbour for parasites and disease-producing agents, and brings about damp, draughty conditions inside the house.

No matter what the type of house, if it is a fixture pigs will in the course of time scoop out the earth on the shady side, usually the south-east side; they lie there during the heat of the day to have the benefit of the breeze in addition to shade. Inside the house they get shade, but no breeze. It is advisable in such circumstances to place a low wooden platform on the ground where the pigs usually camp, otherwise the site may become a quagmire right alongside the house in wet weather.

If the floor of a pig shed is a raised one (if made of hardwood, it should be), another common fault is to find pigs camped under the house. This again is a most undesirable practice, as the ground under the floor does not get any sunlight and is thus apt to become a hotbed of disease. This is particularly likely to happen where the floor is not impervious and moisture and filth drop through. The space under the floor should be effectively boarded up if risk of disease from this source is to be obviated.

The boar yard should be long and narrow rather than rectangular, with the shed at one end and the feed trough away at the other. This ensures that he takes some exercise from the shed to the trough. The farrowing pen should have a guard rail or fender right round to prevent sows crushing sucklings against the wall.

Wallows, unless properly constructed of concrete, should not be tolerated. The ordinary mud wallow is a depository of filth and infection, and as such is a continuous source of risk to the health of pigs.

Shade in the Pig Yard.

Shade trees and shrubs are desirable under summer conditions in Queensland, but should only be retained on high ground. The white cedar berry tree should not be planted as the berries are poisonous to pigs. Adequate shade will do much to eliminate cases of heat stroke and apoplexy. The ordinary galvanized iron roof makes sheds too hot for pigs in the summer, and if additional shade is provided the comfort of the pigs will be much enhanced and healthier and more thrifty animals will result.

The Isolation Pen.

A very valuable addition to any piggery is a quarantine or isolation pen. The importance of isolating sick pigs at the earliest possible stage of an outbreak (or suspected outbreak) of infectious or contagious disease cannot be over-emphasised.

Too often a farmer fully appreciates the importance of isolating sick pigs, but having no quarantine or "hospital" pen is forced to just put them "over the fence." In such circumstances, the sick pigs promptly take up a position alongside the fence separating them from their former abode and the risk of further pigs becoming infected is but little reduced. It is important that drainage from the site of the isolation pen should be away from and not towards the piggery, also that the pen has a "buffer" or double fence to prevent contact between sick and healthy pigs, if the latter are at large.

Another advantage of an isolation pen is that pigs which have become lame, either through injury or some minor ailment, can be segregated and given the chance of recovering without interference by their fellows.

The isolation pen should be thoroughly cleansed and limed after each period of tenancy, otherwise disease germs may linger and infect future "patients."

PREVENTION OF PARASITIC DISEASES.

Parasitic diseases are the causes of such a large proportion of losses that they warrant some special observations, even in an article of such a general nature as this.

Reference has already been made to the fact that worm infestation arises as the result of contamination of yards and feed troughs by dung and urine from infested pigs. It is well known by farmers generally that worms cause pigs to be unthrifty and slow in growth, and are a cause of diarrhoea, wasting, and certain types of pneumonia; further, that worms may be present in one or more of the following situations, viz., stomach, bowels, lungs, liver, and kidneys. It is also generally appreciated that young pigs may die if not treated. Just by what means pigs become worm-infested is not however nearly so well understood. The position can be stated very briefly as follows:—

Worms in Pigs.

Male and female worms are present in a infested pig. The male fertilizes the female and the latter then lays eggs which are passed out in the dung of the pigs (in the case of the kidney worm in the urine). The eggs are naturally very small and can only be seen with the aid of a microscope. What they lack in size, however, they make up in numbers. The female large round worm of pigs (found in the small intestine or first portion of the bowel) is said to lay as many as 27,000,000 eggs during its lifetime. Eggs may under suitable conditions remain fertile for several years, illustrating the difficulties attending the control of these parasites.

Pigs become infested with worms by swallowing worm eggs. Knowing this, and knowing moreover that eggs are present in enormous numbers in the dung and urine, it is obvious that so long as pigs are confined in small yards they will almost certainly become infested in some degree unless a very high standard of sanitation is maintained.

Hence the necessity for regular collection and removal of dung, a drainage system that keeps the yards and sties as dry as possible, and the prevention of soiling of food and drinking water.

To Keep Young Pigs Worm-free.

A system of management for the sow and her litter designed to keep the young pigs worm-free is as follows:—A few weeks before farrowing the sow is treated for worms. When farrowing is imminent, the farrowing pen (which should have a concrete floor and sides likewise constructed of concrete for the first 12 inches) is prepared by sweeping and scraping followed by scalding with boiling water to which a little caustic soda has been added; finally a disinfectant solution is applied. The application of the disinfectant without these preliminary cleansing practices will be useless. The sow is thoroughly washed with warm soapy water, paying particular attention to the udder immediately before being put into the farrowing pen. A single small lump of dirt remaining on the sow may contain enough worm eggs to defeat the whole object of the system. If the farrowing pen is of a suitable type and the procedure outlined has been faithfully followed, then the sucklings will run very little risk of becoming infested soon after birth. As we have seen when dealing with anaemia of suckling pigs, it will be unwise to keep the sow and litter confined to the farrowing pen for any length of time unless precautions are taken. In practice, it is wise to aim at removing the sow and litter from the farrowing pen when the sucklings are 7-10 days old. They should be carted, not driven, to a pasture where no pigs have been kept for at least 12 months, or failing this to a small paddock which has been cropped since last being tenanted by pigs. The sucklings should be kept there until 4 months old, at which age they can be put into the fattening pens, as they are then much less susceptible to the effects of worms. If this system cannot be followed in its entirety (e.g., because of no suitable farrowing pen), then it should be adopted as far as practicable. Sows might, for instance, be allowed to farrow in portable colony houses in "clean" pasture.

If comparative freedom from worms is to be attained, it seems inevitable under Queensland conditions that, at least so far as the average farmer is concerned, the semi-intensive system of pig raising should give way to the paddock system.

External Parasites.

Of the external parasites, lice are the commonest and are prevalent throughout the State. Although farmers are generally quite conversant with measures to control them, the ill-effects arising from lice infestation are not fully realized and it is emphasised that the presence of lice is opposed to the production of thrifty, early maturing pigs. The parasites cause constant skin irritation and often, because of scratching and rubbing, the skin becomes raw and may be infected. The ill effects then become obvious, but it is the reduced rate of growth, caused by continued irritation before the skin becomes raw and bleeding, which has to be kept in mind.

CONCLUSIONS.

It seems to be a tradition among many farmers that pigs can be successfully raised amidst dirt and filth on any food that is offering, no matter how sour or unbalanced it may be. Such an attitude is difficult to understand. It is certainly not correct, and to the farmer who claims to get good results in such circumstances all that can be said is that the day will come when he will experience serious mortalities.

Over and above this, it can be stated with certainty that with improved management he would market a very much higher percentage of pigs born on the farm and at much greater profit to himself. The average farmer would almost certainly be greatly surprised were he to keep accurate records of pigs born on the farm and pigs marketed as porkers or baconers. In some cases, the latter would be barely 50 per cent.

Given a fraction of the attention and forethought accorded to the rearing of calves, foals, or lambs, the pig would more than hold his own. As it is, losses in the pig industry from disease are high. That this state of affairs is consequent on mismanagement and not because of natural difficulties in the rearing of pigs, all farmers can easily prove for themselves.

It can be done, simply by giving the pig a greater share of consideration in the activities of the farm, as a whole, than has hitherto been accorded.

Ear Notching of Pigs.

C. R. GRIEVE, Assistant Adviser in Pig Raising.

BEFORE a litter is weaned, the young pigs should be given a permanent identification mark. Tattooing, tagging, and ear notching are common methods of identification, but of these the lastmentioned is undoubtedly the best and as nearly permanent as possible. Notching has the advantage over tattooing in that it can be used on all breeds of pigs and, if neatly done, remains legible regardless of the pig's age. A pig's number also can be observed in the paddock without the necessity of yarding the animal and perhaps washing its ear.

Tattooing, however, is the only method of ear marking officially recognised by the Australian Stud Pig Breeders' Society for the identification of Large White and Mid White pigs. Nevertheless, it is definitely advantageous also to ear-notch these breeds for the reasons stated.

Metal tags are not satisfactory as they are often lost through pigs fighting or rubbing their ears against fences, or other objects. With this method, also, the pig has to be yarded and the tags cleansed before the number can be read.

It is not claimed that ear notching is the perfect system of identification, for it is realised that pigs may occasionally tear their ears through fighting, thus marring the notches; their ears also may be disfigured by excessively deep and careless notching.

However, these risks may be reduced to a minimum if the following points are observed.

1. No marks should be placed from the middle to the base of the upper edge of the ear. To make notches in this position it is necessary to cut deeply into the cartilage to ensure that the notches will not grow out as the pigs age. This means that there is always a danger of causing the ear to break over and droop in an unsightly manner—a very objectionable feature especially in show stock.

2. The value or number allotted to positions near the point of the ear should be so designed that it is not necessary to take out more than one notch in this part of the ear for any number; otherwise the tip of the ear may droop.

3. Round punch holes should not be used near the tip of the ear where they are most likely to be torn.

4. Pieces removed from the ear should vary according to the size of the pig—avoid cutting veins where possible.

The ear notching system illustrated in Plate 34 has been designed to avoid the above faults as far as possible and is one example of the many systems in which notches in particular positions of the ears represent numbers, enabling each pig or each litter to carry a different number. A brief description of this system which employs both ears for notching is as follows:—

All unit numbers are placed on the right ear and the tens in the left or near ear. Confusion between the two may be avoided by observing that the words unit and right each contain the letter "i" and the words ten and left the letter "e."

It will be noted that numbers 1, 2, 4, and 7 are recorded by a single notch, their value being determined by the relative position on the ear. Numbers 3, 5, 6, 8, and 9 represent a combination of the previous positions, e.g., 2 and 1 to make 3; 4 and 1 to make 5; 4 and 2 to make 6, and so on. For these numbers it is therefore necessary to make two notches.

The tens are represented by notches in the left ear, the 10, 20, 40 and 70 positions corresponding to the 1, 2, 4 and 7 positions respectively in the right ear.

Any number up to 99 may thus be made by a combination of the above figures. If it is necessary to number beyond 99, round punch holes could be used as shown in the diagram, but in the average herd, where all pigs in the litter are given the same number as the dam, it is usually unnecessary to go beyond 99. By adopting the 1, 2, 4, 7 combination the number of cuts in the ear is reduced to a minimum.

RIGHT EAR—UNITS.
LEFT EAR—TENS.

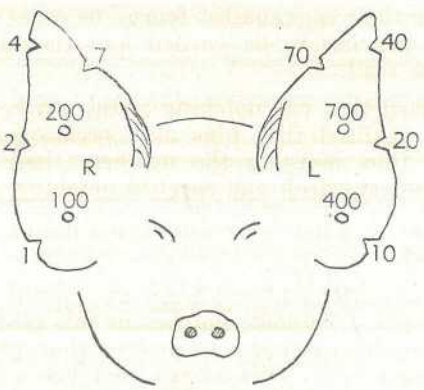


Plate 34.
THE KEY OR GUIDE OF EAR-MARKING SYSTEM.

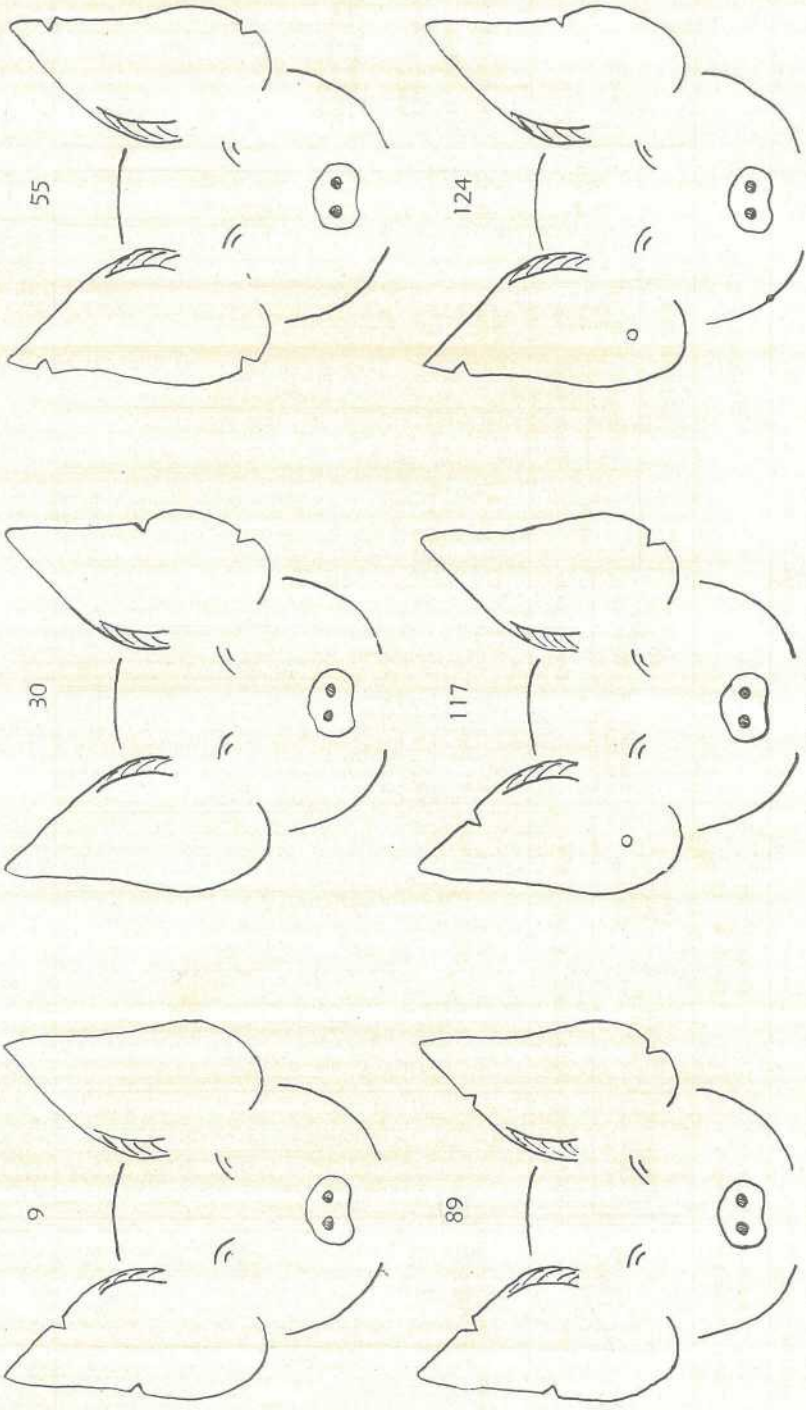


Plate 35.
Illustrations Taken at Random.

SOW'S BREEDING RECORD.

Name of Sow: "Sunnybrook Pearl XVI." Date of Farrowing: 3–7–38.
Breed: Large White. Earmark No. 65.

Sire: "Sunnybrook Major II." Earmark: 32
Dam: "Sunnybrook Gem V." Earmark: 12

Litter Farrowed—	Sire of Litter.	Number in Litter.		Died at Birth.		Date of Deaths before Weaning.		Earmark and Date Weaned.	Disposal of Litter.									
									Date of Deaths after Weaning.		Sold to Market.							Remarks.
											Date.	Number.		Average Weight.	Price.	Gross Return.		
		Boars.	Sows.	Boars.	Sows.	Boars.	Sows.		Boars.	Sows.		Boars.	Sows.			£	s.	d.	
2–9–40	Sunnybrook Major	7	5	1	1	..	1 3–10–40	65 29–10–41	..	..	28–3–41	5	2	Lb. 140	d. 9	36	15	0	1 pig born dead
									..	..	10–4–41	1	1	136	9 8½	5 4	2 16	3 9	1 pig overlain 1 death——pneumonia
								Boars. Sows. 6 3											8 baconers 1st grade; 1 2nd grade
																46	14	0	

As the position of the notch on the ear determines its value it is important that positions 1 and 10, and 4 and 40 be kept well towards the bottom and the tip of the ear respectively, to prevent being confused with the positions 2 and 20 in the middle of the ear.

Pliers with a $\wedge$ shaped cutting piece are recommended for ear marking, as notches of various sizes—according to the age of the pig—can be made simply by pushing the pliers varying distances on the ear. Small pigs up to weaner age should have only a comparatively small piece removed from the ear.

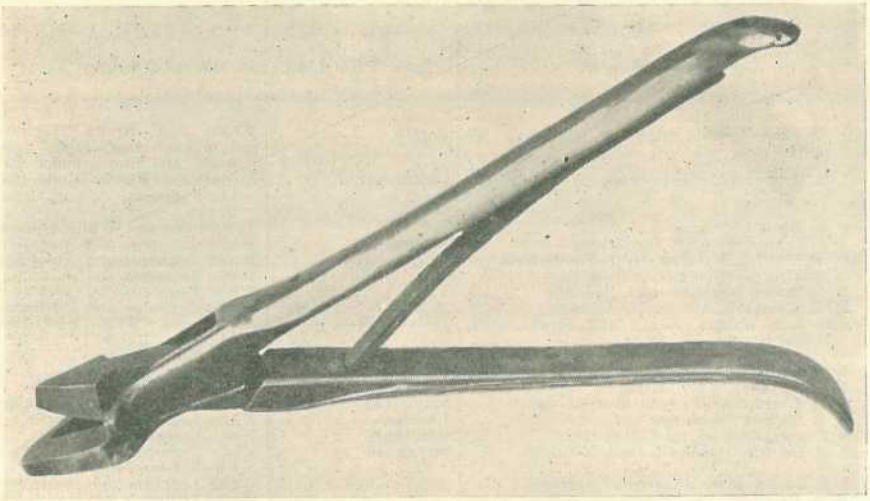


Plate 36.
Ear Marking Pliers with a $\wedge$ Shape Cutting Piece.

Careful recording of the ear mark allotted to each animal or each litter of pigs (see specimen, breeding record page 114) is just as important as the marking itself for one's memory should not be relied upon in these matters. Identification of pigs in this way is also of value in recording pedigree and performance.

It should be noted that ear notching is not a desirable method for the identification of pigs intended for slaughter.

ALL-ELECTRIC FARMS.

Electric power operators in England and the National Farmers' Union have formulated a plan to provide every farm in Great Britain with electricity. In the United Kingdom, with its unique nation-wide grid, electricity is available to 97 per cent. of the entire population of the British Isles. The new plan will complete the extension of the distribution systems into the remotest rural areas, and in particular to individual isolated farms. Wartime achievements of agriculture in Britain were made possible largely by the high degree of electrification already attained in the farming industry. In one big farming district in the north of England, for example, 86 per cent. of the farmers are running all-electric farms at low cost, because of the co-operation of the local electricity supply department, which connects up outlying farms without additional charges for long-distance installation. One farm required as much as two and a half miles of overhead cables, but the cost was not passed on to the farmer. This farm has all its fixed machinery, from grain drier to dairy boiler, supplied with light, heat, and power by electricity.

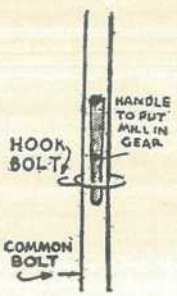
REGISTERED HATCHERIES

The following applications have been received to the 31st January, 1946, for the registration or the renewal of the registration of hatcheries:—

Name of Owner.	Name of Hatchery.	Breeds of Poultry Kept.
V. H. Allen, Oxley road, Oxley	Alaura	White and Brown Leghorns, Minorcas, Australorps, Langshans, and Rhode Island Reds
I. M. Armstrong, Randall road, Wynnum ..	Chanticleer	Australorps, Rhode Island Reds, Light Sussex, and Plymouth Rocks
P. R. Bach, Cleveland	..	Australorps and White Leghorns
J. S. Bauer, Oakwood, Bundaberg	Triangle	White Leghorns and Australorps
C. W. Bowtell, 4 Payne street, Toowoomba ..	..	White Leghorns and Australorps
J. Bowtell, North street, Wilsonton	..	White Leghorns and Australorps
D. L. Burns, Brisbane road, Redcliffe ..	Yalta	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley ..	Mahaca	White Leghorns and Australorps
Carr and **Watson**, Logan and Creek roads, Mount Gravatt	Bellview Stud ..	Australorps, White and Black Leghorns, Rhode Island Reds, and Minorcas
J. L. Carrick and **Son**, Manly road, Tingalpa ..	Craigard	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton	White Leghorns
A. R. Chard, Chard's road, Bundaberg ..	Sunnyland	White Leghorns and Australorps
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
A. J. Daniels, Struck Oil road, Moongan ..	Struck Oil	White Leghorns, Australorps, and Rhode Island Reds
J. E. Dautel, Rifle Range road, Gympie ..	..	White Leghorns and Australorps
V. R. Dearling, 85 Holberton street, Toowoomba	..	White Leghorns and Australorps
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
E. Eckert, Head street, Laidley	Laidley	Australorps, Rhode Island Reds, and White Leghorns
C. L. Eggar, Moggill	Rose Hill	Australorps
Elks and **Sudlow**, Beerwah	Woodlands	Australorps
F. G. Ellis, Stanthorpe road, Warwick ..	Sunny Corner ..	Australorps
W. Ellison, junr., Bald Knob, via Landsborough	Willeden	Australorps and White Leghorn,
W. G. Gregory, Deeragun (Box 46, Townsville)	Rocks	White Leghorns and Australorps
T. L. Griffiths, Silkstone, Ipswich	Hillcrest	White Leghorns and Australorps
W. J. Grigg, Tumoulin	..	White Leghorns and Australorps
F. P. Grillmeier, Milman	Mountain View ..	Minorcas, White Leghorns, and Australorps
P. E. and **G. G. Hannay**, Ridley road, Aspley ..	Sunny Hill	White Leghorns and Australorps
W. H. Harvey, Trout road, Aspley	Stonehill	White Leghorns
P. Haseman, Stanley terrace, Taringa ..	Black and White ..	White Leghorns and Australorps
F. E. Hills, Sim's road, Bundaberg	Littlemore ..	White and Brown Leghorns, Australorps, Rhode Island Reds, Anconas, and Langshans
H. Hufschmid, Ellison road, Geebung ..	Meadowbank ..	White and Brown Leghorns, Rhode Island Reds, Minorcas, and Australorps
A. J. F. Jull, Ramsay street, Middle Ridge, Toowoomba	Stradmore	White Leghorns
R. H. Kennedy, 357 Bridge street, Wilsonton, Toowoomba	..	White Leghorns, Australorps, and Rhode Island Reds
F. E. Kiepe, 40 Hursley road, Toowoomba ..	..	White Leghorns and Rhode Island Reds
E. C. Kolberg, Handford road, Zillmere ..	Gerbera	Australorps
W. A. Lehfeldt, Kalapa	Lehfeldts	Australorps
W. A. Luke, 108 Russell street, Toowoomba ..	Downs	White Leghorns, Rhode Island Reds, and Brown Leghorns
J. McCulloch, White's road, Manly	Hindes	White Leghorns and Australorps
A. Malvine, Waterworks road, The Gap ..	Alva	Australorps
H. L. Marshall, Kenmore	Stonehenge	Australorps and White Leghorns
A. Mawhinney, Robinson road, Aspley ..	Aspley	White Leghorns and Australorps
Mrs. P. W. E. Maynard, Doonside, via Dalby	Doonside	Australorps
Mrs. M. J. Meager, Stenner street, Middle Ridge, Toowoomba	Gladfern	White Leghorns and Australorps
C. J. Mengel, New Lindum road, Wynnum West	Mengel's	Australorps
F. J. Miller, 305 Bridge street, Toowoomba ..	..	White Leghorns
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
F. S. Morrison, Kenmore	Dunglass	Australorps

REGISTERED HATCHERIES—*continued.*

Name of Owner.	Name of Hatchery.	Breeds of Poultry Kept.
H. Obst and **Sons**, Shepperd	Collegeholme	White Leghorns and Australorps
C. E. E. Olsen, Marmor	Squaredeal	White, Brown, and Black Leghorns, Australorps, Langshans, and Anconas
A. C. Pearce, Marlborough	Marlborough	Australorps, Rhode Island Reds, Langshans, Light Sussex, White Wyandottes, and Khaki Campbell and Indian Runner Ducks
W. J. Perkins, 110 Neil street, Toowoomba	Rhode Island Red Stud	Rhode Island Reds and White Leghorns
G. Pitt, Box 132	Pitt's	White Leghorns, Rhode Island Reds, and Australorps
F. M. Proellocks, 81A Herries street, Toowoomba	Vale View	White Leghorns
J. C. and **G. E. Raff**, Musgrave road, Sunnybank	Brundholme	Rhode Island Reds, White Leghorns, and Australorps
G. R. Rawson and **Son**, Main's road, Sunnybank	Sunbeam	Australorps
C. G. A. Rivers, Tamaree	Tamaree	Australorps and White Leghorns
J. Rogoff, Woodridge	Kingston road	White Leghorns and Australorps
C. L. Schlencker, Handford road, Zillmere	Windyridge	White Leghorns and Australorps
J. Schumann, 291 Bridge street, Toowoomba		Rhode Island Reds, Brown and White Leghorns
P. H. Scotney, 1 Priest street, Toowoomba		White Leghorns and Rhode Island Reds
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Electric	White Leghorns and Australorps
N. G. Seymour, Ipswich road, Darra	Sohufa	Australorps and White Leghorns
W. B. Slawson, Fraser road, Mitchelton	Kupadibin	Australorps
T. Smith, Isis Junction	Fairview	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield	White Leghorns
A. W. Stehn and **Son**, 285 West street, Toowoomba	Red Spot	White and Brown Leghorns. Australorps, and Rhode Island Reds
R. S. L. Stockman, Kairi	Tinaroo	White Leghorns, Australorps, and Rhode Island Reds
A. H. Tebbutt, Stewart terrace, Gympie	Delrae	White Leghorns and Australorps
A. G. Teitzel, West street, Acaciavale, Townsville	Teitzel's	Australorps and White Leghorns
H. G. Thorpe, Box 36, Goomeri	Thorburn	White Leghorns, Rhode Island Reds, and Australorps
W. B. J. Tonkin, Parkhurst, North Rockhampton	Tonkin's	White Leghorns and Australorps
W. Warren, Progress street, Tingalpa	Wilshirlyn	Australorps and White Leghorns
N. J. Watson, Jerry's Downfall, via Kingston	Glencoe	White Leghorns and Australorps
G. A. C. Weaver, Herberton road, Atherton	Weaver's	White Leghorns, Australorps, and Brown Leghorns
F. H. J. Weeks, Bajool	Glen Brae	Black, White, and Brown Leghorns, and Anconas and Australorps
Mrs. V. M. White, Archerfield road, Darra	Viola	White Leghorns and Australorps
Mrs. I. G. Winter, 761 Ruthven street, Toowoomba		White Leghorns
Mrs. L. M. Wooller, Huet street, Rockhampton	Riverview	Rhode Island Reds, White Leghorns, and Australorps
P. A. Wright, Laidley	Chillowdeane	Australorps and Brown and White Leghorns



WINDMILL CONTROL.

Most windmill handles have to be tied or wired to keep them in place on a windy day. Here is a device which is much handier. Take a large iron ring, large enough to go around the leg of the windmill. Cut the ring through with a hacksaw so that it can be slipped around the leg of the mill. The ring can be sprung enough to let it slip freely over the hook bolt in the mill leg when the mill is to be put into gear. It is easy to slide the ring up and down, and the handle cannot fly up when the ring is in place.

QUEENSLAND SHOW DATES.

Queensland Agricultural Show Societies are quickly moving again into active organization, and appended is a list of show dates, registered up to 10th January by the Queensland Chamber of Agricultural Societies, for 1946:—

FEBRUARY.

Stanthorpe	7th and 8th
Killarney	22nd and 23rd
Warwick	26th, 27th, and 28th

MARCH.

Goombungee	16th
Pittsworth	19th and 20th
Millmerran	22nd
Oakey	27th and 28th

APRIL.

Toowoomba	2nd to 4th
Dalby	9th and 10th
Chinchilla	11th and 12th
Miles (Show and Bushmen's Carnival)	17th and 18th
Mount Perry	27th
Nanango	26th and 27th
Roma	30th, and 1st and 2nd May

MAY.

Monto	1st and 2nd
Kingaroy	1st, 2nd, and 3rd
Eidsvold	6th and 7th
Murgon	9th, 10th, and 11th
Beaudesert	8th and 9th (Camp Draft 10th and 11th)
Kilkivan	17th and 18th
Esk	17th and 18th
Gympie	22nd and 23rd
Biloela	23rd and 24th
Laidley	24th and 25th
Blackbutt	24th and 25th

JUNE.

Kalbar	1st
Maryborough	6th, 7th, and 8th
Boonah	7th and 8th
Childers	10th and 11th
Bundaberg	13th, 14th, and 15th
Lowood	14th, 15th, and 17th
Gin Gin	17th and 18th
Rockhampton	19th to 22nd
Gladstone	20th and 21st
Mackay	24th to 27th
Toogoolawah	28th and 29th

JULY.

Proserpine	5th and 6th
Rosewood	12th and 13th
Gatton	19th and 20th
Cairns	23rd, 24th, and 25th
Yarraman	26th and 27th
Ipswich	30th and 31st, and 1st and 2nd August

AUGUST.

Lawnton	2nd and 3rd
R.N.A.	12th to 17th

SEPTEMBER.

Canungra	7th
Beenleigh	20th and 21st

OCTOBER.

Nerang	4th and 5th

Plate 37.

PEANUT AND MAIZE CROPS, KINGAROY DISTRICT.

GENERAL NOTES

Staff Changes and Appointments.

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

Mr. R. M. Marshall has been appointed Inspector, Division II., under the Diseases in Stock Acts and the Slaughtering Act, Department of Agriculture and Stock.

Messrs. V. G. Tredwell (Currumbin) and A. W. Want (Yandina) have been appointed Growers' Representatives on the Banana Industry Protection Board until the 30th September, 1946.

Mr. E. Sutherland, Temporary Adviser on Dairy Machinery, Department of Agriculture and Stock, has been appointed Dairy Adviser (Machinery) in the Department.

Mr. E. U. McCarthy, Q.D.A. Assistant to Plant Breeder, Queensland Agricultural High School and College, Gatton, has been appointed Adviser, Agriculture Branch, Department of Agriculture and Stock.

Mr. E. L. Melville, Q.D.D. (Sunnybank), has been appointed Adviser, Pig Branch, Department of Agriculture and Stock.

Following an extension of the activities of the Pig Branch, the undermentioned officers of this section of the Department of Agriculture and Stock have been assigned to headquarters as follows:—Mr. B. R. Martin, B.Sc., Adviser, returned from war service, will be stationed at Toowoomba; Mr. E. R. Melville, Q.D.D., recently appointed an Adviser, will be attached to Brisbane; and Mr. C. R. Grieve, Assistant Adviser, will take up duty at Murgon in the near future.

End of Poultry Mash and Crude Protein Rationing.

The Minister for Agriculture and Stock (Hon. T. L. Williams) has announced that the rationing of commercially prepared poultry mashes and crude protein meals of animal origin has been lifted as from the last day of January.

The feeding position has been reviewed at frequent intervals. The review made in December last disclosed the fact that many coupons issued to poultry keepers had not been surrendered, and from a more recent survey of the position it was found that coupons for approximately 1,500 tons of poultry mash will not be used during the current period.

The present rationing plan was based on egg production. It is considered that the improvement in egg supplies is such that poultry raisers who wish to engage in the production of table poultry should be given the opportunity to do so rather than continue the overproduction of eggs.

With reference to a recent Press statement relative to rationing in Toowoomba, it is interesting to note that poultry farmers in the Darling Downs area have been supplied with coupons to the value of 1,418 tons of poultry mash, whereas ingredients have been allotted to manufacturers of this product on the Downs for use in that area sufficient for an output of 427 tons, the difference being made up, as in normal times, by supplies drawn from other parts of the State. The quantities of ingredients allocated for the manufacture of poultry mashes were based on stated sales prior to the introduction of the rationing scheme.

The elimination of rationing of crude protein of animal origin is possible as the result of increased production of these meals. The production is now sufficient to meet normal requirements in Queensland.

The rationing of bran and pollard is being continued after the 31st January, 1946, and permits will be posted as usual to dairy farmers supplying milk for human consumption and to poultry keepers who are accustomed to preparing their own mashes, providing that these persons have previously received permits for these mill offals.

Expansion of the Wool Branch.

The Minister for Agriculture and Stock (Hon. T. L. Williams) has announced that, in furtherance of the policy of his Department in respect of the expansion of the Sheep and Wool Branch the Governor in Council had approved of the following appointments:—

Mr. G. R. Morrison to be Senior Adviser, on probation; Mr. H. C. Hall to be Adviser; Mr. J. H. Campbell to be Adviser, on probation; and Mr. G. S. McGregor to be Cadet, on probation.

Mr. C. J. Swinburne, Adviser in Sheep and Wool at Blackall, has now been promoted to the position of Senior Adviser.

It is proposed to assign some of these officers for field duties to the pastoral areas of the State.

Following the recent appointment of Mr. F. Bryant as Assistant Wool Technologist, it is proposed to set up a fleece testing unit in the Department as part of a programme of research in the wool industry, and arrangements are now in progress to obtain the necessary equipment.

Extension of Veterinary Services.

With the gradual return to normal conditions, it is now proposed to extend the activities of the Veterinary Section of the Division of Animal Industry within the Department of Agriculture and Stock.

Difficulty has been experienced in obtaining suitable veterinary officers, because of claims made on their services by other Departments and by the Commonwealth, also because of their absence on military duties. The Minister for Agriculture and Stock (Hon. T. L. Williams) has announced that arrangements have been made for the following additional appointments:—

Mr. W. H. Southcott, B.V.Sc., to be Veterinary Officer, on probation.

Mr. A. T. Bell, B.V.Sc., to be Assistant Veterinary Officer, on probation.

Mr. P. J. O'Sullivan, Q.D.A., B.Agr.Sc., to be Assistant Parasitologist, on probation.

These officers will be stationed at the Animal Health Station, Yeerongpilly.

Vegetable Group Committee.

Following on the amendment of the *Fruit Marketing Organisation Acts* passed last session, providing for the setting up of a vegetable sectional group committee within the Committee of Direction of Fruit Marketing, the Minister for Agriculture and Stock (Hon. T. L. Williams) has announced the undermentioned appointments, provisionally, as members of the Vegetable Group Committee:—

Messrs.—

E. H. Short (Dimbulah), representing Far North Queensland;
H. A. H. Scott (Bowen)—Lower North Queensland;
T. P. Reynolds (Chatsworth, via Gympie)—Gympie and District;
W. J. Beattie (Lagoon Pocket, via Gympie)—Mary Valley;
R. J. McAnally (Cooroy)—Near North Coast;
C. H. Woff (Sunnybank)—Brisbane Metropolitan Area;
C. M. Apps (Wellington Point)—Northern Section, Redlands;
A. E. Newman (Gracemere)—Central Queensland;
R. H. Blake (Cleveland)—Southern Section, Redlands;
J. C. H. Logan (Upper Tent Hill)—Gatton and District.

These members will hold office until vegetable growers have an opportunity of electing members to a vegetable group committee when the Committee of Direction elections are held in August next, after which the present appointed members will go out of office unless they, or any of them, are re-elected.

Sugar Values.

The total value of the 1944 sugar output is computed by the Sugar Board to be £12,740,000, the average price for all sugar being £19 16s. 1d. on the 94 net titre basis. The quantity sold in No. 2 Pool (that is, sugar produced by mills in excess of their "peaks" but produced from cane grown on assigned land) was 13,300 tons, while 22 tons of "excess" sugar was manufactured from cane grown on non-assigned land. The average price of No. 1 Pool sugar was £19 18s. 1d., and of sugar surplus to Australia's domestic requirements, £15 0s. 6d. per ton.—*From Ann. Rept. Bur. Sug. Expt. Stns.*

Rural Topics

Junior Farmers Come to Town.

A visit from junior farmers, 60 strong, from the Northern Rivers of New South Wales, was a recent welcome event. Their educational tour extended from the Border to Warwick, thence over the Darling Downs to Toowoomba and down through the Lockyer, calling at Gatton Agricultural College and the woollen mills and railway workshops at Ipswich on the way. In Brisbane, the boys were shown over the laboratories of the Department of Agriculture and Stock, where they saw the war against wogs being waged in earnest. Frank in giving their impressions, they spoke of Queensland as the coming State from a farming point of view. These young farmers were out to see for themselves what the other fellow does and why he does it. To them the week was crammed full of interest, and they went back home, as one young farmer put it, "with wider vision and greater faith in farming and its future in Australia."

Members of the Junior Farmers' Clubs of New South Wales, their visit was sponsored by the North Coast District Council of that body, with headquarters at Lismore. As one important result of their visit an extension of the Junior Farmers' Movement to this State may be anticipated.

History of the Junior Farmers' Movement.—The history of their movement as told by one of its bright young leaders has an interest for the country men and women of Queensland. It was established in 1928, chiefly to check the drift of young people from the land to the towns and cities. Its members, both boys and girls between the ages of 10 and 21, were provided with definite objectives to induce them to cultivate an interest in their own rural environment. "Out of small beginnings come great ends." Junior Farmers' Clubs were formed throughout the Northern Rivers. This year's aggregate membership in that district alone is over 500. Throughout New South Wales there are now 360 clubs with a membership aggregating 12,000. The confidence and support of parents and district farmers were quickly gained. Agricultural and other teachers, numbering over 100, act as part-time supervisors, but mainly the boys themselves supply their own leadership. The educational and social value of these Junior Farmers' Clubs is appreciated in every country centre where they exist, and especially the practical and technical nature of the projects undertaken by them, for which expert guidance is obtained from the trained field men of the Department of Agriculture. State records in potato yields, maize yields and vegetable production have been set up by these young farmers, and many of them have repeatedly won the highest awards in animal husbandry and farm produce classes at district shows. In all cases these junior farmers have developed skill and efficiency in farming technique and have acquired a broader interest in country life and industry.

Between the Home and the School.—Between the school and the home close contact is maintained. This is more effective than it appears at first sight. Parents realize that their boys and girls are being treated as individuals, with individual tastes and inclinations; and there's a carry-over from the school to the home which stimulates interest and confidence in both parent and youngster. Development of co-operation, community training, good citizenship and personal character are diligently fostered.

Influence on Social Life and Rural Progress.—Field days on district farms are arranged, and every district show has full entries from club members. Pot-hunting is not encouraged, and in many cases cups and other trophies have been replaced by ribands and honour cards. Club interests are not entirely agricultural, for members also take an active part in the social life of the whole community. Debates, films, dances, excursions, camps and organized games are all included in

regular club activities. Character training is largely developed by the need for perseverance and hard work in carrying out club projects. Capacity for real work and pride in the job is inculcated on the principle that high wages and improved standards of living will be ineffective, unless accompanied by a desire to put maximum effort and pride in the task undertaken. Greater and improved agricultural production and better living conditions on the farm and in country centres are claimed as club achievements. Among other achievements of these Junior Farmers' Clubs are higher crop yields by its members over district averages; improved methods and ideas in local agricultural practice; improvement in country show exhibits; development of closer personal and social contacts between the junior farmers themselves and their seniors at field days, shows and committee and council meetings; and a steady increase of enrolments at Agricultural High Schools and at the Technical Colleges and at the Hawkesbury Agricultural College —in short, a decided stimulus in the development of advanced agricultural education and a more complete country life. The voluntary services of district farmers are enlisted by club members in carrying out their farm projects.

Agricultural Education.—These Junior Farmers' Clubs initiated a vigorous drive for more secondary agricultural education for rural communities, and so provide opportunities for farm boys to become expert farmers and leaders of their own industry with a sound technical background. The clubs are helped by local advisory committees of farmers and townspeople, who give voluntary and ungrudging service to the club movement.

Future of the Movement.—As to the future of the Junior Farmers' Clubs, one young member, speaking with every confidence, put it this way: "The future responsibilities and opportunities of the Junior Farmers' Clubs for usefulness are immense, and they will be rather an important factor, in my opinion, in developing our future agricultural production, which is as necessary as industrial development. And there is no reason why agriculture shouldn't be on the same footing economically as other industries, for farmers, including junior farmers, are entitled to fair prices for the things they grow and to living standards and amenities comparable with those of their fellow-citizens engaged in other industries."

Our School Project Clubs in Queensland are, in common with our Rural Schools, working largely along similar lines and will, no doubt, expand into Junior Farmers' Clubs, as in the South, which, in turn, are modelled in some measure on the 4-H Club Movement which has done so much to advance agriculture in America.

The Bid for Better Butter.

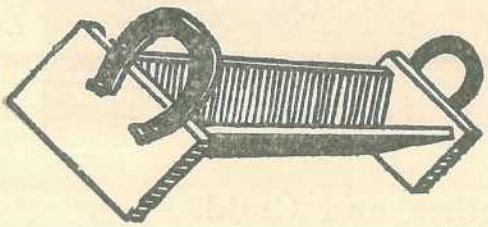
Now, more than ever before, we are hearing a lot about the challenge of margarine to butter—a challenge made more real by wartime rationing. From all accounts, the consumption of margarine has increased enormously in Britain, our best butter export market. Two ounces of butter a week is all that's allowed each person in Britain under the rationing scheme, so naturally there's a growing demand for butter substitutes and margarine fills the bill as the favourite choice. The trouble is that from the dairy farmers' point of view margarine, a tasty substitute, has already got a long lead over butter, and the question arises will that lead be easy to overtake when the need for butter rationing ends? It's no good denying the palatability and food value of margarine as it is now made, nor the seriousness of the competition between it and butter on the British breakfast table.

What we have to do, therefore, is to maintain the highest attainable quality in our export butter, for quality, as well as price, will be a determining factor in the regaining and the retaining of our butter markets overseas. It's still easy to sell all the butter we can send, and will be for some years yet, but now is the time to look further ahead and so arrange our export trade on the basis of highest quality standards. We have to remember that tastes now formed will take a lot of changing, and it's no good under-estimating the strength of the challenge of margarine. Better butter will, it is believed, be the winning bid on the export market.

Rules for Riding.

Keep up your head and your heart, your hands and your heels keep down. Press your knees close to your horse's sides, and your elbows close to your own.

GADGETS AND WRINKLES

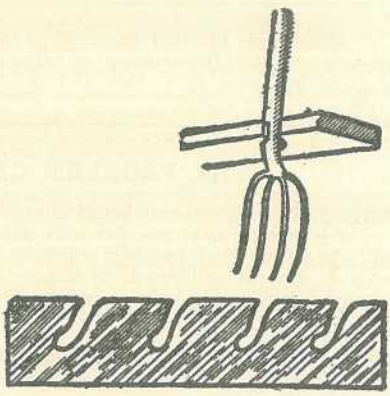


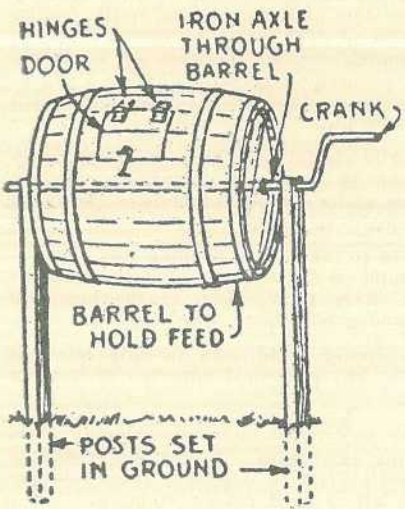
HANDLES FOR A PIG TROUGH.

A horseshoe nailed at each end of a pig trough will make it easier to move about the feeding floor when cleaning up.

HANG FORKS UP.

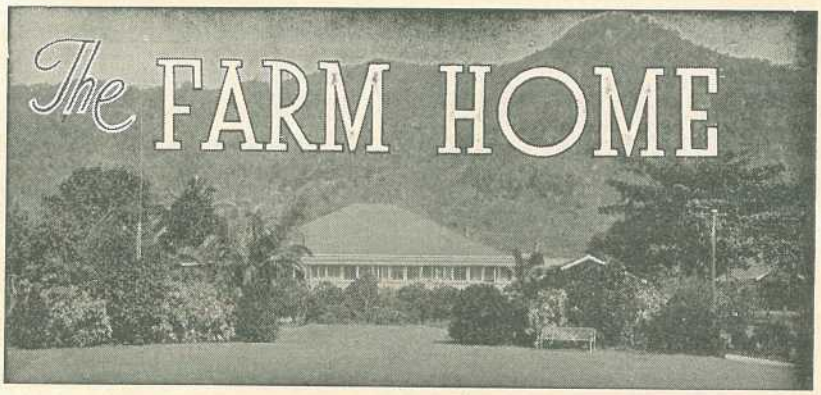
Instead of standing forks in a corner, it is handier (with less risk of accident by falling with sharp points upward) to make a hanger for them. The hanger is cut from an old board, with holes bored in it to fit the handles, then a notch sawn into each hole (see drawing) to pass the handle through. The tools are hung with the fork end up, and they stay up where they can do no damage. Other tools may be hung the same way.





DRY FEED MIXER.

Dry feeds can be mixed quickly and easily with this outfit. An ordinary wooden barrel is mounted between two posts on an iron rod which is bent at one end to form a crank. A door is cut in the side of the barrel and fitted with hinges and a hook to hold it tightly shut.



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.

THE PROBLEM OF THE ONLY CHILD.

THERE is a traditional belief that the only child will not turn out well. This, of course, is not true, for only children often turn out very well. There is no doubt, however, that an only child is handicapped. The child brought up in a family of several children is to a large extent disciplined by them, apart from any discipline or guidance he may receive from his parents.

In the bringing up of all children, it is most important that parents should agree in regard to their management, and that one should support the other. This applies particularly to the management of the only child.

There is always the danger that, having only the one child on whom to lavish their attention and affection, parents may pamper and spoil him. In their anxiety to make him a model child, they may fuss over him and nag at him, until, feeling deprived of his freedom and experiencing a sense of frustration, he comes unhappy, irritable and resentful, loses confidence in himself, or, in the case of a strong-willed child, becomes defiant. It is better to encourage a child to develop a degree of independence than to insist on his conforming to standards of behaviour which may be beyond his capacity to reach at the moment.

To ensure healthy development, an only child should be allowed from an early age to mix with other childrenn. If this can be done in conjunction with his attendance at a nursery school or kindergarten under trained supervision, so much the better. What applies to the boy applies equally to the girl.

While realizing their responsibility in regard to the child's training and development, parents should keep in mind that example is better than precept and that healthy development is most likely to occur where there exists in the home an atmosphere of harmony, true companionship, and goodwill.

The only child is not infrequently an adopted child, and in this case the problem of management may be made easier by the periodical adoption of another infant, until the family is gradually built up.

Any further advice in regard to this or any other matter concerning child management can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters, "*Baby Clinic, Brisbane.*" These letters need not be stamped.

IN THE FARM KITCHEN.

Useful Hints.

When butter is short a substitute can be made by rendering chicken fat and a little suet together and allowing to set. Chicken fat is excellent for frying fish; it does not melt like other fats.

When creaming butter and sugar together add about one tablespoonful of hot milk. This helps to melt the sugar.

Egg and Onion Pie.

Line a tart plate with a good short crust. Fry 4 oz. of bacon, previously cut into strips. Add three or four sliced onions and cook until soft, but not dry. Add pepper and salt to tastes, and a dessertspoon of chopped parsley. Beat three eggs and add half a cup of milk or stock, and, if liked, a little mixed mustard. Fill the prepared tart case and bake in a moderate oven until a golden brown and quite set.

Potato Fritters.

Grate 2 cups of peeled raw potato and drop into cold water. Drain well and add to a batter made with 1 beaten egg, ½ cup of milk, 1 teaspoon of melted dripping, and 2 tablespoons of plain flour, pepper and salt, and 1 teaspoon of chopped parsley. Drop in spoonsful on well-greased pan and cook slowly until well browned, then turn and cook on the other side. Serve with bacon for a light luncheon.

Vegetable Pie.

Mix together ½ cup of cooked and diced potato, carrots, beans, and celery, ½ cup of cooked peas, 1 tablespoon of grated raw onion, 1 cup of soft bread-crumbs, 1½ cups of milk or stock, pepper and salt to taste, and 2 beaten eggs. Bake for half an hour. The top may be covered with buttered crumbs or strips of pastry, lattice fashion. This pie is excellent with cold meat.

Oatmeal Griddle Cakes.

One cup of cooked oatmeal, 1 cup of flour, 1½ cups of milk, 1 egg, 1 teaspoon of salt, 1 tablespoon of melted butter, 2 teaspoons of baking powder. Add the milk, salt, yolk of egg and fat to the oatmeal and beat for three minutes, then add the flour and baking powder, also the white of egg, stiffly frothed. The batter should be like thick cream. Drop in spoonfuls on a hot griddle well greased, and cook till brown on one side, then turn and cook the other side. Serve with syrup.

Coffee Crisps.

Mix 2 cups of self-raising flour with 1 cup of fine oatmeal and 1 cup of sugar. Melt 1 cup of fresh, well-clarified dripping in a saucepan with 1 cup of milk (or milk and water). Add a good pinch of baking soda to the warm mixture, and flavour with a dessertspoon of coffee essence. While still nicely warm pour over the flour and oatmeal. Mix quickly to a smooth dough. Knead a very little on a floured board. Roll out very thin. Cut with a sharp knife or fancy cutter. Bake in moderate oven till a pretty brown.

Marie Biscuits.

Cream together ½ lb. sugar and ¼ lb. butter, add 2 well-beaten eggs and blend thoroughly. Sift together 2 tablespoons of cornflour, 1 teaspoon of baking powder and a pinch of salt and add to the above mixture. Work in slowly ½ a cup of milk in which ½ a teaspoon of bicarbonate of soda has been dissolved. When all are well blended add enough sifted flour to make a firm, easy-to-handle dough. Roll out thinly, cut into rounds, prick and bake in a moderate oven to a light fawn colour.

Date Patty Cakes.

Mix one-third cup soft butter with 1 and one-third cup brown sugar. When partly creamed, break in 2 eggs and beat mixture until very light. Then add ½ cup milk, 1¾ cups sifted flour, mixed with 2 teaspoons baking powder. Beat to a smooth batter, then stir in ½ teaspoon each of cinnamon and nutmeg, and ½ lb. of chopped dates rolled in flour. Beat hard for two or three minutes. Bake in fancy papers and ice.

ASTRONOMICAL DATA FOR QUEENSLAND.

MARCH.

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	5.41	6.20	Cairns	30	27	Longreach	36	34
6	5.44	6.15	Charleville	27	27	Quilpie	35	35
11	5.46	6.10	Cloncurry	51	48	Rockhampton ..	10	10
16	5.49	6.04	Cunnamulla ..	29	29	Roma	17	17
21	5.51	5.59	Dirranbandi ..	19	19	Townsville	25	23
26	5.54	5.53	Emerald	19	19	Winton	41	39
31	5.57	5.48	Hughenden ..	35	33	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	2 43	4·49
2	3.43	5·34
3	4.45	6.15
4	5.49	6.54
5	6·52	7.32
6	7.56	8.09
7	9.00	9.48
8	10.05	10.29
9	11.11	11.14
	p.m	
10	12.17	11.04
11	1.20	11·58
12	2.21	..
		a.m.
13	3.16	12.56
14	4.05	1.57
15	4.49	2.58
16	5·28	3.58
17	6.02	4.57
18	6.35	5.53
19	7.06	6.47
20	7·37	7.41
21	8.09	8.34
22	8.43	9.27
23	9.20	10.20
24	10.00	11.14
		p.m.
25	10.45	12.08
26	11.34	1.01
27	..	1·52
	a.m.	
28	12.28	2.40
29	1.26	3.25
30	2.27	4.07
31	3·30	4·47

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	12	44	27	19	2	52	30
6	19	20	35	37	10	11	39	42
11	11	29	26	44	0	19	28	52
16	14	25	30	41	5	16	34	48
21	24	15	40	31	15	6	46	35
26	29	11	44	25	19	0	52	28
31	24	13	41	29	16	3	47	32

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	51	8	65	36	49	22	42	9
3	44	16	60	42	45	27	36	16
5	33	27	53	48	38	33	28	23
7	22	38	46	56	30	41	20	33
9	12	47	39	62	24	47	12	39
11	6	51	36	64	20	50	7	43
13	7	51	36	64	21	50	8	43
15	13	47	39	62	24	47	13	93
17	21	39	45	57	30	42	19	33
19	30	29	51	50	35	35	25	25
21	40	19	57	44	42	29	33	18
23	48	11	63	38	47	24	39	12
25	52	6	66	35	50	21	43	8
27	52	5	66	34	50	20	43	7
29	50	6	64	35	48	21	41	8
31	42	13	58	40	43	25	35	14

PHASES OF THE MOON.

New Moon, March 4th, 4.01 a.m.; First Quarter, March 10th, 10.03 p.m.; Full Moon, March 18th, 5.11 a.m.; Last Quarter, March 26th, 8.37 a.m.

The equinox of March 1946 (the autumnal equinox of the Southern Hemisphere) occurs at 4 p.m. Eastern Australian standard time on the 21st. The Sun will then shine directly over the equator and on that day will rise and set at true east and true west, respectively. The term equinox signifies equal night and implies the equal duration of night and day. However, although the Sun's centre is above the horizon for half the 24 hours, from the table of sunrise and sunset it will be noticed that on the 21st the interval from sunrise to sunset is 12 hours 8 minutes. This arises from the fact that we see the edge of the Sun about 4 minutes before the centre is on the theoretical horizon and about 4 minutes after the centre sinks below the horizon in the evening.

On March the 6th and 18th, the Moon will rise and set almost true east and true west, respectively. It will be observed that for the few days near this full moon there is only a little more than 30 minutes later in the times of moonrise each succeeding day. This is the corresponding "harvest moon" to that which occurs in the northern hemisphere in September and which is of so much value in harvest operations. In Queensland, the effect is not as marked as in the higher latitudes and harvesting is well over by March.

Mercury.—At the beginning of the month Mercury will set about 40 minutes after sunset and at the end of the month it will rise about 35 minutes before sunrise.

Venus.—At the beginning of the month, in the constellation of Aquarius, this planet will set about 25 minutes after sunset. At the end of the month, in the constellation of Pisces it will set about 45 minutes afer sunset.

Mars.—At the beginning of the month, setting soon after midnight, this planet to the west of Castor and Pollux will have commenced its journey eastward again in relation to the fixed stars; and by the end of the month will be between Pollux and Saturn, setting about midnight. On March 12th at 9 p.m. it will be 1 degree north of the Moon.

Jupiter.—Near Spica, Jupiter, at the beginning of the month will rise between 8.30 p.m. and 9.30 p.m. and will be visible low in the eastern evening sky. At the end of the month it will rise about an hour after sunset.

Saturn.—Still making interesting patterns with Mars and Castor and Pollux, Saturn at the beginning of March will set between 1.45 a.m. and 3.10 a.m. about 25 degrees north of true west. At the end of the month it will set about midnight. On the 19th it will be 3 degrees south of Mars, and on the 12th 2 degrees south of the Moon.

QUEENSLAND WEATHER FOR JANUARY.

January rains, particularly during the second and third weeks, gave practically a State-wide distribution of valuable to heavy over-average totals. Slightly under normal amounts were received in scattered localities in the Carpentaria and North Coast Barron and somewhat more generally in the South Coast, Port Curtis, and northern Moreton districts. In the Port Curtis coastal section deficiencies in the last four months have been a somewhat unusual feature. Early seasonal rains over drier inland pastoral areas were opportune, particularly in the Central-West and South-West. Present relief in those districts will need to be consolidated by further soaking falls in February and March to offset the past series of adverse seasons. Some heavy daily rain registrations included Einasleigh 405 points (8th) and many 2 to 3-inch totals east Carpentaria (9/10th), Central Coast amounts 726 points Giru, 939 Proserpine (10th), Mackay 1,037, Bloomsbury 990, Eton 769 (11th), Ayrshire Downs 8 inches (12th), and Torrens Creek 556 points, Woodstock 360, and Prairie 340 (22nd). On the 23rd a number of stations west and south of Brisbane reported 3 to 5 inches up to 624 at Kalbar and 630 at Laidley. These falls caused local flooding, Lockyer Creek, &c,. but main streams in the Moreton and Port Curtis districts were not affected. However, much flooding of low-lying areas occurred in practically every other river basin in the State with consequent transport difficulties and train service dislocations on far north and inland lines. Central and Tropical Coast streams from adjacent highland catchment areas and Carpentaria systems, especially the Flinders, were affected by the heavy falls in the eastern headwaters. In the Central and South-West areas river beds carried valuable run-off miles wide from the heavy Upper West and Central Interior falls. In the third week Downs and Maranoa catchments and river basins received heavy to local flood rains. Highest river heights recorded—Flinders, Richmond, 33 ft. (24th); Hughenden 9 ft. (22nd); Barcoo, Isisford, 15 ft. 6 in. (23rd); Paroo, Eulo, 9 ft. 1 in. (23rd/24th); Warrego, Charleville, 10 ft. 10 in. (22nd); Wyandra 10 ft. 6 in. (25th); Cunnamulla 15 ft. 3 in. (28th); Fitzroy system—Dawson River, Taroom, 19 ft. 9 in. (25th); Baralaba 18 ft. 8 in. (31st); Boolburra 16 ft. 3 in. (1st February); Mackenzie River, Comet, 34 ft. 10 in. (24th); Fitzroy River, Riverslea, 24 ft. 8 in. (28th); Yaamba 19 ft. 6 in. (29th); Funnel Creek, Saltbush Park, 16 ft. 6 in. (15th); Isaacs River, Clive Station, 30 ft. (24th); Brisbane River system—Lockyer Creek, Gatton, 27 ft. 6 in. (23rd); Warril Creek, Harrisville, 15 ft. 9 in. (25th); Bremer, Rosewood, 18 ft. 6 in. (23rd); Burdekin River system—Burdekin, Gibson's Farm (Home Hill), 25 ft. 8 in. (24th); at Bridge 2 ft. 9 in. over rails; Sellheim 22 ft. (22nd); Suttor River, Lornsleigh, 15 ft. 8 in. (25th); Condamine system—Dogwood Creek, Miles, 28 ft. (24th); Condamine River, Tummavil, 29 ft. 3 in. (24th); Warwick 15 ft. 6 in. (24th); Kings Creek, Clifton, 19 ft. (23rd); Condamine, Condamine, 22 ft. 6 in. (2nd February); Pratten 19 ft. 9 in. (25th); Surat and St. George still rising at end of month; MacIntyre and Severn system—MacIntyre River, Inglewood, 9 ft. (25th); Goondiwindi 24 ft. 7 in. (27th); Dumaresque, Riverton, 18 ft. 4 in. (23rd); Texas 21 ft.

Temperatures.—Average maximum temperatures ranged from 2.6 degrees below normal at Boulia (98.3 degrees) to 2.0 degrees above at Palmerville (91.3 degrees). Average minimum readings from 2.2 degrees below at Palmerville (71.3 degrees) to 3.2 degrees above at Georgetown and Longreach and 5.9 degrees at Mitchell. The highest daily reading was 113 degrees on 3rd at Boulia. Days over 100 degrees—Richmond 26 (13 consecutive), Winton 25, Camooweal 23 and Windorah 20.

The rain position is summarised below—

District.	Normal Mean.	Mean Jan., 1946.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	1,389	1,603	15 above
Peninsula South	935	1,512	62 ,,
Lower Carpentaria	725	878	21 ,,
Upper Carpentaria	628	1,495	138 ,,
North Coast, Barron	1,328	1,208	9 below
North Coast, Herbert	1,411	2,230	58 above
Central Coast, East	893	1,261	41 ,,
Central Coast, West	537	881	64 ,,
Central Highlands	400	585	46 ,,
Central Lowlands	321	563	75 ,,
Upper Western	316	656	108 ,,
Lower Western	170	308	81 ,,
South Coast, Port Curtis	658	600	9 below
South Coast, Moreton	671	654	3 ,,
Darling Downs East	375	674	80 above
Darling Downs West	298	571	91 ,,
Maranoa	302	424	40 ,,
Warrego	214	407	90 ,,
Far South-West	191	231	21 ,,

Commonwealth of Australia, Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JANUARY RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of years' records.	Jan., 1945.	Jan., 1946.		Jan.	No. of years' records.	Jan., 1945.	Jan., 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	11·52	42	15·22	19·38	Gatton College ..	4·32	44	3·62	9·27
Cairns	16·43	61	23·22	12·81	Gayndah	4·70	72	5·34	7·10
Cardwell	16·99	71	13·29	25·54	Gympie	6·57	73	6·31	5·08
Cooktown	14·10	67	19·66	9·93	Kilkivan	5·63	62	5·34	9·28
Herberton	9·31	57	11·74	13·49	Maryborough ..	6·97	72	7·97	5·70
Ingham	15·96	51	8·97	26·59	Nambour	9·37	47	4·74	9·30
Innisfail	20·24	62	26·14	30·04	Nanango	4·65	61	4·29	5·19
Mossman	18·87	19	22·41	19·40	Rockhampton ..	7·39	72	2·33	9·71
Townsville	11·05	72	3·03	15·60	Woodford	7·72	55	5·75	6·58
Central Coast.					*Darling Downs.*				
Ayr	10·95	56	4·12	14·09	Dalby	3·44	73	3·84	5·24
Bowen	9·65	72	4·02	17·65	Emu Vale	3·22	47	3·72	7·35
Charters Towers ..	5·35	61	2·88	10·10	Jimbour	3·51	64	2·45	6·91
Mackay	13·50	72	3·38	15·60	Miles	3·83	58	2·04	8·44
Proserpine	14·95	40	5·98	29·12	Stanthorpe	3·68	70	2·23	6·93
St. Lawrence ..	8·93	72	3·24	13·13	Toowoomba	5·16	71	6·16	9·11
South Coast.					Warwick	3·58	78	5·03	8·07
Biggenden	5·25	44	3·63	7·69	*Maranoa.*				
Bundaberg	8·52	60	4·91	4·91	Roma	3·20	69	2·19	2·21
Brisbane Bureau ..	6·30	94	2·63	4·68	St. George	2·64	62	2·10	4·62
Caboolture	7·96	67	4·74	5·72	*Central Highlands.*				
Childers	7·23	48	3·38	8·43	Clermont	5·02	72	3·55	4·32
Crohamhurst	11·78	50	3·73	7·21	Springsure	4·21	74	1·55	6·33
Esk	5·64	56	3·56	3·45					

CLIMATOLOGICAL TABLE FOR JANUARY.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Coastal.									
Cairns	..	89	74	93	25, 26	67	2	1281	20
Herberton	..	83	65	89	6, 7	58	2	1349	17
Townsville	..	87	76	92	6, 24	71	14	1560	19
Rockhampton	29·86	86	71	99	5, 6	64	9	971	14
Brisbane	29·93	85	70	103	26	63	10	468	12
Darling Downs.									
Dalby	..	90	67	104	5	59	11	524	9
Stanthorpe	..	83	61	97	5	54	1	693	9
Toowoomba	..	82	64	98	5	57	10	911	9
Mid-Interior.									
Georgetown	29·77	93	76	105	2	70	7, 8	1473	16
Longreach	29·82	96	76	108	4	65	11	618	15
Mitchell	29·85	93	72	103	4	55	8	335	6
Western.									
Burketown	..	91	77	99	21	68	9	1031	15
Boulia	29·73	98	76	113	3	68	12	336	11
Thargomindah	29·77	99	76	112	3	62	18	89	3

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Commonwealth of Australia,
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