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Edited by
J. F. F. REID
Associate Editor
C. W. WINDERS, B.Sc.Agr.

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Event and Comment.

A Call for More Cotton.

COMMENTING on the passing of the *Cotton Bounty Bill* by the Federal Parliament, under which a minimum price of 15d. a lb. for raw cotton is guaranteed for the next five years, the Minister for Agriculture and Stock (Hon. H. H. Collins) stated that there was apparently some misunderstanding as to what price the growers would obtain. The present guaranteed price for raw cotton, which is equivalent to 5¼d. a lb. seed cotton, was, he said, the assured price to growers over the next five years. Growers might receive substantially better prices, in accordance with the sale values obtained by the Queensland Cotton Board for each season. It was announced by the Board recently that a basic price had been obtained for the 1946-47 season which, if a crop of over 6,000 bales of raw cotton were produced, would return to the growers approximately 6½d. a lb. of seed cotton.

The Minister pointed out that this price would be nearly a 1d. a lb. seed cotton better than had ever been paid to Queensland growers, and could possibly be improved if a substantially greater yield than 6,000 bales of raw fibre were produced in this State in the coming season. He felt that all farmers in the cotton-growing districts should, therefore, plant as much cotton as they could properly farm. There was a definite need for increased production of cotton not only to ensure that Australia's requirements for raw cotton will be met, but also to increase the supply of protein-rich concentrates for the dairying and pig raising industries in this State.

Continuing, Mr. Collins stated that it was most opportune that an improved price for cotton was being obtained. The productivity of thousands of acres of pastures had been seriously depleted during the past two dry seasons. The best way to restore the carrying capacity of these

areas, where the land was suitable for cotton, would be to plough them out and plant cotton for two or three seasons, and then re-sow the pasture. The cultural operations associated with cotton-growing would help to restore favourable conditions for the re-establishment of pastures of good quality for three or four years, when the land could again be prepared for cotton-growing. He felt that dairy farmers should undoubtedly practise the grassland-cotton rotation more extensively than was the general custom. It was becoming recognised in all countries with highly developed systems of agriculture that the best results were obtained from pastures where grassland was included in the cropping rotations for short rather than for long periods. Many pastures on dairy farms in the cotton-growing districts of Queensland had been established for as long as twenty years, and were now undoubtedly at a very low ebb as regards both productivity and quality. While it was realised that the long dry period would make preparation of seed beds out of grassland difficult unless rain occurred in the near future, he hoped that all dairy farmers with soils suitable for cotton would make every effort as early as possible to get land prepared for as much cotton as could be properly farmed during the coming season.

Mr. Collins also stressed that there had been a big increase in the installation of irrigation plants for growing food crops during the war. Investigations by his Department had clearly demonstrated that growing cotton with supplementary irrigation greatly increased cotton yields, and he suggested, therefore, that with the improved prices for cotton farmers with the watering facilities and equipment should include cotton-growing under irrigation in their cropping programmes.

The Demand for Good Meat.

ADDRESSING members of the Aberdeen-Angus Society recently, Mr. Collins said that never was there a greater demand for good meat than at present. A survey recently completed by a competent authority—the Abattoir Royal Commission—showed that although Queensland had already nearly half the cattle in Australia, the number could be doubled by improving our cattle country and developing some particularly fine fattening lands along the Cooper.

Judging by the cattle to be seen at the Brisbane Show, Queensland could produce beef equal to the world's best. The point was that we should produce more of it. The day had gone when the five-year-old bullock could be looked on as prime beef. If consumers were demanding beef from eighteen-months-old and two-year-old steers, Australia must meet the market.

Crop fattening of beef cattle was being done on a limited scale, but would have to be practised more extensively together with water conservation to ensure better feeding and more regular pasture growth. Good seasons and bad were part of our natural conditions. The cattle industry would never come into its own while there was a continuance of hit-or-miss methods.

There was much talk of "tenderising" meat, added Mr. Collins. He thought the better way to supply the market for tender meat would be to produce young cattle of what was called the modern type. That would also give a bigger outturn of cattle from our grazing country. He looked forward to the time when crop fattening would become part of our ordinary cattle economy, when all rivers would be locked and the water used for irrigation; and also to the development of markets in the "Near East" as well as Britain.

Fodder Crops in the Mackay District.

N. E. GOODCHILD, Senior Adviser in Agriculture.

THE recently experienced dry winter season must have brought home to everyone associated with the stock raising industries in this State the urgent need for further attention to fodder crops and fodder conservation to supplement our natural and artificial pastures. The need for active attention to the growing of fodder crops and of fodder conservation is just as evident in the Mackay district as it is elsewhere in Queensland. The usual practice of most stock owners in the past has been to rely on native pasture grasses to a very large extent and, in some cases, also on sown permanent pastures.

A glance at butter factory reports and fat stock sales reports would be sufficient to indicate to any interested person the need for some modification of this past practice. Such records show very clearly that at certain times of the year production falls far short of production at other times of the year. This inevitably follows where stock owners depend entirely, or almost entirely, on pasturage.

There are two obvious ways in which the position can be improved. In the first place, stock owners can give more attention to the use of feed and of cultivated crops grown during that part of the season in which natural and sown pastures are not making prolific growth. In the Mackay district this season occurs in winter and early spring. It may not always be possible to grow winter fodder crops when the farmer is entirely dependent on natural rainfall, but in many seasons winter fodder crops can be grown quite successfully in this district. A glance at Plates 26 to 28 will give some indication of the bulk of fodder which can at times be grown during the winter months when growth in permanent pastures is at a low level.

The second way in which improvement can be effected in the fodder position is by fodder conservation. A great many different types of fodder crops are suitable for conservation, either as grain, as hay, or as silage. The possibility of growing grain crops satisfactorily in the Mackay district is not great, and therefore no further consideration is given to the production of grain crops in this article.

Winter Fodder Crops.

In a district such as this, where the winter temperatures are not particularly low, the one cereal most likely to give satisfactory results is oats. Other fodder crops such as barley, rye, canary seed, and field peas are not likely to be as useful as the former in this particular area.

When it is intended to plant oats for fodder in the Mackay area the land may be prepared towards the end of the wet season, say about March or April, by thorough ploughing and preparation of a good seed-bed, with a view to planting in late April or May. The seed may be drilled in with a seed drill, if one is available, or it may be broadcast and harrowed into the ground. If the former method of planting is adopted about 1 bushel to the acre should be sufficient, but slightly more seed would be required when the crop is broadcast and harrowed in. No cultivation is possible during the growing period of the crop; therefore, the need for thorough clean preparation of the seed bed is obvious. Provided a reasonable amount of rain is experienced during the growing period, a great volume of feed can be expected from a field of oats. Grazing should not be attempted before the root system is well developed and the plants are firmly established in the ground. This stage can normally be expected to have been

Plate 26.
MOWING CROP OF SUNRISE OATS, SARINA DISTRICT.

reached about six to ten weeks after planting. In a season of adequate rainfall good grazing can be expected between June and September. If it is not desired to feed the crop off green, it may be allowed to develop to the seeding stage and then made into hay. The best method of haying oats is undoubtedly to cut with a reaper and binder, and cure the hay in the sheaf by stooking in the field. However, if no reaper and binder is available, hay can be prepared by mowing and curing loose, although when this method is adopted handling is much more difficult. Should the crop not be required for grazing, or for hay, oats will also make very satisfactory silage, if cut when the grain is at about the milky stage or even earlier. The crop may be ensiled after chaffing, or the green sheaves may be ensiled entire.

It may not always be possible to sow oats at the most desirable time; for example, suitable rains may not have occurred, or other farm operations may have delayed the preparation of the land. However,

satisfactory results have at times been obtained when planting has been delayed even into July. During a wet winter the crop may be affected by rust. No practicable means of controlling this disease is available, and if rust should occur the farmer would be well advised to make the most of what feed is available before the crop is rendered useless.

Summer Fodder Crops.

As a rule, pastures are at their most succulent and useful stage during the summer months. However, it may be considered desirable to grow supplementary fodder crops even during this period of the year. Crops such as white panicum and Sudan grass, if planted in the spring, should, provided reasonable weather is experienced, produce a great deal more feed for stock than the usual type of pasture. Again, it is

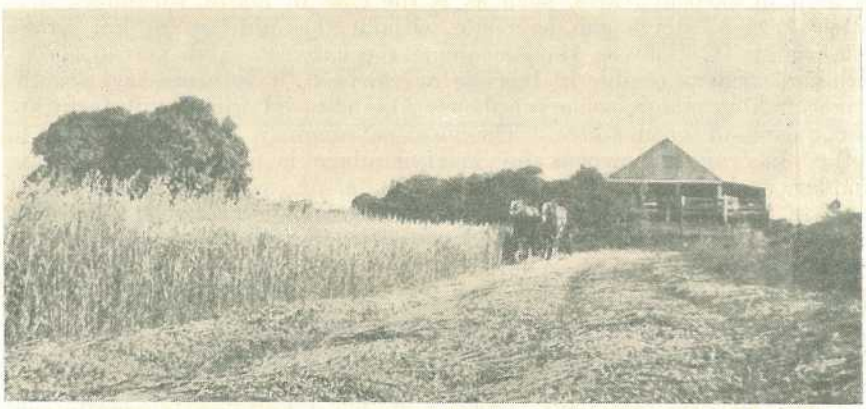


Plate 27.
Harvesting Sunrise Oats at Sarina.

necessary to provide a well-worked seed-bed before attempting to plant summer fodder crops. The time of planting will be dependent on the occurrence of suitable planting rains, but these may be expected any time from September onwards. The period of heavy rainfall between January and March is not conducive to the satisfactory establishment of fodder crops, and for this reason it is desirable to plant before the wet season sets in. Once such crops are well established, growth is not seriously retarded by the heavy wet season rains. However, it is considered that the most profitable use to which summer crops can be put in this district is fodder conservation.

Fodder Conservation.

Whilst the conservation of fodder in the form of hay may have some place in the economy of this district, undoubtedly conservation of fodder as silage will play a more important part. A considerable number of the farmers and graziers in the area are already becoming interested in silage as a form of fodder conservation. This is readily understandable, as the urgent necessity for some form of fodder conservation to combat periods of dry weather must be as apparent to any progressive stock owner in this district as elsewhere in the State.

Silage.

A great advantage of silage is that it provides a succulent and bulky feed at a time when feed is not only short but also dry, and apart from the actual food value in the material its succulence has also a very real value. Usually, the more bulky crops are used for silage, because they provide a heavy yield per acre, and naturally this lowers the cost of production. For instance, it would be expected that it would cost less per ton to grow 200 tons of green maize on 20 acres than it would cost to produce 200 tons of oats on 40 acres; in one case the area being twice as great as in the other case. Very good silage can be made from green maize or from saccharine sorghums, and both of these crops can be expected to produce very heavy yields per acre. However, as stated earlier, green oats will make good silage, and in fact, any bulky succulent greenfeed can be cured into good silage. If the bulky feed is high in carbohydrates, such as is the case in maize, sorghums, and other grasses, silage can be made without the addition of any other materials. If, however, the succulent crop carries a high percentage of protein, such as occurs in lucerne or cowpeas, it is necessary to add, when making silage, some supplementary material which will facilitate the curing of good silage. The most satisfactory material to add to either lucerne or cowpeas for making silage is a high carbohydrate fodder, such as maize, saccharine sorghum, or even cane tops, but if none of these is available a satisfactory silage can be produced by adding a mixture of 50-50 molasses and water to the extent of about 6 per cent. by weight.

Silos.

This term usually conjures up an image of an aboveground "tub" silo, but several other types of silos, cheaper than the tub silo, can be used.

(*a*) *The Overhead Silo.*—This cylindrical building is usually constructed of reinforced concrete, the walls being about 4 inches through. The diameter and height vary according to the capacity required.

(*b*) *The Pit or Circular Underground Silo.*—This comprises a circular pit, preferably with a concrete collar down to a depth of about 4 feet, where the lower soil has good holding properties.

(*c*) *The Trench Silo.*—This excavation is long and narrow, and is constructed very cheaply with modern machinery, but may not be used very often, and can only be used where the soil and drainage conditions are favourable.

(*d*) *The Open Stack Silo.*—This is actually not a silo in the real sense of the term, but is merely a stack of silage material built something like a hay stack, but confined between a pallisade of strong high poles at intervals of about 2 feet and covered by a considerable weight of earth.

The Silage Crop.

When it is considered necessary to grow a crop especially for silage, the best results can be expected from a crop comprising a mixture of a grassy crop and a legume, for example, maize and cowpeas. However, maize or saccharine sorghum can be planted in drills with cowpea seed, and provided favourable weather is experienced and the soil is suitable and fertile, huge crops of excellent silage material may be obtained from these mixtures; for example, with maize and cowpeas a bulk of 10 to 12 tons per acre is not an unreasonable expectation. Both crops are planted in the normal way, preferably with a maize drill or, if this is not available, they can be dibbled into a shallow drill made with a light swing

plough. The maize would be planted at around 12 to 16 lb. per acre, and the cowpeas at a rate that will provide about four seeds to every foot of row. Instead of maize, a saccharine sorghum may be substituted at the rate of approximately 6 to 8 lb. per acre. The drills should be sufficiently far apart to facilitate normal inter-row cultivation.

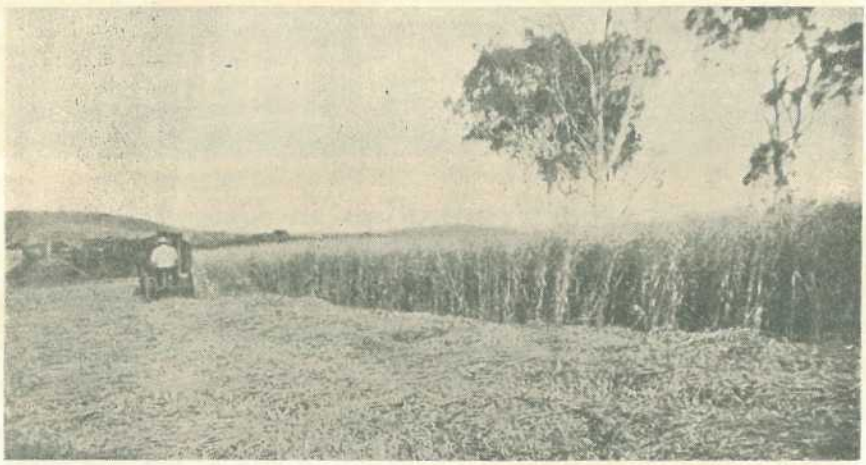


Plate 28.
Sunrise Oats Grown on Alluvial Flat at Plane Creek.

It is not possible in a short article such as this to cover such an extensive subject as fully as may be desirable. However, if enough has been said to indicate, particularly to interested farmers, the lines along which they may direct their farm operations and farm management in order to cope with the possibilities occasioned by prolonged periods of dry weather, its object will be achieved. All interested stockowners are strongly recommended to consult the local Advisory Officer of the Department of Agriculture and Stock with respect to further details concerning their own particular problems, for example, the work associated with the erection of a silo, growing of the necessary crop to fill that silo, and the harvesting and acreage of such a crop. Not one to be undertaken lightly, it must be apparent to all progressive men that, if periods of alternating high production and low production are to be merged into uniformly high production throughout the year, it is a task which must eventually be undertaken by all.

Papaw Latex Production in Queensland.

G. W. J. AGNEW, Horticulture Branch.

IT has been shown that the active principle or enzyme contained in the milky latex of the green papaw can be used to advantage in several commercial operations connected with fellmongering of sheep skins, preshrinking of wool, and clarification of certain brewed beverages. During the war, the demand for "papain," the name given to the powdered or dried latex, increased considerably, and consequently a certain amount of investigational work on this product has been undertaken.

Some work was done in 1942 on the collection and preparation of papaw latex. This work was carried out in collaboration with the Industrial Chemistry Division of the Commonwealth Council for Scientific and Industrial Research. Various samples of latex were obtained from papaw trees growing in the Maroochy area. Latex was extracted from immature fruits, and from the pressed juices of leaves, leaf stalks, and growing tips. Samples were taken from three distinct varieties, viz., Hawaiian Solo, Nambour No. 1, and New Guinea Red. In preliminary tests, fresh latex was treated with either alcohol or acetone, but later samples were air dried on glass before being despatched by air to Melbourne, where determinations were made of enzyme activity.

W. J. Ellis and F. G. Lennox in a paper entitled "Some Observations on Australian Grown Papain," which appeared in the Journal of the Council for Scientific and Industrial Research for August, 1943, reported that:—

(1) "Papain samples prepared by drying latex from green fruit grown in Queensland possessed marked gelatinase and rennase activity."

(2) "Juice pressed from the skin of the fruit possesses higher rennase activity than that obtained from the fruit flesh."

(3) "Seed extract has no measurable activity."

(4) "The activity of the latex is of the same order for papain from different species (varieties) and for preparations dried in alcohol, acetone, or in air."

Notes on Latex Collection.

Method of Tapping Fruits: Much of our very limited experience in tapping of papaw fruits for the collection of latex is comparable with

that reported by Hawaiian workers. The procedure is as follows:—About three full-length incisions one-eighth inch deep are made on the surface of green fruits (Plates 29 and 30) with a stainless steel knife. The latex flows almost instantaneously, and streams into a glass receptacle. The first flow runs freely for about 8-10 seconds, then diminishes rapidly, and drips on slowly for another 25-30 seconds. Finally the latex oozing from the cut surface congeals on the surface and is scraped off and collected. The tedium and the slow rate of collection involved in holding a receptacle under each tapped fruit long enough to obtain the maximum amount of latex are factors which have caused this work in overseas countries to pass into the hands of cheap coloured labour.

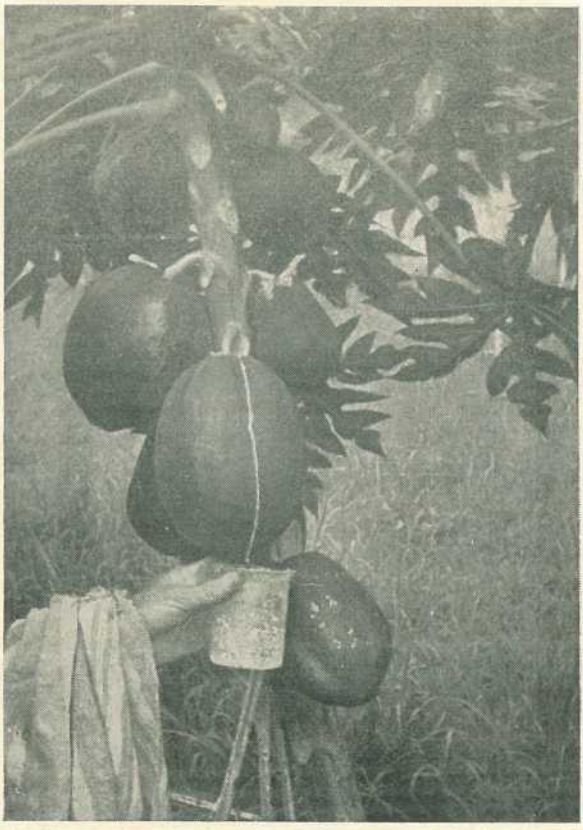


Plate 29.
Illustrating the Method Employed in Collecting Papaw Latex.

Difficulties Encountered in Tapping: It is possible with loose free-hanging fruit, as shown in Plate 31, to continue making incisions whilst the receptacle is being held to collect the latex from the first incision. Unfortunately, this type of fruit is not often encountered, as most trees have fruits crowded together and set at an angle to the stem, thus preventing the making of full-length cuts, with consequent reduction of the

amount of latex collected. Instead of streaming to the apex of the fruit, the latex runs off at the sides, necessitating the use of a large and cumbersome collecting dish.

Time of Tapping: Best results are obtained by tapping fruit during the wet summer months of January, February and March, and especially following rain. Latex flow also appears to be greatest early in the morning.

Suitability of Varieties for Tapping: Obviously, dwarf growing trees which produce their first fruits within 2-3 feet from ground level, as do many of the strains carrying the Betty character, are more suitable for latex collection than tall-growing varieties, such as the Hawaiian Solo and many local ones.

Varieties which bear medium-sized fruits, which hang freely, are the most desirable. The feature of free-hanging fruits is one which, besides being dependent on varietal type, is also considerably affected by closeness of planting, and by the extent of effective pollination of all fruits on the tree.

Plate 30.

ILLUSTRATING THE METHOD EMPLOYED IN COLLECTING PAPAW LATEX FROM THREE FULL-LENGTH INCISIONS ON THE SURFACE OF A PENDANT FRUIT.

No extensive tests have been conducted with regard to quality of papain produced by different varieties, but tests with three varieties grown at Nambour, carried out by officers of the Council for Scientific and Industrial Research, have shown that there is a consistent difference in enzyme activity in favour of the New Guinea variety.

Latex Yields: An average half-grown fruit of 2 lb. weight produces about 2 cubic centimetres of fresh latex (there are about 29 cubic centimetres in a fluid ounce). No accurate information as to yields is available, though reports by some collectors state that they count upon obtaining a yearly production of 1 lb. of dried latex per tree.

Some authorities state that the coagulated latex will produce about one-quarter of its weight as air-dried powder. For Queensland fruits the yield of dried papain varied between one-fifth and one-eighth of the weight of fresh latex.

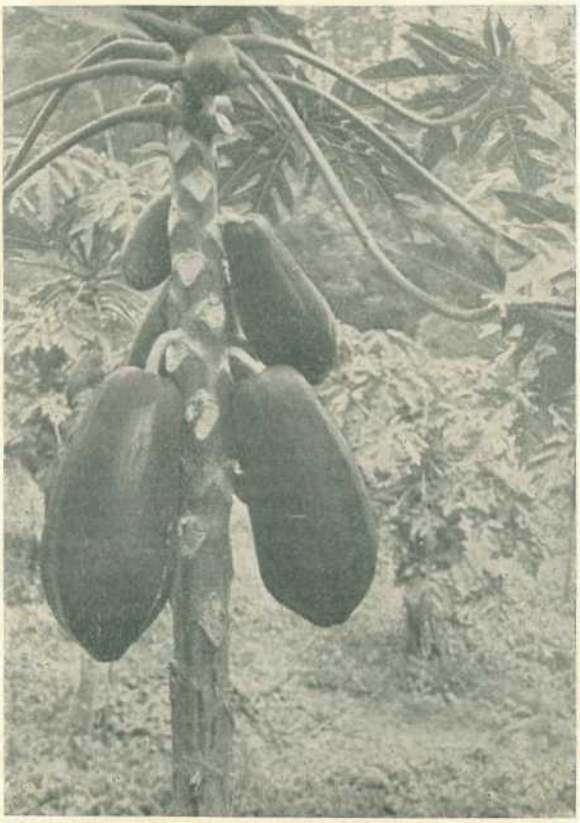


Plate 31.

Fruit Type Considered to be Ideal for Lancing for the Collection of Papaw Latex.

It has been found by some collectors that the first exudation of latex gives the greatest yield and the best quality of papain, and it has been recorded that potash starvation disastrously affects the yield of papain, but that phosphate starvation does not exert any marked effect.

Possibilities with Male Trees: It is considered that the fruits produced by some male trees could be utilised to advantage in the production of papain. Within some strains (see Plate 33), notably those carrying Betty characters, there is a large percentage of male trees which bear as many of 100 or more fruits. These fruits are normally wasted, whereas their skins could be used to produce papain.

Latex from Pressed Plant Juices: It was previously thought that young trees quickly grown during the summer would be of sufficient size (as in Plate 34) in from 4-5 months to be crushed prior to separating the papain from the pressed plant juices. It is not expected that the yield of papain would be large, and no actual figures are available to indicate whether it contains a working quantity of papain.

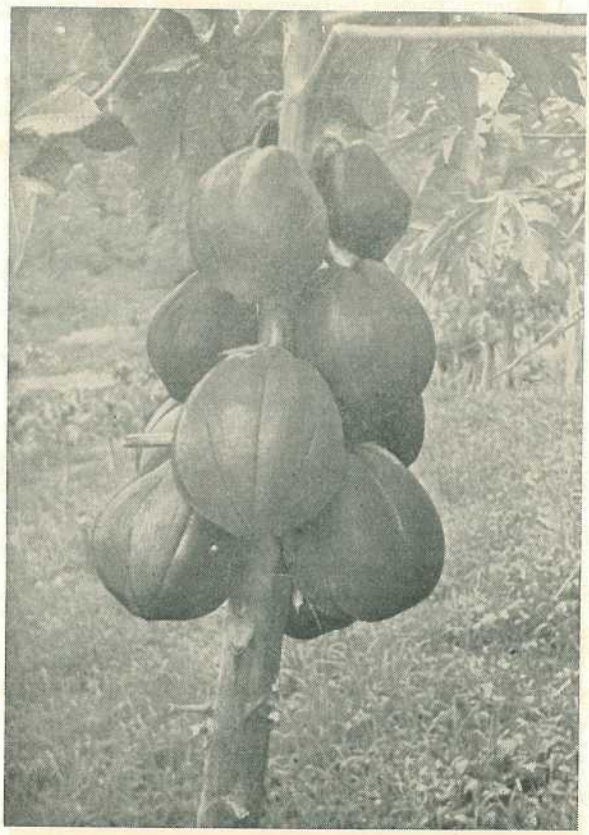


Plate 32.

SHOWING THE SCARS ON PAPAW FRUIT RESULTING FROM LANCING FOR LATEX COLLECTION EIGHT MONTHS PREVIOUSLY.

Following the investigations mentioned above, officers of C.S.I.R. reported that they were unable to detect enzyme activity in the pressed plant juices prepared at Nambour and treated with acetone. In this instance, however, it was considered that enzyme deterioration had occurred due to the effects of acetone.

W. W. Jones, working in Hawaii, considers that the papain can be separated from the pressed plant juices of stems and leaves by the addition of ammonium sulphate or alcohol, and that because the product is about equal in enzyme activity to the dried latex from fruits it offers possibilities for the machine preparation of papain.

Commercial Production Possibilities.

The matter of greatest immediate concern is whether it would pay the fruitgrower to collect and dry the latex at the ruling market price of 20s. per lb. for the dried product.

Local Experience in Harvesting: It has been shown that an operator with little or no previous experience can harvest latex from about 30 fruits per hour, using trees in their first crop and with most fruits within

Plate 33.

A Male Papaw Tree Bearing about 50 Pendant Fruits which Normally Go to Waste. Some Strains Bear Even Heavier Crops.

easy reach of the ground (as illustrated in Plates 29 and 30). This represents a harvest of about 60-80 cubic centimetres of latex per hour. Taking three hours in the morning, 7 a.m. to 10 a.m., as being sufficient to produce the best results, it is therefore possible to harvest slightly more than ½ lb. of fresh latex in that time. After drying, about 1½ oz. remains as the net yield, which at present is valued at 2s.

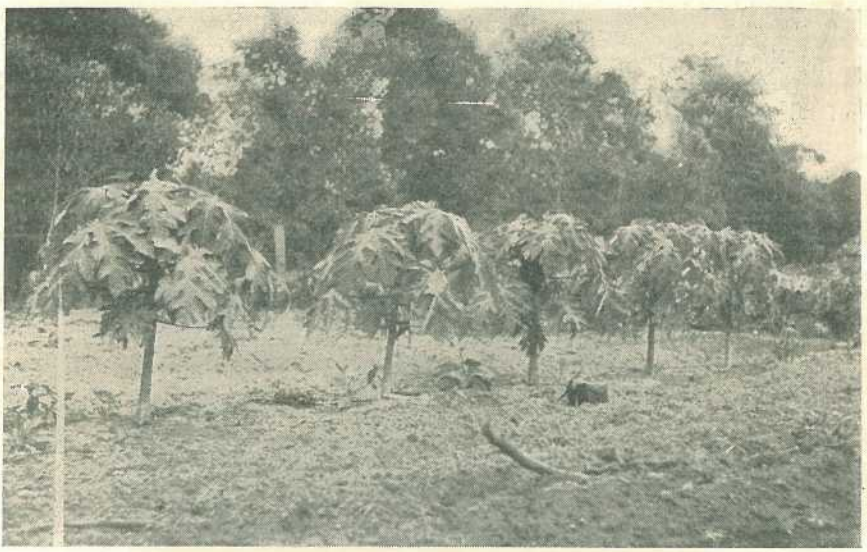


Plate 34.

YOUNG PAPAW TREES FOUR MONTHS OLD AND SPACED 3 FEET APART. SUCH TREES COULD BE CRUSHED TO PRODUCE LATEX.

Latex Collection as an Adjunct to Canning: Fruits which have been used for collecting latex are not necessarily lost thereafter. Plate 32 depicts the scarring which results from one series of incisions. The disfigurement resulting from a large number of incisions can well be imagined, and is such as to produce an unsightly appearance on the fruit, which would condemn it for the fresh fruit trade, though it does not impair its internal quality. Such fruits would be suitable for canning, provided the scarring did not produce deep furrowing. These fruits could then be profitably used in a young industry, which demands greater quantities of better quality fruit than it is receiving, as it is chiefly reject fruits that find their way to the canneries. Canneries have been payng £10 10s. per ton for canning papaws.

Further Investigation: With greater skill and experience, and with other conditions of fruit shape and position of fruit on trees being favourable, it seems very probable that the rate of latex collection will be improved. The chief line for further investigation on this subject is therefore considered to be the acceleration of the rate of latex collection so that the returns may be sufficiently attractive for papaw growers to consider tapping the fruits.

PLANT PROTECTION

The Potato Tuber Moth and D.D.T.

N. E. H. CALDWELL, Entomologist.

FEW potato growers have escaped serious loss, at some time, from the activities of the potato tuber moth.* In southern Queensland the spring crop is the one which normally suffers from the attentions of this pest. In 1944 and 1945 losses were even more extensive than usual, and growers are, therefore, naturally concerned about the prospects for the spring planting this year.

Type of Injury.

The larva or "grub," the actively destructive stage of the insect, attacks all parts of the plant. Infestation of the leaves and stems may result in a reduction in yield, especially in non-irrigated crops during a dry spell, but, generally, tuber infestation causes the grower most concern. Many potatoes may have to be discarded in the field, while further deterioration may occur after harvesting if the tubers are not treated with a protective dust such as derris or magnesite.

Cultural Control Measures.

In the past, control of this pest in the field has depended on cultural measures—"hilling-up" and watering, where irrigation is available—and prompt handling at harvesting. Experience has shown that these measures have definite limitations in preventing tuber infestation, while it has yet to be proved that they have any appreciable effect on the "grub" population in the leaves and stems.

Possibility of Chemical Control.

Chemical methods of controlling tuber moth in the field—that is, the use of sprays and dusts—have hitherto not been successful. However, the appearance of the new insecticide, D.D.T., has again drawn attention to the possibility of this means of combating the pest, and many growers are considering the advisability of using this material on the spring crop of potatoes.

It has been amply demonstrated that D.D.T. will give a very good kill of tuber moth larvae in the leaves and stems of potatoes as well as of other susceptible plants, such as tobacco and egg plant. It has, however, not been so easy to show that a correspondingly satisfactory decrease in tuber infestation can be brought about for a reasonable expenditure on insecticide applications.

Experiments indicate that, for the best results, D.D.T. applications should start at the main flowering period, and that a later start of operations is attended by too much risk of quite unsatisfactory control.

* *Gnorimoschema operculella* Gn.

If the moth infestation turns out to be light, the value of the crop saved may scarcely cover the cost of treatment. On the other hand, should a severe attack develop, the money spent has reasonable prospects of returning a good profit.

The grower's best policy, therefore, is to regard insecticide applications as a form of crop insurance and to apply D.D.T. according to the provisional recommendations given below, if, in the light of past experience and of observations in the growing crop, a severe moth attack seems likely.

Provisional Recommendations for Use of D.D.T.

The best advice that can be tendered to growers at the present moment is to apply a D.D.T. spray at fortnightly intervals from the main flowering period onwards. This will mean at least three and perhaps four or five applications. A spray will give better results than a dust, and should contain 0·1 per cent. D.D.T. Proprietary brands of D.D.T. spray concentrates at present on the market give directions on the container for mixing the spray with water to give this strength. The rate of application will probably range from 60 to 100 gallons per acre and the spray is best applied by means of the power outfits now available for this purpose.

Attention should, of course, still be given to those cultural measures which assist in keeping an unbroken cover of soil over the tubers, while every precaution should also be taken as usual to prevent infestation of the tubers after they are dug. In other words, the application of D.D.T. must be regarded as one of a series of operations, each of which plays a part in reducing tuber moth damage in the field.

The Spring Spray Programme in the Citrus Orchard.

F. W. BLACKFORD, Pathologist.

THE citrus orchardist should have finished the winter application of a lime sulphur (1-15) spray by the end of August. Then, as the trees commence to bud and blossom, he should prepare for the spring copper spray. Home-made cuprous oxide mixture applied when most of the fruit has set—that is, when one-half to three-quarters of the petals have fallen from the blossom—is the all important spray for the control of most diseases disfiguring the fruit in the later part of the season. To be ready for use, the stock mixture or concentrate must be made up a little time beforehand, as it has to age in the barrel for at least a fortnight, preferably longer, before it is in the form which has been found to be the most effective. Accordingly, with the first appearance of flowers the concentrate should be prepared so that it will be ready for use at the correct time. The strength of spray to use is 3 gallons of the stock solution to 40 gallons of water.

The time of application is most important. In the first instance, it must be realised that copper sprays are preventive and not curative and to be of any value must be applied before diseases appear. The organisms causing black spot and brown spot are known to be capable of infecting the fruit over a considerable portion of its life on the tree. In the case of melanose and scab the state of affairs is somewhat different. The fungi causing these two diseases cannot infect the rind of the fruit once

it has reached an age of approximately eight weeks; but the fruit from the time it is set until it reaches this age is susceptible to attack. Accordingly, in both cases, but particularly for melanose and scab, it is necessary to apply the spray as soon as most of the fruit has set, hence the recommendation—when one-half to three-quarters of the petals have fallen from the blossom. This ensures that nearly all of the fruit will receive a spray coating and the set is not harmed in any way. Delaying the application will permit infection, which cannot be eliminated by any subsequent treatment.

As a general rule, this application of copper should be made to all varieties. Coastal growers could well afford to do this. In the inland districts, such as Gayndah, there is not the same need for its use on navels or grapefruit, which are reasonably free from the skin blemishes due to the various diseases, but most other varieties will benefit from the copper spray.

With the spring application there may also be included in the spray mixture the zinc sulphate–lime or zinc sulphate–caustic soda spray for mottle leaf, lead arsenate for the grasshoppers which disfigure the rind of the fruit, and nicotine sulphate for aphids which sometimes are serious on the young growth. When preparing a combination spray mixture the most convenient method is to dissolve the zinc sulphate in a half kerosene tin of water and add it to the spray vat which has been half filled with water. The lime is mixed or caustic soda dissolved in another kerosene tin of water and slowly added while the vat is being filled, stirring well all the time. Just before the vat is completely filled the lead arsenate and nicotine sulphate mixed separately with a little water may be added and well stirred in. Finally the required amount of the stock solution of home-made cuprous oxide is poured in, the vat filled and the mixture well agitated.

When spraying it is essential that all parts of the young fruit, both sides of the leaves and the young twigs receive their coating of the spray mixture. Making sure of this takes time and material. However, the result justifies the effort, and picking and packing a heavier crop of clean fruit will pay dividends for the trouble taken earlier in the season.

Control of the Banana Rust Thrips.

N. E. H. CALDWELL, Entomologist.

THE banana rust thrips*, after a period of comparative inactivity, has again become prominent in southern Queensland banana growing districts. It is possible, therefore, that another series of bad "rust" years may be experienced in the immediate future. With the post-war market likely to become increasingly critical of blemished fruit, growers must once again face the question of controlling this pest. Since earlier investigations were made into this problem, some changes have taken place both in the banana-growing industry and in the sphere of pest control. On the one hand, rust control has undoubtedly been complicated by the increasing popularity of the Mons Marie banana, a fairly tall-growing type with bunches considerably less accessible than those of the Cavendish variety. On the other hand, the advent of the new insecticide, D.D.T., may do something towards simplifying the problem.

* *Scirtothrips signipennis* Bagn.

Established Control Measures.

Covering the bunch as soon as possible after it is thrown with a suitable hessian cover, bag, tube or cloak, and then dusting with a nicotine dust at regular intervals will give a very high degree of rust control. The cover must be a good quality "sugar" hessian, namely, 11 oz. hessian. More open types cannot be recommended. The nicotine dust should contain not less than 2 per cent. nicotine. The bunch should be dusted thoroughly either just before or just after the cover is placed in position. Subsequent dustings may be made in accordance with two schedules—either at fortnightly intervals until the bunch is harvested, or at weekly intervals for a period of three weeks, after which dusting is discontinued.

Brown paper bunch covers have at times been substituted for hessian with fair success. Single tubes of unglazed brown paper of a D/C rating* of not less than 30 lb., but preferably of 35 lb., will last the life of a bunch in many cases. Lighter papers are unlikely to prove satisfactory. During the wet season, when heavy rain may be accompanied by cyclonic winds, double tubes are advisable, particularly in exposed plantations.

The incidental benefits resulting from covering the bunches are considerable and well known to growers. They are, however, offset to some extent by certain practical difficulties. If bags are used, the "bell" must be broken off, either when the bag is placed on the bunch or a week or two later; otherwise rotting of the "bell" in the bottom of the bag may set up various fruit rots. Some method of marking the covers has to be adopted to indicate when a bunch requires dusting and also, in the case of bags, its approximate age. Cutting operations are slowed down to some extent when the bunches are covered. Finally, fixing covers to bunches of tall-growing varieties is probably impracticable in some cases.

Weekly applications of a nicotine dust throughout the life of the bunch will give fair control of rust, provided the treatment is thoroughly carried out. This method may find an application under some circumstances; for instance, in tall varieties on which bunch covering cannot be carried out.

Suggested Use of D.D.T.

Many growers will be interested in the prospects of using the new insecticide, D.D.T., for banana rust thrips control and some, no doubt, are determined to test this material on their own plantations.

A preliminary experiment was carried out last summer with a dust containing 2 per cent. D.D.T. The insecticide showed distinct promise. While the immediate reduction in thrips population was not as spectacular as in the case of nicotine, the greater persistency of D.D.T. appeared to have an important ultimate effect in reducing rust development. There are indications that on uncovered bunches the interval between treatments may be prolonged to at least a fortnight.

Dusts containing both nicotine and D.D.T. are expected to appear on the market shortly. Provided each ingredient retains its full effectiveness in the mixture, such dusts should play a very useful part in the rust control programme, combining the quick but short-lived action of nicotine, to deal promptly with the existing thrips population, with the

* The D/C rating is a trade designation based on the weight of a ream of sheets each 20 inches by 30 inches.

slower but more persistent effect of D.D.T., to delay the establishment of further colonies. This composite dust may prove especially useful for dusting, without covering, the comparatively inaccessible bunches of the taller varieties.

Growers wishing to try D.D.T. may, therefore, have the choice of a "straight" 2 per cent. D.D.T. dust and a nicotine-D.D.T. dust, containing adequate amounts of each active ingredient. The dusts can be used either on covered or uncovered bunches and the interval between treatments need not be less than a fortnight. It may be found that, on covered bunches, very few applications will be necessary, particularly with the mixed dust.

Precautions Necessary in Using D.D.T.

D.D.T. dusts are not expected to have any adverse effect on the banana fruit, but experimental work has not yet been sufficiently extensive for a complete assurance to be given on this point. Growers should watch the fruit closely, so that if any ill effects do occur they can be detected in the early stages and control measures changed.

In certain combinations D.D.T. loses some of its efficiency. It is believed that, in the dust form, any nicotine-D.D.T. mixtures marketed in Queensland will be quite satisfactory, but evidence from field experiments to confirm this point is not yet available. Provided "straight" dusts of suitable concentrations are procurable, growers can mix their own nicotine-D.D.T. dust as required, to guard against any deterioration in storage. Thus to obtain a dust with 2 per cent. of each toxic ingredient it would be necessary to mix equal parts of two dusts, one containing 4 per cent. nicotine, the other 4 per cent. of D.D.T.

Sprays containing D.D.T. should not, at present, be used for the control of the banana rust thrips, owing to the risk of injury to the fruit.

Important Points in Rust Control.

Control measures for the banana rust thrips may be necessary from October to April, but in many seasons the period is much shorter. The appearance of the young bunches in the plantation, and not of the cut fruit in the shed, is the key to the correct timing of control measures. When bunches less than a month old show appreciable amounts of thrips injury control measures should be put into operation. By the time rusty fruit is being cut, much of the damage for that season has been done.

It cannot be emphasised too strongly that, no matter what method of rust control is adopted, each bunch must be treated as soon as practicable after it is thrown, as the primary infestation takes place when the bunch is coming out of the plant throat. Thus regular inspections of the plantation, preferably every week, are necessary. Care should be taken at all times to ensure that the dust penetrates well into the top hands, where the greatest amount of rust almost invariably occurs, while at the first treatment the bunch stalk between the top hand and the plant throat should also be dusted.

The incidental benefits to the fruit resulting from covering the bunches are so great, particularly when it hangs through the winter, that the covering plus dusting technique is strongly recommended wherever it is practicable.

D.D.T. and Codling Moth Control.

N. E. H. CALDWELL, Entomologist.

CODLING moth is a major pest in the Granite Belt, and growers, particularly those with apples, the main crop attacked, are keenly interested in the possibility of using the new insecticide, D.D.T., to assist them in controlling this insect.

Experimental work, both in Queensland and elsewhere, indicates that, following a calyx spray of lead arsenate, cover sprays containing 0·1 per cent. D.D.T. will control codling moth on apples at least as well as, if not better than, insecticides such as lead arsenate, white oil, and white oil-nicotine sulphate. However, certain undesirable effects have followed the use of D.D.T. in experimental work at Stanthorpe. Populations of woolly aphids and mites increased rapidly on all trees receiving D.D.T. cover sprays and towards the end of the season they had reached serious proportions. This has also occurred in other parts of the world where D.D.T. is under trial. Presumably D.D.T. reduces the efficiency of the various parasites and predators which normally keep these pests in check. Growers intending to try this insecticide should, therefore, be prepared for a sharp increase in woolly aphids and mites, for which subsidiary control measures will probably be necessary. This effect is likely to be worst on late maturing varieties, which usually receive a greater number of cover sprays.

To offset these disadvantages, there is evidence that D.D.T. will have some beneficial effect in assisting to control fruit fly. Also, judging from experience with closely-related species on other crops, it is expected to give good control of the apple leaf-hopper. The effect on scale insects attacking deciduous fruits is unknown.

The strength of the spray should be such as to contain 0·1 per cent. D.D.T. Directions for mixing the materials available on the market to this concentration will be found on the containers. The use of higher concentrations is, in the light of present knowledge, unwise, because of the risk of injury to the trees and of the probable accumulation of undesirably heavy residues on the fruit. On the other hand, experiments suggest that lower concentrations will give less satisfactory control of codling moth.

If used at all, D.D.T. sprays should be applied in accordance with the timing schedules drawn up for the older-established cover sprays. While it has been shown that D.D.T. residues will kill both adult moths and young larvae, this effect is unlikely to persist in the field for more than about a fortnight. Thus the possibility of reducing the number of cover sprays with safety seems remote, even if D.D.T. were used throughout the season. However, because of the risk of increased woolly aphid and mite populations, it is perhaps unwise to contemplate using D.D.T. to this extent at present. It may be preferable to apply alternate sprays of D.D.T. and the insecticide formerly used on the orchard, with the additional safeguard that the D.D.T. treatment should be discontinued if the aphids and mites get out of hand.

Before embarking on a large scale programme involving D.D.T., growers should pay careful attention to the question of costs. D.D.T. sprays are more expensive than the alternative cover sprays and their use is not likely to reduce the cost of control measures for codling moth. Finally, should woolly aphids and/or mites get out of hand, additional expenditure may be incurred in controlling them.

Copper Deficiency of Sheep in Queensland.

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

IN August, 1945, an inspection was made of the wool which was being shorn from some sheep depastured in north-western Queensland and it was considered this clip showed a fault characteristic of copper deficiency. Subsequent research work carried out conjointly by C.S.I.R. and this Department confirmed this suspicion and revealed that there were some large, fairly well defined areas where a copper deficiency occurs. The purpose of this article is to acquaint graziers with the symptoms and correction of the trouble.

The Utilisation of Copper by Plants and Animals.

Copper occurs in the soil and during their growth plants take up minute quantities. Various factors influence the amount of copper in the plants. Of these the amount of copper present in the soil, presence of other elements, plant species and stage of growth, are amongst the most important.

When the plants are eaten some of the copper is absorbed into the bloodstream during the normal process of digestion, and it is later stored in the liver. Although the amount of copper required is extremely small, it has a vital function to perform in the formation of red blood cells, and apparently in determining the arrangement of the protein molecules which make up the wool fibres. When there is insufficient copper in the plants to keep abreast of the rate at which the copper is utilised by the animals, supplies are drawn from the liver stores. When these are exhausted symptoms of copper deficiency become obvious.

Symptoms of Copper Deficiency in Sheep.

The symptoms produced by copper deficiency depend upon the age of the animal. In adult sheep the most noticeable lesion is in the wool and the changes which occur are quite definite.

The normal character as indicated by the crimp of the wool is lost and in cases where the deficiency is a border-line case large "secondary waves," which appear to be superimposed on the crimp, appear. Plates 35 and 36 show typical cases.

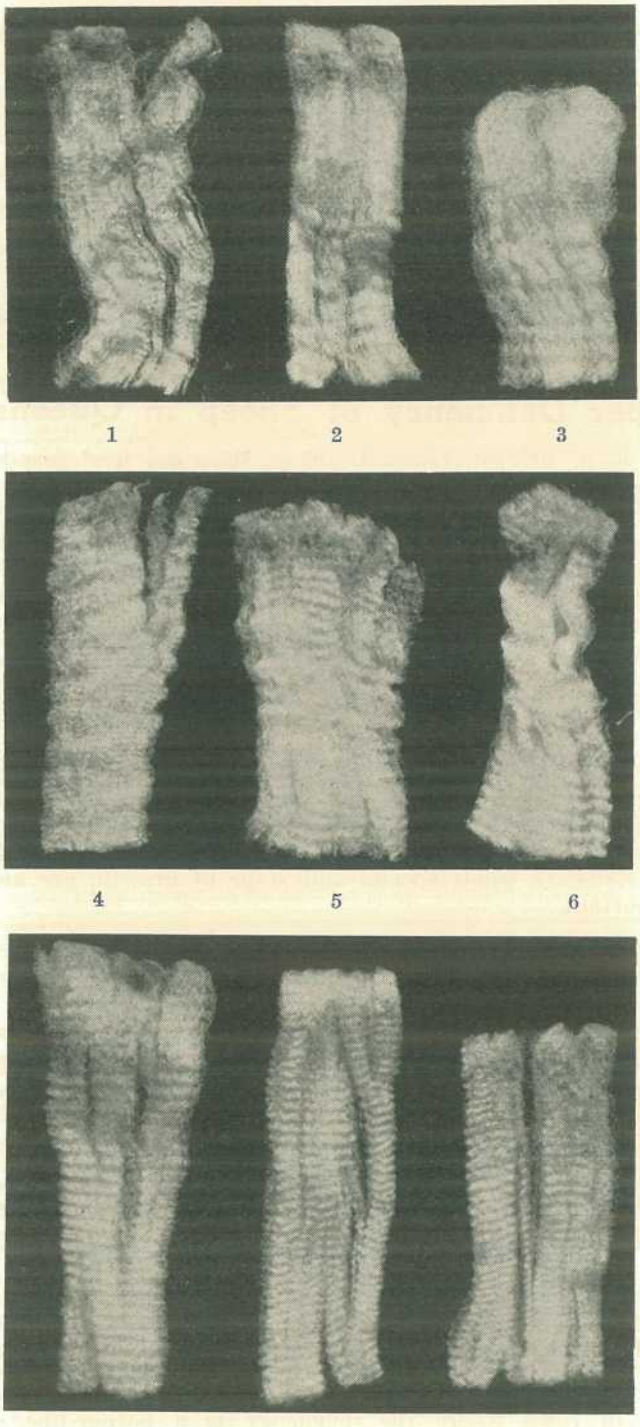


Plate 35.

EFFECT OF COPPER DEFICIENCY ON WOOL.—Lower tier is of normal fleeces, middle tier of slightly affected fleeces, and upper tier of badly affected fleeces.

If the deficiency is accentuated the abnormality is more marked and, in extreme cases of deficiency, the wool is referred to as "steely," "stringy" or "silky." Probably "silky" is the most descriptive single term, as the crimp has almost completely disappeared, though there may be some indefinite waves and the wool has a typical glassy sheen, sometimes referred to as a "galvanised shine." The handle is soft and slippery and the general impression is that the affected wool has no "guts." The affected fleeces are not usually sound and when the whole length of the staple is affected there is no definite break but the wool is more inclined to be "rotten," in that the staple can be broken anywhere.

One interesting feature which must be borne in mind is that the abnormality in the wool will only occur in that part of the staple grown during the time in which there is insufficient copper to meet the demands of the sheep and after the liver stores have been exhausted. Typical "silky" wool has been seen on previously good-woolled stud rams some time after their introduction from sound country to copper deficient areas. When these animals have been returned to sound areas the wool has become normal again.

One of the most outstanding demonstrations of the importance of copper in the development of normal wool character is to be seen in Plate 36, which shows the wool from a merino and a crossbred sheep. These animals were introduced into a copper deficient area and after three months were shorn. The new wool showed typical "secondary waves" and these are clearly seen towards the tip end of the staples. Six months after shearing the animals were drenched at frequent and regular intervals with bluestone solution and the remarkable change is obvious. Adult sheep run on deficient areas are inclined to be a little unthrifty, though there are very few definite signs apart from the changes in the wool.

Some interesting observations have been made on black sheep running on country which is now known to be copper deficient. These animals showed intermittent white bands along the length of their black staples and there was a strong correlation between the occurrence of these white bands and the appearance of changes typical of copper deficiency in the wool of white sheep. In addition, the black pigment returned immediately to the wool of a black banded staple which was growing white wool when the animal was given copper drenches.

If weaners are subjected to a copper deficiency they produce abnormal wool, their general growth and development are slow and the sheep give the impression of being stunted and poorly grown. Eventually they may grow into reasonably good sheep, though they are inclined to lack the substance and size of animals grown on sound country. If ewes are subjected to a serious copper deficiency during the latter stages of pregnancy and if the copper status of the sheep does not improve soon after lambing a peculiar set of symptoms, followed by heavy mortalities of the lambs, may occur.

Lambs 1 to 2 months old are most commonly affected. The first signs are a check in growth rate and a tendency for the lambs to become unthrifty. If the lambs are driven for half-a-mile or so they begin to stagger and lose control of their hind limbs. Further forced exercise will accentuate the condition and within a few days of first being noticed the affected animal is capable only of travelling short

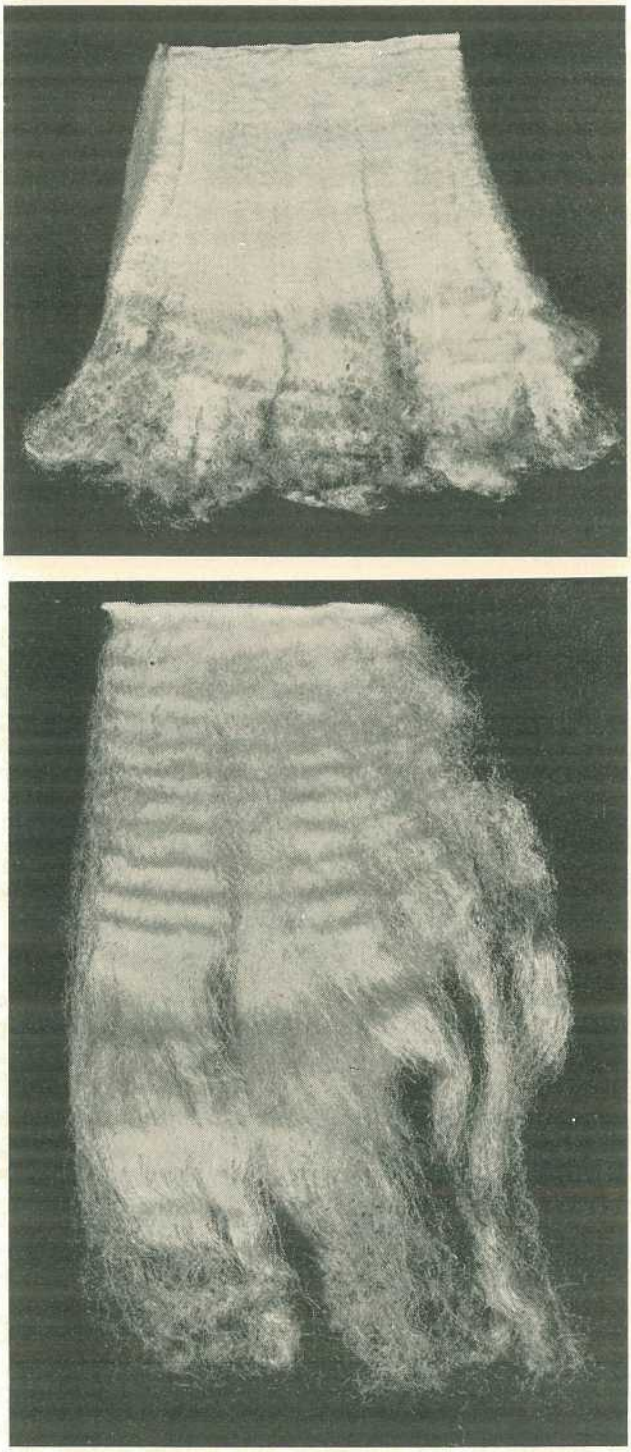


Plate 36.

WOOLS FROM MERINO AND CROSSBRED SHEEP IN WHICH THE BENEFICIAL EFFECT OF COPPER TREATMENT IS APPARENT.

distances. If attempts are made to force these lambs along they show an exaggerated back leg action, knuckle over at the pasterns, their hindquarters sway, and finally they go down. If left alone the affected lamb will get up again after a short rest but will be incapable of travelling very far. The disease progresses rapidly and the forelegs become affected and at this stage the lambs lie about in the paddock unable to rise. Their appetite is maintained, however, and they will crop all grass within reach and the animals appear bright and alert. Death usually occurs as the result of the activity of predators—foxes, eagle hawks, etc.

If the lambs do not develop the disease until they are three or four months old the course is generally much less severe. There is a check in growth rate and the abnormal swaying gait does not become apparent unless the sheep are driven. Such lambs often survive.

Overcoming a Copper Deficiency.

Before attempting to treat any disease condition in live stock it is first necessary to obtain a correct diagnosis as to the nature of the disease.

The diagnosis of a copper deficiency in sheep is based upon:

1. The occurrence of abnormal wool.
2. Chemical analysis of the liver and/or blood.
3. The clinical appearance and history of the sheep.

Obviously the carrying out of this work calls for close co-operation between those who produce wool, prepare the wool for sale, and handle the clips at sale time and the technical services which are available on application to the State Department of Agriculture and Stock. Wool samples may be submitted to the Department's Sheep and Wool Branch and where necessary investigatory follow-up work will be undertaken.

Copper deficiency is easily overcome by arranging a small regular intake of copper by the sheep.

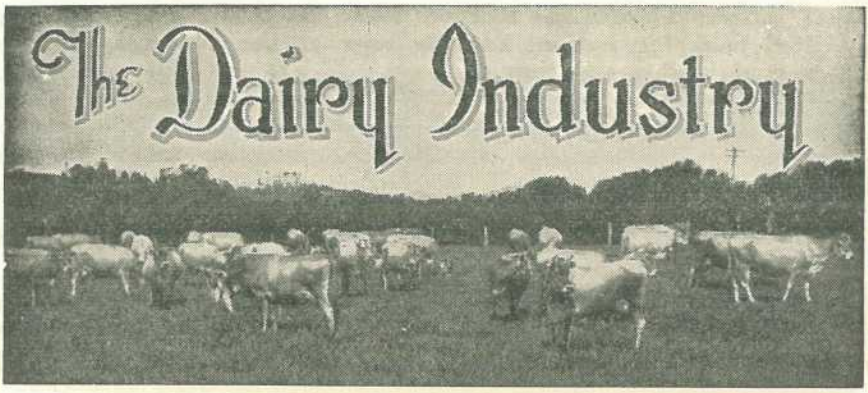
The exact way in which the copper is given will depend on local conditions. Under grazing conditions copper may be given to sheep through either the water or a suitable supplement.

Whether or not the copper can be given through the water will depend upon:

1. The type of water, i.e., surface, artesian or subartesian.
2. The composition of the various salts in solution in the water.
3. The type of water facilities which exist; that is, cement or metal troughs and holding tanks.

The greatest difficulty to be overcome in the feeding of copper in supplements is to prevent chronic copper poisoning which may result from the sheep eating too much of the supplement.

Because of these factors no hard and fast rules can be given. It is clear that the control measures adopted will depend entirely upon the local conditions on the individual properties and recommendations can be made only after full cognisance has been taken of all factors.



The Care of the Cream Separator.

E. SUTHERLAND, Dairy Adviser (Machinery).*

THE cream separator is obviously one of the most important pieces of machinery on the dairy farm, and, as with all machinery, its life and efficiency depend on proper care and attention. In many instances farmers are too casual concerning the care of separators, and it is quite common to find separators *loose on their foundation* and not *level*. It is not an exaggeration to say that seven out of ten separators are not level. When it is remembered that the wormwheel inside the separator, that is, the bronze wheel driving the spindle, travels at a speed of between 500 and 600 r.p.m. and the spindle and bowl at a speed of 7,000 r.p.m., it will be readily understood that any machinery travelling at such speeds should be on a firm foundation and should be *dead level*.

The importance of *correct oiling* cannot be too strongly stressed. Oil companies have spent thousands of pounds on research to enable them to tell the farmer the correct oil to use in his machinery. Do not use any oil in the separator except the particular grade recommended by the company from whom the separator was purchased. If the separator is of the splash feed oiling type, do not forget to change the oil in accordance with instructions. While doing this do not merely drain the old oil and pour the new oil in, but take an extra five minutes to remove the plate and clean out the sludge in the sump, because if the new oil is poured into a dirty sump the new oil only is being contaminated. Remember, oil can become so contaminated that it becomes an abrasive rather than a lubricant. Correct lubrication definitely pays dividends.

Concerning the *speed* of a separator, many farmers drive their separators at the wrong speed and adjust the cream screw to compensate for that incorrect speed. This is definitely wrong. The separator bowl is balanced to travel at a certain speed and it should be driven at that speed and then the cream screw adjusted accordingly. If turning a separator by hand, check the speed with a watch, because it has been found on tests that bells on separators indicating the speed are very often out of order. If the separator is power driven (the usual drive is from the engine to a counter-shaft and from the counter-shaft to the separator) avoid slipping belts. A slipping belt not only gives variation in speed and consequently variation in cream tests, but also drives the machinery along in a jerky manner and the jerks are conveyed right to the bowl of the separator.

* In a Country Hour broadcast talk, by courtesy of the Australian Broadcasting Commission.

The *bowl* is the all-important part of the separator. The discs inside the bowl are separated by small metal tags fixed on the discs which are called caulks. These caulks wear down with use, and it will be found that at the end of, say, 12 or 18 months' wear (according to the size of the herd being milked) one or perhaps two extra discs can be added. An indication that discs are required is a slight wobble in the bowl. Another test is to take the bowl, rest it sideways on the palm of one hand and give the bottom a bump with the other hand; if the discs move at all, add another. There should be no movement of discs inside the bowl.

If the bowl is not at the correct height, particularly if it is too low, skimming becomes inefficient. A general direction concerning the adjustment of the *height of the bowl* cannot be given here, as different makers of separators have different ideas regarding this adjustment, but farmers are advised to check the height of the bowl by referring to the instruction book for their particular brand of separator.

The amount of milk entering the bowl, that is, the *inflow*, may require attention. If the usual supply tank on the separator has been discarded in favour of a large vat (as is generally the case when a farmer installs milking machines) the milk flowing into the bowl, particularly when the vat is full, should be controlled by turning the tap only until the float comes up to the tap with the milk flowing nicely over all of the float. The float does control the inflow to a certain extent, but it is usual for firms supplying large vats to fit them with a standard size tap, the farmer receiving the same size tap for a 75 gallons separator-vat as he would for a 90 gallons vat. As the milk goes down in the vat the tap can be turned on more. With too great an inflow the farmer may be expecting, say, a 50 gallons separator to do a 60 gallons job, which again results in inefficient skimming.

Towards the end of the separating do not starve the bowl; that is, do not let only a small amount of milk run from the tap for any length of time with the float well down away from the tap. This results in very thick cream being formed in the cream spout, which would be noticed after separating had finished. If the vat is of the flat-bottomed type, tilt it up near the end of the separating and so avoid just a trickle of milk running into the bowl.

To sum up: for long life and efficient working of a separator watch these points:—

1. **See that it is on a firm foundation and level.**
2. **Use the correct grade of oil.**
3. **See that the separator is turned at the correct speed.**
4. **Avoid slipping belts.**
5. **Check the height of the bowl.**
6. **Make sure that a sufficient number of discs is in the bowl.**
7. **See that the rate of inflow of milk is correct all through the separating, and**
8. **Towards the end of the separating do not starve the bowl.**

Feeding the Cow Before Calving.

T. K. KELLY, Dairy Officer.

WHILE the value of feeding the milking cow is appreciated, the value of providing adequate fodder for the cow before calving is often underestimated. The whole lactation is affected if cows are losing condition during the six weeks before calving. This is particularly true of first and second "calvers" which must provide for body growth.

Most dairy farmers aim at having most of their cows calving just before the succulent herbage growth season is expected to begin. This is sound on the principle that butterfat is produced at its cheapest from young succulent pasturage. However, it means that the cow is preparing for her lactation during the late winter and early spring months. This period, unfortunately, is often dry and consequently calls for wise management and the desirability of having reserve fodders.

A prerequisite is that the cow should have at least two months spell before calving again. This gives the dry cow an opportunity not only to nourish the unborn calf, but also to put condition on her body and provide a mineral reserve in her bones.

If a farm is incapable of growing and storing fodder, judicious stocking and pasture management should be practised. Should the pastures be dry or the soil known to be deficient in certain essential minerals, licks or mineral mixtures should be available to the stock. Dr. Hammond, of the Animal Nutrition Research Institute, Cambridge University, in his report on *The Conditions of Animal Production in Australia* observed that "The feeding of calcium phosphate during this period (before calving) to obtain a body storage for the subsequent lactation is frequently neglected." A weekly allowance of from ½ lb. to 1 lb. of sterilized bonemeal maed attractive wtih either cereal meal (10 per cent.) or salt will be found beneficial in practically all coastal dairying districts.

On a farm where crops can be grown and fodder stored good fodder is never wasted on the cow before calving. A true dairy cow will milk off any surplus condition into the bucket. Silage and grain are valuable fodders. Lucerne hay is of particular value to the cow preparing for lactation because of its high lime content, in addition to its other feed qualities. All legumes are characterized by their high content of phosphoric acid and lime, particularly the lime.

Green fodder is a reliable food and tonic when pastures are dry. Sudan grass, panicum and Japanese millet are suited to most Queensland districts and should be sown early if sufficient rains fall for planting.

To have the cow ready for the job is comparable to having machinery ready for seasonal work. A cow during her early lactation has high inherent capacity for production, the limit varying with the inherent capacity of the individual. Thus capacity plus profit is wasted if the cow commences her lactation as an inefficient machine, in poor condition.

Hand Feeding of Dairy Cattle.

MOST dairymen have probably at some time, when hand feeding, asked themselves how much hay or chaff they should give their cattle. They have probably asked themselves how much hay or chaff the cattle can handle, how little they can do on, and what is the most economic method of feeding—a lot of roughage or a little roughage. The answers to these questions are of definite practical importance when hand feeding, points out a note by the Division of Animal Industry of the New South Wales Department of Agriculture.

For example, a farmer who had recently taken over a metropolitan dairy approached the New South Wales Department and said that, while his cows were producing well, and he thought he was feeding well, his feed bills took most of his milk cheques. What was wrong?

Consideration of the ration being fed quickly showed the reason. The ration was approximately—

Lucerne hay	22 lb.
Concentrate	8 lb.

The cattle were averaging 3 gallons per head per day. The cost of the ration was as follows:—

	Cost of Feed per ton	*Cost per lb.*	*Amount Fed. lb.*	*Cost.*
Lucerne hay	£10	approx. 1d.	22	22d
Concentrates	£8	approx. 1d.	8	8d
Total	..	..	30	30d

Approximate cost of feed per gallon—10d.

The roughage was the greater part of the weight and the greater part of the cost of the ration. Did the roughage provide a proportionate amount of the food value of the ration? In other words, was a food unit in the roughage as cheap as a food unit in the concentrate? Investigation showed that food units in the roughage were extremely expensive.

	Food Unit Value per 100 lb.	*Cost per ton.*	*Cost per Food Unit.*
Lucerne	40	£10	approx. 3d.
Concentrates	70	£8	" 1·4d.

That is, food units in the roughage were costing twice as much as food units in the concentrates.

The dairy farmer was advised to cut the lucerne hay down to about 10 lb. per day and increase his concentrate allowance up to about 14 lb. per day. This reduced his feeding cost to about 8d. per gallon—a 20 per cent. reduction in feeding cost.

A Sound General Rule.

It can be taken as a general rule that where roughage—that is hay or chaff—is bought, it is a much dearer source of food matter than concentrates, and should be fed only in limited amounts. That is, in amounts sufficient to provide some roughage in the ration.

Where roughage is grown on the farm, the advisability of feeding large or small amounts of roughage must depend on the cost of production of the roughage, and the price or cost of production of concentrates. If lucerne hay can be produced cheaply, such as at £3 per ton, or silage produced at £1 per ton, these roughages will be cheaper sources of food matter than concentrates at usual prices, and it would pay when hand feeding to give a full feed of roughage and only limited amounts of concentrates.

To summarise, when feeding bought hay or chaff, feed only a small amount, say 10 lb. per head, or even less. Where roughages are home-grown and cheaply produced, cheapest feeding will be produced by feeding large amounts of roughage (20 lb. or more of hay or chaff, or 60 lb. of silage where no grazing is available) and feeding only limited concentrates.

Plate 37.

BEEF COWS ON KINDON STATION, GOONDIWINDI DISTRICT, QUEENSLAND.

How Butter is Made.

F. B. COLEMAN, Senior Adviser in Dairying.*

TAKE the receiving platform of a typical Queensland butter factory as the starting point and watch the big motor lorries arrive laden with tons of cream. The cream carriers have been out among the farmers since early dawn, picking up their cream and are now converging on the factory from several directions. On the arrival of each load there is much bustle and noise, the banging of cans on steel plates, the noise of steam and the hum of machinery. The men work fast, tipping the cream from the heavy cans into the vats, as the platform has to be quickly cleared so as to avoid holding up the next load. The cans rattle along the conveyors to the scales where they are brought to a temporary standstill while the weight is recorded. These scales are very sensitive and are checked daily for accuracy.

To the Grader.

The cans now move a little further along the conveyor until they come to the cream grader, a man whose job it is to taste each can of cream for flavour, to examine it for any defects and to determine its quality. The senses of taste, smell and sight are used to assess quality. They are highly developed in the man doing this very important work, the quality of the resultant butter depending very largely on his skill and experience. He first stirs the cream vigorously with a steel stirring rod and takes a small quantity into a container which is placed in order in a numbered tray. These samples will be later tested by means of the Babcock Test to determine the percentage of butterfat, which forms the basis of payment to the supplier. The grade of the cream having been decided and recorded, it is moved along to the respective tipping vat, where it is tipped and the can inverted over a steam jet to remove the remnants of cream. The empty cans now commence the last section of their journey by moving along the conveyor to the can washer, a machine which washes and steams inside and out and finally dries the cans.

The Vacreator Room.

The cream then goes into the vacreator room, which is very large, airy and well lighted. Inside are clean tiled floors, gleaming white-tiled walls and shiny modern equipment. It is a picture of hygiene carried to a high standard. A ceaseless flow of ivory coloured cream is now on its way to large open vats, shaped somewhat like a bath but each holding some hundreds of gallons. The big volume of rich looking cream shows up in relief against the shiny, dark blue glass sides of the vats. Inside these vats, of which there may be four or five or more in a row, are big coils stretching from end to end. These are used for the circulation of hot water with which to warm the cream in winter time or for the circulation of brine for cooling and they are revolved so as to thoroughly mix the cream. The cream received may be fresh cream with a low percentage of lactic acid or older cream with a higher acidity. Seasonal and other differences cause this acidity to fluctuate so much that it is necessary to control it. This is done by a process called neutralization, which consists of the addition of a suitable alkali which neutralizes the acid. Acidity of the raw cream is accurately determined by test, the amount of alkali to be added is worked out from a chart and thus the

* In a Country Hour broadcast talk, by courtesy of the Australian Broadcasting Commission.

ultimate percentage of acidity required can be ascertained. Neutralizing the acidity is necessary, as sour cream could not be pasteurized (i.e., heated) without curdling. In addition, neutralization permits of a more uniform quality butter being manufactured, prevents undesirable flavours resulting from the heating of sour cream, assists in removing objectionable volatile odours, prevents fat losses, and improves the keeping quality of the butter. The operator sets the coils moving in the vats previously described, and, as the cream is being circulated, the alkali solution is sprayed over the surface.

Cream under Vacuum Treatment.

The cream is now in a condition for the next treatment, which in the modern plant is called vacreation, or the treatment of cream under vacuum. Vacreation is the modern process of heating, purifying and partially cooling cream, which effects destruction of bacterial life, removal of chemical impurities, concentration, partial cooling and sweetening of flavour. The vacreator is a machine of gleaming metal, a mass of vertical cylinders, tubes, pipes, pressure and vacuum gauges and thermometers, and with its highly polished surfaces of stainless steel it looks most impressive. The process consists of passing the cream in a finely divided state, through live steam at a precisely controlled temperature, successively through several distinct degrees of vacuum, the whole cycle occurring within a few seconds. Deodorization is effected in two separate stages by washing with steam (in vacuo). Products resulting from previous bacterial action and any taint derived from feedstuffs are thereby eliminated.

To the Cooler.

We have now a product with a suitable acidity and such destruction of bacterial life as will enable the resultant butter to keep in good condition in cold storage until it is opened up in London a month or more later. From the vacreator the cream is pumped to the top of a large cooler. Water flows through the inside of the coils while cream is cooled by flowing over the outside. It then moves over another set of coils through which brine is circulated, the temperature being reduced to as low a temperature as required. From there it is pumped into big stainless steel or glass lined holding vats with revolving agitators. There it is held overnight and kept at a temperature low enough to inhibit bacterial development and to permit control of churning temperatures.

Churning.

Early the following morning the buttermaker comes into the picture and sets about preparing his churns. This he does by giving them a hot water followed by a cold water treatment. The churn itself may be a circular one capable of turning out 40 boxes of butter at one churning or the circular 100 box churn which stands nearly twice as high as the operator. The size of the latter churn can be imagined when it is realised that these huge wooden churns turn out more than two tons of butter at each churning. The cream is either run by gravity or pumped from the holding vats into the churn, which is then revolved in top gear for 30 to 40 minutes until a change or break in the cream occurs. The churn is then stopped and water added in order to keep the temperature low enough to obtain a firm grain, to reduce the viscosity of the cream and so on. The churn is then revolved again until the buttermilk is separated from the fat. On looking into the churn one can see a mass of golden grain about the size of wheat grain. The buttermilk is then

drained off and pumped away. Wash water is next added with the object of removing remnants of buttermilk and so improving the keeping quality and to firm the grain to ensure an even incorporation of moisture and salt during the working of the butter. The churn is again set in motion for a few revolutions, then stopped and fine salt added with the object of bringing out desirable flavours, expelling moisture from the butter granules, improving keeping quality and slightly deepening the colour. Great care and skill have to be exercised by the buttermaker to ensure that the legal limits of moisture and salt are not exceeded and precise and accurate tests have to be done by him to safeguard this.

The Finished Product.

The buttermaker now sets the rollers inside the churn in motion and the butter, passing between pairs of rollers, is brought to a compact form with the moisture and salt evenly incorporated. The finished butter is now taken from the churn by means of a stainless steel trolley and wheeled into the packing room, where it is cut up into 56 lb. cubes, placed into boxes and finally stored in the cold room to await railage. Eventually it reaches the city, where it is strictly graded by Government graders before shipment overseas.

This description is necessarily brief but indicates sufficiently the high standard of butter manufacture which has been attained in Queensland. Great progress has been made during the last twenty years in the dairy industry, but it is becoming evident that in the not too distant future even the present efficient method of manufacture will be revolutionized.

VALUE OF HERD TESTING.

All experience goes to confirm the fact that it is not much use boasting about the bucket production of a dairy cow, unless it is proven by test.

When herd recording was first established in Queensland it was contended by many farmers that they could tell what their cows were capable of doing without putting them under test, merely by appraising the animal on the points which filled the eye—those outward characteristics usually identified with high producers—but a check-up on the farmers' judgment with the Babcock test showed their declared preferences to be based more on a guess than on proven or provable fact. That is not to say, of course, that a dairy farmer is not able to make a fairly accurate estimate of the productive capacity of the cows he is milking every day, but it is considered that such an estimate is not enough if he is looking for maximum profit.

As a point in dairy practice, it is suggested that the first aim of any farmer should be to determine which cows it pays best to feed. Without herd recording that cannot be done, satisfactorily anyhow. Many cows yield well, but their milk is not high enough in butter-fat content. Many apparently good milkers cannot stay the distance, falling off in production towards the end of their milking period.

Dairy farmers to-day know that mere guesswork can be costly in relation to milk and butter production, so an improved and simplified herd recording system would be widely welcomed.

By herd recording not only the low yielders are determined, but if the job is done systematically the way is clear for the culling of the light performers at the bucket in favour of the pick of the dairy herd. A regular check on the whole feeding and breeding programme also is advisable, so that herd improvement may become continuous. Moreover, regular testing adds to the farmer's interest in sound dairy practice.

If anyone has any doubt about the value of systematic herd testing, the district dairy adviser will provide plenty of solid arguments in its favour as part of an established dairy farm routine.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which qualified for entry into the Advanced Register of the Herd Books of the A.I.S., Jersey, Ayrshire, and Guernsey Societies, production records for which have been compiled during the month of May, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
MATURE COW (STANDARD 350 LB.).				
Rhodesview Royal Primrose 2nd	W. Gierke and Sons, Helidon	11,502·2	525·603	Fairvale Major
Tabbagong Beauty 30th (251 days)	J. Phillips, Wondai	13,282·9	510·566	Parkview Royalist
Ennismore Emma	E. W. Jackson, Nobby	10,204·15	403·225	Navillus Amy's Sheik
Sunnyview Locket (251 days)	J. Phillips, Wondai	10,980·45	402·535	Burradale Byron
Springleigh Buttercup 8th	H. F. Moller, Boonah	8,243·55	364·842	Burradale Ronald
Chelmer Ethel	G. Francis, Kumbia	9,766·6	362·253	Greyleigh Victory
SENIOR, 4 YEARS (STANDARD 330 LB.).				
Penrhos Stella 10th	Sullivan Bros., Pittsworth	9,534·71	363·164	Penrhos Sovereign
Ardilea Nessie 6th	W. Hinrichsen and Sons, Clifton	8,591·25	348·488	Newstead Reliance
Rhodesview Lincoln 2nd	W. Gierke and Sons, Helidon	7,782·75	331·409	Rhodesview Supreme
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Valera Una	Sullivan Bros., Pittsworth	9,499·53	384·094	Rosenthal Pendants Prince
Ennismore Remona 2nd	E. W. Jackson, Nobby	9,440·4	366·427	Navillus Prince Henry
Euroa Lauretta 3rd	P. R. Emery, Dallarnil	7,629·5	334·498	Dnalwon Sceptre
Aynesley Gem 4th	G. Francis, Kumbia	8,121·05	33[illegible]·749	Alfa Vale Pride 6th
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Rosenthal Rosebud 22nd	D. Robinson, Womina	8,459·88	326·969	Rosenthal Perfection
Rhodesview Nancy 47th	W. Gierke and Sons, Helidon	7,744·85	316·794	Blacklands Prospector
Ardilea Nessie 7th	W. Hinrichsen and Sons, Clifton	7,564·5	296·210	Newstead Reliance
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Fairvale Fuschsia 5th	F. B. Sullivan, Pittsworth	9,161·25	373·377	Alfa Vale Pride 2nd
Rhodesview Fussy 6th	W. Gierke and Sons, Helidon	7,501·25	344·123	Rhodesview Neal
Valera Lila 9th	D. Sullivan, Pittsworth	7,913·75	317·814	Rosenthal Surplus 2nd
Sydmouth Violet	T. Vayro, Helidon	7,165·65	305·396	Mount Blow Security
Mount Camp Truesign	Madge Bros., Southbrook	7,365·14	283·861	Rosenthal Red Major
Rhodesview Nancy 51st	W. Gierke and Sons, Helidon	6,200·	276·784	Fairvale Major
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Glen Idol Florrie 9th	Estate P. Doherty, Gympie	8,335·4	340·933	Blackland's Count
Mount Camp Thelma 34th	Madge Bros., Southbrook	8,228·64	328·746	Rosenthal Red Major
Bantry Nellie	D. Sullivan, Pittsworth	8,163·25	316·295	Penrhos Blossom's Prince
Tara Daphne 2nd	Mrs. K. Henry, Watts' Siding	7,631·1	298·652	Alfa Vale Plummer
Fairvale Doris V.	I. B. Skerman, Kaimkillenbun	7,273·18	270·818	Fairvale Sir Echo
Tara Hope	Mrs. K. Henry, Watts' Siding	5,902·2	257·532	Murray's Bridge Pansy's Gift
Valera Trixie 6th	F. B. Sullivan, Pittsworth	7,389·18	319·464	Alfa Vale Pride 2nd
Glen Idol Daphne 14th	Estate P. Doherty, Gympie	6,995·	298·790	Blackland's Count
Valera Una 4th	Sullivan Bros., Pittsworth	7,178·90	296·747	Alfa Vale Pride 2nd
Bpringlea Pretty Jean 2nd	J. E. Heath, Murgon	8,291·2	291·386	Alfa Vale Lieutenant
Sunyaview Fuchsia 31st	R. Moore, Kingaroy	7,235·15	285·476	Trevor Hill Reception
Ripley Park Rosebud II.	I. B. Skerman, Kaimkillenbun	6,991·7	271·056	Esrom Wee McGregor
Ripley Park Rosette II.	I. B. Skerman, Kaimkillenbun	7,357·19	266·250	Esrom Wee McGregor

JERSEY.

Mature Cow (Standard 350 lb.).

Palen Poppy	Prison Farm, Palen Creek	6,666·85	402·185	Oxford Card
Trecarne Jersey Queen 2nd	T. A. Petherick, Lockyer	7,665·35	397·963	Trinity Some Officer
Romsey Blossom	J. Wilton, Killarney	7,948·42	394·331	Oxford Dainty Peer
Romsey Dainty Rose	J. Wilton, Killarney	6,716·	358·837	Oxford Dainty Peer

Senior, 4 Years (Standard 330 lb.).

Lynford Kitty	F. H. Sippell, Murgon	8,201·4	340·000	Glengariffe Cunning Cossack

Junior, 4 Years (Standard 310 lb.).

Kathleigh Silver 2nd	F. W. Kath, Dalby	9,497·76	522·002	Oxford Daffodil's Victor
Glenrandle Golden Girl	P. Kerlin, Killarney	6,552·	334·741	Bellgarth Stylish
Trecarne Golden Dairy Girl 2nd	T. A. Petherick, Lockyer	6,253·95	324·466	Brampton, Daffodil's Peer

Senior, 3 Years (Standard 290 lb.).

Kathleigh Biscuit	F. W. Kath, Dalby	8,140·01	481·689	Oxford Daffodil's Victor

Junior, 3 Years (Standard 270 lb.).

Le Nid Judy	W. C. Paroz, Biloela	6,572·45	330·520	Westbrook Aster's Lad 39
Trecarne Daffodil's 2nd	T. A. Petherick, Lockyer	5,478·1	303·198	Brampron Daffodil's Peer
Rosehill Margaret	A. Huth, Milbong	6,356·4	285·217	Carnation Successor

Senior, 2 Years (Standard 250 lb.).

Ashview Lady 2nd	C. Huey, Sabine	6,629·	405·366	Trecarne Victor 4th
Romsey Bonnie	J. Wilton, Killarney	6,418·02	344·778	Oxford Pixie's Victor
Woodview Ladyette	P. H. Schull, Oakey	5,010·4	285·635	Treccarne Royal Officer

Junior, 2 Years (Standard 230 lb.).

Strathdean Gentle Jean	S. H. Caldwell, Bell	6,518·65	392·638	Oxford King's Victor
Marshland's Royal Lady (imp. N.Z.)	F. W. Kath, Dalby	7,026·62	390·669	Brampton Dreaming Royal
Strathdean Delilah	S. H. Caldwell, Bell	6,968·67	382·525	Oxford King's Victor
Glenrandle Lucy	P. Kerlin, Killarney	6,819·3	360·438	Bellgarth Glory King
Lermont Brightgirl	J. Schull and Sons, Oakey	5,641·6	325·535	Selsey Samare's Hallmark
Primrose Sweet Nell	T. Little, Clifton	5,256·1	306·136	Sunny Glen Masterman
Bellgarth Bluebell (255 days)	P. Kerlin, Killarney	5,025·5	294·524	Oxford of Fawn's Victor
Nairfale Lady Laura	R. P. Browne, Yangan	5,334·2	283·334	Nairfale Noble Count
Le Nid Princess	W. C. Paroz, Biloela	4,693·25	270·525	Westbrook Aster's Lad 39th
Winston Envy	A. Huth, Milbong	5,087·9	258·419	Brookland's Twiddler
Oxlea Golden Belle	L. Oxenford, Oxenford	4,825·75	248·338	Oxlea Golden Lad
Le Nid Gaynor	W. C. Paroz, Biloela	4,364·95	240·893	Westbrook Aster's Lad 39th
Trecarne Jerseybell 2nd	T. A. Petherick, Lockyer	4,666·2	239·486	Trecarne Ruler 2nd
Palen Nancy	Prison Farm, Palen Creek	4,718·6	237·503	Banyule Silvermine Oxford

AYRSHIRE.

Senior, 3 Years (Standard 290 lb.).

Benbecula Twinkle	N. C. Mann, Broxburn	9,554·54	353·999	Benbecula Felix 2nd

Senior, 2 Years (Standa d 250 lb.).

Crescent Farm Betty	N. C. Mann, Broxburn	7,832·67	285·351	Myola Orphan Boy

Junior, 2 Years (Standard 230 lb.).

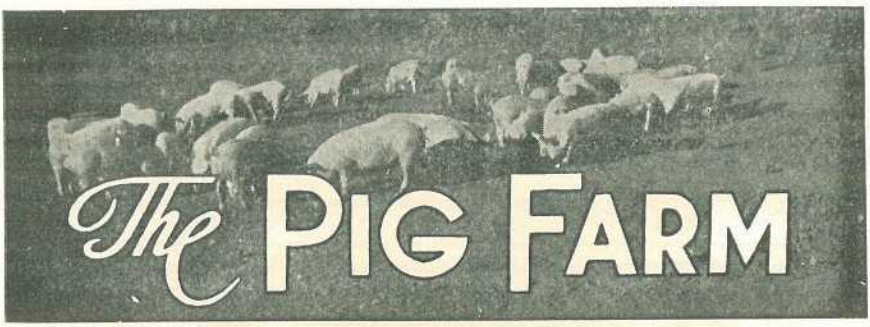
Crescent Farm Lady Bell	N. C. Mann, Broxburn	8,189·39	292·319	Myola Orphan Boy
Crescent Farm Beautiful Maid	N. C. Mann, Broxburn	6,920·26	246·828	Myola Orphan Boy
Crescent Farm Peggy's Pride	N. C. Mann, Broxburn	6,538·82	245·023	Myola Orphan Boy

GUERNSEY.

Junior, 2 Year (Standard 230 lb.).

Linwood Bittern	E. G. Foxton, Maleny	7,633·65	376·102	Warrawong Winter

Plate 38.
A GOOD CUT FOR FODDER CONSERVATION—A Field Scene near Goondiwindi.



The Bacon Pig.

F. BOSTOCK, Officer in Charge, Pig Branch.

THE Pig Industry to-day is beginning to receive the closer attention of farmers, which it should have been given years ago, instead of being looked upon as a side-line to dairying. However it must be realised that the day of "hit and miss" methods in building up a successful local and export trade have gone forever. In these times of keen competition success can only be attained by farmers who are prepared to study the demands of the consumer and realise that a first class product cannot be produced from a second class pig, no matter how efficient factory management or cure may be.

Much depends on the careful selection of boars and sows, therefore when choosing breeding stock, very careful consideration should be given to their selection. It is very true that far too many pigs of wrong type are brought on to farms where brood stock selection has not received proper attention.

To assist in this selection of breeding stock the conformation of a bacon pig should be better understood and the following points should be considered:—

Starting at the head and working back through the body, first we can consider the—

Head with Jowl and Neck, which consists largely of bone and is of low value, therefore it should be light, with no coarse fat at the jowl or neck.

Shoulders and Fore End should be light, free from wrinkles and coarseness. The collar consists largely of overlapping muscles and gristle and is a cheap cut.

Back should be long and level; it demands a high price per lb. and length means quantity, while level denotes weight and depth of loin. The fat not to exceed 1½ inches at any point.

Sides should be level and moderately deep. Distention of the lower part is accompanied by thin belly cuts, while a moderately deep side affords good depth of prime back cuts and undercuts.

Underline to be straight. The thin streaky and flank cuts are not unduly distended or thin.

Belly should be thick in flesh, because the value is increased by thickness.

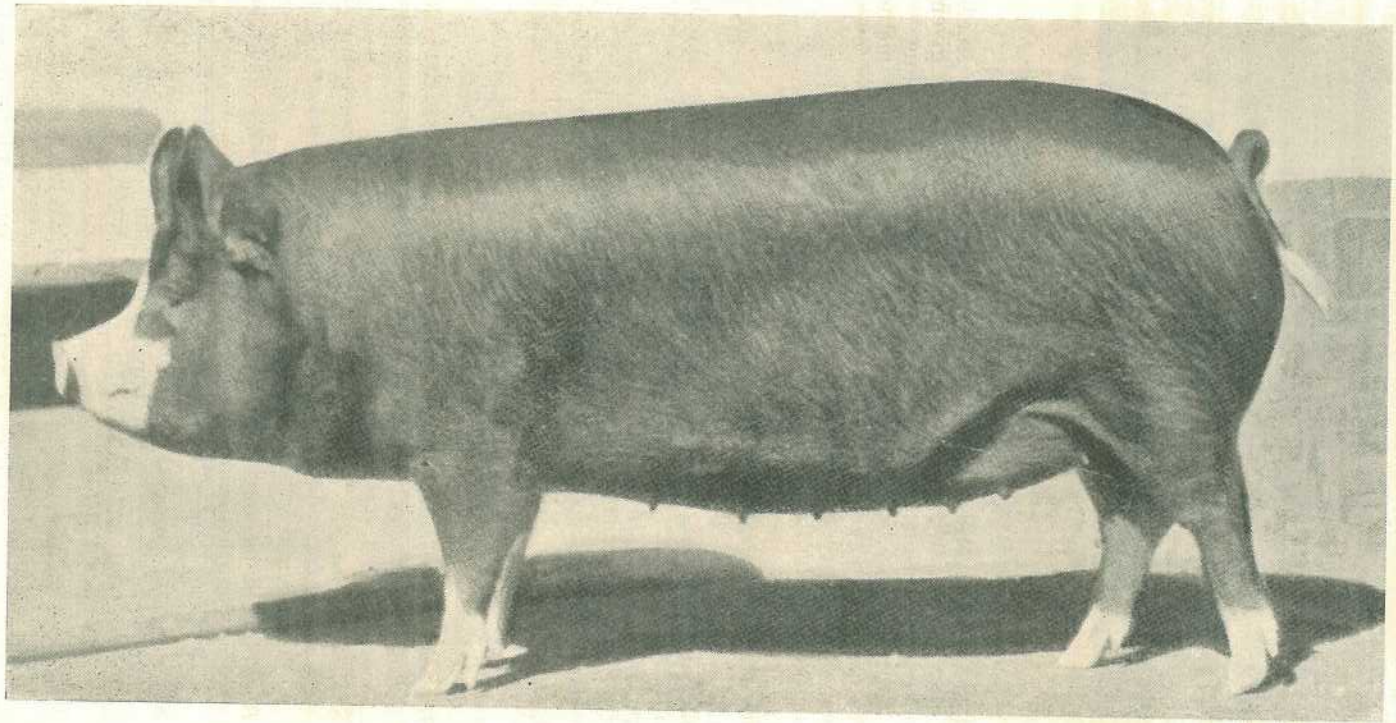


Plate 39.

CORRECT-TYPE BACONER.

Flank to be thick and handle firm and should be in line with the sides.

Ham to be broad, wide, and deep to the hock. These characteristics denote plenty of flesh. No depression should be visible at the tail, as it indicates excessive fat.

Tail to be set high, which denotes a higher proportion of flesh than when set low. However, a tail set too high indicates excessive backfat.

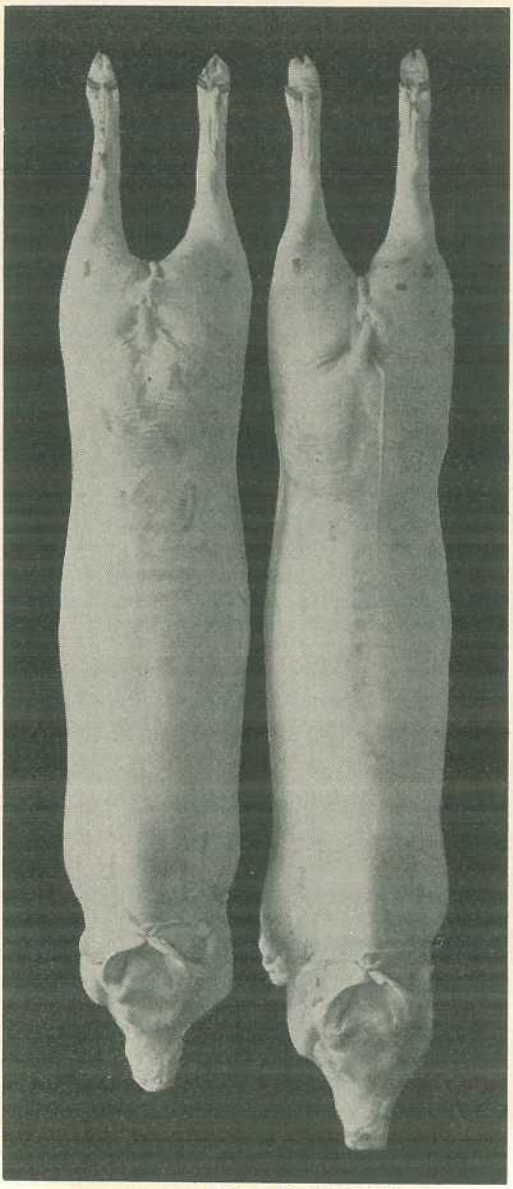


Plate 40.

COMPARISON IN CARCASS LENGTH.

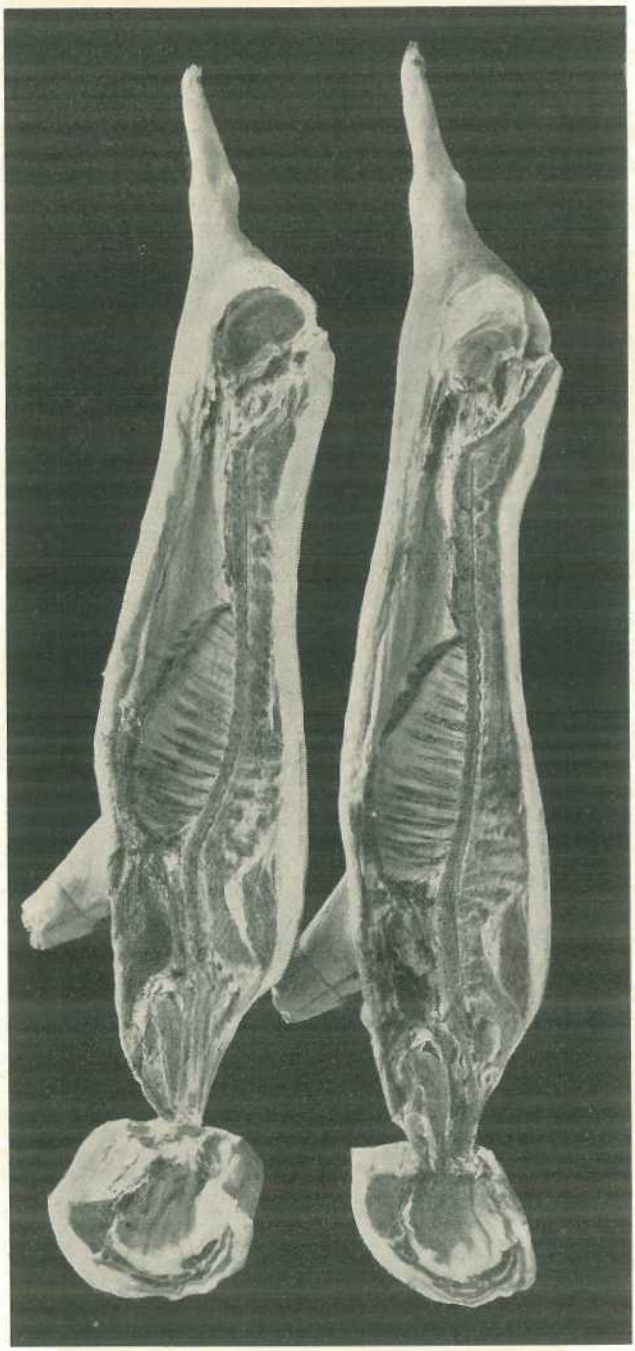


Plate 41.
COMPARISON OF FAT DEVELOPMENT.

Legs set wide apart and the pig standing well up on its toes.

Bone to be fine, which indicates quality and does not detract from weight.

Skin must be free from coarseness and wrinkles.

Hair to be fine, indicating breeding.

Now, consider briefly the pig after slaughter, by a description of the main carcass points, which may be divided into three sections. 1. Marketing points—colour, skin and dressing. 2. Breeders' points by inspection, and 3. Breeders' points by measurement. (Hammond System.)

Colour should be a clean fresh white; dark colouration due to pigmented skin; sunburn before slaughter or excessive drying in storage should be avoided.

Skin should be smooth and not too thick or coarse.

Dressing.—Bruises and weals due to fighting before slaughter, hits from sticks, kicks when loading, or bruises from fighting in truck or lorry should be absent. There should be a complete absence of hair or scraper cuts.

Breeders' points by inspection.

Hams.—The bone should be fine and ham well filled out with lean meat. The space between the legs U rather than V shaped.

Shoulders.—These should be light in proportion to the rest of the carcass, because it is a low priced cut.

Streak.—Not only should the belly be thick, but it should contain a high proportion of lean meat.

Breeders' points by measurements.

Body Length.—This is measured from the edge of the pubis bone to the junction of the sternum with the first rib. It gives a measure of the length of the valuable loin joint, which can be cut from the carcass. A high proportion of this to the weight of carcass as a whole increases the value for cutting purposes.

Leg Length.—This is measured in a straight line from the edge of the pubis bone to the tip of the toe. When taken in relation to weight of carcass, it gives a measure of the amount of bone in the carcass.

The side is now cut through at the level of the last rib. This position was selected, because not only does it expose the most valuable part, but also the latest developing part of the carcass, thus affording the best index of the state of the development of the carcass as a whole.

Eye Muscle of Loin.—The thickness is measured half-way along its width. This gives the best measure of lean meat throughout the carcass. Different carcasses vary much more in thickness than in width of the muscle.

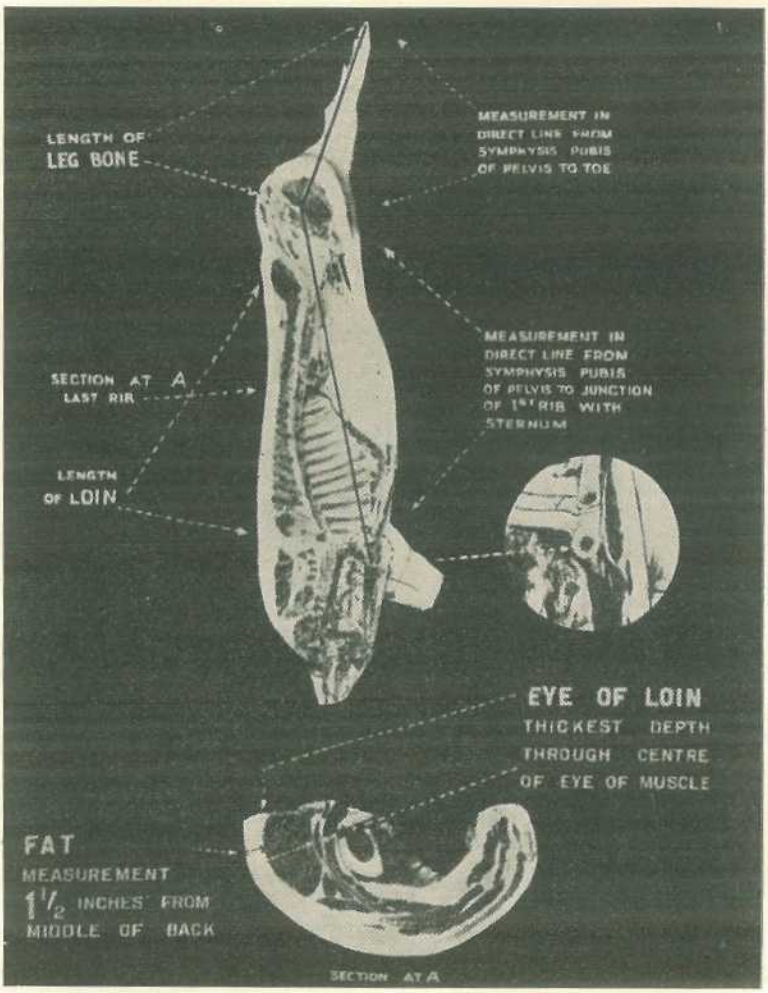


Plate 42.
Hammond System of Carcass Judging.

Backfat.—This is measured 1½ inches from the middle line, with one point of the callipers at the edge of the eye muscle and the other just on the inner layer of the skin. This gives a better measure of the amount of fat in the carcass than does the measurement of the fat at the shoulder, because it is the last part of the back to develop.

Having considered the conformation of the different parts of bacon pig, but, while good conformation is very necessary, sight should not be lost of the fact that it does not altogether denote good quality meat, which so largely depends on feeding.

Breeding exerts the greatest influence on the general conformation, but feeding influences the quality of the flesh, also colour and texture of the meat and, to some extent, the quality of the bone.

REGISTERED HATCHERIES

REGISTRATION of poultry hatcheries entails blood testing and the removal of birds found to be affected with pullorum disease, or are otherwise unsuitable for breeding purposes.

Owner.	Name of Hatchery.	Breeds.
V. H. Allen, Oxley road, Oxley	Alaura	White Leghorns, Australorps, Langshans, and Rhode Island Reds
I. M. Armstrong, Randall road, Wynnum West	Chanticleer	Australorps
P. R. Bach, Cleveland		Australorps and White Leghorns
Mrs. E. A. Baltzer, 10 Mary street, Toowoomba	Austral	White Leghorns
J. S. Bauer, Oakwood, Bundaberg	Triangle	Australorps and White Leghorns
Beach Bros., Wellington Point	Brach Bros.	Australorps and White Leghorns
J. M. Beccaris, Harvey's Range road, Townsville	Winova	Australorps, White Leghorns, and Rhode Island Reds
H. Brazil, Beaudesert road, Cooper's Plains	Brazil's	Australorps and White Leghorns
D. L. Burns, Brisbane road, Redcliffe	Yalta	White Leghorns and Australorps
P. J. C. Bygrave, Robinson road, Aspley	Craigan Farm	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca	White Leghorns and Australorps
W. Carr, A. B. and A. T. M. Watson, Logan and Creek roads, Mount Gravatt	Bellview	Australorps, White Leghorns, Minorcas, and Rhode Island Reds
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	Australorps and White and Brown Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
A. Cowley, The Gap	Melody	White Leghorns and Australorps
A. J. Daniels, Moongan	Daniel's	White Leghorns, Australorps, Anconas, Brown Leghorns, and Rhode Island Reds
T. Duval, New Lindum road, Wynnum West		Australorps and White Leghorns
E. Dearling, Haden		White Leghorns and Australorps
V. R. Dearling, 85 Holberton street, Toowoomba		White Leghorns, Australorps, and Brown Leghorns
Dixon Bros., Wondecla	Dixon Bros.	White Leghorns
E. Eckert Head street, Laidley		Australorps, Langshans, and White Leghorns
A. W. Edwards, Stenner street, Middle Ridge		Australorps and White Leghorns
C. L. Eggar, Moggill	Roschill	Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner	Australorps
Elks and Sudlow, Beerwah	Woodlands	White Leghorns and Australorps
W. Ellison, junr., Bald Knob, Landsborough	Willeden Plantation	White Leghorns and Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn	Australorps
N. H. Gibson, Manly road, Tingalpa	Gibson's	Australorps and White Leghorns
Gisler Bros., Wynnum	Gisler Bros.	Australorps and White Leghorns
R. T. Green, 116 North street, Toowoomba		White, Black, and Brown Leghorns, Australorps, and Langshans
W. G. Gregory, Deeragun	Rocks	White Leghorns, Australorps, and Rhode Island Reds
T. L. Griffiths, Margaret street, Silkstone, Ipswich	Hillcrest	White Leghorns and Australorps
J. W. Grigg, Tumoulin		Australorps and White Leghorns
F. P. Grillmeier, Milman	Mountain View	Australorps and Minorcas
T. A. Haggquist, Edmonton	White Rocks	White Leghorns
P. E. and G. G. Hannay, Ridley road, Aspley	Sunnyhill	White Leghorns and Australorps
C. Hartmann, Box 73, Pittsworth	Vigor	Australorps, White and Black Leghorns
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
L. G. Higgins, Middle Ridge, Toowoomba		Anconas, Rhode Island Reds, and White Leghorns
F. E. Hills, Sims road, Bundaberg	Littlemore	Australorps, Rhode Island Reds, White Leghorns, White Wyandottes, and Langshans
A. H. Hillenberg, Crow's Nest		Australorps
Hodgen Bros., Spring street, Middle Ridge	Austral	White Leghorns and Australorps
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington	Australorps and Rhode Island Reds
H. Hufschmid, Ellison road, Geebung	Meadowbank	White and Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
Mrs. E. R. Hurren, 44A Herries street, Toowoomba	..	White Leghorns and Australorps
H. Jones, Ridgelands	Jolly Farm	Langshans, Australorps, White Leghorns, White Wyandottes
A. J. **F. Jull,** Stradmore, Ramsay street, Middle Ridge	Stradmore	White Leghorns
W. Kelly, Parkhurst, via North Rockhampton	..	White Leghorns, Australorps, and Rhode Island Reds
R. **H. Kennedy,** 357 Bridge street, Toowoomba	..	White Leghorns, Australorps, and Rhode Island Reds
F. **E. Kipee,** 40 Hurlsey road, Toowoomba ..	..	White Leghorns
E. C. Kolberg, Handford road, Zillmere ..	Gerbera	Australorps
F. Le Breton, Bald Knob, via Landsborough..	Pagoda	White Leghorns
W. A. Lehfeldt, Kalapa	Lehfeldt's	Australorps
W. **A. Luke,** 108 Russell street, Toowoomba..	Downs	White and Brown Leghorns, Australorps, and Rhode Island Reds
J. McCulloch, White's road, Manly	Hindes	White Leghorns and Australorps
A. Malvine Waterworks road, The Gap ..	Alva	White Leghorns and Australorps
A. Mawhinney, Robinson road, Aspley ..	Aspley	White Leghorns, Australorps, and Rhode Island Reds
Mrs. P. W. E. Maynard, Doonside, via Dalby ..	..	Australorps and White Leghorns
W. S. MacDonald, Babinda	Redbird	Rhode Island Reds and Anconas
F. Maxfield, 60 Holberton street, Toowoomba	Braeside	White Leghorns
C. J. Mengel, New Lindum road, Wynnum West	Mengels	Australorps
F. J. Miller, 305 Bridge street, Toowoomba ..	Rhode Island Red ..	White Leghorns
J. A. Miller, Racecourse road, Charters Towers	Hillview	White Leghorns
H. H. Millman, Haly street, Kingaroy ..	Kingaroy	Australorps, White Leghorns, Wyandottes and Plymouth Rocks
F. S. Morrison, Kenmore	Dunglass	Australorps
C. J. Nielsen, Kensington street, Bundaberg ..	Bena Vista	Australorps, Rhode Island Reds, and White Leghorns
S. V. Norup, Beaudesert road, Cooper's Plains	Norups	White Leghorns and Australorps
H. Obst and Sons, Shepperd	College Holme ..	White Leghorns and Rhode Island Reds
H. W. and C. E. E. Olsen, Marmor	Squaredeal	White, Black, and Brown Leghorns, Anconas, and Australorps
E. E. Palmer, Greenmount	..	Rhode Island Reds
A. C. Pearce, Marlborough	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Runner Ducks, and Bronze Turkeys
W. J. Perkins, 110 Dearling street, Toowoomba	Rhode Island Red ..	Rhode Island Reds
A. J. Philp, Upper Sheridan street, Cairns ..	Aerodrome	White Leghorns, Australorps, Rhode Island Reds, Anconas, and Light Sussex
G. **Pitt,** Box 132, Bundaberg	Pitts'	White Wyandottes, White and Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
Mrs. M. Price, care Post Office, Macalister ..	..	Australorps and White Leghorns
F. M. G. Proellocks, 81 Herries street, Toowoomba	Vale View	White Leghorns
J. C. and G. E. Raff, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
G. R. Rawson and Son, Mains road, Sunnybank	Sunbeam	White Leghorns, Australorps, and Black and Brown Leghorns
C. G. A. Rivers, Tamaree	Tamaree	Rhode Island Reds and White Leghorns
C. Roberts, Trout road, Aspley	..	White Leghorns
J. Rogoff, 423 Logan road, Stone's Corner ..	Kingston road ..	Australorps
C. L. Schlencker, Handford road, Zillmere ..	Windyridge ..	White Leghorns and Australorps
P. H. Scotney, Priest street, Toowoomba ..	..	White Leghorns and Rhode Island Reds
J. Schumann, 291 Bridge street, Toowoomba	..	White and Brown Leghorns, Rhode Island Reds, and Australorps
S. E. Searle, New Cleveland road, Tingalpa ..	Tingalpa	White Leghorns and Australorps
N. G. Seymour, Ipswich road, Darra	Sohufa	White and Black Leghorns and Australorps
R. E. Slaughter, Handford road, Zillmere ..	Monarch	Australorps and White Leghorns
H. A. Springall, Progress street, Tingalpa ..	Springfield	White Leghorns
A. W. Stehn and Son, 285 West street, Toowoomba	Red Spot	Australorps, Rhode Island Reds, White and Brown Leghorns
J. P. Skelly, Helidon	Helidon	Australorps and White Leghorns
W. B. Slawson, Fraser road, Mitchelton ..	..	White Leghorns, Australorps, and Light Breeds
T. Smith, Isis Junction	Fairview	White Leghorns and Australorps
P. W. Stark, Crow's Nest	Austral	Australorps
H. M. Stephens, 160 Barolin street, Bundaberg	Barolin Stud ..	Australorps and White Leghorns
J. Stevenson, Dragon street, South Warwick	Ivanhoe	Rhode Island Reds, White Leghorns, and Australorps

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
R. Stockman, Kairi	Tinaroo	White Leghorns and Rhode Island Reds
A. H. Tebbutt, Stewart terrace, Gympie ..	Delrae	White Leghorns, White Wyandottes, and Australorps
A. G. Tietzel, West street, Aitkenvale, Townsville	Tietzel's	White Leghorns and Australorps
R. M. Thomson, Parkhurst, North Rockhampton	..	Australorps
H. G. Thorpe, Box 36, Goomeri	Thorburn	White Leghorns, Australorps, and Rhode Island Reds
G. L. Vogler and M. E. Hooper, Kenmore ..	Stonehenge	White Leghorns and Australorps
W. Warren, Progress street, Tingalpa ..	..	White Leghorns and Australorps
N. J. Watson, Lister street, Sunnybank ..	Glencoe	Australorps and White Leghorns
Mrs. V. M. White, Archerfield road, Darra ..	Viola	White Leghorns and Australorps
P. A. Willson, Board street, Deagon	Myara	White Leghorns and Australorps
G. A. C. Weaver, Herberton road, Atherton ..	Weaver's	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
F. H. J. Weeks, Bajool	Glen Brae	White Leghorns and Australorps
Miss I. G. Winter, 761 Ruthven street, Toowoomba	..	White Leghorns
Miss L. M. Wooller, Huet street, Rockhampton	Riverview	Rhode Island Reds, White Leghorns, and Australorps
P. A. Wright, Laidley	Chillowdeane ..	White and Brown Leghorns and Australorps
A. Wruck, Main road, Upper Brookfield ..	Wrucks	White Leghorns and Australorps

Plate 43.

The Eungella Range Road, near Mackay, Queensland.

ANIMAL HEALTH

The Buffalo Fly.

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

THE two most important pests of cattle in Australia are the cattle tick and the buffalo fly. Both of these were introduced into the Northern Territory from the East. The buffalo fly arrived on buffaloes in 1828. During the next 100 years it spread across to the northern coast of West Australia and over the border into north-west Queensland. Immediately it appeared here regulations were enforced whereby cattle could travel from this area only after being sprayed with a repellant fluid at railhead. These restrictions prevented the fly from spreading for over ten years, but in 1939 an abnormal and prolonged wet season permitted it to move rapidly eastwards across the Gulf of Carpentaria. This movement continued in subsequent years and, in the summer of 1942-43, it occupied all dairying areas on the east coast of Queensland as far south as Townsville. Its advance south from here has been rapid. Any attempts at this stage to forecast the southern limit of its distribution, or, rather, how far south it will go before it ceases to be a pest, would be simply guessing. It is expected that the fly will cling mainly to the coastal areas. It will probably progress some distance inland, but this is dependent upon temperatures and rainfall. Low temperatures and dry conditions are unfavourable.

DESCRIPTION AND HABITS.

The parasite (Plate 44, fig. 4) is about half the size of a common house fly. It is usually associated only with cattle and buffaloes, but will also attack horses, sheep, pigs, dogs, and man, but only when these are close to cattle, for the fly can live only where cattle and buffaloes are found. Among cattle, it has a preference for bulls, stags, aged cows, and beasts in poor condition. Calves generally carry relatively few flies. It lives on blood and has a very painful bite. A few flies are of little importance but, when conditions are favourable, single animals may harbour several hundred to a few thousand flies. They congregate in greatest numbers around the withers, shoulders, and flanks, but on windy and rainy days they move to more sheltered positions. The spread from beast to beast is by flight, and when disturbed the flies rise in a swarm and settle again very rapidly. It is not known how far buffalo flies can travel in flight. The distance is at least two miles, and is probably greater. The irritation caused when they pierce the skin and suck blood prevents the animals from feeding and resting. They are kept on the move trying to find some relief. Beef cattle lose condition or fail to fatten. Among dairy cattle the fly is considered to affect the milk yield. A proven source of very serious loss is the damage caused to the hides by the efforts of the animals to rid themselves of the pests by rubbing against fence posts and trees. As the animals become accustomed to the flies, however, they become less worried and the ill effects are less conspicuous.

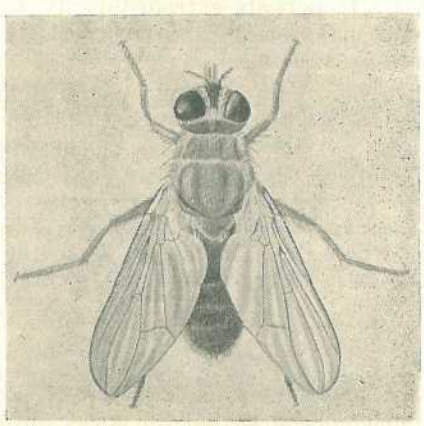
LIFE HISTORY.

The buffalo fly lays its eggs in the freshly dropped dung of cattle and buffaloes. The egg (Plate 44, fig. 1) hatches in about 24 hours and the maggot which emerges feeds in the dung. It is a typical fly maggot and is fully grown in about 4 days when it is about ¼ inch in length. The fully-grown maggot (Plate 44, fig. 2) then descends into the lower parts of the dung or into the soil and becomes a small, brown, barrel-like body ⅛ inch long (Plate 44, fig. 3). Inside this puparium, as it is called, the adult fly is formed and in about 4 days the fly emerges, dries its wings and flies off. Thus, in summer time,

1

3

2



4

Plate 44.

THE BUFFALO FLY: Fig. 1.—Egg x 30; Fig. 2.—Larva x 16; Fig. 3.—Pupa x 16; Fig. 4.—Adult fly x 16.

[Drawn by I. W. Helmsing.

a new generation may be seen every 8 or 9 days, which means that, under favourable conditions, the flies can increase very rapidly. There is little information as to how long flies will live on an animal, but this may be several weeks. Once removed from their host, however, they rarely live longer than about 24 hours.

CONTROL.

The restrictions imposed on cattle moving from infested areas in Queensland have proved very irksome to the owners. These restrictions have not prevented the fly from spreading, but they have so successfully delayed its advance that, from the economic aspect, they have been

well worth while. For example, from 1930, cattle were passing through Townsville in large numbers from the infested north-west areas, after being sprayed and trucked at railheads on the north-west railway, and at no time were any flies carried through. When the Townsville district became infested in 1943 the flies came from the northern coastal areas. Once the fly reached this district its control become more difficult, for it was then in very favourable country with cattle distributed in large numbers all the way to the New South Wales border. Two spray treatments have been employed, one within the fly area, the other on its margin. Although the spread south has been much more rapid than previously, these sprays must be credited with slowing down the pest's advance.

Recent work by the Council for Scientific and Industrial Research has shown that very good control on infested properties can be obtained by the use of D.D.T. and also by trapping.

The Use of D.D.T.

D.D.T. will kill most species of insects when they come into contact with it. When applied to cattle it does not keep buffalo flies from alighting on the animals and attempting to feed, but once they have come into contact with hair or skin sprayed with D.D.T. the flies are killed. It persists extraordinarily well and animals which have been treated may remain free from flies for periods which may extend up to two to three weeks.

D.D.T. is particularly useful against insects which move about on an animal's body. In such cases, good results have been obtained by treating only certain areas of the body, for sooner or later the insects move to this area and come into contact with the poison. The buffalo fly has these habits and it is necessary to spray only those parts of the body which are specially favoured by the flies, such as the shoulders and withers. A further saving in the cost of spraying can be made by taking advantage of the habit of the fly of moving from beast to beast, and it has been found that excellent control can be secured from treatment of only half the herd.

D.D.T. may be applied either as a watery emulsion or suspension, or as a solution in oil. When used as an emulsion or oily solution, the recommendation is that the spray applied to cattle should contain 4 per cent. D.D.T.

Emulsions.

There are several emulsions on the market, all of which carry instructions for breaking down to the recommended strength of 4 per cent. Emulsions, when applied at the rate of 1 gallon of 4 per cent. D.D.T. per 80 head, give good protection, which in cases of heavy infestation may be expected to last about two to three weeks. These may be applied by means of a powerful hand continuous atomiser. It is necessary to treat only the shoulder and withers, and these parts of the body should be saturated with the spray.

Where large numbers of cattle are to be treated, the use of a hand continuous atomiser may become laborious. The knapsack spray is much easier to use, but can be very wasteful. Much of this waste however, can be avoided. Knapsack sprays are issued with a pair of large aperture nozzles and a pair of small aperture nozzles. Use the smaller nozzles, keeping the pressure in the pump well up and direct the spray on to the animals, holding the nozzle about 18 inches away.

Household sprays such as used for spraying for flies and mosquitoes in houses are useless where saturation is required, as they give too fine a spray.

Solutions.

D.D.T. is not soluble in water, but can be brought into solution in several other liquids, including fluids such as kerosene and petrol. One of the best and cheapest solvents to use is power kerosene. A 4 per cent. solution of D.D.T. can be obtained by dissolving 1 lb. of D.D.T. in sufficient power kerosene to make 2½ gallons of spray.

Oils like power kerosene have a very irritating action on the skin when applied too liberally or too frequently. This oil solution of D.D.T. should be delivered therefore as a fine mist, sufficient only to wet the hair. Protection against the fly given by this solution is less than that obtained from emulsions, but this is to be expected as a much smaller quantity of D.D.T. is sprayed on to the animals.

The safest and cheapest way of delivering this solution is by means of a household atomiser; for example, a Flit gun. A few puffs to each area of the body to be treated is sufficient. When used at this rate 2 pints will protect a herd of cows for more than one month.

Suspensions.

In this type of preparation, particles of D.D.T. are held in suspension in water. With one particular commercial "water soluble" preparation at a dilution containing 2 per cent. D.D.T., results against buffalo fly comparable with those obtained with emulsions were secured in experimental work carried out by the Council for Scientific and Industrial Research.

Protection of Dairy Cattle.

These are most conveniently treated in the bails. The first treatment should include all animals, but thereafter control can be maintained by treating only the proportion of the herd harbouring the most flies. Dry dairy cattle are best handled in the manner advised for beef cattle.

Protection of Beef Cattle.

Both beef cattle and dry dairy cattle can be treated in the crush after passing through the arsenical dip used for routine dipping for cattle tick. A 4 per cent. D.D.T. emulsion or 2 per cent. "water soluble" commercial suspension should be used, as these give the longest protection against the flies, and this is very desirable with cattle which are not handled very often. The suspension or emulsion is applied with a hand continuous atomiser or a knapsack spray in the manner already described.

Undoubtedly, a dip charged with D.D.T. would be the best to use, for this would kill all ticks and protect against buffalo fly at the same time. The practical use of such a dip depends on the stability of D.D.T. preparations and their cost. Emulsions are unstable and at present very costly, and the suspension type of preparation is more promising. In trials carried out by the Council for Scientific and Industrial

Research, dips charged with this suspension containing 0·5 per cent. D.D.T. have given a little more than 14 days' protection against the fly. Furthermore, these tests have shown that the suspension will remain reasonably stable in the dip.

Warning.

D.D.T. is a poison and must be handled with care. When used in the dairy shed every consideration must be given to prevent it getting into the milk. The milk buckets should be removed when spraying is in progress. Contamination of the udders should be avoided and the hands should be washed after using the spray. Heavy contamination of the human skin with emulsions or oily solutions may be dangerous, and due precaution should be taken to prevent this.

Trapping.

Trapping when used in conjunction with D.D.T. spraying gives excellent control. Even in the absence of spraying, trapping may be expected to bring about a considerable reduction in the numbers of the pest. Details of the trap recommended by the Council for Scientific and Industrial Research may be had on application to the Department of Agriculture and Stock, Brisbane. Briefly, this method of control comprises:—

(1) The erection of traps through which the cattle are trained to walk. These traps are wooden structures, with glassed-in sides and roof. A number of canvas strips hang from the roof inside the trap. As the cattle walk through the flies are removed by the canvas strips as they brush against the body. The flies when removed from the animal fly to the glass on the sides and roof. This glass is treated with D.D.T. and contact with this kills the flies. The D.D.T. on the glass will last for several months.

(2) The trap must be used at least twice daily. This can be assured by building it into the fence of the milking yard so that cattle pass through it on the way to the milking shed.

(3) With a little patience, there is no difficulty in getting the cattle accustomed to the trap. This is done by passing them through it for several days before the canvas screens are hung. Then, by adding the curtains gradually, the cattle can be accustomed to forcing their way through. The practicability of these traps is shown by the fact that after this training cattle realise the association between walking through the trap and freedom from the fly and will walk through of their own accord.

The traps so far have been adopted mainly for the protection of dairy cattle. They should be capable of use for beef cattle also, as they are in the United States. Any beef cattle owner who wishes to try them could erect one or two traps in a fence shutting in a regular watering place. The cattle would have to be watched very carefully until they have become accustomed to the traps (see (3) above).

Dr. Eugen Hirschfeld.

AN APPRECIATION.

A LINK with the earlier medical and scientific life of Queensland was severed by the death on his property at Bybera, Darling Downs, on the 18th June, 1946, of Dr. E. Hirschfeld. To readers of the *Queensland Agricultural Journal* and to farmers and pastoralists generally the name of Dr. Hirschfeld is familiar for his work in pastoral research, the results of some of which were published in the pages of this Journal.[1] He had often addressed members of the Royal Society of Queensland, the Royal Geographical Society of Australia and members of Parliament on his pet subject—pasture improvement.[2] Soon after taking up Bybera in 1929, he started making a collection of the grasses and fodder herbs of the property and had them neatly mounted in a large volume which he always jokingly referred to as the "Herbarium Byberense," a sly dig perhaps at the botanists' weakness for technical words.

Plate 45.

THE LATE DR. E. HIRSCHFELD.

He had a very simple and lucid way of writing and took great pains over the preparation of his articles. If he used a long word, he used to look at it and say to himself, naming perhaps a labourer known to him, "Now, could so and so understand that?" If he could not satisfy himself on that point, he did not rest until he found a shorter word or was able to rewrite the sentence in a simpler form.

He had a particular fondness for the brigalow and belah country, looking on it, if properly handled, as one of our greatest assets. In an article in this Journal for April, 1938, he claimed that no country could compare with cleared brigalow country in its drought-resisting capacity, due primarily to the peculiar colloidal subsoil holding moisture for an exceptionally long time. He was a great advocate of poisoning brigalow as opposed to mere ringbarking, also in waiting some years before burning off, as fire is the chief cause of suckering.

He lost no opportunity in preaching the use of licks rich in phosphates to counteract the lack of phosphorus in many of our soils, and was a strong advocate of the use of a lick originally manufactured under the direction of Dr. Montgomery White, the present Agricultural Chemist. Phosphorus

is, as he pointed out in an article in the *Queensland Agricultural Journal* for September, 1940, associated both in plants and animals with the process of reproduction. It follows that keeping up the phosphatic balance means an increased lambing and calving. As a source of vitamins where other vegetables were hard to obtain, he was a keen advocate of the use of native plants, such as pigweed, warrigal cabbage, saltbush, and bluebush. An account of the native plants that can be used as vegetables, mostly as spinach substances, appeared from his pen in the *Queensland Agricultural Journal* for March, 1939.

Apart from all the foregoing the late Dr. Hirschfeld was, of course, well known and highly respected in his own profession. He was born near Breslau (Germany) on the 22nd January, 1866. He graduated from Strasburg University in 1887, and took his M.D. degree in 1889. He was a pupil of some well known figures in German science of the last century—Virchow, Koch, Cohnheim and Hoppe-Seyler. He arrived in Australia in 1893, and was admitted M.D. *ad eundum gradum* by the University of Queensland in 1911, and served on the Senate of the University from 1910-1914; and also as a member of the Legislative Council in the Parliament of Queensland. He wrote many papers on various aspects of preventive medicine, in particular tuberculosis, and a classic description of dengue fever.

He had a ready wit. On one occasion soon after a visit with him to Bybera, we met the editor of the local paper, who said, "I suppose you are a regular pair of bush-whackers now." "White," said the old doctor, "he has just paid us a *very* great compliment." He had a great love of the land and for the people of the land, and was never happier than when, during brief respites from the demands of a large medical practice, he was riding among the stock in the Bybera paddocks or working on his pasture experiment plots or recording the practical results of his soil and pasture studies.

Dr. Hirschfeld was a colourful personality of great gifts and strength of character. World travelled, he spoke several languages fluently and was an authority on classical literature, quoting often from original Greek and Latin works. To those privileged to enjoy his friendship he was a good companion and a remarkably interesting conversationalist with an extraordinary range of human interest, an unusually wide knowledge of men and affairs, and an all-embracing charity. His passing certainly leaves a blank in the professional, cultural and social life of the State.

—C.T.W.

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[1] *Some Pasture Problems of Western Queensland.* (Aug., 1936.)
Soil Problems in Brigalow and Belah Country. (June, 1937.)
Concerning the Brigalow. (April, 1938.)
Australian Native Vegetables. (March, 1939.)
The Phosphorus Problem in Western Queensland. (Sept., 1940.)

[2] *Our Western Pastures.* (Paper, Royal Geographical Society of Australia (Q), 27th Oct., 1942.)
Queensland Pastures, Their Development and Improvement. (An address to Members of the Queensland Cabinet and of the Legislative Assembly and Senior Government Officers, Brisbane, 31st Jan., 1945.)

GENERAL NOTES

Shortage of Poultry Feeds.

A serious position faced the poultry industry as a result of the acute shortage of poultry feeds, said the Minister for Agriculture and Stock (Mr. H. H. Collins) recently. He stated that he had discussed the problem with members of representative bodies within the industry and decided to make a survey of flocks and the feed position generally. This survey is now completed and reveals that there has been little, if any, reduction in poultry flocks during the last twelve months. The survey of the feed position indicated that the present wheat supply will be approximately five-sevenths of that for the corresponding period of last year. In addition, there is no barley or sorghum available, and the volume of maize production is not yet known, but the prospects are that it will be less than last year. Oats, if available, must be transported from South Australia, and shipping problems are at present holding up supplies. Bran and pollard supplies to the principal mash mixers are also in short supply.

With the resumption of killing at the meatworks, there should be fair supplies of meat, but it is doubtful whether all requirements could be satisfied. Because of the lack of winter rains there will be few, if any, early grain crops.

On an aggregate, said the Minister, there will be only forty per cent. of food available for the July to December period of this year in comparison with the corresponding period of last year.

In summing up the position, Mr. Collins stated that there will definitely not be enough feed to maintain present poultry flocks at existing levels, and he urged all poultry raisers, for their own protection, to reduce their food requirements by rigorous culling of their flocks.

Every effort has been and is being made to obtain feeding grains and mill offals from southern States; however, it may be found impossible, on the present outlook, to obtain the necessary supplies.

Relief for Dairy Farmers.

The Minister for Agriculture and Stock (Hon. H. H. Collins) has announced that the Government had decided to relieve dairymen of their obligation in regard to the amounts still outstanding on account of assistance extended to them during the 1936 drought period. This assistance was granted in order to minimise stock losses resulting from the shortage of feed and to keep up production as far as possible under the conditions prevailing at the time.

The Government has now decided to relieve dairymen of the obligation for payment of approximately £8,600.

Dairy associations and factory managements who carried out the work of distributing the assistance and collecting repayments are entitled to the thanks of both the Government and the dairy farmers concerned, Mr. Collins added.

For Frosted Pineapples.

The Minister for Agriculture and Stock (Mr. H. H. Collins) has announced that a quantity of sulphate of ammonia will be made available to pineapple growers whose crops have suffered frost damage in the coastal area south of Isis Junction. Application forms for this purpose are available at licensed fertilizer dealers and from officers of the Department of Agriculture and Stock. The last day for lodgment of applications is 31st August, and applications received after the closing date will not receive consideration.

East Moreton Stallion Board.

For the purpose of the examination of stallions at the Royal National Exhibition, the East Moreton Stallion Board has been constituted in pursuance of the provisions of "*The Stallions Registration Acts, 1923 to 1940.*" The members are:—Messrs. A. F. S. Ohman, M.V.Sc. (Divisional Veterinary Officer, Department of Agriculture and Stock), chairman; D. Jackson (Teneriffe); and T. MacDonald (Wooloowin).

Rural Topics

Record Price for a Beef Bull.

Years ago a team of A.I.F. Diggers interested in British stockbreeding was doing the rounds of agricultural shows in the Old Country. At the Highland Show at Edinburgh that year they saw one of the finest parades of beef cattle they had ever seen in any show ring. One particular beast filled the eye as a perfect type of Hereford, a bull, Edgcote Hero by name, with straight-edge top and under line, built close to the ground, and all beef right down to the hoof, and which had just been sold to an Argentine buyer for 10,000 guineas. Not long before they had been on a stock farm outside Inverness, in the north of Scotland, where they had seen one year's crop of bull calves—only 15 in all—which had been sold to another Argentine buyer for 2,000 guineas a head—or 30,000 guineas for the lot. Many similar cases of top grade beef breeders and big prices had come within their experiences on that Scottish tour and they all, naturally, left a deep impression on the minds of those Australian stockmen—an impression not only of science, skill and brains in breeding, and of spectacular rewards, but of the enterprise of Argentine cattlemen, Australia's competitors in the British meat market.

A reader has kindly brought under notice a recent copy of "The Scotsman," the great Edinburgh daily newspaper, containing a report of the previous day's dealings at this year's Perth (Scotland) bull sale, at which the reserved junior champion Shorthorn bull brought no less than 14,000 guineas. That revived a memory of the 10,000 guinea bally bull already mentioned parading round the ring at Edinburgh and which seemed something in quality and sale value near the ultimate of a cattleman's dream; but 14,000 guineas walking on four legs in a saleyard is certainly something worth talking about. Even that price was not the record for the last Perth bull sale, for a new world record for a Shorthorn had been set the day before when 14,500 guineas was paid for a half brother of the 14,000 guinea bull. Herd averages at the sale also were spectacular, ranging up to 7,500 guineas. In the saleyard many Shorthorn cattle families, famous the world over, were represented. And here is a significant point: American and Argentine buyers were very active at the sale, running the bidding up to the big figures.

Such a record of high quality stock and spectacular purchases is obviously a reminder that the whole future of the Australian cattle industry depends on quality. That is why the parade of stud stock in any show ring, and especially at the Brisbane Exhibition, is always a satisfying sight.

Although present world requirements of meat far exceed the available supply, and for some years at least there will, perhaps, be no difficulty in selling our exportable surplus, it is necessary to take the long view and plan to meet the keener competition on our export markets which will surely develop as normal times return. American and Argentinian cattle breeders are obviously awake and are among the keenest buyers at the bull sales in the Old Country, which, as everyone knows, is the stud stock farm of the world.

Grazing is necessarily a long-range business, and success depends on the soundness of the herd foundation and the quality of replacement stock. That is why the show ring is so important, for in the arena can be seen how sound breeding principles work out in practice, how stock can be improved by selection, breeding and feeding, and how essential science is to animal husbandry.

The fact that Australia's competitors, notably those of the Argentine, have never slackened in their demand for the best of stud beef bulls has to be fully appreciated. It seems certain that importations of stud stock to Australia as an infusion of new blood will be delayed until the shipping position has improved. Australian cattle breeders have, however, maintained high stock standards, in spite of wartime difficulties, as is evident at show parades and at recent stud stock sales.

On the prospects of our beef trade generally, the domestic demand must expand as our population increases. Then there is the possibility of market expansion in the countries north of this continent where changing habits and, perhaps, increasing purchasing power, may strengthen the demand for our pastoral products.

Still, as a Scotsman would say, that 14,000 guineas walking on four legs in the Perth bull ring must have been a grand sight.

AN EDUCATIONAL FILM LIBRARY.

The Shell Educational Film Library established in 1940 was the first free sound film library to be instituted in Australia, and now has comprehensive branch film libraries in four capital cities. The Brisbane Branch Library was opened on 1st August. The library is open to any operator of a 16 m.m. sound projector, provided the equipment is not used for personal gain. It consists of six copies of each of more than 120 subjects of great variety and excellent quality, ranging from strictly technical subjects, which during the war were used widely by Army and Air Force and educational institutions for instructional purposes, to documentary and general interest subjects of high educational and entertainment value.

More than a quarter of a million feet of 16 m.m. sound film is distributed every month to hundreds of borrowers in every corner of the Commonwealth. The service is entirely free, the sole obligation of the borrower being payment of return freight on film packages. Shell pays the outward freight and all other charges in connection with the administration, upkeep and operation of the highly organised system necessary to ensure the smooth operation of such a big output of film.

Plate 46.

Processing the Shell 16 m.m. Technicolour Film, "London Victory March."

Typical of these productions is the latest addition to the library, a technicolour film of "London Victory March." Of special interest in this short is the march past of the Australian Victory Contingent. This film was taken in London and processed in Australia.

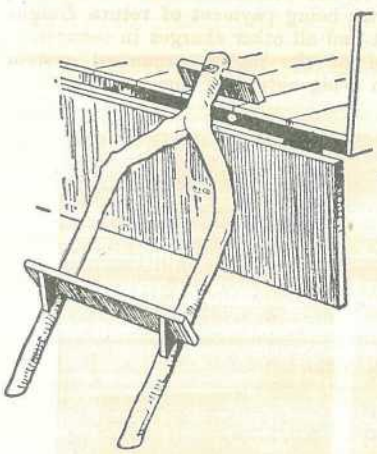
Another outstanding film is "The Mosquito," a documentary film depicting the life history of the mosquito and the malaria parasite, together with control measures used in Eastern countries as well as in Australia. The Australian section of this film was produced with the co-operation of the Health Department of the Brisbane City Council as well as the Army and Medical Authorities in Queensland.

This film is still being used for the education of children attending primary schools in the metropolitan area, and also extensively in country centres for the education of school children.

Other outstanding films include "Under Western Skies" and "Permanent Agriculture," in which causes of soil erosion are strikingly pictured. This month, both these films have already attracted appreciative audiences in Darling Downs centres. This form of visual education is intensely practical and the Shell Film Unit is to be commended for setting an excellent example in national service.

GADGETS AND WRINKLES

A BAG LIFTER FROM BUSH TIMBER.



This is quite a good home-made bag lifter, the fork being 1 ft. longer than the height of the cart.

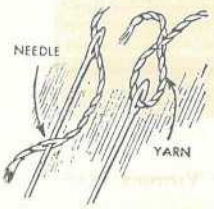
A cross-piece is bolted across the single end.

In use, this rests on the tail of the cart and stops the wobble when the fork is lifted.

Across the opposite side of the form (22 in. from the ground) is a 4 inch wide platform, or step bolted to each leg by a long bolt.

Rest the crosspiece against the back of the cart, then upend a bag of super against the step; then lift its lower end. Heave the bag on to the step, then upend the fork, bag and all, and dump the bag on the cart. It calls for much less effort than a straight-out lift of 3 ft. 6 ins. does.

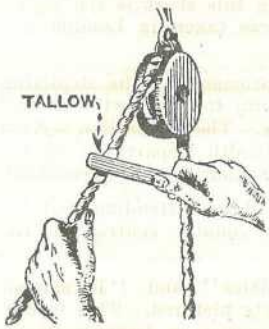
KEEPING YARN IN THE EYE OF A NEEDLE.



The annoyance of having yarn or twine pull from the eye of a needle and so cause frequent rethreading may be avoided by first pulling the yarn through the eye and then spreading the strands near the end that was pulled through and then inserting the needle as shown.

This will make a smooth tie without a knot and its use will be found very convenient on many occasions. It also helps to avoid losing quite a number of needles.

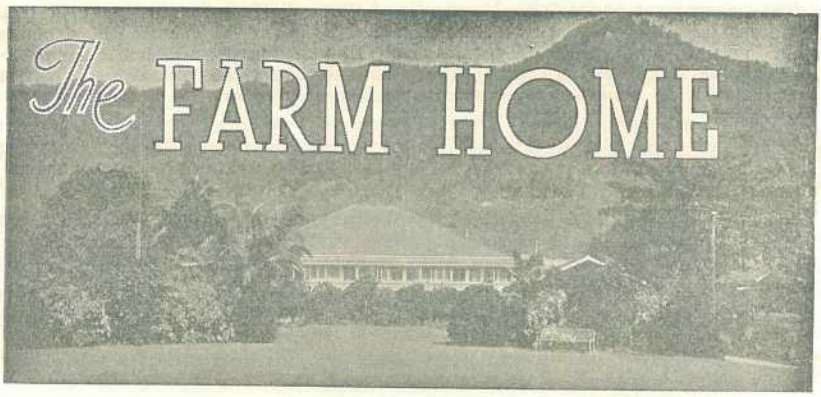
TALLOW SLOWS UP ROPE WEAR.



This is a very useful idea to obtain the maximum wear from rope. Tallow rubbed into any manila, cotton or linen rope at points which get the greatest wear will do wonders towards lengthening the life of the rope as well as making it easier to handle, especially in wet weather.

Genuine mutton or sheep's tallow is best and will not tend to rot the fibres.

The items on this page have been extracted from "Handy Farm and Home Devices and How to Make Them," a recent notable work by J. V. Bartlett, published in Adelaide on behalf of the War Blinded Association. Arrangements are in train for early distribution of this very useful book in Queensland.



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.

BEFORE BABY IS BORN.

QUEENSLAND has reason to be very proud this year, because a new record has been established, and a more important record than any in the worlds of trade or sport, and that is the lowest infant death rate and the lowest maternal death rate in the history of this State.

When the first Maternal and Child Welfare Centres were opened, approximately 59 babies and 3 mothers died for every one thousand babies born. Last year, the number was reduced to just over 29 babies and 2 mothers, which means a saving of the lives of almost 800 babies and 27 mothers for the year.

"How has this been achieved?" it may be asked. The reply is:—"By improving the care and supervision available to the mother before baby is born, by encouraging every mother to feed her own baby, and by making available in our welfare centres regular trained supervision of baby's health, feeding and management from the time his mother leaves hospital."

However, although this reduced death rate is the lowest on record, it is not yet good enough. We realise that still far too many babies die in the first month of life, and we feel that *every* mother should be able to go through her confinement safely and be healthy afterwards, and we know that this is all part of one problem. We can only save these new-born babies by saving their mothers—if we save the mothers, they will save the new-born.

The key to our problem then is the period *before* baby is born, known as the ante-natal or pre-natal period. The deaths of mothers in child-birth and of very young infants can not be reduced merely by providing hospitals and medical and nursing care for the time when baby is born. What must be done is to make sure that every expectant mother has specialised care for the whole 9 months of her pregnancy. To achieve this, we must have the co-operation of every prospective mother, and every prospective father too, because a father can do a great deal to encourage his wife to obtain the help and advice available for her at these times.

In Queensland we are fortunate in that ante-natal care is in fact available for every mother. If she intends to have her own family doctor to look after her when her baby is born, she should visit him as soon as she knows she is pregnant, and he will be pleased to arrange for her to call regularly for supervision right up to her confinement. If, however, the mother intends to have her baby in a public hospital, she should arrange to attend the ante-natal clinic attached to that hospital during her pregnancy.

The Government, through its Maternal and Child Welfare Service, has established free ante-natal clinics in both North and South Brisbane, so that mothers who are unable to travel to the hospital regularly, or who are having a nurse only to look after them when baby is born, may arrange with the sisters at their nearest Maternal and Child Welfare Centre to have medical supervision at one of these clinics.

Country mothers who cannot attend either doctor or hospital regularly can enrol with the Ante-natal Correspondence Service at 184 St. Paul's Terrace, Brisbane, and receive a monthly letter of helpful advice related to this particular period of pregnancy, and also a booklet called *The Expectant Mother*.

The sisters at any Maternal and Child Welfare Centre, who are general, obstetric and child welfare-trained nurses, are always willing to supply patterns of baby clothes, and advice on these and any other personal problems. Next month, we shall consider the special points of ante-natal care.

Further advice on this and other matters 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.

Eggless Sponge Pudding.

Two cups plain flour, 1 teaspoon ground ginger (if liked), 1 cup golden syrup, ½ cup butter, ¾ cup hot water, 1 teaspoon bicarbonate soda. Sift flour and ginger into a basin and add the golden syrup. Put butter into a cup and fill cup with hot water. When butter has melted add soda, and when soda has dissolved mix into the flour, &c. Mix thoroughly, put into a buttered basin, and steam two hours. Serve with sweet sauce.

Roly-poly Pudding.

Three ounces grated suet, ½ lb. flour, a pinch of salt, ½ teaspoon of baking powder, cold water, 4 oz. jam. Add to the suet the flour, salt and baking powder. Mix well and make into a firm paste with water. Roll out ¼ inch thick. Wet the edges all round, and spread the paste with jam. Roll it up into the shape of a bolster, and press the edges together securely. Put the pudding into a floured cloth and tie both ends. Have ready a pan of boiling water, put it in without bending it, and boil quickly for two hours.

Apple Pie.

Peel and core some juicy apples and slice them. Butter a fireproof dish and put in a layer of apples and then a layer of chopped candied peel, some cleaned currants and a little mixed spice. Put the melted butter over this and continue with layers of apple and candied peel and currants. Over the top add a cup of sugar and a cup of hot water and cover the pie with pastry. Bake in a hot oven.

Rhubarb Pie.

Hot water pastry: Six ounces flour, 2 oz. lard or suet, ½ teaspoon salt, ½ gill milk, water, or a mixture. Filling: ½ lb. rhubarb, 1½ oz. sugar, water. Sieve flour and salt. Put fat and milk or water in a pan—bring to boiling point. Pour into centre of flour. Beat and mix with wooden spoon until a pliable consistency. Shape pastry into a cup—place fruit and sugar into cup. Cover with pastry—mark edges. Bake in a hot oven 40-45 minutes. Serve hot or cold.

Golden Syrup Pudding.

Mix 2 tablespoons cornflour, 2 tablespoons sugar, and 2 eggs to a paste. Then add 2 heaped tablespoons golden syrup. Pour two pints boiling milk on to the mixture. Stir into a smooth mixture and bake for 15 minutes.

Honey Lemon Pie.

Take 1 cup of honey, 3 egg yolks beaten lightly, 1 tablespoon flour, juice and freshly-grated rind of 1 lemon, 1 tablespoon melted butter. Mix thoroughly in order given, then add 1½ cups milk. Line pie plate with pastry, bake golden brown, pour in lemon and honey mixture and bake till set. Cover with meringue made with egg white beaten with 3 tablespoons honey and a few drops of lemon juice and browned lightly.

QUEENSLAND WEATHER IN JULY.

There were a few showers in a restricted area along the North Coast Barron and Peninsula which brought aggregate district rainfall totals to 18 per cent. below and 5 per cent. above normal respectively, otherwise over the greater part of the State it was rainless. Deficiencies ranged from 83 per cent. to 100 per cent. below average, including 11 districts in the 95 to 100 per cent. category. July makes the third exceptionally dry and mainly rainless month in succession, and the aggregate average figures for May, June and July incorperated below in the District Rainfall Table indicate in most cases a record three months dry spell. General pastoral and agricultural prospects have steadily deteriorated and the lack of surface water is acute in many places. Badly spaced or poor inland rain distribution during 1945 (and for three previous years in the Southern Interior) was partially offset by useful monsoonal falls in January. Improved conditions, at that time, were not consolidated for winter carrying, as normal summer rains failed and conditions have steadily deteriorated. Early and abundant general rain is required during August and September, normally low rainfall months, to revive all pastures and replenish surface water. Up till the end of March and early April tropical coast and adjacent highland areas, parts of the Downs and Moreton Divisions had received abundant to flood fall totals, but since then the few isolated showers have been valueless to agricultural and dairying industries. Most of the Port Curtis and adjacent highland areas missed the summer flood rains and received a poor distribution in 1945. From the Maranoa to the Central and South Coast early relief is urgent. With no rain during the critical cultivation and sowing period practically no wheat could be successfully sown and in central and southern cane areas cold to frosty night conditions have contributed added adverse effects.

Pressure.—Abnormal activity was maintained in the southern low pressure belt but none of the rapidly moving centres penetrated far enough inland to have any normal winter season rain producing influences in Southern Border districts, though at times moderate westerly winds in those districts, accompanied the movement of the more vigorous southern low centres and spread dust and smoke haze over most of the State. The stability of the prevailing continental "high" over inland Australia was practically unbroken, with resultant cloudless conditions, persistent frosts and maximum hours of sunshine.

Temperatures.—Consistent moderate maximum readings accompanied the cloudless conditions and averages were well above normal, ranging from 0.9 deg. above at Georgetown and 1.2 deg. at Palmerville to several over 3 deg., 3.7 deg. at Stanthorpe and 5.0 deg. at Thargomindah. Minimum temperatures were much below normal, most 3 to 4 deg., and ranged from 0.5 deg. below at Longreach to 8.9 deg. at Rockhampton, 6.2 deg. at Mitchell and 7.2 deg. at Stanthorpe.

The excessive frost periods of previous months were continued. Herberton reported 30 deg. on the grass (19th), while Mitchell recorded 24 frosts, lowest terrestrial reading 15 deg. (6th); Tambo 22, lowest 19 deg. (3 nights); Stanthorpe 27, lowest terrestrial 7 deg. (16th).

Bush Fires.—With the prevailing record dry spell many small fires of the local type were reported in the south-east districts and along the coastal areas. A much more critical period, however, will follow with normally rising temperatures and the possibility of stronger north-west to west wind days during August and September, unless soaking rain falls at an early date. The following table sets out the record low relative humidity figures for Brisbane during June and July:—

	Per cent. 9 a.m.	Per cent. 3 p.m.	Per cent. 9 p.m.
June	54	37	56
(Normal)	73	54	73
July	53	26	51
(Normal)	72	51	72

Brisbane.—Pressure $\frac{9+3}{2}$ 30.025 inches (normal 30.080 inches). *Temperatures.*—Mean maximum 71.9 deg. (normal 68.5 deg.), record highest (previous 71.8 deg., 1917). Mean minimum 46.2 deg. (normal 48.8 deg.), lowest since 45.2 deg. in 1929. Mean temperature 59.5 deg. (normal 58.6 deg.). Highest daily 84.3 deg. (23rd) record. Lowest daily 38.3 deg. (20th). *Rainfall,* 19 points (average 218 points). Record 3 months dry spell (May to July) 68 points recorded (average 770), (123 in 1917) and 210 in 1940). *Sunshine,* 286.8 hours (9.3 daily), record highest, 87 per cent. of possible number of hours.

The rainfall position is summarised below:—

Division.	Normal Mean.	Mean 1946.	Departure from Normal.	Total May, June, and July.	Average May, June, and July.
	Points.	Points.	Per cent.	Points.	Points.
Peninsula North	42	44	5 above	181	237
Peninsula South	24	Nil	100 below	11	119
Lower Carpentaria	20	Nil	100 ,,	3	109
Upper Carpentaria	42	Nil	100 ,,	1	256
North Coast Barron	114	93	18 ,,	377	619
North Coast Herbert	179	31	83 ,,	300	898
Central Coast East	111	5	95 ,,	68	473
Central Coast West	65	10	85 ,,	13	276
Central Highlands	116	2	98 ,,	16	402
Central Lowlands	82	Nil	100 ,,	15	286
Upper Western	41	Nil	100 ,,	1	159
Lower Western	51	Nil	100 ,,	Nil	193
South Coast Port Curtis	178	22	87 ,,	30	632
South Coast Moreton	227	27	88 ,,	102	873
Darling Downs East	181	21	88 ,,	69	520
Darling Downs West	141	11	92 ,,	25	443
Maranoa	147	2	99 ,,	13	442
Warrego	107	2	98 ,,	19	353
Far South-west	69	Nil	100 ,,	19	267

Commonwealth Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

SEPTEMBER.

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	6.03	5.33	Cairns	26	32	Longreach	34	36
6	5.58	5.36	Charleville	27	27	Quilpie	35	35
11	5.52	5.38	Cloncurry	48	52	Rockhampton ..	9	11
16	5.46	5.40	Cunnamulla ..	29	29	Roma	17	17
21	5.40	5.42	Dirranbandi ..	19	19	Townsville	22	27
26	5.35	5.45	Emerald	18	20	Winton	38	42
31	5.30	5.46	Hughenden ..	33	27	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	9.16	10.38
2	9.50	11.27
3	10.26	..
		a.m.
4	11.06	12.21
5	11.50	1.15
	p.m	
6	12.38	2.09
7	1.31	3.59
8	2.28	3.47
9	3.27	4.32
10	4.27	5.13
11	5.28	5.51
12	6.29	6.27
13	7.30	7.02
14	8.33	7.38
15	9.37	8.15
16	10.43	8.55
17	11.49	9.40
18	..	10.31
	a.m.	
19	12.54	11.27
		p.m.
20	1.56	12.28
21	2.52	1.31
22	3.41	2.35
23	4.25	3.38
24	5.03	4.38
25	5.38	5.36
26	6.10	6.32
27	6.43	7.28
28	7.14	8.22
29	7.47	9.27
30	8.22	10.12

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	24	14	40	29	15	4	46	3?
6	29	10	45	25	20	0	52	28
11	23	14	39	30	14	5	45	34
16	13	25	28	41	2	16	31	48
21	11	28	26	43	0	19	28	52
26	19	19	35	34	10	10	39	39
31	26	12	42	27	17	2	49	30

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	40	15	57	41	42	26	33	15
3	48	11	63	38	47	24	39	12
5	52	5	66	34	50	20	43	7
7	52	4	66	34	50	20	43	6
9	48	8	63	36	47	22	39	9
11	38	17	56	43	41	27	32	17
13	27	28	49	49	33	34	23	24
15	15	39	41	57	26	42	15	33
17	7	48	36	62	21	48	8	40
19	5	52	35	65	20	50	6	44
21	9	50	37	63	22	49	9	42
23	13	42	39	59	24	44	13	36
25	22	33	46	53	30	38	20	28
27	33	22	53	45	38	30	28	20
29	46	9	61	37	46	23	37	10

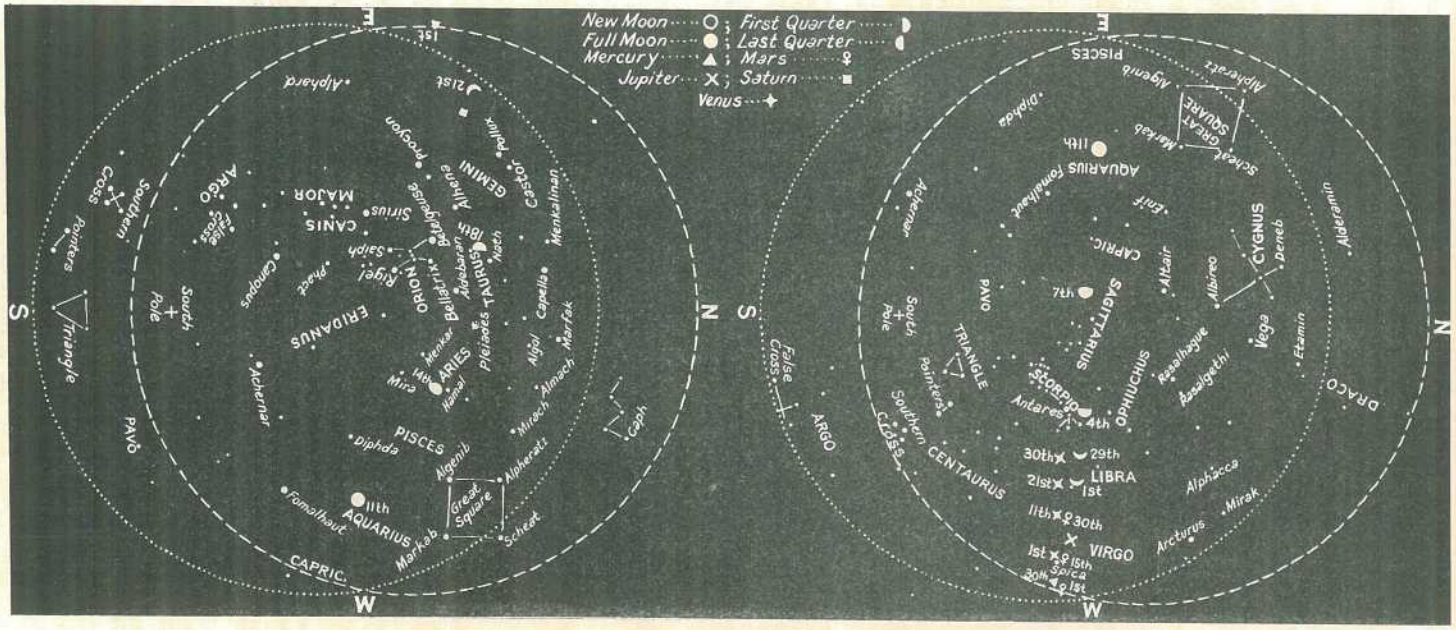
Phases of the Moon.—First Quarter, September 4th, 12.49 a.m.; Full Moon, September 11th, 7.59 p.m.; Last Quarter, September 18th, 4.44 p.m.; New Moon, September 25th, 6.45 p.m.

The Spring Equinox of the Southern Hemisphere will be September 24th. On this day the sun will rise and set at true east and true west respectively. On September 13th and 26th the moon will rise and set at true east and true west respectively.

Mercury.—At the beginning of the month, will be west of the sun, rising about half an hour before sunrise. On the 14th it will be in conjunction with the sun after which it will pass to the east of the sun, setting about one hour after sunset by the end of the month.

Venus.—Will still be a brilliant object in the western evening sky and on the 4th will pass just south of that other brilliant planet, Jupiter. At the beginning of the month it will set between 9 p.m. and 10 p.m. and at the end of the month will set between 9 p.m. and 10.15 p.m., being at its greatest angle east of the sun on the 18th.

Mars.—In the constellation of Virgo, will be observable in the western sky during evening twilight. On the 25th it will pass one degree south of Jupiter, setting about 15 minutes after the planet at the end of the month.



Jupiter.—Will make interesting patterns with Venus and Mars in the western evening sky. At the beginning of the month it will set between 9 p.m. and 10 p.m. and at the end of the month between 7.30 p.m. and 8.30 p.m.

Saturn.—In the constellation of Cancer, at the beginning of the month will rise between 4.15 a.m. and 5.15 a.m. about 22 degrees north of true east. At the end of the month it will rise between 2.30 a.m. and 3.30 a.m.

Star Charts.—The chart on the right is for 7.15 p.m. in the south-east corner of Queensland to 8.15 p.m. along the Northern Territory Border on the 15th September. (For every degree of longitude we go west, line increases 4 minutes.) The chart on the left is for 9 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the New South Wales Border. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about one hour later than the time stated for the 15th and at the end of the month about one hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JULY RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of years' records.	July, 1945.	July, 1946.		July.	No. of years' records.	July, 1945.	July, 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	1·12	42	2·62	0·50	Gatton College	1·37	44	2·03	0·26
Cairns	1·53	61	3·03	0·98	Gayndah	1·47	72	3·23	0·46
Cardwell	1·38	71	1·75	0·06	Gympie	2·07	73	2·83	0·35
Cooktown	0·98	67	0·96	1·26	Kilkivan	1·50	62	3·35	0·31
Herberton	0·89	57	1·61	0·54	Maryborough	1·93	72	4·38	0·09
Ingham	1·69	51	1·49	0·12	Nambour	2·67	47	4·81	0·60
Innisfail	4·75	62	6·61	1·37	Nanango	1·65	61	1·55	0·74
Mossman	1·19	19	1·94	1·01	Rockhampton	1·73	72	3·93	0·11
Townsville	0·67	72	0·45	0·01	Woodford	2·28	55	2·01	0·18
Central Coast.					*Darling Downs.*				
Ayr	0·73	56	2·22	Nil	Dalby	1·71	73	1·57	0·32
Bowen	0·92	72	3·80	0·16	Emu Vale	1·57	47	2·05	0·10
Charters Towers	0·67	61	0·78	0·20	Jimbour	1·48	64	1·54	0·28
Mackay	1·64	72	4·68	0·10	Miles	1·62	58	1·12	0·36
Proserpine	1·58	40	4·30	0·24	Stanthorpe	2·00	70	2·48	0·35
St. Lawrence	1·36	72	3·72	0·07	Toowoomba	2·06	71	3·08	0·41
					Warwick	1·80	78	1·64	0·05
South Coast.					*Maranoa.*				
Biggenden	1·41	44	3·19	0·10	Roma	1·43	69	2·13	0·05
Bundaberg	1·83	60	4·58	0·17	St. George	1·21	62	1·90	0·03
Brisbane Bureau	2·16	94	3·57	0·19					
Caboolture	2·37	67	4·05	0·13					
Childers	1·70	48	2·16	0·18	*Central Highlands.*				
Crohamhurst	2·90	50	3·28	0·52	Clermont	1·06	72	2·66	Nil
Esk	1·90	56	2·17	0·30	Springsure	1·18	74	2·24	Nil

CLIMATOLOGICAL TABLE FOR JULY.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure at 9 a.m. Mean	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	77	61	81	24, 25, 27	51	20	98	4
Herberton	..	71	48	81	23, 24	34	19	54	3
Townsville	..	77	54	81	26	45	20	1	1
Rockhampton	30·11	76	42	87	15	31	3	11	2
Brisbane	30·08	72	46	84	23	38	20	19	2
Darling Downs.									
Dalby	..	69	34	80	22	23	6	32	3
Stanthorpe	..	61	26	72	22	16	6	35	3
Toowoomba	..	65	35	75	22	26	6, 9, 10	41	3
Mid-Interior.									
Georgetown	30·06	83	49	88	24, 26	38	20	Nil	..
Longreach	30·15	78	43	89	16	34	19	Nil	..
Mitchell	30·16	70	31	85	22	21	6	4	2
Western.									
Burketown	..	82	53	88	29	44	19	Nil	..
Boulia	30·07	76	40	89	22	32	19	Nil	..
Thargomindah	30·09	70	44	84	22	34	19	Nil	..

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.