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

QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Anzac.

WITHOUT national sentiment there can be no true national life. Proper sentiment and tradition are an expression of the soul of a people—that was the keynote of the commemoration of the Gallipoli landing on 25th April, the twenty-fourth anniversary of the great event. The hitherto untried troops of Australia and New Zealand received their baptism of fire on the beach at Anzac Cove on the first Anzac morning under conditions which would have tested the stoutest hearted veterans—such as they afterwards became on other battlefields of the World War of 1914-1918. The men of the 1st and 2nd Divisions of the Australian Imperial Force and of the New Zealand Expeditionary Force, together with their comrades of the Royal Navy and British Expeditionary Force, set standards and established traditions which inspired their fellows in the later campaigns. In a moment those men of our race became "the living theme of boys unborn for countless centuries; peers of the noblest souls that God has fired—part of the amplest feat of history."

In their observation of Anzac Day year after year, the people of Australia not only pay a tribute to the men who went West, and to the women who suffered so much, but keep alive memories of their achievements and ideals—and of their sacrifice—and so assist in the creation of a powerful inspirational force in the life of their own homeland. Anzac Day is to us an appeal—and to those who come after us, a

perpetual appeal—not to glorify war, but to seek to achieve the highest ideals of citizenship as exemplified by the makers of the Anzac Tradition which will endure while the nation lasts.

Grow More Cotton!

IN the course of a recent broadcast address to farmers, the Acting Minister for Agriculture and Stock, Hon. David A. Gledson, advocated an extension of the cotton acreage in districts adapted to the cultivation of the fibre. "I do so," he said, "with the fullest confidence that an increased production of cotton in Queensland is in the best interests of the farmers of this State and of the people of Australia as a whole."

Continuing, Mr. Gledson said that the establishment of the cotton spinning and weaving industries in Australia twelve years ago, and their rapid expansion during the past five years, had created a big market for cotton. For 1939, consumption of raw cotton lint in Australia would be 35,000 bales, while in Queensland we were only producing 13,000 bales. There was, then, a big leeway to make up before we could supply Australian requirements, which were increasing every year.

Primary producers and farmers generally in Queensland were faced with many serious problems, Mr. Gledson added. These included the obtaining of a profitable market for the commodities which they produced, and the establishment of a balanced system of farming in this State. The old adage of the danger of putting all one's eggs in the one basket still remained true, and it was the policy of his Department to build up as far as it was possible an economical and balanced system of farming, and of primary production generally in Queensland.

In this respect, the cotton industry offered great possibilities. The growing of cotton in combination with dairying and other rural pursuits offered an opportunity of establishing a balance in primary production, which was so much desired.

Research officers of his Department had demonstrated that cotton grown in rotation with Rhodes grass and other fodder crops was an efficient method of production, and helped to give that balance in Queensland agriculture which they were striving to achieve.

This method of crop rotation would particularly apply to a cotton-dairying combination. Increased cotton production would also benefit our great dairying industry in a way not generally realised, by making available a cheap dairy stock food of high protein content—cotton-seed meal—which, fed to dairy herds during the winter months, would assist in maintaining continuity in butter production at a high level throughout the year.

The extremely low prices for wheat ruling at present, with the disturbed international situation and the uncertain oversea markets for this product, was a matter of deep concern to wheat farmers, who were now making plans and preparing land for next season's sowing of wheat. He would suggest that where the land and conditions were suitable, wheat farmers might consider setting aside 20 to 50 acres of land for planting cotton.

As for a profitable market for cotton, they had in Australia a market for all the cotton we can grow, and he knew that farmers would agree with him that the Australian home market was their best market. Since 1935 the average net return to cotton-growers by the Cotton Board had been 4d. per pound of seed cotton delivered on rails.

To depend mainly upon overseas markets for the commodities which we produce was in the present state of international affairs to risk seriously our future prosperity.

Another point on which he felt safe in advocating increased cotton production was from an Australian national point of view. Cotton was of vital importance in any defence scheme which Australia must devise. Cotton in some form or other entered into the life of every individual Australian, and it was used extensively in key industries which were vital to the economic life of this country. Increased production of cotton would not have to compete on glutted overseas markets and at the varying price levels on those markets. It could be absorbed by Australian secondary industries to meet the requirements of the Australian people for manufactured cotton goods. He thought that this was the strongest argument behind the Queensland Cotton Board's advocacy of increased production of raw cotton—that it would build up our secondary industries, supply our own people with the manufactured goods which are at present imported, and be the means of stimulating the industrial and economic life of the whole of the Commonwealth.

The Minister asked farmers and other primary producers who were in a position to grow cotton to consider very carefully the appeal of the Cotton Board, both in respect of their own interest in the stabilisation of primary industries, and their interest in national security.

Australia must be in the position to rely on herself, and it was in this regard that he asked that farmers grow cotton, or increase their present acreage wherever possible. The officers of his Department would supply the fullest information and guidance on all matters relating to the cotton industry.

Cotton Culture.

THE Queensland cotton industry is established on a co-operative basis and is one of the few industries in which the product grown is handled by the growers' organisation from the field to the manufacturer. This organisation, the Queensland Cotton Board, takes control of the seed cotton when it leaves the farm, transports it to the nearest ginnery, gins the cotton, markets the lint, and manufactures by-products, all the resultant profits being returned to the grower.

Over a number of years, cotton has proved its adaptability to the conditions within the recognised cotton-growing regions, and can be successfully grown on most of the main soil types within these areas. It offers distinct advantages over many other crops because of its drought-resistant qualities.

The stability of cultivations newly broken up out of the original grasslands has been studied carefully for several years, and it is obvious that substantial benefits are obtained on most soils when cotton is grown in rotation with pastures of a sufficient stage of establishment. The benefits which may be expected are increased yield per acre; improvement in lint quality; and reduced costs of production.

To maintain the Queensland cotton-growing industry on a firm basis, it is incumbent on the growers to supply fully the requirements of the spinners. To accomplish this, increased areas are necessary. When the general suitability of cotton for most of the soil types of the south-eastern portion of this State is considered, it becomes all the more apparent that growers cannot afford to exclude cotton from their system of farm cropping.

Little-leaf—A Functional Disorder of Apple Trees at Stanthorpe.

KEIGHLEY M. WARD, M.Agr.Sc., Research Officer.

THE term "little-leaf" as applied to deciduous fruit trees refers to a physiological disorder of which the major effects are the suppression of shoot growth, the production of subnormal leaves and fruit, the dying back of branches, and the reduction of cropping. The name has arisen because the most conspicuous symptom of the trouble, and the first to become evident, is the growth in spring of small, even tiny leaves instead of normal ones. Such leaves are found mainly at the terminal parts of the branches, and especially on wood produced in recent seasons. The fact that these leaves are usually arranged in small rosettes has led to the term "rosette" also being used to describe the disorder. This condition has existed on apple trees in the Stanthorpe district for some ten or twelve years.

For the most part, the fruit-producing soils of the district are of a coarse sandy nature with a tendency to dry out quickly. This is a common feature also of overseas areas where little-leaf has become a serious trouble in deciduous fruit orchards. The disorder has assumed considerable importance in Stanthorpe orchards on account of the rapidity with which the number of affected trees has increased, and of the fact that it is fairly widespread among the more important varieties of apples grown. There is evidence which suggests that the better, vigorous type of tree is somewhat more susceptible to the trouble than others. Fortunately, in this district, though it has been noted on pear and plum trees in several instances, it has not appeared extensively in fruit trees other than the apple.

In view of the extent of the disorder, the serious effect it has on apple trees, and the absence of suitable control measures, some concern was felt among apple growers, and for these reasons investigations were undertaken with the object of finding the most effective means of restoring affected trees to a normal condition and of preventing the further increase of the trouble. The earlier work on the problem was conducted by other departmental officers—namely, Messrs. R. B. Morwood and H. St. J. Pratt. The work now being carried out is based primarily on the results of overseas investigations which have shown that the occurrence of little-leaf is associated with the supply of zinc to affected trees.

This article is a progress report on the writer's experimental work which was begun on apple trees late in 1936, and the results reported are based on the response given by various treatments during the 1937-38 growing season.

DESCRIPTION OF LITTLE-LEAF.

Incipient Stage.

Prior to the appearance of the most characteristic symptoms there is often a tendency towards shortening of internodes on the shoots produced at the terminal portion of the branch in spring and summer. This shortening may not be very marked, and may occur irregularly along the length of the shoot. Another symptom of the onset of the disorder is the appearance, usually in summer and autumn, of mottled leaves. Mottling may, however, become evident in spring. A typically

Plate 173.
Typical little-leaf growth showing spring symptoms, as compared with normal growth.

mottled leaf is chlorotic or yellowish in the interveinal areas, but the normal green colour remains in the region of the main veins. This mottling is also associated with the more advanced stages.

Later Stages.

Almost invariably the presence of the disorder is first observed in spring when there is a delay, perhaps for as long as two weeks, in the leafing-out of the terminal growth on one or more branches of the tree. When the leaves appear they are greatly reduced in size, are rigid and narrow, and arise from the parent twig at an acute angle. They develop slowly and usually remain only a fraction of the normal size throughout the season, forming small rosettes at each bud on the parent wood (Plates 173 and 174.) Mottling of the small leaves and often also of other foliage near affected shoots is a characteristic symptom during the summer. Terminal shoot growth is either completely lacking or is greatly suppressed and in marked contrast to that of the previous season (Plate 178; shoots 1 and 2).

In the season following the appearance of growth such as this, the buds on little-leaf shoots may fail to break altogether, and thus neither foliation nor shoot elongation takes place (Plate 175). Later, the shoot commences to die from the tip, and this dieback proceeds downwards into the older wood, resulting in the death of a considerable portion of the branch. A characteristic feature of this dying back is the very clearly defined line of demarcation between the dead and living tissue. In the early stages only a few branches on the tree may show signs of the disorder, but the whole tree is liable to become affected within a few seasons.

Although the terminal part of a little-leaf branch may not grow, it appears to be characteristic of the disorder that vigorous growth arises from several points immediately below the terminal, and subsequently if the branch be pruned back to a strong shoot, which thus becomes the terminal, that shoot invariably develops little-leaf within the next season or two. If this pruning treatment of the trouble be practised for a few seasons, the tree becomes seriously unbalanced (Plate 176) or if applied to the whole tree there is a rapid decrease in its stature.

The fruit produced on little-leaf trees, particularly on affected branches, is usually much reduced in size (Plate 177) and there is a deterioration in flavour, although the keeping quality does not appear to be destroyed. The cropping capacity of affected trees is, however, seriously reduced, and it is evident that such trees could reach an unprofitable condition within a few seasons.

The disorder is most readily observed in young vigorous trees growing on either seedling or Northern Spy rootstocks, or in trees that have been top-worked to another variety. Nevertheless, older and less vigorous trees are equally subject to attack, and though they may show clear symptoms of the disorder, under some circumstances it may be difficult to distinguish between true little-leaf and unthriftiness.

STANTHORPE EXPERIMENTS.

The measures being investigated at Stanthorpe in order to find effective means of supplying zinc to apple trees include foliage and dormant-period sprays applied at various strengths, soil dressings at

Plate 174.
Characteristic appearance of growth at the extremities of branches affected with little-leaf. Photograph loaned by Mr. H. St. J. Pratt.

different rates, and tree injections. The treatments are being applied to apple trees which vary in their age, severity and period of attack by the disorder, rootstock and general condition of health. The work has involved the initiation of five experiments on a total of 264 trees. In each experiment the treatments are applied according to a replicated and randomised system of plots, the unit of treatment being a single tree showing definite symptoms of the disorder.

Plate 175.

Jonathan apple tree severely affected with little-leaf and showing the suppression of shoot growth on a previously vigorous tree.

The effects of the various measures are determined from two aspects—firstly, nature and amount of the immediate response, and secondly, duration of response.

A satisfactory quantitative method of expressing the amount of response is being sought by measuring—(i.) the total terminal shoot growth on each tree; (ii.) the increase in length of terminal shoots on little-leaf branches only—measurements are made during the season preceding treatment and the following season; (iii.) the number of little-leaf branches per tree; (iv.) yield in weight of fruit per tree. In order to increase the accuracy of the work a system has been introduced of recording the history of each branch on all experimental trees.

In some experiments, trees are to receive the same treatment annually until it is established whether or no they will respond to that treatment, and in others—*e.g.*, experiments on strengths of foliage and dormant sprays—the duration of response following a single application of the treatments is to be observed.

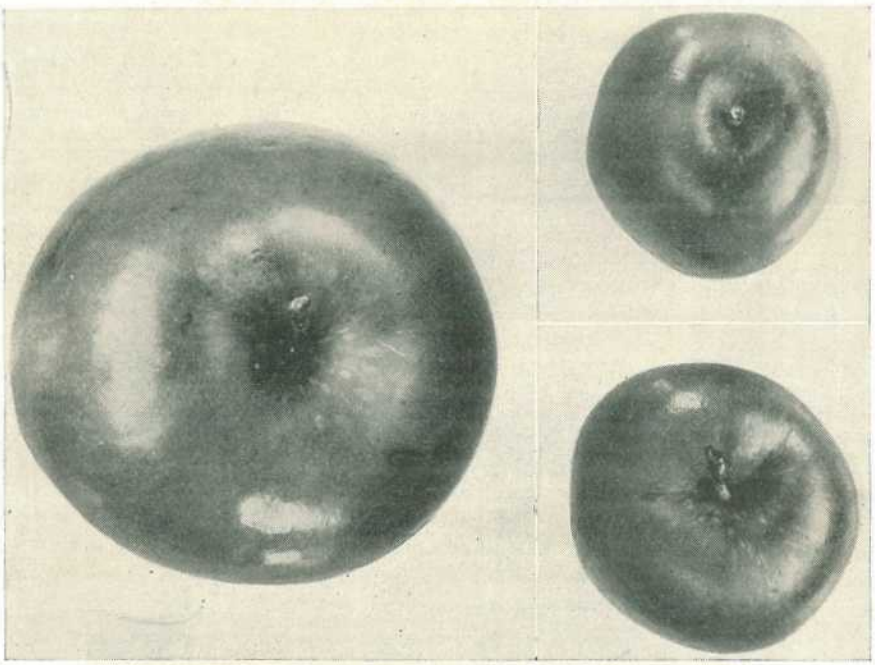
Plate 176.
Apple tree showing the unbalancing effect produced by little-leaf.

Fundamental work relating to the cause of little-leaf has not been undertaken at Stanthorpe up to the present time in view of the relatively advanced stage of such work overseas. Potential causes of the disorder are discussed in the latter part of this article.

Description of the Experiments.

In 1937 four groups of experiments were initiated on apple trees growing under a variety of conditions. The experiments are described below.

A. The first experimental block consists of eighty nine-year-old trees which comprise Jonathan, Delicious, and Granny Smith varieties, growing on seedling rootstocks. Apart from being retarded by little-leaf, they generally tend to be unthrifty as do other trees in this orchard; that is to say, little-leaf is not the only factor which limits their growth. In addition to zinc treatments therefore, they are receiving dressings of complete fertilizer. They have exhibited the disorder in a severe form for about six years.



A B

Plate 177.

A. Fruit from normal tree. B. Fruit from little-leaf tree.

B. The second group consists of forty-eight full-bearing Granny Smith trees, twenty-one years old, growing on Northern Spy roots. These trees were vigorous until four or five years ago but then became affected with little-leaf in varying degrees of severity. They now exhibit signs of unthriftiness, and sometimes only careful observation will show the distinction between this condition and true little-leaf.

C. The third group is made up of sixty-four six-year-old trees consisting of Jonathans, Delicious, and top-worked Gravensteins, all of which are on French seedling rootstocks. The general health of the trees is from fair to good. Little-leaf has developed on these during the past two or three years only.

D. The fourth experiment is being conducted on fifty-six eight-year-old Jonathan and Granny Smith trees growing on seedling roots. These belong to a vigorous type of tree whose growth has not apparently been limited by any major factor other than little-leaf. They are the only trees which have responded to any of the zinc treatments in such a way that the response could be expressed in terms of growth increase. They have become affected with the disorder within the past four years.

E. A fifth experiment was begun in the winter of 1938 on Delicious and Jonathan trees growing on seedling and Northern Spy roots. Those on the former stock have grown into the larger trees, and in general, the Delicious are more vigorous than the Jonathans. The trees on Northern Spy roots have been affected with little-leaf for about three years, and those on the seedling stocks have developed the trouble during the past two years only.

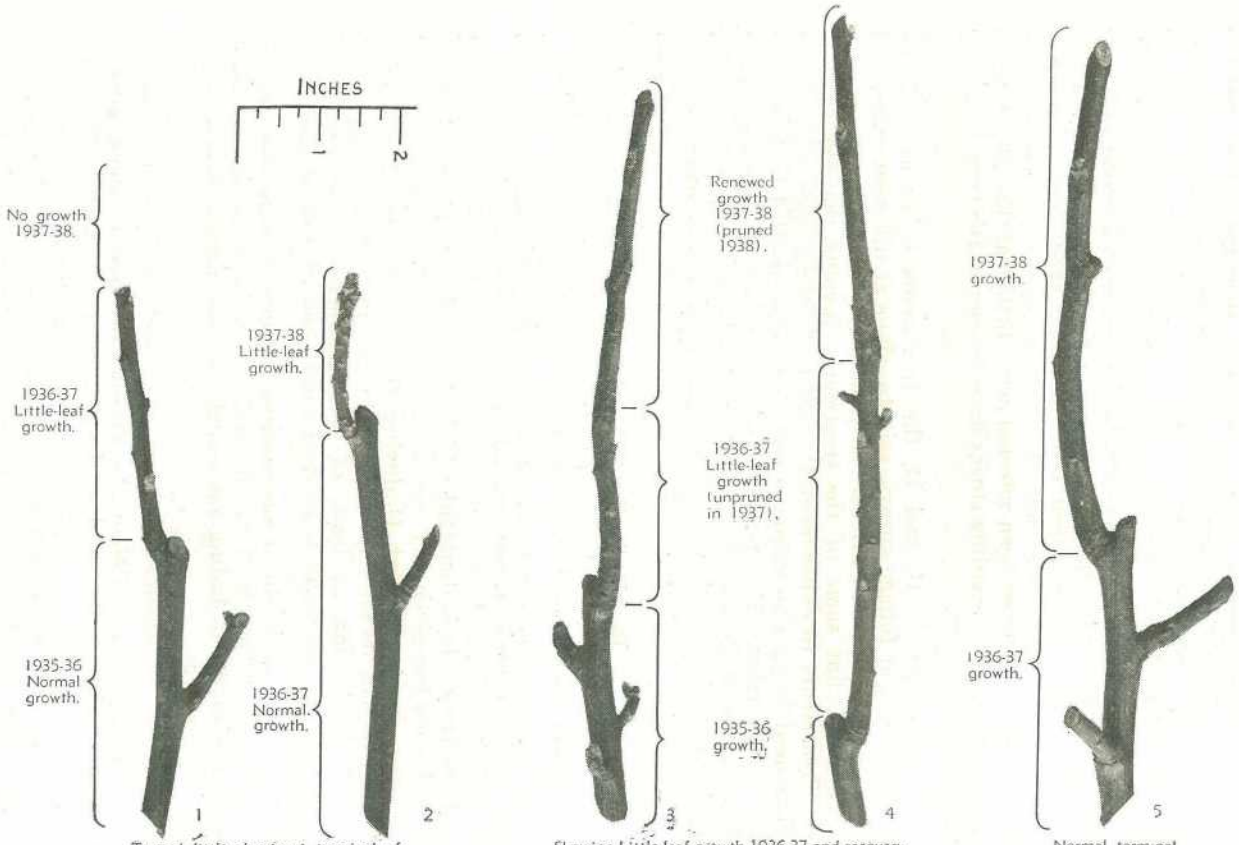
In experiments A, B, and D, the treatments being applied are dormant-period and foliage sprays, soil dressings at different rates, and tree injections. Zinc sulphate is the principal form in which zinc is being supplied, but some of the treatments involve the use of zinc oxide. Treatments in experiment C consist of foliage sprays only, the materials used being zinc sulphate and zinc oxide applied in November at various strengths. For purposes of comparison, a dormant spray has been included in the experiment, and this was applied in July, 1938. In experiment E various strengths of dormant-period zinc sulphate sprays are being tried; they were applied early in August, 1938.

Results in the 1937-38 Season.

In the first three experiments (A, B, and C) no treatment has yet shown response which can be expressed quantitatively. In the A and B experiments, however, there appeared to be a consistent response to dormant-period sprays—a response which has been reflected in the production of normal sized and unmottled foliage on previously affected parts of the trees. It is doubtful whether any other treatment in these two experiments has given any consistent results. No response occurred on the trees in experiment C during the 1937-38 growing season. Possibly there will be an improvement in the 1938-39 growing period as the result of some, at least, of the treatments. The results of experiment E will not begin to be shown until the 1938-39 season.

The fourth experiment D has resulted in more definite and quantitative responses. This is a randomised block trial in which seven different treatments, including untreated controls, are replicated eight times on single trees.

The various treatments employed are shown in Table I., and for each treatment the figures show the average increase in shoot growth on little-leaf branches, the total number of branches showing little-leaf before treatment (1937) and after (1938), and also the average total terminal shoot growth on each group of eight trees receiving any one particular treatment. Last season's measurements showed a high degree of variability between and within treatments, and so the differences between treatments must be large before they become significant. In the case of growth increase on little-leaf branches (column 1), one treatment cannot be said to have given better results than another unless there is a difference of 19·5 centimetres.



Typical little shoots at terminal of main branches.

Showing Little-leaf growth 1936-37 and recovery in 1937-38 following dormant period spray.

Normal terminal shoot.

Plate 178 .

A perusal of the table will show that terminal growth on little-leaf branches (column 1) increased significantly only on trees which received dormant-period sprays (treatments I. and II.). The response to treatment on these sixteen trees was consistent and was outstanding when compared with any other treatment. The most satisfactory feature of this response was that it occurred on wood which was definitely affected with little-leaf in the previous season (Plate 178). Furthermore, the dormant sprays were followed by renewed growth within about three months of their application; the sprays were applied late in July, and from the early part of the ensuing growing season there was an improvement in shoot growth.

Injections probably gave the most inconsistent results, as in some cases all little-leaf branches on an injected tree apparently recovered and added a considerable amount of growth during the season, while other trees, usually ones more severely affected, failed to show any response at all. It would appear either that the injected solution had not reached all parts of the tree in some cases, or that insufficient time had elapsed to allow recovery to take place.

TABLE I.

RESULTS OF LITTLE-LEAF EXPERIMENT D, 1937-38.

Treatments.	Column 1.	Column 2.		Column 3.
	Average Terminal Growth Increase on Little-leaf Branches.	Total No. Little-leaf Branches.		Average Total Terminal Shoot Growth per Tree.
		1937.	1938.	
	cms.			cms.
I. Dormant spray, 50 lb. $ZnSO_4$/100 gal. before pruning (July)	35·5	12	0	775
II. Dormant spray 50/100, immediately after pruning	39·4	18	3	785
III. Injection 0·125% solution in October	data incomplete	26	42	441
IV. Foliage spray 10–5–100 in November	11·3	24	25	665
V. Soil application 5lb. $ZnSO_4$ per tree	19·6	21	20	556
VI. Soil application 2½lb. ZnO per tree	11·5	21	25	590
VII. Control—untreated ..	8·1	22	29	481
S.E. for growth increase on little-leaf branches = 6·9. Significant difference = 19·5. ($P < 0·01$)				Differences not significant.

Although the trees in this experiment have not yet responded to any of the other treatments, it is possible that some of them will show results in the 1938-39 season.

From column 2 in this table it is obvious that on trees which received treatments I. and II. there was a well-marked improvement in the number of little-leaf branches in 1938, as compared with the number in the previous season, or with trees receiving other treatments. In column 3 is shown the total terminal shoot growth per tree, and although

A B

Plate 179.

Two adjoining Jonathan trees in Experiment D. In 1936-37 tree A added 239 cms. of terminal growth, and B 79 cms., as compared with 800 cms. on a normal tree. In the winter of 1937 A received a zinc sulphate spray, and B was left unsprayed. In 1937-38 A produced 525 cms. of terminal growth, and B 42 cms.

differences between these figures are not statistically significant, they indicate the general tendency of the little-leaf disorder to suppress terminal shoot growth. This tendency is perhaps more convincingly illustrated by Plate 179.

With reference to treatment II., in which a strong zinc sulphate spray was applied within five hours of the pruning of the trees, a certain amount of injury was caused. The spray solution apparently penetrated the twigs through the cut surface and passed down the length of the twig. This resulted in a strip of dead tissue appearing in the wood of the shoot and extending back 3 to 15 inches from the pruning cut. The injury was not severe, and, as the bark was not affected, it could not be observed until the shoot had been pruned. However, in orchard practice it is advisable to prevent such injury by applying the zinc spray either before the trees are pruned or not less than two weeks after pruning.

ZINC SULPHATE IN RELATION TO OTHER SPRAYS.

As yet much remains to be learned in connection with the interaction of zinc sulphate and other spray materials, but during the past two seasons a certain amount of information has been gathered on this subject.

The question often arises of combining zinc sulphate with lime sulphur or red oil in winter sprays, and with lead arsenate or white oil in summer sprays, since by such combinations growers seek to reduce to a minimum the number of occasions on which they need to spray. With respect to winter spraying, occasions arise when it is desired to treat apple trees with zinc sulphate to control little-leaf, and with lime sulphur or red oil to control diseases or pests. Under such circumstances the most satisfactory procedure would probably be to apply the zinc sulphate during the latter half of July and the other sprays towards the end of August. With respect to red oil, it is sound practice to avoid spraying the trees with this material just prior to the application of zinc sulphate, as the presence of the oil on the trees would tend to prevent the zinc spray from sticking to the bark and would probably hinder its penetration into the plant tissues.

A number of growers in the Stanthorpe district have adopted zinc sulphate foliage sprays in treating little-leaf, and consequently the question has been raised as to whether the combining of zinc sulphate with lime sulphur, white oil, or with lead arsenate in various summer sprays is advisable. Zinc sulphate can safely be combined with lime sulphur at the concentrations used in foliage sprays—*i.e.*, 10 lb. zinc sulphate, 5 lb. hydrated lime in 100 gallons of water, together with the appropriate strength of lime sulphur. No definite evidence has yet been secured to show whether zinc sulphate is effective against little-leaf when applied in combination with white oil, but, in general, the combination would seem to be an undesirable one.

The combination of zinc sulphate and lime with lead arsenate in foliage sprays is not always a safe one, as has been shown by overseas investigations (9). Although the presence of hydrated lime with the zinc sulphate in combination with lead arsenate tends to reduce arsenical injury by decreasing the amount of soluble arsenic, the zinc sulphate in the mixture has caused severe russetting of Ben Davis apples. In the Stanthorpe district last season, however, the application of a mixture of zinc sulphate and lime either alone or in combination with lead arsenate did not cause fruit russetting nor foliage injury on apple trees.

NOTES ON GENERAL RESEARCH ON LITTLE-LEAF.

Little-leaf has for years been a serious trouble on deciduous fruit trees in parts of the United States of America and in South Africa. In the former country all the main varieties of deciduous fruits, including grapes and walnuts, are affected by this disorder to a serious extent. A similar condition, known as "mottle-leaf," which occurs on *Citrus*, presumably arises from the same cause as little-leaf of deciduous fruits.

Much research has been directed towards finding the cause of the trouble and the part that zinc plays in plant growth. No parasitic organism, such as a fungus or a bacterium, has been found to be directly associated with affected trees; and grafting and transplanting experiments have indicated that the condition is not cause by a virus (8). Of a large number of chemical elements tried on fruit trees zinc alone has given definite response (7). It was thought, therefore, that little-leaf was due simply to a zinc deficiency in the soil, but further experimental evidence has shown that other factors are probably involved and that soil micro-organisms may play an important part, perhaps, in influencing the availability of zinc to the trees (2).

In greenhouse experiments, Hoagland and others showed that "little-leaf" soil had a toxic effect on a number of plants and produced typical little-leaf symptoms in apricot seedlings. Hoagland, Chandler, and Stout (8) showed that by sterilising certain soils healthy maize plants could be grown, whereas prior to sterilisation the soil produced little-leaf affected plants. The addition of small amounts of unsterilised "diseased" soil to the sterilised soil resulted in the re-establishment of toxic conditions, which could be overcome subsequently by the addition of zinc sulphate. These observations were confirmed by Ark (2), who made bacterial cultures from "little-leaf" soil. When two types of these bacteria were inoculated into soil or sand cultures in which peach or walnut seedlings were growing, symptoms very similar to those of little-leaf appeared, but their development was preventable when zinc sulphate was present in the culture. In Victoria (10) the application of 15 lb. of zinc sulphate per acre with superphosphate resulted, in certain districts, in a marked improvement in the growth and yield of wheat on land which was infected with root fungi and eelworms. The evidence suggested that the presence of the zinc sulphate enabled the plants to withstand the effects of these organisms.

All of this work indicates a potential relationship between little-leaf, zinc supply, and soil micro-organisms. Other work has suggested that zinc availability is associated with soil acidity (1). It still remains to be explained why the action of certain cover crops, such as lucerne, among trees affected with little-leaf will cure or reduce the disease (3), and why trees growing on sandy soils are so subject to the disorder.

That zinc may play an important role in the life processes of plants is made evident by much research, including that of Reed and Dufrenoy (12), who found when working on mottle-leaf of citrus that in the mottled leaves cytological and physiological development were seriously disturbed, and that spraying such leaves with zinc sulphate produced important changes which led to the recovery of the leaves.

Whatever the ultimate cause of little-leaf may be, it has been amply demonstrated that supplying zinc to affected trees results in a partial or complete cure. From the economic point of view the most pressing problem is to find the most effective method of supplying zinc to the

different varieties of fruit trees, since all the varieties do not respond uniformly to the same method. Various treatments of deciduous trees have been investigated by several workers, notably Chandler and his associates in California. The results of this work are briefly as follows.

Soil Dressings.—In acid soils a few pounds of zinc sulphate has effected a cure in some varieties, but in alkaline soils so much zinc is quickly rendered unavailable that very heavy dressings are required to produce results. In these latter circumstances, acid substances, such as iron sulphate, may prolong the period of availability of the zinc. In general, it would appear that soil dressings are too expensive for most practical purposes.

Foliage Sprays.—The use of zinc sulphate with sufficient lime to prevent injury has given a measure of response on apricot trees which were affected with little-leaf to a mild degree but usually the effect has been manifest for a few months only, and such sprays will not cure badly affected trees. Further, other deciduous fruits have not responded satisfactorily to the treatment. The use of lime seems to have a tendency to reduce the effectiveness of the zinc sulphate. It is considered that rain, dew, and fog are important factors in bringing about any response from this treatment since they probably assist in the transport of the zinc into the plant tissues. Chandler ([5]) states that apple, peach, and plum have responded to all methods of treatment except spraying the foliage. Foliage sprays with the zinc-lime mixture have, however, given striking results when used on citrus trees to control mottle-leaf.

Dormant Sprays.—The use of strong solutions of zinc sulphate in water, without lime, has resulted in satisfactory response on apple, peach, and plum. The duration of response to this treatment is relatively longer than with some other treatments, and it is considered to give the quickest results. It has not been tried extensively on apricots and pears, but is thought to offer the most promising measure for these fruits. Swabbing the wounds of grapevines with a strong zinc sulphate solution immediately after pruning has given excellent results when the pruning is done before the vines will bleed.

Zinc Pieces Driven into the Tree.—This treatment consists of driving pieces of zinc, zinc-coated nails, or galvanised iron into the bark of affected trees, and has shown promising results with walnut, grapevines, and other fruit plants. The method is slow in action but, provided that the pieces do not fall out, it is considered that it should be effective for several years.

Cover Crops.—The growing of lucerne among little-leaf trees in the States of Washington and California has reduced the amount of little-leaf in apple, grapevine and stone fruits over a period of years. The means by which this is brought about has not yet been fully explained.

Injections.—The injection, for experimental purposes, of very dilute solutions of zinc sulphate into affected trees has produced satisfactory responses. A more commonly used method of injection has been to place dry zinc sulphate, zinc oxide, or zinc dust into holes bored into the trunk of the tree. In order to avoid serious injury the material must be placed in the hole so that none is left on the outer sapwood or bark. This method has produced beneficial results, and is considered to be useful in experimental work.

With reference to the occurrence of little-leaf in Australia, it has been reported by Barnard (4) that conditions resembling little-leaf exist in Western Australia, South Australia, Victoria, and Queensland, and he considers they are all comparable and probably represent the same disorder in varying degrees of intensity. They are variously termed "pruning dieback" in Western Australia, "dieback" in South Australia and Victoria, and "little-leaf" or "rosette" in Queensland. It is stated that the disease differs in severity in the different States, ranging from minor importance in Victoria to the most serious form of dieback in the Stanthorpe district. Investigational work on the disorder has not yet been published from Australian States other than Queensland, where, in 1937, it was shown that a spraying in autumn with zinc sulphate, lime, and water (10 lb., 5 lb., and 100 gallons) resulted in growth responses in the following spring (11).

SUMMARY.

Little-leaf, a functional disorder of apple trees, is of major importance in the Stanthorpe district, where it results in the complete suppression of terminal growth, followed by dieback, on individual branches or on whole trees.

Symptoms of the disorder are most noticeable in spring, when the development of the foliage on affected shoots or branches is delayed, and leaf growth is markedly reduced, resulting in the formation of rosettes of small leaves in the place of normal foliage and normal shoot growth.

Previous investigations have demonstrated that the disorder can be remedied by supplying zinc to affected trees. Extensive experimental work of a quantitative nature has therefore been undertaken at Stanthorpe to find the most practicable means of supplying zinc to apple trees growing under a variety of conditions. The various treatments under investigation include foliage and dormant-period sprays, soil dressings, and tree injections.

After one growing season, definite response has been obtained only on those trees which received a dormant spray consisting of 50 lb. of zinc sulphate in 100 gallons of water. This treatment was applied in July, and response was observed in the following October. Other treatments did not show any consistent response in the season following their application, but it cannot be inferred that all these other treatments will continue indefinitely to show no beneficial effects. It is felt that further positive results may be obtained from several treatments during the 1938-39 season.

The question of the relation of zinc sulphate sprays to certain spray mixtures used in treating pests and diseases of apple trees is briefly discussed.

Some of the most important overseas research work on the little-leaf problem is reviewed.

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THE USE AND VALUE OF TREES.

In trees lie the character and the soul of a farm. Trees create immediately a favourable impression on any visitor, and the farmer and his family have reason to be proud of a beautiful farmyard with restful, shady trees and row upon row of sheltering avenues along the lands or in the veld, providing shelter and protection for man and beast and ameliorating the struggle for existence.

When it becomes desirable or necessary to sell a farm, the trees on the property are a very strong factor in assisting the farmer to obtain the best possible price.

As a protection for the farmyard, orchards, gardens, and lands, there is nothing quite as effective as well-placed avenues of trees. . . . The fodder value of some species of trees is another important factor which must not be overlooked.

—J. C. de Klerk in Farming in South Africa.

A Noxious Weed—The Needle Burr.

W. D. FRANCIS, Botanist.

THE Needle Burr or Spiny Amaranth* has been declared a noxious weed throughout the State by a notice in the *Government Gazette* of 25th February, 1939. The accompanying description and illustration (Plate 180) are published to assist all interested persons in recognising the plant.

This noxious weed is an annual plant which grows to a height of 1 to 4 feet. Its leaves are usually dark-green, but they are occasionally red in colour. The stems are often green, but on the other hand they are frequently red, and they are furrowed or grooved. The leaves are placed alternately on the stems, and the leaf stalks are $\frac{1}{4}$–$\frac{3}{4}$ inch long. The leaf blade is lance-shaped, with a blunt point, which, however, is furnished with a fine bristle at its apex. The leaf blade, which is $\frac{3}{4}$–2 inches in length, is narrowed into the leaf stalk at its base, and the midrib and primary lateral nerves are prominent. The spines which give the plant its common name arise from the forks of the leaves and vary in length from $\frac{1}{8}$–$\frac{3}{8}$ inch. The inflorescence is straw-coloured, and is situated in the forks of the leaves, where it forms rounded groups or clusters of flowers, and it also forms long spikes at the ends of the branchlets. The small flowers are interspersed with sharp-pointed bracts which are $\frac{1}{10}$–$\frac{1}{6}$ inch in length. The individual flowers measure about

* *Amarantus spinosus.*

[*Photo.: Depart. Agric. and Stock.*

Plate 180.

Needle Burr or Spiny Amaranth (*Amarantus spinosus*), which has been declared a noxious weed throughout the State.

$\frac{1}{10}$ inch in length and consist of five sepals enclosing five stamens in the male flowers and a single one-celled ovary in the female flowers.

The Needle Burr is a native of tropical America. It is now widely spread in Queensland, particularly in coastal localities from the New South Wales border to Cairns.

IMPORTANCE OF PASTURE MANAGEMENT.

Pastures—both natural and sown grasses, as well as native herbage—form the foundation of the wool, fat lamb, beef, and dairying industries. Grass, regarded as a crop, is, therefore, our most important crop.

Developments in grass land improvement in recent times have proceeded along very sound lines. There has been a great improvement in pasture management methods. Rotational grazing is more widely practised, and grass conservation has become a matter of regular seasonal routine on many well-managed properties.

These developments, however, have been chiefly in the regions where 20 inches and upwards is the annual rainfall registration. Comparatively little grassland improvement has been practicable in districts of lighter or low rainfall. But obviously any developments which are possible in regions of more or less scanty rainfall would mean a lot to the grazing industry, the wool industry especially.

The rational development of grasslands, especially in districts of moderate or low rainfalls, is governed by five fundamental factors; and these factors are:—First of all, the classification of grass country into clearly defined regions based on the amount and incidence of the rainfall, length and nature of the growing season and soil type. Secondly, it is important to determine the species and pasture mixtures most suitable for these regions. Thirdly, there is the need of developing by selective breeding of improved strains of grass species found to be most suitable in each district. Fourthly, fertilizing where that is practicable and reasonably economical. And, fifthly, improvement in methods of pasture management.

Rotational grazing, which allows for resting periods during which grass makes substantial growth is one of the important principles in pasture management. Stock thrive better and suffer less from worms and other parasites when they are frequently moved on to fresh pastures. The real point is that rotational grazing enables the highest yield of pasture to be obtained with the fullest possible utilization of the pasture.

The intensive system of rotational grazing based on what is called the "short bite," and which is practised largely in the older countries, has, however, not achieved the results expected of it in Australia. But even in the countries where growth of grass is more or less continuous throughout the year, this intensive system is not altogether satisfactory. But rotational grazing, with reasonable rest periods for the growth of grass is essential for the best use of the type of grass swards produced under Australian conditions, because of the need for pasture plants—that is grass and herbage—to provide adequate reserves of nourishment to support a vigorous top growth.

Some Observations on Dairying in Britain.

E. B. RICE, Dairy Technologist.*

DAIRY farming is carried on in Britain in practically every county under a great diversity of conditions, and, therefore, in giving some impressions of the industry, it will be appreciated that an attempt can only be made to present a general outline of the main practices operating and that only brief reference can be given to each subject dealt with. It is hoped, however, that some insight will be given into the vast magnitude of the dairying industry, and of agriculture, in a country which is often regarded in Australia as primarily industrial.

Breeds of Cattle.

The dairy cattle population of Britain numbers over 3,000,000, a figure considerably in excess of that of the combined total of the dairy cows in all the Australian States. The production per head, too, is much greater than that of Australian cows, probably averaging about 600 gallons per year. Because of the density of the population of Britain there is a huge demand for milk for human consumption, surveys having shown that two-thirds of the milk is utilized for this purpose. Since so much milk is required for supplying the requirements of the liquid milk market, it naturally follows that the most popular breeds of cattle are those which supply a large quantity of milk. The Dairy Shorthorn is the predominant breed, owing its position to the fact that the animals can be fattened for beef when their milk yield declines through various causes. Next in numerical strength comes the Friesian breed, another noted heavy milk-producing breed. Although these two breeds greatly outnumber others, there are many different breeds encountered, certain of which are often reared in their native districts for sentimental reasons. A few cows of the Channel Island breeds are kept on many farms specializing in other breeds in order to maintain the colour and richness of the milk supplied to customers, while many farmers specialize in these breeds. The Guernsey cows, in fact, are often nearly as large and as heavy producers as the Shorthorns.

As an indication of the numerous breeds to be met with, I might enumerate the classes for which trophies were offered at the Royal Counties Show at Reading which I attended in July, 1937. These were Shorthorn, Jersey, Guernsey, Friesian, Devon, Sussex, Aberdeen, Angus, Dexter, Red Poll, Kerry, Ayrshire, Lincoln Red, Welsh Black.

In my tour of the dairying districts of Scotland, I visited the Ayrshire district, which is a noted cheese-producing area. It was a fine sight to see the Ayrshire cattle, which predominate there, grazing on the green hills. This breed shows special adaptability on the exposed, rugged hills of its native land.

Costs of Upkeep of Dairy Cattle.

In a country where hand feeding has to be practised for a period of about seven months in the year, and where land values are high, the

* Mr. Rice returned last year from a course of instruction at the Dairy Research Institute, Reading, England, and which was sponsored by the Department of Agriculture and Stock by direction of the Minister, Hon. Frank Bulcock. This article is a record of some of his impressions of visits to various parts of Great Britain in which dairying is a major industry.

Plate 181.
A Jersey Cattle Parade on Jersey Island.

animals to be profitable must produce high yields compared with cows kept under the grazing dairying conditions in most parts of Queensland. Some valuable data on the costs of upkeep of dairy cattle have been collected by the various County Agricultural Committees and the information contained in the following paragraphs should be interesting to Queensland farmers. In an inquiry carried out on fifty-eight farms in the Reading area in 1935-36 the average cost of keeping a cow for the year was £24 4s. 11d. More than half of this was represented by feeding costs, amounting to £13 15s. 4d. per cow, which were made up as follows:—

	£	s.	d.
Purchased foods	6	13	10
Hay and roots	4	18	11
Grass	2	2	7
	£13	15	4

It is evident that costs, especially of feeding, have to be carefully watched and, as soon as the yield of an animal declines below a profitable level, it must be disposed of for beef.

Much attention is also being devoted to grassland management, the farmer being urged to consider grass in the same light as any other crop, it being the cheapest and most important raw material on the farm, and to use improved husbandry in its culture. In the investigation on the above farms it was calculated that a cow yielding 600 gallons of milk consumes 4,019 lb. starch equivalent (a measure of nutritive values of foods), every pound of which fed via grass costs 0·58d. and via other foods 0·96d.

The Reading inquiry also showed the average costs of producing 1,500,000 gallons of milk on the fifty-eight farms to be—

	Average Cost (pence per gallon).
Foods	5·4
Labour	2·4
Sundries	1·3
Herd maintenance	1·2
Gross farm costs	10·3
Less Credits	0·8
Net farm costs	9·5

Another investigation made throughout England and Wales by economists showed the mean cost of milk production to be 9·32d. per gallon, the average being 11·96d. in winter and 7·30d. in summer.

Life of Cows in a Herd.

Through various causes the number of cows removed yearly from a British herd must be regarded high in comparison with Australian herds. Computations made at the National Institute for Research in Dairying, Reading, England, from estimates furnished by investigators in nine districts scattered throughout England, covering over 86,000 cows, showed the productive life of a cow in one herd to average

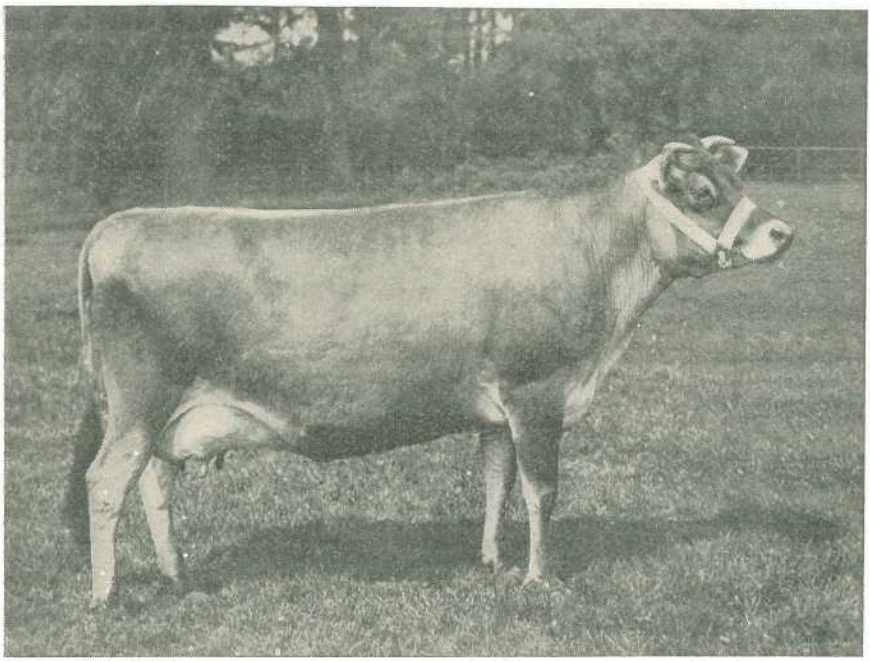


Plate 182.
A Jersey Heifer on a farm in Sussex, England.

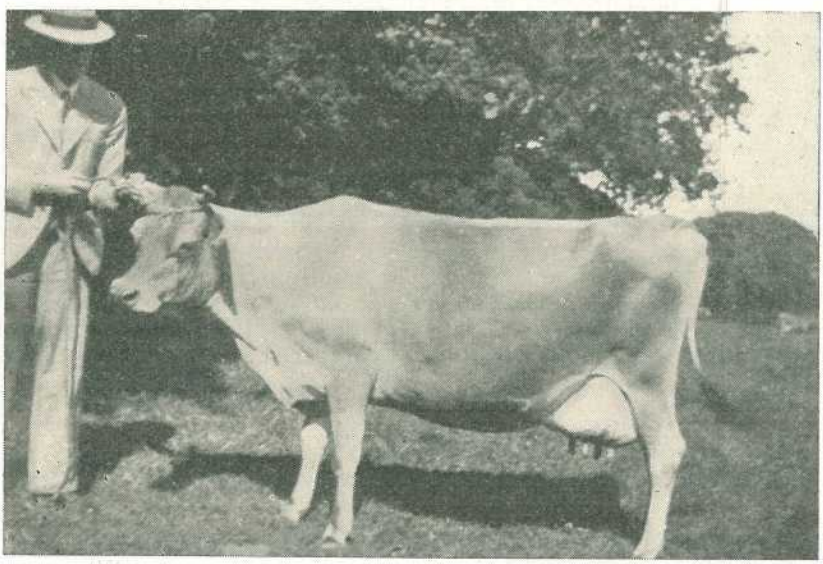


Plate 183.
Type of Jersey Cow on a dairy property in the South of England.

3·5 years. The causes of the disposals, which were obtained in some surveys, are set out below in tabular form:—

Cause.	Disposals.	
	Per 100 Cows Yearly.	
Trade	3·4	7·6
Low milk yield	4·2	
Sterility	6·1	16·3
Abortion	0·7	
T.B., Johne's disease, wasters	3·1	
T.B. test reactors	1·2	
Udder troubles	1·6	
Sundry diseases	1·2	
Accidents	0·4	
Old age	0·9	
Miscellaneous causes	1·1	

Calf Rearing and Management of Young Stock.

Calving time for most of the cows is in the autumn, the object being to have the largest number of cows in full profit during the winter in order to maintain uniformity of production throughout the year. This is, of course, essential on farms where milk selling is the chief objective. Heifer calves of larger breeds, like Shorthorns and Friesians, are sometimes left with the cow for seven days, while those of smaller breeds, like the Channel Island cows, are left for ten days. Then for three to four weeks they are fed on whole milk, after which a little good hay is supplied and a little dried cake and meal mixture, the wholemilk gradually being reduced. By the eighth or ninth week the milk is stopped entirely and the feeding consists of cake and meal mixture, good hay and water. On other farms the calves are fed wholemilk up to eight to nine weeks, then gruel or proprietary calf meal. Under such conditions about 60 to 100 gallons of milk are consumed before the calf is entirely fed on other foods, so that calf rearing becomes an expensive item. Again, on some farms a number of cows are set aside solely for providing milk for calf raising, while other farmers prefer the cow to suckle the calf, under which system it is weaned at about eight to nine weeks. Proprietary calf nuts or meals are being increasingly used and are often fed in the form of a dry meal, the milk or water being given separately. Some farmers feed gruels made up from such meals, but the dry meals are less trouble and prevent the common pot-bellied appearance of gruel-fed calves. Mating of heifers takes place at about eighteen to twenty-one months of age, so that the first calf is dropped when the animal is about twenty-seven to thirty months old.

Bulls.

It will be appreciated that the necessity to regulate calving times of the cows makes it imperative to keep the bulls separated from the remainder of the herd. In my travels, I do not remember having seen a bull roaming at large with the cows. All bulls were obviously of high quality, for to keep a "scrub" would be disastrous where high yields must be carefully safeguarded. Although progeny recording of bulls has not received the same prominence as it has in Denmark, there

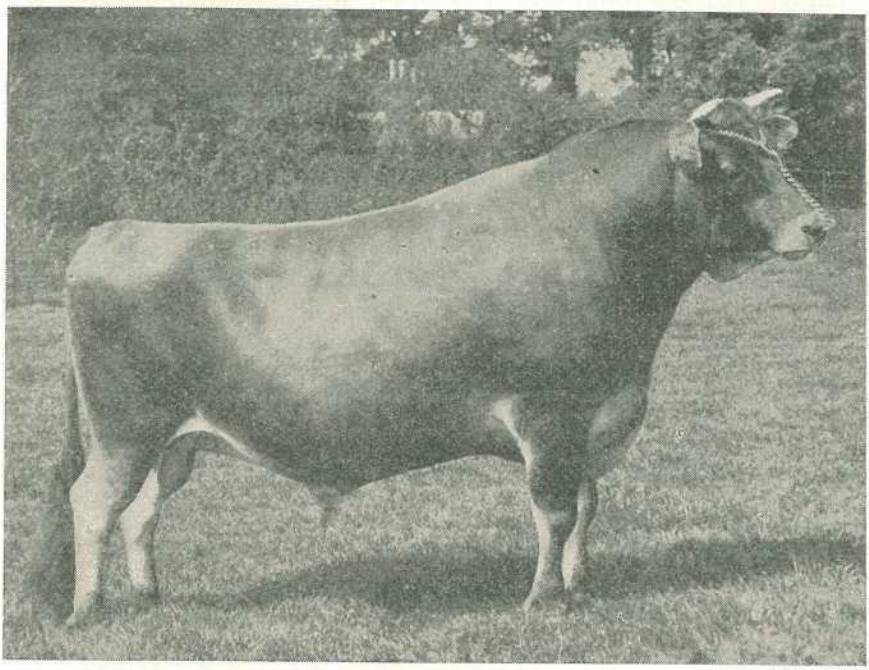


Plate 184.
The Pride of a Jersey Herd, Sussex, England.

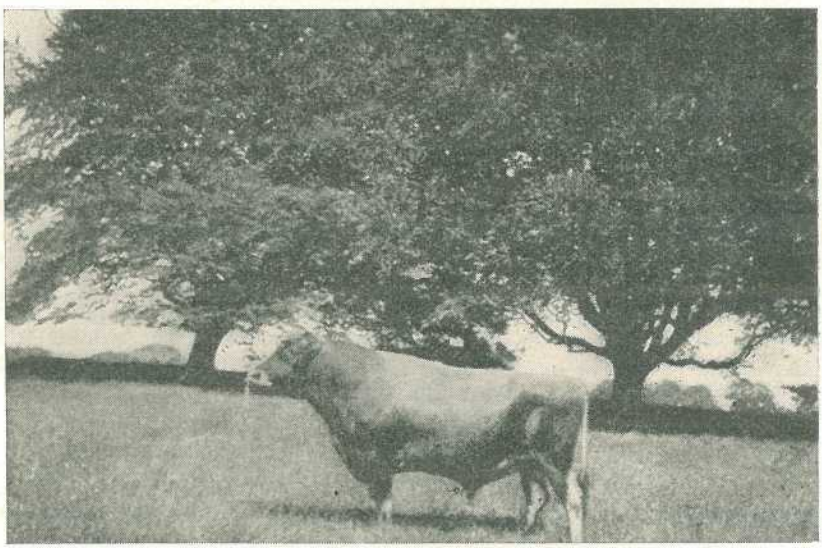


Plate 185.
The Head of a Jersey Herd on an English Farm.

appeared to be an awakening to its possibilities and provision is now being made on the forms furnished by the Milk Recording Societies for the inclusion of the requisite information for compiling a "bull index."

Dairy Buildings and Appointments.

Under the open-air dairying system practised in Queensland a comparatively simple structure meets all requirements for a milking shed, but in England, where for practically half the year the cows remain continuously indoors, substantial buildings in which feeding and milking can be carried out, are needed. The types of dairy buildings and standards of shed sanitation vary considerably, but on the better farms the dairy appointments are exceptionally good, and embody the most modern features of hygiene in respect of ease of cleaning, lighting, ventilation, and pure milk production. Tubular steel fittings are commonly employed for the cows' standings and in many sheds automatic water-drinking bowls are fitted for each cow. Steam sterilizers are used on all the better farms, and, where bottling is done on the farm, a small refrigeration plant is fitted in the dairy.

In spite of its disability of coldness in northern latitudes, where the cows have to lie on it for long periods, concrete has not yet been surpassed for cowshed floors, because of its many compensating features, such as imperviousness, cheapness, life, strength, &c. A bedding of straw is, of course, used on it when the cows remain indoors. At the Hannah Dairy Research Institute, Ayr, Scotland, I was shown a rubber mastic floor which had proved satisfactory in all respects and possessed the special advantage of being warmer than concrete.

In the South of England there has been a tendency in recent years to depart from the practice of keeping the cows indoors in the colder months. A system, known as the Hosier Open Air System of Dairying, has received the support of a number of farmers. Its essential features are that the cows are kept outside, day and night, throughout the year. They are rugged on winter nights and, perhaps, on very cold days. Milking is done in a portable bail type of building very similar to the ordinary bails used in Queensland, but which is always equipped with a milking machine, and which is frequently moved from place to place on the fields. The advantages claimed for the system are that much of the outlay on expensive buildings is avoided, labour costs are much reduced because of the ease of cleaning the shed and machine milking, soil fertility is improved by the spreading of the manure on the fields where it accumulates, disease is less rife than if cows are kept closely confined in a shed for a lengthy period, and general health is better. The milk yield is also undiminished. These claims have been substantiated by official investigations, and, no doubt, the system will receive more extensive adoption on certain farms peculiarly suited to it in the milder climatic parts of the country.

Feeding.

Feeding of dairy cattle in Britain and European countries is highly scientific at the present time, and particularly during the period of stall feeding can accurate quantities of nutrients be fed. This is not nearly so easy to accomplish under Australian conditions, where, normally, stock are out on pastures the whole year round, and practically only during droughts has hand feeding to be resorted to. Again,

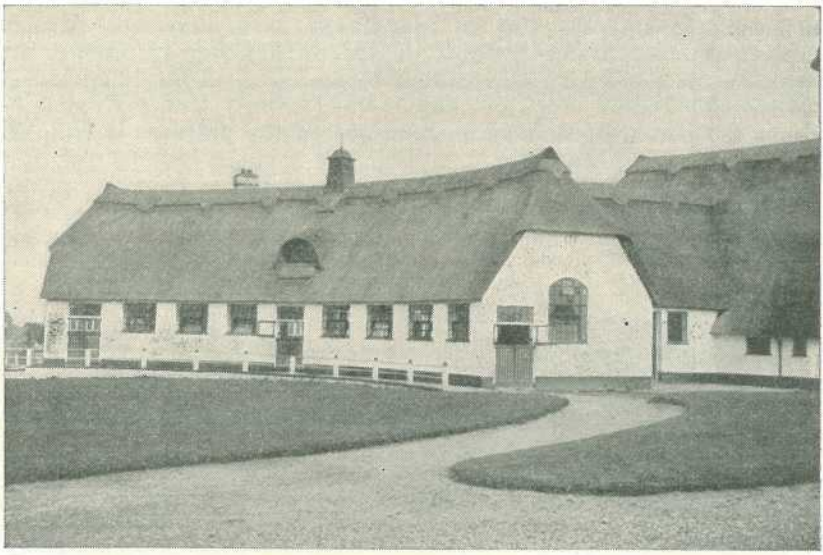


Plate 186.
Picturesque Thatched Farm Buildings on an English Estate.

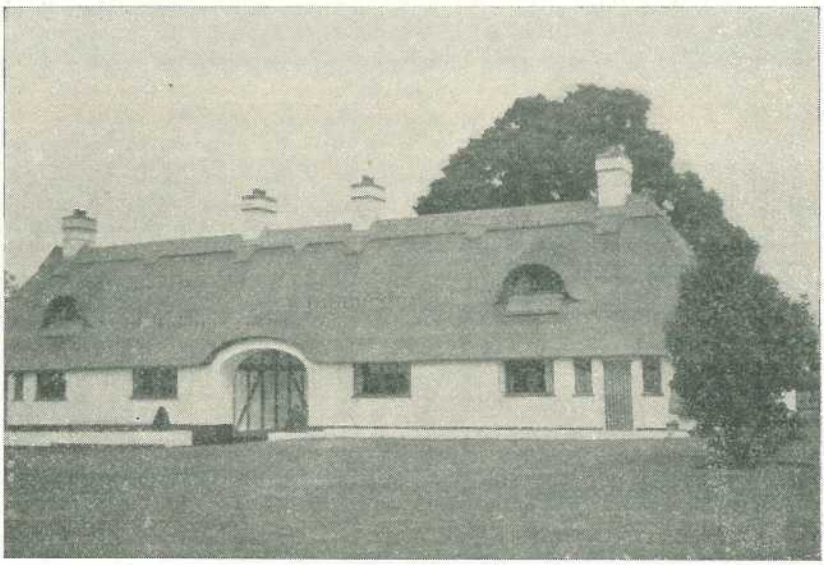


Plate 187.
Entrance to Ovaltine Model Dairy, England.

under Australian conditions, where the price received for cream for buttermaking and the cost of purchased foods may not render it economical to feed concentrates to the extent that they are used in other countries, too much emphasis cannot be placed upon the importance of pastures and fodder crops in dairy cattle feeding. Under English conditions the period of summer feeding out on the pastures is from May to October. For about four months in the summer grazing period the cow may be receiving an adequately balanced ration from the pastures alone, but at the beginning and also at the end of the summer it is often found necessary to supplement the pastures with concentrates and green fodders.

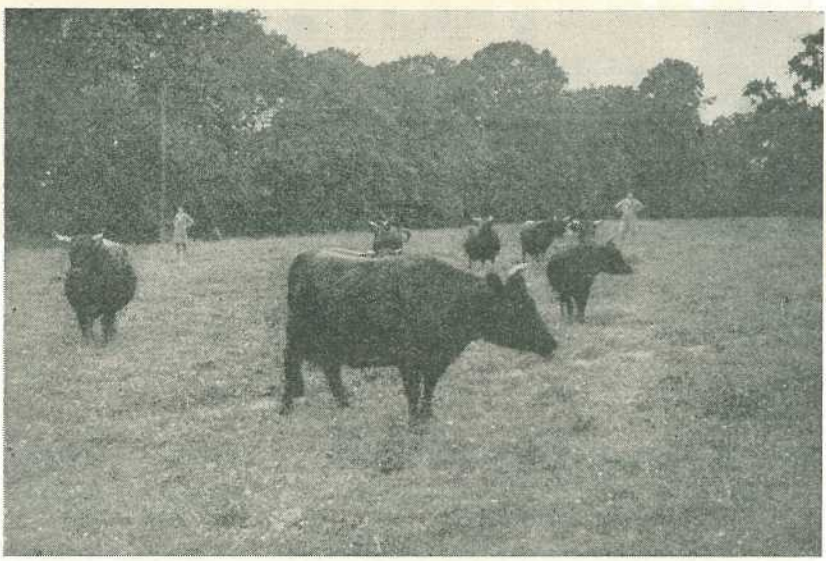


Plate 188.
Dexter Cattle on a Farm in England.

During the winter, when there is an almost complete stoppage of pasture growth, hand feeding is adopted entirely. The usual basis of winter rationing is to divide the food required by the animal into the maintenance and production portions. The maintenance ration, made up of bulky, starchy foods, is required to replace wastage of tissue, provide the energy for bodily requirements, &c., and the production ration, which consists of concentrates and grains, chiefly supplies the needs for milk production. The maintenance ration usually consists of hay, roots (mangels, swedes, turnips), silage, cabbage, kale, sugar beet tops, and straw, although with the conversion from arable to grassland farming, straw is now used in much lesser quantities than a decade ago. The use of roots, too, has declined in popularity, for, though beneficial to milk yield, they can be entirely replaced by hay, and present labour costs restrict the areas planted for root growing. Hay is the foundation of the maintenance ration on almost every farm, and haymaking is regarded, as in all European countries, as a most important farm operation. There is almost certainly a greater variety of concentrated foods available than in any other country, some of the products which are used being oats, bran, dry grains, cottonseed cake or meal,

maize gluten feed, linseed cake or meal, dried brewers' grains, palm kernel cake, bean and pea meal, soya bean meal and cake, coconut cake, rice meal, barley meal, dried beet pulp, meat and fish meals. Proprietary concentrate cakes and nuts have acquired great popularity because of the simplicity of rationing when they are used, and are usually fed at the rate of 3 to 3½ lb. per gallon of milk yielded.

Rye grass-clover mixtures are the chief pasture grasses, other grasses grown extensively being cocksfoot and timothy.

Plate 189.

A TYPICAL ENGLISH FARM.—A picturesque scene on the Wiltshire Downs. Guernsey cattle on their way to pasture after the morning milking.

To illustrate typical examples of the feeding methods followed in the country, the practices adopted on four of the farms visited are outlined below:—

Farm No. 1.—At this farm proprietary concentrates were fed all the year round at the rate of 3½ lb. per gallon of milk yield in winter and 2 lb. per gallon of milk to cows on grass. The winter maintenance ration was:—

10 to 12 lb. hay;

14 lb. chop (cabbage, green maize, silage) from October to Christmas; or

12 lb. chop (kale, straw or hay) from the end of September to February;

7 to 10 lb. roots (mangels) from Christmas to end of spring (April).

Farm No. 2.—Feeding methods on this farm were extremely simple for English conditions. Hay alone (no roots, no kale) was fed for

maintenance in winter, together with a proprietary cake concentrate, according to milk yield, for the production ration. When the cows were out at grass in the summer concentrates were not given.

Farm No. 3.—In the early part of the summer grazing period the pasture was supplemented by maize and oats or maize and cottonseed cake. Cows giving less than 4 gallons of milk were not fed any supplements in May and June, when the pastures were at their maximum nutritive stage. As the summer advanced, estimates were made from time to time of the quantity of nutrients that the animals were thought to be receiving from the pastures, and supplementary feeding was arranged accordingly; for example it may be estimated at one time that the grass is capable of providing maintenance and producing 2 gallons of milk. Then cows yielding over 2 gallons have additional protein concentrates fed to them. Later, the grass may be considered only capable of maintenance and the production of 1 gallon of milk, and a revised ration, according to this estimate, is fed, and so on, until the full winter rations are again being given.

Farm No. 4.—The winter feeding usually consisted of a maintenance ration of—

14 lb. hay;

7 lb. oat straw chaff;

56 lb. mangels.

For the production ration the undermentioned concentrates mixture was fed:—

	Per gallon of milk yield.
Decorticated cotton cake	1 lb.
Maize meal	1 lb.
Maize gluten feed	1 lb.

The area of grazing land on this farm was limited, so during summer the pasture was supplemented by 30 lb. per head per day of green forage crops, and an allowance of concentrates was given to any cows which were considered to be receiving sufficient nutrients for full production from the green foods available (cows yielding over 3 gallons of milk daily).

Grass Drying.

Two innovations in cattle feeding which were attracting interest during my stay in England were grass drying and a new method of making silage, known as the A.I.V. process.

Trials with grass-drying machines were made at the National Institute for Research in Dairying, and three machines were in operation when I visited the Hannah Dairy Research Institute, Ayr, Scotland. At these institutes much practical information on the process and on the feeding value of the dried product has been collected over a period of years. Briefly, the object of drying grass is to cut, dry, and so preserve the pasture growth at its maximum nutritive stage; that is, when about 4 to 6 inches high, as experiments have shown that, irrespective of variety, the protein content of grass at this stage approximates that of a protein-rich concentrate. The mineral and vitamin contents of the young grass are also largely retained by the process. Practical feeding experiments have confirmed the scientific data concerning the

nutritive value of dried grass, and cattle can readily be induced to eat it. In fact, at one large model dairy in Stratford the owner has replaced purchased concentrates entirely by grass grown and dried on his property. In Britain, where the cows have to be hand fed in the byres for from five to seven months each year, it is hoped that grass drying will pave the way for more economical feeding and help to retain in the country a portion of the huge sums which annually go to foreign countries for the purchase of concentrated feeding stuffs. The process is still in the experimental stage, the cost of drying is high, and the capacity of the machines limited, but mechanical improvements can almost certainly be expected. An advantage under English conditions is that the operations can be carried on in almost any weather. The opinion of most authorities is that artificial drying of grass appears to offer good possibilities in Britain.

A.I.V. Silage.

The new method of making silage, called the A.I.V. process, was devised by Professor A. I. Virtanen, of Valio Dairies, Finland, whose lecture before the Pasteur Club at Reading University I had the privilege of attending. The method has been taken up enthusiastically on the larger farms in Denmark, Finland, and other Continental countries, and trials have been made with the process in Britain. The essential difference between A.I.V. and ordinary silage depends upon the addition of a dilute solution of acid to the material being ensiled for the purpose of adjusting the acidity to a point (pH 4·0) which checks plant respiration and certain types of bacteria which deteriorate silage, but does not inhibit the desirable fermentation by the lactic acid bacteria. Apart from resulting in a decreased loss of material compared with the ordinary methods, it is claimed that the nutritive value, particularly the protein content, of silage made by the process is greater.

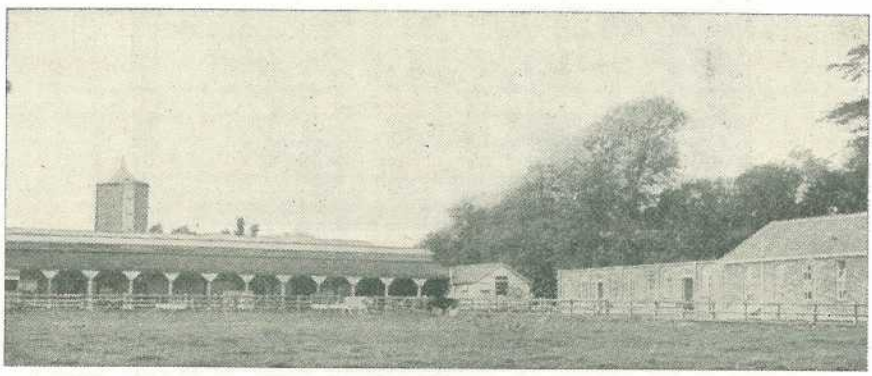


Plate 190.

Cowshed, National Institute for Research in Dairying, Reading, England, with silo in the background. The building on the right is an experiment factory.

Milk Recording (Herd Testing).

Milk recording was not adopted in England until many years after it was firmly established in Denmark, and, in fact, it was not until the years just preceding the World War that interest began to be shown in the matter. In 1914 the Ministry of Agriculture organised the formation of societies and made money grants in aid of the work.

Progress was naturally impeded in the war years, but steady improvement has taken place since. About 5 per cent. of the cow population is now included on the books of the societies, but there are wide variations in the numbers of cows under test in the various counties, as high as 25 to 30 per cent. of the total number of cows in certain counties being recorded. It is compulsory for a farmer wishing to undertake recording to enter the whole of the members of his herd, and records are taken, not over a lactation period, but over a whole year. The

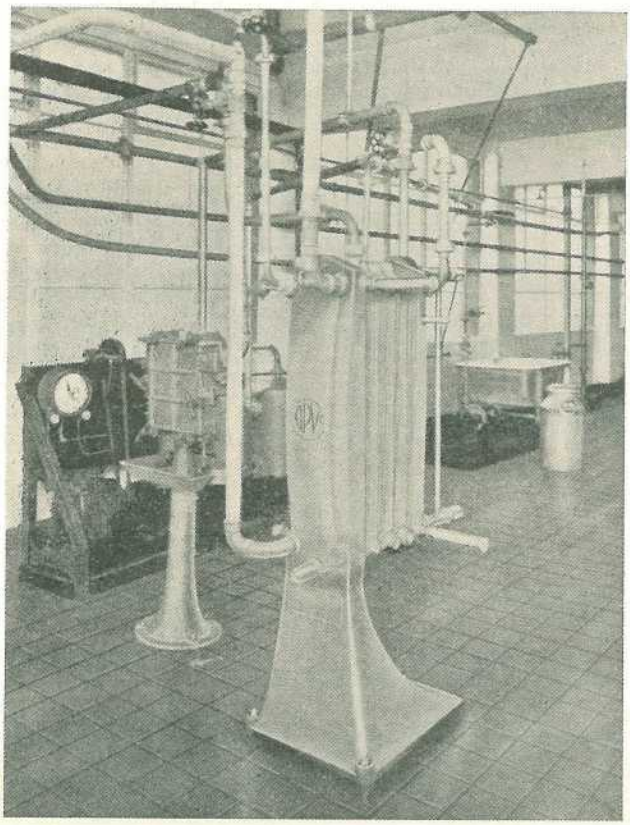


Plate 191.
A pasteurizer in a London dairy.

milk recording year is from the evening of 1st October in a year to the morning of 1st October in the succeeding year. It is only natural, too, in a country where milk selling is the chief aim of most dairy farmers, that greater importance is attached to milk yield than to butterfat production, but provision is made for recording butterfat production as well as total milk yield. Under English conditions the information derived from the records, in addition to enabling the farmer to identify low-yielding cows for culling from the herd and high producers from which to select for breeding purposes, is also of great value in the rationing of the herd and for denoting the influence of changes of food on milk yield. On most farms the rule is to keep daily records of yields and for butterfat, if recorded, samples are taken by

the recording officers once monthly. On certain farms permission is given for the milk of each cow to be weighed once weekly. The Milk Recording Scheme has the official recognition of the Ministry for Agriculture, which also assists by means of money grants, but the actual work is carried out by Milk Recording Societies, which exist in practically every county. The societies employ the recorders, tabulate and calculate the results, &c. Members of the society pay an annual subscription and an annual levy per cow. As previously referred to, the records now provide information which can be used for progeny testing of bulls, or, as it is often called, bull indexing.

The scheme also provides a service for the registration and marking of bulls and calves, the actual marking being done by the recording officers.

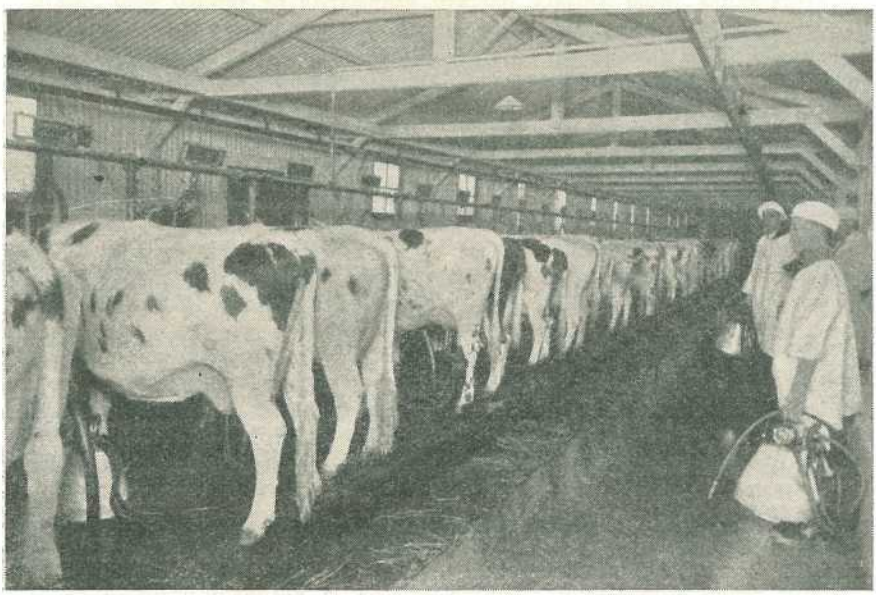


Plate 192.

Milking time in a modern English dairy. Note the bucket machines in operation.

Buttermaking in England.

Whereas in former years butter was usually made on the farms, there has in recent years been a rapid change to factory buttermaking with the result that the farm-made product is now being largely replaced by the factory product. The expansion in factory buttermaking has taken place throughout the country, but has been carried out on the largest scale in Cornwall and Devonshire, counties which are far removed from the thickly populated industrial districts, where, naturally, the surrounding farms are practically all engaged in producing milk for city requirements. The Milk Marketing Board, which controls the marketing of practically all milk produced in England and Scotland, and proprietary companies, have erected many large factories in various districts.

The type of butter produced in most of the English factories, especially in the South, is not starter-ripened to give a full-flavoured,

acid butter resembling Danish in characteristics, but is made from milk delivered daily to the factory, where it is separated, pasteurized, and the cream churned into a mild-flavoured butter more like Australian. Except for the delivery of the fresh milk from the farms for separation at the factory, the system of butter manufacture does not depart very widely from that followed in Australian factories; in a few remote dairying centres farm separation is practised, but it is only exceptional and not the general practice that it is in Australia.

Milk is paid for according to its fat test, but, as yet, different rates of payment based on the hygienic quality have not been introduced. Butter grading, too, is not compulsory, but creameries (as the factories are called) may join a voluntary scheme inaugurated by the Ministry of Agriculture—the National Mark Scheme—and products entitled to use this mark must satisfy certain standards of purity and quality. The possession of the mark is, therefore, really a Government guarantee of quality, and people are being educated to ask for National Mark products. Samples of butter from participating creameries are taken at regular intervals by the Ministry's officers and forwarded to the British Dairy Institute, Reading, for grading and scientific examination. The butter is graded upon arrival and is then held for ten days at a temperature of 60 deg. F. when it is re-examined to determine its keeping quality at ordinary temperatures.

It is hardly within the scope of an article of this nature to deal with the many complex factors associated with butter marketing in Britain, but it is felt that reference should be made to the advocacy sometimes urged for Australian manufacturers to attempt to copy Danish methods of butter manufacture. Apart altogether from the technical difficulties which prevent this at the present time, there is, it is contended, no further proof needed of the fallacy of the suggestion than the fact that in most English creameries a mild butter, like Australian, is manufactured. In the South of England, representing roughly half the population, this type of butter is most sought after, whilst in the North and in Scotland, consumers, through long association with Danish butter, prefer its fuller flavour, except in Manchester, Liverpool, and Glasgow, where Danish type and Australian type butters are sold in roughly equal quantities. Danish butter is actually shipped to the Northern ports and not to London and Southern ports. At the present time, all Australia's butter exports are finding a ready market in the South where it is preferred.

Margarine.

It is intended to digress from the subject proper once again to refer to the sale of margarine in Britain. Large quantities of this product are consumed and its competition must always be borne in mind, for it is likely to continue as a factor influencing butter prices. There is a section of the British public which can only afford to pay a certain price for butter and must resort to the use of substitutes if the price soars above their limited capacity to buy this article of food. Some years ago large quantities of margarine were consumed, the total weekly tonnage of margarine and butter eaten by the English people being about 5,000 of each. When the price of butter crashed in the depression years and it had to be sold at a sacrifice to clear stocks, many people who hitherto used to buy only margarine changed over to butter. In spite of the efforts of the margarine manufacturers, by extensive advertising, colouring of their product to look like butter, adding to it the essential

butter flavour and certain vitamins, and improving its spreading quality, they have not been able to recapture their lost market, and it is estimated that there are now about 9,000 tons of butter and 3,000 tons of margarine sold weekly.

Butter and margarine prices in retail shops vary from time to time, depending upon the seasonal fluctuations of imports. About the time of my arrival, some prices in London were:—

Margarine—slightly salted, 5d., 6d., and 8d. per lb.

Butter—dairy, 11d., New Zealand 1s., Empire 10d., Danish 1s. 1d.

Cheese and Cheesemaking.

As with buttermaking, so there has been a change over in recent years from farm to factory cheesemaking, though much cheese is still made on the farms; this is especially so with varieties other than cheddar. The increased milk supplies needed for human consumption, as a result of the Milk Marketing Scheme, have contributed largely to the decline in farm cheesemaking, while much of the surplus milk from the liquid milk market is now used for factory-made cheese.

Unlike in Queensland, where practically only one variety of cheese —cheddar—is made, there are numerous varieties produced in Britain. Most British cheeses take their name from the particular district in which their manufacture originated, and they are even at the present time made in most of those districts, sometimes exclusively, the principal varieties being Cheddar, Cheshire, Leicester, Stilton, Wensleydale, Derby, Lancashire, Dorset Blue, Gloucester, Dunlop, Caerphilly, and cream cheeses. Many cheeses of foreign origin are also made in limited quantities in England, such as Roquefort, Camembert, Gorgonzola (blue veined cheeses of French and Italian origin), Edam and Gouda (Dutch hard cheeses), Gruyere (Swiss), Coulommier, Gervais, Pont l'Eveque (French).

About 10 per cent. of the country's milk production is converted into cheese. Payment for cheese milk is mostly made on a gallonage basis, irrespective of its richness in butterfat, though some factories make differential rates of payment according to the fat content of the milk.

The National Mark Scheme has been extended to include most varieties of cheese. Factories and farms desiring to have their produce graded in accordance with the scheme must apply to the Ministry of Agriculture and agree to comply with the conditions and procedure laid down. Their premises and equipment must be suitable and hygienic, the quality of their product must be constantly maintained, and periodic inspections of the milk supply and process of manufacture are made.

Of the cheese consumed in England about 25 per cent. is British-made and about 75 per cent. imported. Of the total imports foreign countries supply about 15 per cent. and the Dominions about 85 per cent. Foreign countries which export to Britain special varieties of cheese are chiefly Holland, France, Italy, Switzerland, and Denmark. Cheddar cheese in large quantities comes from the Dominions—New Zealand (50 per cent.), Canada (30 per cent.), Australia and South Africa (5 per cent.).

Some interesting information was accumulated in a survey made of London retail stores some years ago. It was then found that more than twice as much white cheddar as coloured was bought in London.

In 500 shops covered in this inquiry, only two kept Australian cheese. However, in the mining and industrial districts coloured and Australian cheese are sold in greater quantities.

The opinions of the London storekeepers were sought concerning customers' flavour preferences. Sixty per cent. of the stores stated their customers preferred mild cheese, while 40 per cent. said that stronger flavoured cheese was preferred.

Milk Production, Testing, and Selling.

There are official dairy bacteriologists, stationed in ten different centres, whose duty it is to examine milk samples taken by authorities charged with looking after the hygienic quality of the milk supply, such as health and medical officers, county councils, veterinary officers, &c. These officials also examine samples submitted by farmers themselves and assist producers to supply a safe, clean milk by instructing them, if necessary, in approved methods of production on their farms. A notable improvement in the hygienic quality of the milk supply has occurred in the past decade as a consequence of the attention focussed on the matter, and, since the advent of the Milk Marketing Board, the payment of a bonus for "accredited" milk. The higher grade milks are often bottled on the producing farms, which are equipped with steam sterilizers for sterilizing equipment and a small refrigerating plant for cooling milk to 40 to 50 deg. F. immediately after it is drawn. The sale of milk in bottles fitted with hygienic metal caps is widespread and, indeed, there is very little other than such milk supplied in the larger cities.

Plate 193.

An example of the simple and effective publicity by the National Milk Council of Great Britain.

Large pasteurizing plants exist in almost every town, and this process is a valuable safeguard, especially of infant life, in a country where T.B. is prevalent in the herds.

Machine Milking.—A few comments on this subject may be of interest. Machine milking is not nearly so common in England as it is in this State, but it is attracting more farmers, largely because of the difficulty of obtaining agricultural labourers, for the drift to the cities is just as marked in European countries as in Australia. The releaser type of machine, almost universally used in Australia, is replaced almost entirely by the bucket type of milking machine which, being less complicated, is easier to maintain in a sanitary condition. Combine-auto recorder machines, rather like the releaser pattern, in which the milk is conveyed from the udder to a glass vessel wherein it

is weighed and its weight recorded on a dial, have been perfected in recent years. Their special advantage is that the milk yield of each cow may be recorded daily, which is desirable under English milk-recording rules.

Plate 194.
Belted Galloway Cattle in an English Show Parade.

Milk Standards.

The official standards for milk have been altered recently and reduced in number, and the methylene blue test, which affords an approximate measurement of bacterial numbers, has replaced the plate count for bacteria in raw milk. The simplification of grades was considered to be better than having numerous standards. The grades previously in existence and their chief requirements were:—

Certified.—From herds isolated from other cattle, and tuberculin tested every six months. The milk to be bottled on the farm in bottles sealed with a disc and cap. The milk must not be treated by heat, and the maximum bacterial count permitted is 30,000 per cc., and no coliform bacillus in 1/10 cc.

Grade A (Tuberculin Tested).—Herd to be isolated from other cattle and tuberculin tested every six months. No heat treatment permitted, and bacterial count not to exceed 200,000 per cc., and no coliform bacillus in 1/100 cc.

Grade A.—Cows to be kept separate from other cows in milk and subject to clinical examination every three months. Bacterial counts similar to Grade A (Tuberculin Tested).

Grade A (Pasteurized).—To be pasteurized at a temperature between 145 and 150 deg. F. for thirty minutes, and the bacterial count not to exceed 30,000 per c.c., and no coliform bacillus in 1/10 cc. Other requirements similar to Grade A.

Pasteurized.—Bacterial count not to exceed 100,000 per cc. No specific farm requirements.

Plate 195.
Butter Factory in Cornwall, typical of the new factories in England.

The Milk Marketing Scheme.

Almost all the milk now produced in England comes under the control of the Milk Marketing Scheme, exemption being granted only to certain producers of certified milk, of whom there are about 2,000. Most of these producers, however, now market their milk through the Board. The Board, which is producer-controlled, commenced operations in October, 1933, having as objectives: (1) Improvement of returns to producers, (2) control and organisation of milk marketing throughout England. The scheme is designed to pay farmers the average price of all milk sold, irrespective of purpose for which it is intended—milk sold for the liquid milk market brings about 1s. 3d., that for fresh cream about 8d., and that for cheesemaking about 5d. or 6d. per gallon. The pool price for milk for whatever purpose it is sold is about 1s. per gallon delivered to the dairy premises, whether butter or cheese factory, pasteurizing depot, &c. Transport charges are thus payable by the individual farmer, and average about 2d. per gallon, so that the average nett return to the producer is about 10d. per gallon. The scheme really provides for a pooling of sales returns, but instead of paying a flat price throughout the country, the return to the farmer varies in different districts in accordance with the proportions of milk utilized for manufacture and for the liquid milk market; but to protect farmers in districts where most of the milk is required for manufacture, the margin between the prices paid in any districts is kept to a maximum of 1d. per gallon. The average retail price paid by the consumer is about 6d. per quart.

The creation of the Board has given a great stimulus to milk production, as, by publicity and other measures, the consumption of milk has been markedly increased since the commencement of operations, until now over 1,000,000,000 gallons yearly pass through the Board's hands. About two-thirds of this immense quantity is used for the liquid milk market and one-third for manufacture into butter, cheese, and condensed milk.

Producers are encouraged to supply a milk of high bacteriological quality, for which they receive a bonus payment of 1d. per gallon over the payment for ordinary grade milk. Approximately one-third of the suppliers to the Board have qualified to receive this payment, and such suppliers' milk is marketed as "accredited" (or Grade A) milk. Other suppliers whose herds are free from tuberculosis (attested herds) also receive this higher rate of payment.

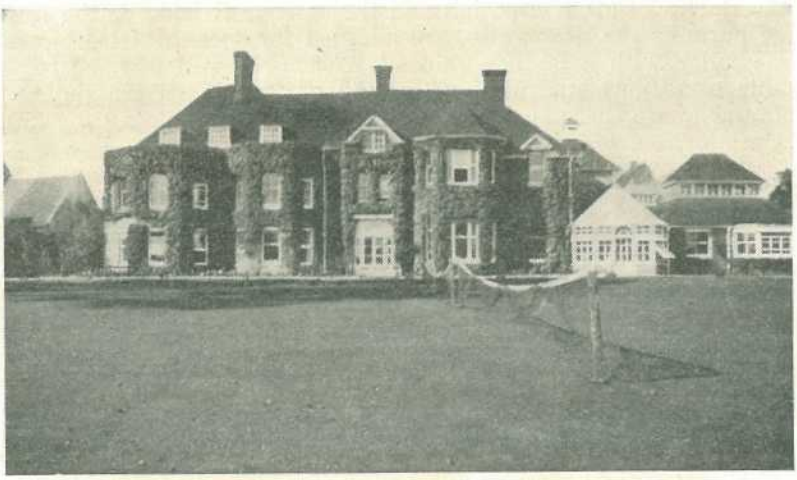


Plate 196.

MAIN LABORATORY OF THE NATIONAL INSTITUTE FOR RESEARCH IN DAIRYING, READING.—The building was formerly an old manor house, dating from the 15th century.

Milk Publicity in England.

With a view to fostering interest in the nutritive value of milk and to encourage its increased consumption, an organisation known as the National Milk Publicity Council was formed some years ago.

Among the many schemes introduced by the Council the Milk-in-Schools Scheme is deserving of special mention. This scheme should have a far-reaching influence on the health, physique, and efficiency of some 3,000,000 school children, who receive on every school day a small bottle of milk containing one-third of a pint. The cost is only ½d. per bottle, and, in necessitous cases, the milk is supplied free of cost.

Satisfactory results have also attended the Milk-in-Industry Campaign, whereby arrangements are made for milk to be drunk during or immediately after working hours. Suitable supplies of milk at the desired hours are arranged in the industrial undertakings and offices wishing to participate in the scheme.

Twelve organisers, together with women lecturers, have been appointed to give lectures and talks to school children, industrial and other workers, and to arrange cooking demonstrations. By the extensive use of newspaper and press advertising, leaflets, posters, films, and shop window displays, further publicity work is undertaken. "Milk weeks" and "cheese weeks" have also been conducted in various towns.

The Fat Lamb Industry in Queensland.

JAS. CAREW, Senior Instructor in Sheep and Wool.

FAT lamb raising is now developing along sound lines in some districts in Queensland, with a result that many prime grade lambs are being marketed. A demand for the suitable age and type lamb and the prices for prime lambs over a series of years have stimulated expansion. This branch of animal husbandry is developing into a major industry on the Darling Downs, especially on the eastern division of the Downs. Other parts of the State, also, are adapted for successful lamb-raising. Any locality with a 25-inch rainfall reasonably well distributed, and suitable conditions otherwise, where the pasture lands are sufficiently good, and where there is enough arable land on the holding for fodder crop production, is suitable for lamb fattening.

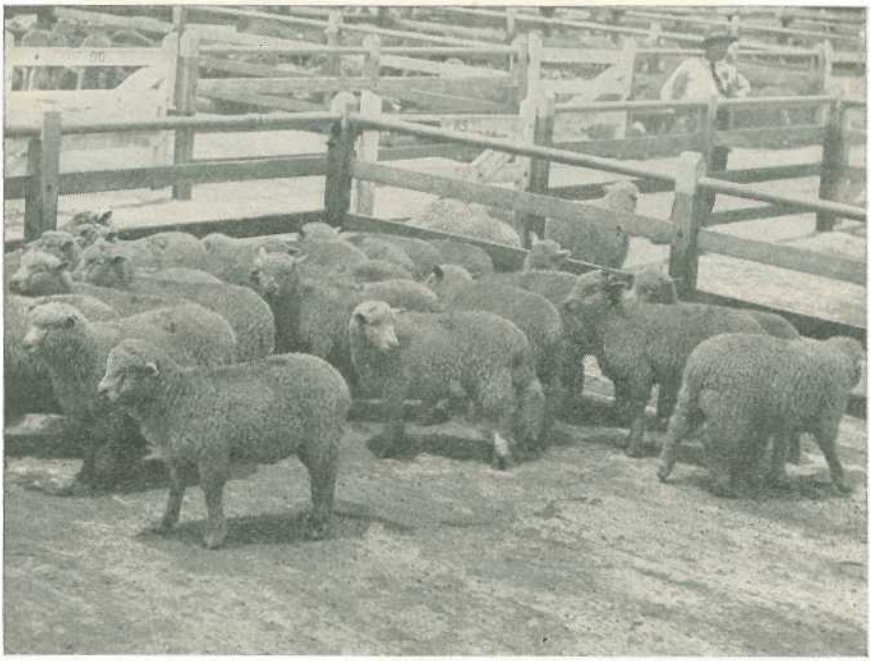


Plate 197.
Fat Lambs at Cannon Hill.

If suitable soil is well cultivated, a wide variation in crop production is possible. In this respect Queensland is fortunate in that conditions favour both summer and winter cultivation of several varieties of fodder crops. Where lucerne can be grown for hay, the land is likely to be too expensive for sheep, but there are many localities, not so rich, perhaps, where lucerne can be grown to provide a good fattening fodder balance. There is room, therefore, for considerable variation in both soil and climate before lucerne can be ruled out as a local factor in lamb raising.

Panicums, millets, and sudan grass are good fattening crops which can be sown in early spring. Sudan grass, particularly, is a good dry

weather standby. Sorghum, if sown in January, should prove a most useful standover crop for winter and early spring. Oats, wheat, barley, canary, and rape also deserve a place in any green crop planting programme on a fat lamb farm. The breed of sheep available may be selected to suit particular conditions and circumstances.

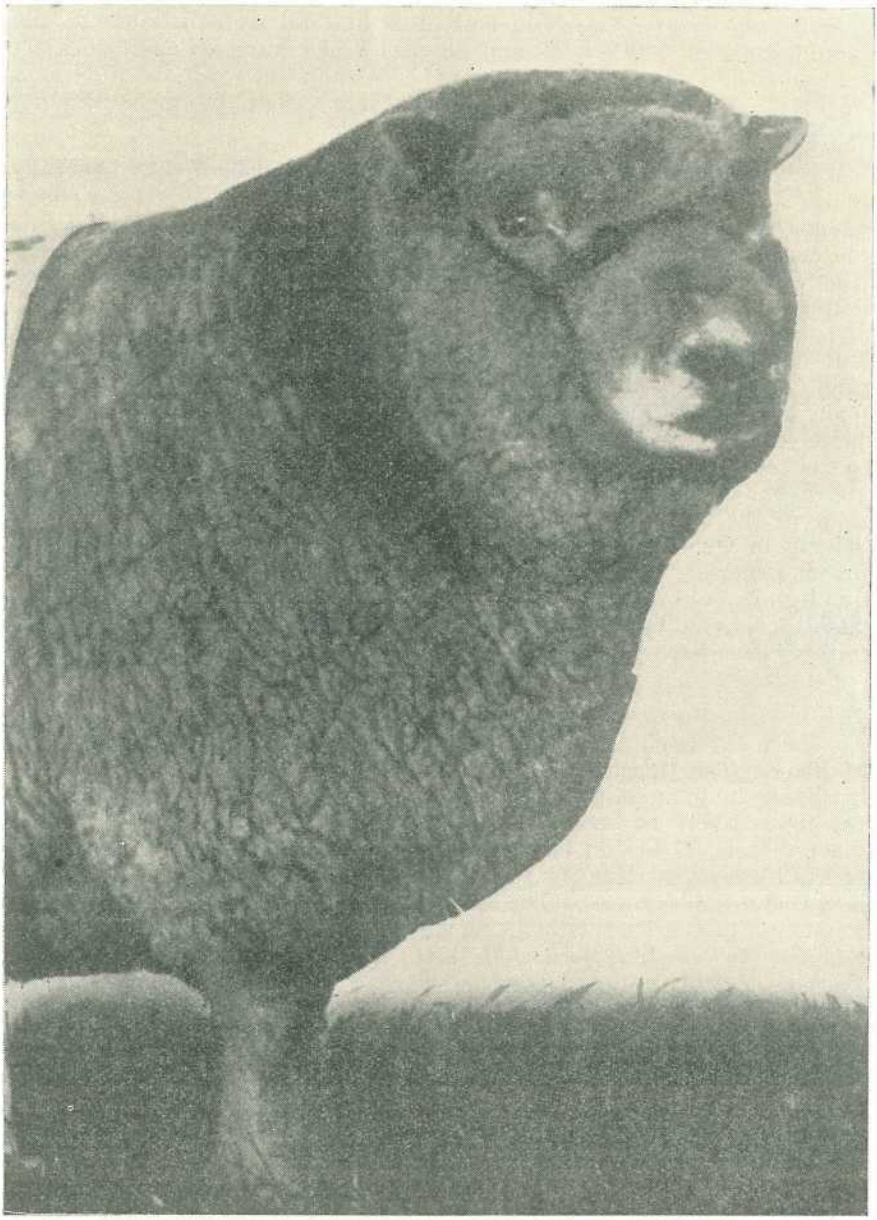


Plate 198.
A Southdown Head which indicates quality.

The Type of Lamb Required.

The present day demand is for a small, plump, well-shaped young lamb, and this demand exerts a big influence on the class of lamb to be bred. The marketable lamb should, therefore, be thickset, with a short body, broad and even in the back, with meat extending down the legs, which should be fine in the bone and fairly short. It should be full fleshed but not over fat, with both flesh and fat well distributed, and should dress at between 30 and 33 lb. When hung on the hooks the carcase should show a full U and not a V shape between the hind legs. To obtain the correct type there are three essentials—the suitability of the sire and the dam, and the food supply.

Some excellent lambs are produced in Queensland, but generally there is a lack of uniformity in combination with quality. As a consequence, there are too many classes, and lambs have to be graded into too many small groups, which reduce their general export value. Fortunately, all carcases are not required to be of exactly the same weight and grade, and lambs that are not models of perfection may be sold at satisfactory prices, provided they are young and in good condition. But as competition increases, as big a percentage as possible of the grade and quality in demand must obviously become the lamb raiser's main aim. The carcase most likely to meet with success in show and prize-winning competitions is that of the Downs types, and the nearer to the Southdown the nearer to present day demand. To make a special endeavour to obtain all lambs of this type would, however, eliminate some of the useful breeds and types of value in establishing fat lamb raising in Queensland on a sound basis. The Southdown and Downs breeds generally are mutton sheep, and do not produce the quantity or quality of wool to compare with the Corriedale or longwool-merino cross. They, too, tend to become over-fat for breeding, and do not give the milk yield necessary to promote a quick development in the lambs.

Breed and Types of Ewes.

As a fat lamb flock foundation the Corriedale can be given pride of place. The Corriedale is a hardy sheep, adaptable to the districts in Queensland, in addition to the Darling Downs, in which fat lamb raising is likely to become established—that is, in the higher regions distant from 50 to 150 miles from the coast, and in which the yearly rainfall averages from 35 to 25 inches. Next in preference are the longwool-merino crosses. The Lincoln, Leicester, Border Leicester, and Romney Marsh mated with the merino all give a crossbred well adapted to form the breeding flock. Of these, preference may be given to the Border Leicester in the plateau and warmer districts, and to the Romney Marsh in country closer to the coast, and on the lower lands and higher rainfall areas. Rams of these breeds, when mated with large-framed plain-bodied merino ewes, produce quick-maturing progeny likely to give a good return as prime lambs. The ewes of such unions possess the desirable characteristics so important in the foundation fat lamb flock. These longwool crossbred ewes also carry a good fleece, which makes up in bulk what it loses in quality; they are strong in constitution, and adapt themselves to diversified farming conditions, are good milk yielders, and give little trouble at lambing time. Their chief disadvantage is that they take after the long wools to too great an extent in their seasonal mating tendencies, and to obtain best lambing percentages autumn mating is necessary.

The pure merino is a very useful breed, but to get best results from them as mothers for fat lambs, young, large-framed, plain-bodied, western-bred ewes, culled for strength from a wool-producing flock, will give best results. An advantage in favour of the merino over the Corriedale or longwool crosses is that they mate successfully at practically any season of the year, providing suitable feed is available. They are obtainable in Queensland in large numbers, and if ewes cast for age are selected, they are usually available at a moderate or even a low price. The merino is a slow-maturing sheep, and as breeders under favourable conditions they will outlast most other breeds and crosses, but they are harder to fatten, and should, therefore, be fattened and sold before they become broken-mouthed. The flesh of the merino is darker than that of either British longwools or the Downs breeds, but a blend of their blood is desirable in bringing a richness of colour into the flesh of the dressed carcase. The merino is unlikely to become over-fat for breeding purposes, as is the case with other breeds and crosses. Their chief disadvantages, as compared with the Corriedale or British long-woolled crosses, are that they do not adapt themselves as well to diversified farming conditions, and they are rather restricted in their milk supply, while their lambing troubles are much greater. They are essentially a dry-climate sheep, as they thrive best where the air is light and dry with a low rainfall. Under most conditions their thin skin and heavy wool-carrying capacity is a disadvantage which is increased in the heavier air regions near the coast, and where the higher rainfall impairs their constitution and leaves them less able to resist parasitic attack, which is a common experience under moist, humid conditions.

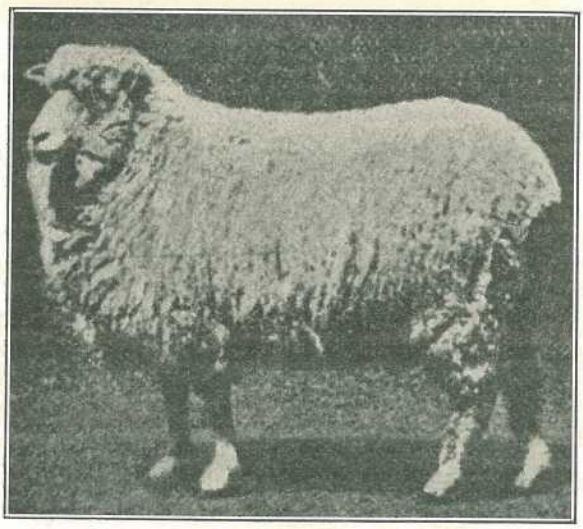


Plate 199.
The type of crossbred to form the breeding flock.

There are several pure British breeds and their crosses in Queensland, but not in numbers sufficiently large for lamb-breeding purposes. The Downs breeds, either pure or crossed, are not satisfactory because of their wool being light in weight and low in value, while their tendency to become too fat for breeding renders them unprofitable generally.

The Dorset horn is an exception, and if mated with the half-bred Lincoln-merino produces a type suitable for breeding with early mating tendencies. The Dorset horn and its crosses are very prolific, and an advantage may be expected from an infusion of this breed, especially in the hotter parts of the Western Darling Downs and further west and north. A comeback is derived from mating a merino to half-bred longwool ewes, of which the progeny are most suitable for early mating in the hotter pastoral regions, and it is a profitable wool producer.

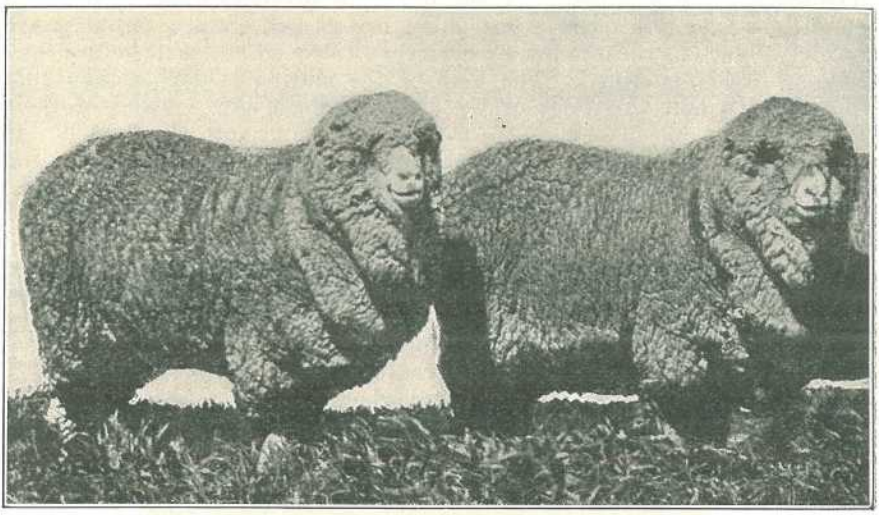


Plate 200.
MERINO EWES.—Large-framed and plain-bodied, suitable for producing crossbred ewes.

The retention of the ewe portion of the drop to breeding age is not economic in some of the present lamb-raising districts because of the smallness of the holdings and high value of the land. The larger holdings further west, of less value agriculturally, which give a fair prospect of successful breeding and fattening, should run the longwools, especially the Border Leicester. The ewe portion of the progeny could be retained for disposal to farmers on the smaller "inside" holdings, as two-tooths. There is a considerable area of suitable country extending from the New South Wales border near Goondiwindi in a northerly direction and embracing Miles, Wandoan, Taroom, and even further north, which could be used to advantage for lamb-raising. This area, also, is suitable for the Corriedale, which as a distinct breed has special claims for consideration. It is a dual purpose sheep, and should be kept to the standard of large frames producing bulky long fleeces. Corriedales of suitable type possess all the good qualities of our best crosses, being big-framed, deep-bodied, and good wool producers. They also are good doers, and possess the hardy constitution necessary in the climatic conditions generally prevailing. The pure-bred lambs are not as quick in maturing to prime as other longwool cross lambs, but this can scarcely be expected from heavy wool producers. The Corriedale ewe also is a good milk producer, and when mated to sires of correct type it will rear quick-maturing lambs and give a profitable fleece of wool at the same time.

Choice of Sire.

Because of the influence of the sire over the progeny, full consideration of the location and conditions and the type of lamb in demand must be given to this matter. Whichever of the British breeds is chosen, it should be of a high grade and typical of that particular breed. As the services of the ram are likely to result in a drop of fifty lambs or over, it pays to spend a few guineas extra on getting pure blood of the correct type. Because of the wide range of soil and climatic conditions in Queensland, choice cannot be restricted to any one breed. There are two distinct types to be kept in mind—the large bulky type, such as the Border Leicester or Romney Marsh; and the low-set plump type, such as the Southdown, Dorset horn, or other Downs breeds. To obtain uniformity of type, a certain standard should be aimed at; such a standard is well defined in New Zealand where the Romney Marsh three-quarter bred ewes are extensively mated with the Southdown ram. In New Zealand, however, conditions—climatic and otherwise—do not vary greatly in one district or another and, consequently, uniformity is practically a constant factor in lamb raising.

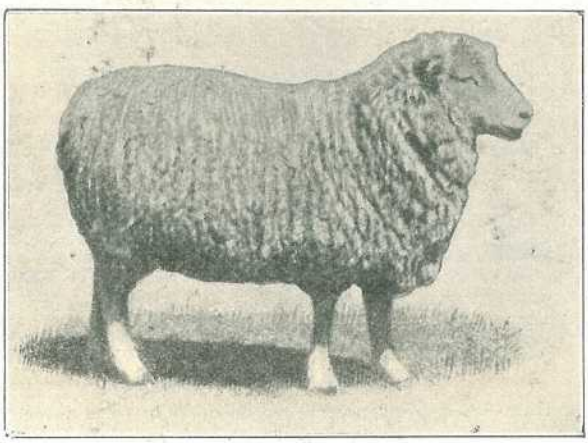


Plate 201.

Dorset Horn × Crossbred Ewe, a cross with early mating tendencies.

In Queensland, there are large areas now being claimed from the wilderness which, when improved, will give returns not yet realized. While the adaptability of these new districts to fat-lamb raising and crossbreeding is assured, to some extent, the breed of sheep best suited to the local conditions has still to be determined. The characteristics of the Corriedale for a pure breed, and Border Leicester for crossing with the merino, indicate a starting point for founding the ewe flock. The resultant ewe progeny mated with Dorset horn rams should produce a desirable fat lamb type. Uniformity in lambs is important, especially where the small flock numbers give little opportunity for selection.

The Ewe Flock.

Ewes should be in good store condition when mated, and the most satisfactory results may be expected from them when on a green bite sufficient to improve their condition.

Rams should be kept in an enclosure away from the ewes at all times except at mating time. All lambs should be as nearly as possible the same age, and success in this respect can be achieved only by timing the mating in keeping with the characteristics of the breed and seasonal conditions.

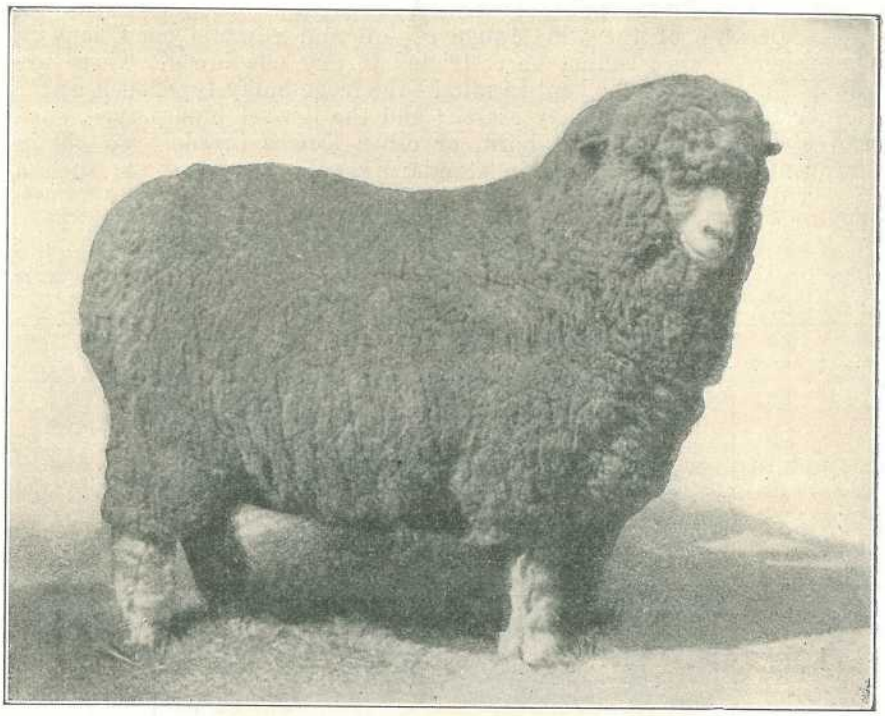


Plate 202.

A CORRIEDALE EWE.—A dual-purpose sheep suitable to form the breeding flock for fat lambs.

The merino and the Dorset horn are the only two breeds that, under normal conditions in this State, will mate at any season of the year. From a lamb-raising point of view, some success may be expected in this respect, but the British long-wool breeds and their crosses give best results when mated in late summer and autumn, say from late in January until June.

Yarding the breeding flock overnight is a sound practice, and it may vary from two to three nights a week. Only two-thirds of the rams should be turned out with the ewes for the first two weeks, and the remainder for the next four weeks. Six weeks or a little longer should be allowed, and if the health of the flock is safeguarded a good even lambing should be expected.

The pasture for the ewe flock at all times, other than when rearing the lambs and topping them off, should be just good enough to keep them going in strong condition. When short green grass is available it is the natural supply, and with regular drenching for worms, if necessary, they should keep in good condition. Should dry weather prevail for any extended period, a good lick, of which the basis is, say, one-third

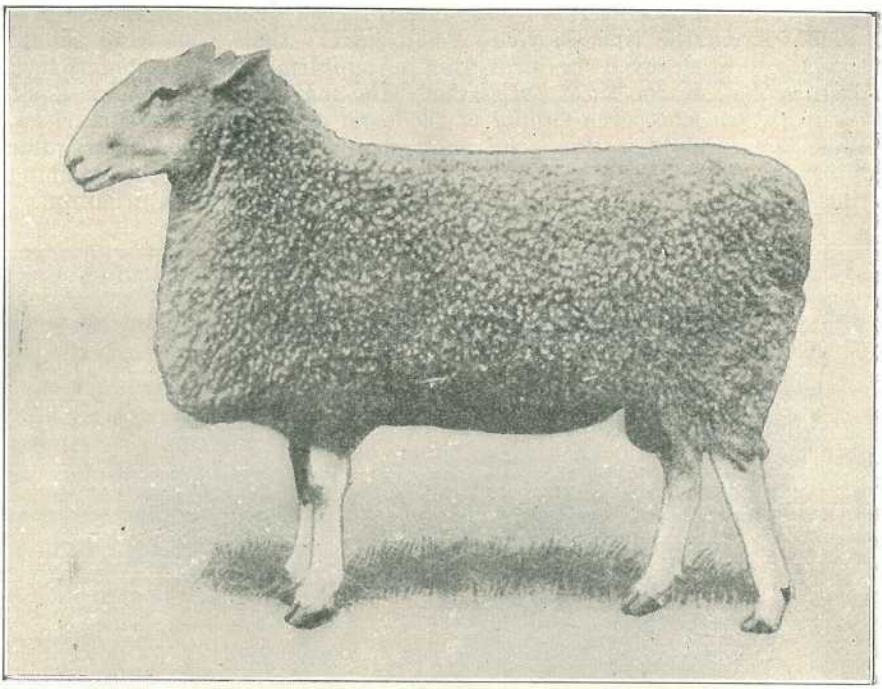


Plate 203.
A BORDER LEICESTER RAM.—Suitable for mating with the Merino to produce the breeders for fat lambs.

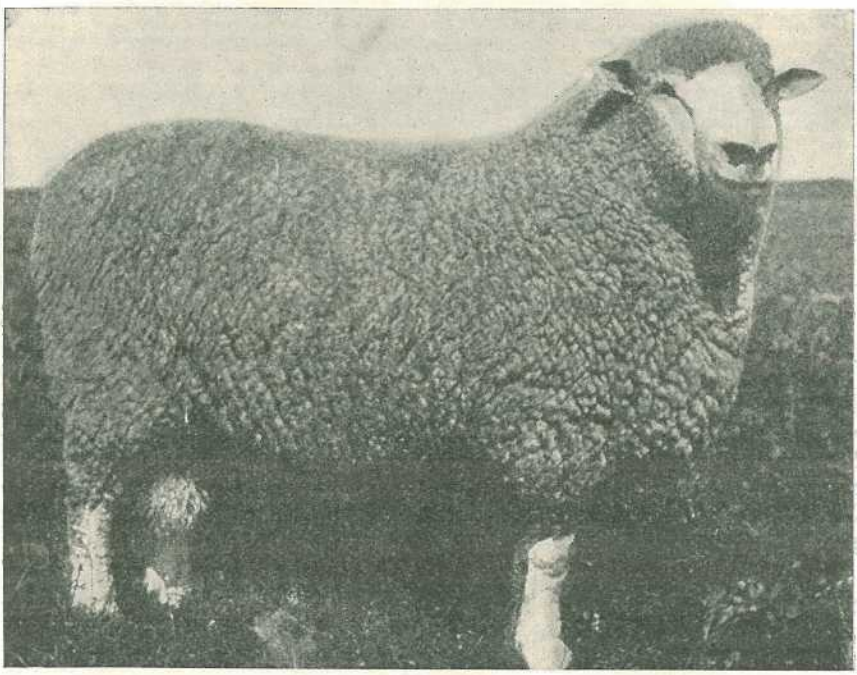


Plate 204.
A ROMNEY MARSH RAM.—Suitable for mating with the Merino.

salt and two-thirds sterilized bone meal of good quality, should be provided. From the time they are "half gone," their well-being should be safeguarded, even to providing a supplementary ration. Good pasture land is the most satisfactory for maintaining the ewe flock, for it gives a more even supply of food and causes fewer irregularities. When near lambing time, the flock should be inspected at regular intervals, and in such a way as would be necessary at the actual lambing time in order that the ewes may become accustomed to such attention.

Plate 205.

A DORSET HORN RAM.—Suitable for mating with the Corriedale or Crossbred Ewes.

At lambing time, the number of ewes saved through proper care and attention goes a long way in bringing up the lambing percentages. Early morning visits are important, and the earlier the better. This is really the hardest and most exacting work of the season and calls for the greatest amount of knowledge and patience, besides exerting the greatest influence on financial results.

Seasonal conditions and good management up to the time of lambing have an important bearing on the lessening of lambing troubles, but the type of ewe and the breed of ram are also important factors in this respect. No matter what the conditions are, or what the influencing factors may be, however, proper care and attention are essential.

Plate 206.

A COMPARISON IN SHEEP COUNTRY.—Left: Country ringbarked two years previously and carrying one sheep to 2½ acres. Right: Country not ringbarked and carrying one sheep to 5 acres.

Care of Lambs.

In marking the lambs, a good practice is to have a secure temporary yard erected in the paddock in which the ewes and lambs are running. All instruments used in lamb marking should be sterilized in boiling water before use and kept in an antiseptic solution when not in use during operations. The younger the lambs are marked the better, as they do not then suffer much of a setback. When small numbers are to be treated, from two to four weeks can be accepted as the correct age. After marking, a combined antiseptic and healing solution should be applied with a clean swab or brush.

The utmost care is necessary in handling, trucking, and transporting lambs to market. If they are to be lifted, put one arm around the brisket, and get a firm grip of their skirt at the flank, with the one hand, in which way they can be handled without injury, and apply religiously the following "dont's"—

Don't overdrive the lambs.

Don't use dogs that bite.

Don't grab lambs roughly by the wool.

Don't prod lambs with sticks or ill-use them in any other way.

Don't overcrowd trucks.

Don't allow the lambs to fall off the gang-boards during loading operations.

Young lambs are likely to lose heavily in weight in transit. In tests carried out by the Department of Agriculture and Stock in 1935, the following losses were recorded:—

Romney Marsh-Corriedale cross—	
Live weight on holding	69 lb.
Live weight at saleyards forty-eight hours later	64 lb.
Loss	5 lb.
Southdown-Corriedale cross—	
Live weight on holding	71 lb.
Live weight at saleyards forty-eight hours later	66 lb.
Loss	5 lb.

This loss in weight is unavoidable, but it serves to emphasise the necessity of careful handling and early slaughter.

Under adverse conditions, the loss would, obviously, be very much greater.

THE FUTURE OF WOOL.

An opinion expressed recently—the opinion of an experienced wool man—was that, properly speaking, there is no wool problem. Quoting a German wool man, he said "the use of substitute fibres is meant only as a makeshift."

It is known only too well how often in recent years there have been wool trade disappointments of all kinds—prices, substitute competition, and so forth—yet, every year, all the clips are being lifted with an almost mechanical regularity. Generally speaking, wool still remains a stable commercial staple.

Transport of Stud Pigs.

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

THE transport by rail of pedigreed and other pigs for breeding purposes is arranged most conveniently by placing the animals in properly constructed crates and sending them by express goods or other trains giving rapid transport to their destination.

Sales of breeding stock are usually arranged on the basis of delivery in crate at sender's station and subject to return of crate to the same station, freight paid (if any), by purchaser and as early as convenient after delivery. Forward freight on such consignments in Queensland is subject to a rail rebate of 20 per cent. (on pedigreed as well as non-pedigreed animals) an amount which should be deducted from the freight total when it is being paid either by consignor or consignee. This rebate, however, is subject to the railway waybill being endorsed "For breeding purposes."

Plate 207.

A suitable type of crate for transport of stud pigs. Note that although this crate has been used principally for weighing pigs on the farm (see also Plate 208), it is of a type adapted for both purposes, the wires being attached when crate is used for weighing.

Note also that excellent opportunity offers on crates of this description for advertising name and address of stud, breed of pig, &c.

Care should be taken always to see that the crates are sufficiently large to allow the pigs reasonable freedom of movement, that a trough for food and water is provided, and that movable doors are fitted at each end of the crate.

It is usually preferable to use sieved sawdust as bedding in pig crates, instead of straw or grass. If pigs are consigned by rail for more than about 300 miles arrangements should be made for an agent to feed and water the animals en route; the expense incurred should be part of the original quotation or a condition of the transaction.

Wherever possible, the despatch of stud pigs in crates should be so arranged that the animals will not have to travel during very hot weather, especially over long distances. It should be specially noted, too, that consignments of stud pigs in crates will *not* be accepted by passenger or mail trains, or interstate or overseas steamers carrying passengers (tourists or otherwise).

Plate 208.

Crate in position and ready for use in weighing pigs; front door is closed. Note, also, the arrangements of the top beam, lever, and spring balance.

In all such transactions three parties are principally concerned—the consignor (that is the sender or vendor), the consignee (the person receiving), and the Railway Department or other transport authorities.

So far as the Railway Department is concerned, provision is made covering the transport of the live animals at scheduled rates, but there are no special regulations relating to the carriage of returned empty

pig crates, although they are given the same attention as other classes of goods.

The consignor is the one principally inconvenienced where there is delay in returning empty pig crates, for it is not usual for stud pig breeders to carry a stock of crates, only those actually required being available.

The Railway Department, of course, also becomes involved where there is delay in return of empty crates. In a recent report the Secretary to the Commissioner for Railways, Brisbane, had this to say, inter alia, in discussing the condition of crates as received and some of the hindrances to rapid return:—

> *Crates.*—No doubt these are made as light as possible to minimise freight, consequently after a period in use they become insecure and liable to damage by the pigs. The boards so often reported as missing are probably removed by the person receiving the pig to release the animal from crate and are not replaced on the crates when being returned.
>
> *Delay in Transit.*—Consignees (unfortunately) invariably use the original consignor's label as a return address, after alteration, and the labels falling off thus lead to the crate being separated from the book entry and resulting in its being held (by the railways) until placed through official correspondence.

As an illustration, the Secretary to the Commissioner indicated that the General Manager at Rockhampton had occasion recently to report to the General Manager at Brisbane that three pig crates addressed to a well-known stud piggery on the main line had been lying on the platform at an isolated siding for a considerable time. These crates had apparently been dumped on the platform without the farmer taking the trouble to consign them—that is, making out a consignment note and informing the station-master accordingly.

The farmer apparently was under the impression that empty pig crates are dealt with in the same way as empty cream cans, but this is not so, because crates must be consigned as goods, and unless so consigned they might be unduly delayed in their return.

Stud pig breeders and others concerned should note, therefore, that before empty pig crates are accepted by the railway authorities for return to the original sender's station they must be consigned in the ordinary way, and where freight is payable—as it is in the case of crates carried over long distances—freight must be prepaid by the person consigning, or finally by the person receiving the crate, if sender's station is not one at which there is an officer in attendance.

It is a good practice to advise the consignee by letter when empty crates are being returned, so that he shall not have to make unnecessary trips to the station in search of the crates.

The Railway Department, it must be admitted, cannot be held responsible if senders neglect to consign, or consign crates with boards missing or otherwise damaged, or without correct address labels firmly affixed to the crate.

It is wise to book space beforehand where crates are being forwarded either with the live pigs on the forward journey or when empty crates are being returned.

Particulars regarding the size of crates, materials used, and any other information on the subject may be obtained from the Department of Agriculture and Stock, Brisbane.

The Breeding Sow.

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

OF the many tasks which fall to the lot of the farmer engaged in the raising of pigs—pedigreed or otherwise—not the least important is that associated with the selection of breeding stock and their efficient feeding and control.

Just what type of stock to select, where to go in order to obtain reliable, healthy animals, the price to pay, how best to transport them, and—in the case of pedigreed stock—the keeping of breeding records, ductive strain. The capacity to breed freely, regularly, and abundantly, to the pig raiser. The business is simplified once the type is decided on, because the points to be observed are the same, whether selecting animals singly or in numbers.

In selecting the breeding sow, the essential points to be looked for are:—

Knowledge of ancestry and pedigree.

Development of, or indication of maternal instinct.

Indications of heavy milk production.

Body development, type, constitution, quality, and character.

Invariably it is the strain within the breed to which the greater importance is attached, for all breeds have good points, and there are reliable animals within every breed.

Modern market requirements demand the production of specified types, but whether the breed selected is the Berkshire, a medium-sized breed (often spoken of as a small breed), or The Large White (one of a group of large breeds), a similar type is required and, in general, bodily conformation should be along similar lines. These special market requirements have brought with them also the necessity for a reorientation of ideas. At one time it was thought to be good policy to cross the long, lean Tamworth boar with the short, fat Berkshire sow, but present day requirements make no provision for the short fat breed, whether it be Berkshire, Middle White, or any of the American breeds. Consequently, in bodily conformation, breeding sows require to be of similar type, even if they are of different breeds. Moreover, no matter how good the boar may be or how efficient the system of management, unless the breeding sow is capable of producing, suckling, and rearing satisfactory litters, the business of pig production will be less profitable. The breeding sow is the money maker and the cash return per sow per annum is the ledger item which will make all the difference between profit and loss. One has often heard farmers say of their breeding sows: "No, they are not for sale, money would not buy them"—thus indicating the paramount value they place on these animals.

One of the important points then is to ascertain whether the sow it is proposed to purchase comes from a prolific, easy-feeding, profit-making strain. As with the boar, it is not possible to determine these qualities from appearance alone. A reliable guide to inherited qualities is the performance records of the parent stock, and the would-be purchaser should demand of the seller the production of such records. A close inspection also should be made of the stock on the farm.

Many years were spent in educating dairy farmers to the great importance of production records in the dairy herd until to-day the dairy farmer looks naturally for the dam's production record as of prime importance when he goes to select a dairy bull or a heifer to provide fresh blood for his herd.

Some pig farmers have not yet developed this routine, but it is becoming more important each year and, in consequence, production records are improving and the business is becoming more profitable.

Pedigree and production records are of special importance and should on no account be overlooked, even if grade or crossbred sows only are to be bought. It is wise to remember, then, that, although individual excellence of the animal itself is highly desirable, it really occupies second place in comparison with the quality and production records of the parent stock.

Pedigree is the permanent record of the breeding of an animal, but is of little value in the absence of reliable records indicating the capacity of the strain to breed true to type and the ability of individual representatives to prove profitable by producing stock of equal or superior merit to those produced by the parents.

With non-pedigreed stock it is equally essential to study the records which indicate such important matters as prolificacy, prepotency, and early maturity. Selection on other lines might result in the purchaser obtaining a really good looking animal, yet a member of a small and extremely unprofitable litter and, perhaps, from a slow-growing unproductive strain. The capacity to breed freely, regularly, and abundantly which is called fecundity, is certainly inherited and is transmitted in no uncertain way. A breeding sow selected from a litter of three pigs cannot be relied on to produce large and satisfactory litters, even though individual animals from such litters may sometimes prove profitable.

Desirable Characteristics.

Constitution.—The innate bodily strength of an animal and the ability to withstand hardship, together with the capacity to resist disease is referred to as constitution and, as such, represents a very important point in brood sow selection.

The vigor and health of an animal is dependent on its constitution, although it is possible to ruin a good constitution by mismanagement and neglect. In the brood sow, a strong, vigorous constitution is indicated by a full, broad, deep, capacious chest (withal a light shoulder is highly desirable), roomy heart girth, good width between the eyes, ears, and forelegs, clean bright eyes, a moist snout, soft, silky, mellow skin and hair, and an attractive healthy action. Pigs need to be strong and healthy if they are to prove profitable.

Maternal Instinct.—To be distinctly feminine in type and of a gentle, matronly disposition is important in a sow. Large-bodied sows are better than small-bodied animals. The long-bodied, light-shouldered type is to be preferred to the short, dumpy class; coarse masculine types which run to fat and lack maternal instinct are quite useless.

By maternal instinct is meant the capacity of the sow to desire to become the mother of numerous progeny and, having produced such a litter, to be able to care for and suckle every piglet in a true maternal way. Big, burly, "beefy" sows which look as though they would turn

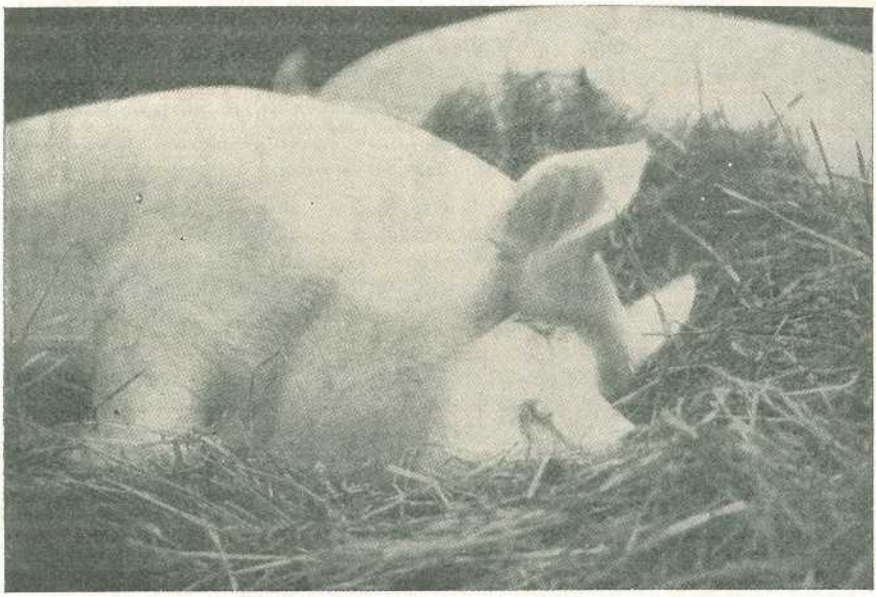


Plate 209.

Contentment and docility are innate characteristics which are worth developing in the brood sow. Such matronly virtues plus prolificacy have given the modern breeding sow a reputation not excelled by any other animal.

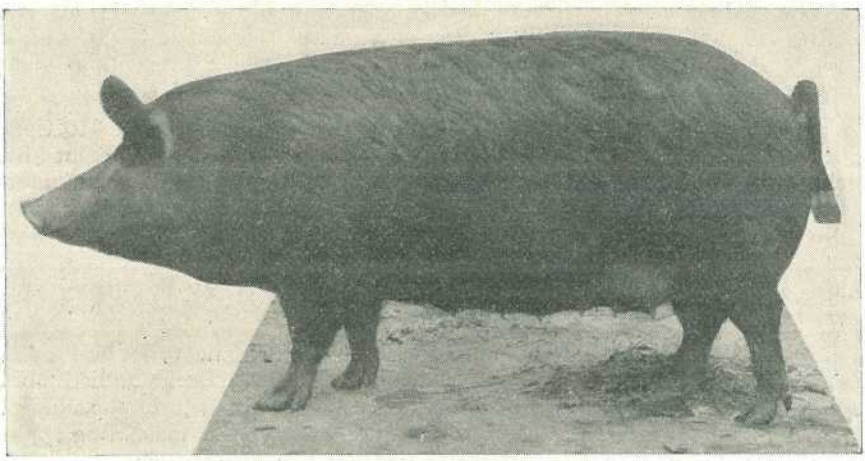


Plate 210.

Brood sows should be distinctly feminine in character and habits, any tendency to coarseness and masculinity being strictly avoided. This sow is of a type within her breed classed as very desirable.

up their noses at the job of suckling litters are often seen in a piggery, some are of a cranky, fighting disposition, preferring all the room at the food trough or in the sleeping quarters. This type of sow is a bugbear to the industry, as also are those small, pot-bellied types so frequently observed with litters of three and four, the usual result of the belief of some farmers that the sow is old enough to breed just as soon as she is big enough to take service.

Size, Conformation, and Control.—Bodily conformation is certainly hereditary; that is why certain families or types become so popular. Breeding sows should be large, roomy, yet well-proportioned, with wide deep chest, long deep body, and well developed hindquarters; otherwise, they are unable to allow for the development of large thrifty litters and for their free and easy birth at farrowing time.

This capacity to produce and rear numerous progeny must be encouraged by proper development during the early stages of the animal's life, and by its selection from strains noted for these desirable and necessary qualities. This requires that during the growing stages the animal should be encouraged to grow and stretch out in preference to becoming fat; and this can best be done by permitting free range over succulent pastures where the animal will have opportunity of picking up not only green food and mineral elements, but will have the benefit of sunshine, exercise, and a clean, healthy living environment. Animals appreciate such conditions, and grow and develop to considerably more advantage than is possible under conditions unfavourable to such rapid growth.

Indications of Milk Production.—The capacity of the sow to produce large quantities of rich nourishing milk is inherited just as it is in the case of dairy cows. Many breeders overlook this most important point and select their stock without any thought of it. It is a fact that some strains of pigs and some animals within other strains are very poor milkers and lack maternal instinct; they do not produce sufficient milk to satisfactorily nourish their litters. Other strains are noted for ability to milk heavily and for a period of two months or more per litter.

According to authorities on feeding, the average daily milk yield for Berkshire, Poland China, and some other brood sows whose breeding was not recorded, ranged from 4·9 to 6·3 lb. daily. The average total yield for 84 days, by which time they went dry, was 429 to 532 lb.

Some sows gave twice as much milk as others. Difficulty was experienced in securing the sow's milk for purposes of testing or recording, hence this figure must be accepted as a guide only to the productive powers of good quality breeding sows.

In special tests it was shown that sow's milk is richer than cow's milk in all nutrients and especially in fat, for it contains on the average 6·7 per cent. fat. One investigator found that fat globules of sows' milk only one fourth as large as those of cows' milk, but eight times as numerous.

The commercial value of a litter of pigs at weaning time will be very largely influenced by quantity and quality of the milk produced by the sow, hence the number of teats and development of the sow's udders is of much importance. The number of teats varies from ten or fewer to fourteen or even sixteen. Since each pigling requires its own teat (and will fight regularly for same) it is essential that the sow have from twelve to fourteen teats in order to be able to suckle a corresponding

number of pigs. The number of teats the breeding sow should have should not be less than twelve. It is undesirable to retain ten-teated sows (or sows with fewer teats) and generally more than fourteen teats is unnecessary although very long-bodied sows capable of rearing very large litters may have sixteen well-developed teats. The teats should be prominent, evenly spaced, and be set well towards the front of the belly. It is suggested that the teats nearest to the breast are those which produce the largest flow of milk.

Prolificacy.

Prolificacy should be the constant aim in selection and development of breeding stock. If the average litter can be maintained at eight to ten (or twelve) reared there will be a greater measure of success than is the case if the number reared is fewer than eight.

That prolificacy is possible and that pigs are productive creatures is amply evidenced by the following summary of litters notified to the National Pig Breeders' Association of England for the year ended 31st December, 1937, and published in the 1938 volume of the National Pig Breeders' Association Herd Books.

Breed.	No. of Litters Notified 1937.	Average Pigs Born per Litter 1937.	Average Pigs Reared per Litter 1937.	Average Pigs Reared per Litter.		
				1936.	1935.	1934.
Berkshire	220	7·85	6·37	6·19	6·95	6·76
Large White ..	13,324	10·62	8·07	8·06	8·10	8·17
Middle White ..	679	9·45	7·46	7·6	7·58	7·65
Tamworth	94	8·37	6·61	6·45	6·53	7·17
Wessex Saddleback ..	1,713	9·91	8·25	8·33	8·32	8·37

Remarks.—In studying these figures it is well to remember that the very large number of litters recorded in favour of the Large White might favourably influence the figures in that breed, as against, say, the Tamworth, with fewer litters notified.

The figures, however, can be accepted as a reasonably reliable guide of production and rearing averages for sows in these breeds of pigs.

Record Litters.—Record-sized litters are often reported, and emphasise again the prolific nature of the breeding sow. Although extremes are undesirable some sows have been able to establish records which it would appear would be difficult to excel. There are numerous records of litters varying in numbers from fourteen to twenty, but very rarely is it possible for the sow to suckle and rear so many.

The Œstral Period.—Sexual heat or œstrum occurs at all seasons of the year, and is not a seasonal condition as in the case with animals who bear fewer progeny and come in more seasonally. Œstrum usually develops within ten days of farrowing, and recurs every twenty-one days, persisting on each occasion for a period of three days or until conception takes place.

The normal breeding life of the sow is five to six years, or more; exceptionally good sows have been known to continue breeding up to the age of twelve years, but in general the sow becomes less profitable each year after reaching six years of age. Thus, commencing at nine

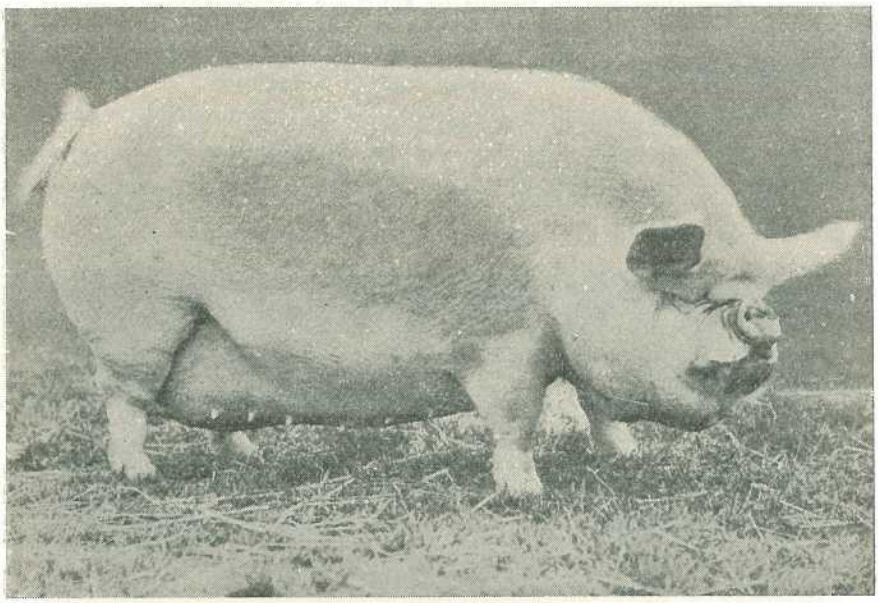


Plate 211.

To be able to suckle her babies and bring them to weaning age in satisfactory condition, the brood sow must have capacious udders and from twelve to fourteen well-developed teats, well forward and evenly placed along the underline. Sows with fewer teats or with blind or dummy teats should be avoided.

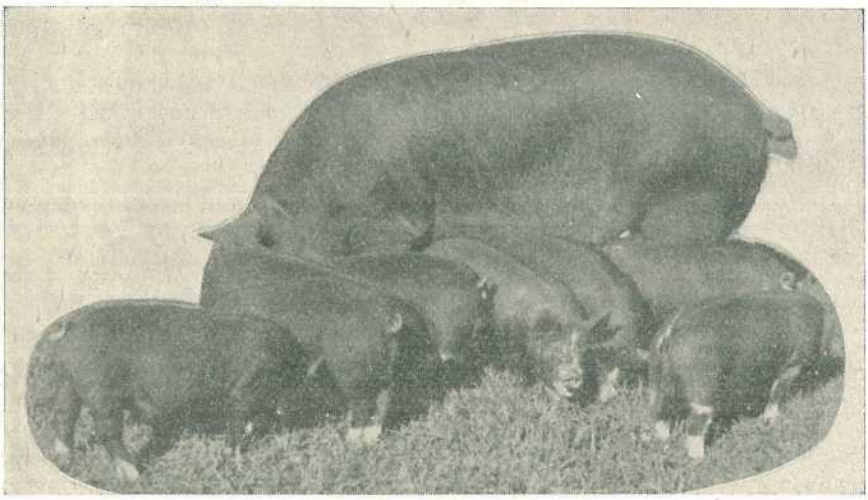


Plate 212.

Carrying more condition than is usual, this sow has given birth to, and is rearing, a nicely developed litter. Care should be taken to avoid having brood sows too fat and they must be allowed regular exercise daily on clean succulent pasture, otherwise trouble may be expected at farrowing time.

to twelve months of age, and breeding regularly twice per annum, the sow should produce up to twelve or fourteen litters during her profitable life, after which it is advisable to prepare her for the butcher, when her carcase invariably forms the base of that great variety of small goods for which the carcase of the pig is famous.

Weaning.—Weaning invariably takes place at about eight weeks of age. In cases where the sow can comfortably suckle her progeny more than eight weeks it will be found to be an advantage to allow sow and suckers to run together for a longer period, up to nine or ten weeks, even if in the meantime the sow comes in season and is mated.

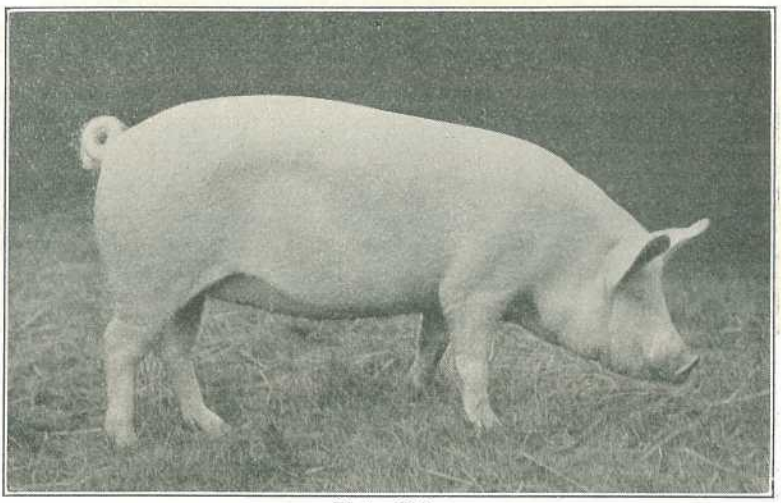


Plate 213.

Spoken of in England as gilts, or yelts, and in Australia as young sows, this young animal carries light shoulders and well-developed hindquarters such as are desirable, withal she has a lengthy, well-developed body, fine bone, and a nicely developed coat.

The Skin and Hair as an Indication of Health.—The skin and hair are always a good index to the health and thriftiness of an animal. The skin should be moderately moist, reasonably free of scurf, and mellow or soft (in comparison) to the touch.

The hair should be bright, soft, and glossy, and should have a slightly oily tendency. If the skin is dry and harsh, with a heavy coating of scurf, and the hair is dry, partly brittle, and inclined to stand on end, it is reasonably sure that the animal is not in good health.

The healthy animal has an active, sprightly gait; it carries itself well on its legs, and has bright, kindly eyes, plus a generally healthy and contented disposition and a well-curled tail.

If the animal is stiff, sore, and slow in its movements, with the head and ears drooping and tail hanging limp, and if there is a rising temperature and a very unpleasant smell, it can be considered the animal is sickening or is seriously ill, and needs immediate attention.

Period of Gestation.—The average period of gestation in the breeding sow is stated by various authors as four months or three months three weeks three days, 112 or 114 days, or 116 to 120 days, or sixteen

weeks. The shortest known period is 110 days, and the longest known period 130 days. No details are available as to the individual records in these cases. The terms gestation and pregnancy are synonymous, and are the names given to the condition of the female when developing young are present in the uterus. The period of pregnancy or the gestation period is the duration of time which must elapse between successful service, usually referred to as conception, and the period of birth, referred to as parturition. The period of gestation, as indicated above, varies in different individuals, and in the case of the sow may vary from fifteen to seventeen weeks, with an average of approximately sixteen weeks. (See Gestation Chart, page 84, January, 1939, issue, Q.A.J.)

Plate 214.
Bedtime on a pig farm where better pigs on every farm is the objective.

It is apparent from Australian experience that sows having the benefit of succulent and nutritious pasture, plus liberal daily exercise in the sunshine in clean pig paddocks where they are undisturbed by other stock are more likely to farrow satisfactory litters than sows who are continuously housed or held under conditions other than those referred to. But keeping pigs in pig paddocks is satisfactory only where clean, warm, dry shelter sheds are available in which the pigs may camp at night. As the farrowing stage approaches it also is advisable that each sow be drafted to her own individual yard or pen, and this should be done approximately three weeks before the birth of the pigs.

Sows do not always agree when housed together at farrowing time, and any disturbance at feeding or at any other time is likely to result in abnormality at birth of the pigs, if not in abortion or other calamity.

Under open-air conditions and with succulent grazing there should be little or no necessity for purgative medicines before or after farrowing, but as individual animals differ in habits, and some are lethargic at this stage, a warm bran mash in which is incorporated 3 fluid oz. of castor oil and just sufficient table salt to disguise the flavour of the oil will prove beneficial if given two or three days before birth date. The

use of drastic purgatives should be strictly avoided, as the after effects are liable to bring on irregularities in the digestive organs. In these, as in many other matters associated with the management of pigs, it will be found that careful control is a very great advantage, and will do more than medicine or force in the securing of satisfactory results. The food should be of a laxative, nourishing nature, and quantity should be strictly regulated according to the condition of the sow and litter.

It is unwise to rout in-pig sows by dogs or to force them to jump logs or troughs or to crowd together and rush through narrow openings or under low-set rails. Exposure to extremes of the weather, undue excitement caused by the presence of other sows or the attentions of an over-active boar, the use of rough, coarse, fibrous foods, lack of minerals and succulent green food, lack of drinking water—these all have disastrous effects on the progress, both of sow and of her litter.

The breeding sow should be normally and regularly exercised. She should be of a docile, contented temperament, any tendency to flightiness being disastrous, for a vicious sow is not only a danger to her own pigs, she is a dangerous animal so far as children and adults are concerned. Similarly, any tendency to sluggishness or over-fatness should be guarded against. Where animals are active and well cared for they take regular exercise willingly; they look and anxiously wait for it. They will also maintain themselves in better breeding condition, and will not have the tendency to become lethargic and sickly, or to become costive —in fact, constipation is the sow's greatest enemy at the stage when she is due to farrow, and unless promptly corrected is liable to lead to fevers (usually referred to as milk fever) and cessation of milk supply.

LAND FOR PASTORAL LEASE.

A resumption from Uanda Holding, known locally as Corinda, will be opened as a preferential pastoral holding at the land office at Hughenden, on Thursday, 1st June, 1939. The block is situated 80 miles north of Aramac and 98 miles south-east from Hughenden. It has an area of 121 square miles and the term of lease will be for thirty years at an annual rental of £3 6s. 8d. per square mile for the first ten years.

A condition will be that the block must be fenced with a marsupial-proof fence during the first three years.

The block is watered by waterholes, a small flowing bore, and three subartesian bores, and the country is described as open to moderately-timbered country, with patches of open brigalow and small plains with belts of gidya and boree scrub, being generally well grassed with good sheep grasses.

Free lithographs and full particulars may be obtained from the Lands Department, Brisbane, and the Land Agent at Hughenden and the Queensland Government Tourist Bureaux at Sydney and Melbourne.

The Cashew Nut.

S. E. STEPHENS, Instructor in Fruit Culture.

ALTHOUGH very well known and popular in the market places of its native home, the Cashew is unheard of in the markets of Queensland; in fact, it is quite unknown to all but a very few people. Even trees of this peculiar fruit are very few in the Queensland tropics.

A native of tropical South America, it is related to the mango, and is known botanically as *Anacardium occidentalis.*

The habit of growth is frequently ungainly, trunk and branches being very crooked and twisted. The foliage is clustered towards the ends of the stiff branchlets, the leaf being broad, oblong-oval, with rounded or emarginate apex. The flowers are produced in terminal panicles.

The fruit is peculiar in that it appears to carry its seed externally as an appendage at the lower end. In reality, the upper fleshy portion is the swollen peduncle and disc. The fruit proper is the seed or nut suspended from this.

The fleshy portion, called the Cashew apple to distinguish it from the true fruit or "Cashew nut," is commonly used for food purposes in its native Brazil. With its distinctive aroma it is said to make a pleasing jam, and is also used largely for making wine and a species of beverage similar to lemonade. The edible varieties of the Cashew apple are bright yellow or brilliant red in colour when ripe, thin skinned, juicy, and astringent.

The Cashew nut is a regular article of commerce, and is imported into European countries in fairly large quantities. It is a kidney-shaped nut about an inch in length and protected by a tough husk or shell, possessing caustic properties due to the presence of cardol and anacardic acid. Fortunately these substances are easily dispelled by heat. The nuts are, therefore, subjected to roasting, which renders them perfectly innocuous. The resultant product is a fine edible nut.

The Cashew is a simple tree to grow, but is one that dislikes being transplanted. The usual mode of establishing trees is to plant the fresh seed in the situation the tree is to occupy. The seed germinates readily within a few days, and the young trees make rapid growth both above and below ground. In young trees the tap root is often more extensive than the aerial growth, but lateral feeding roots are often deficient.

Growth is rapid for several years, and under favourable conditions the tree will start bearing at about three years, the crop being ripened during the summer months.

The tree is usually regarded as being fairly short-lived, surviving for only fifteen to twenty years, when it gums excessively and dies out. In North Queensland, however, several trees up to about twenty-five years old are still vigorous, and fruit well when seasonal conditions are favourable.

In regard to soil requirements, the Cashew is not particular, but its preference is for a sandy soil. It is intolerant of frost and does best under fairly dry climatic conditions, consequently its cultivation must be restricted to the drier parts of the tropics.

Well known allied species native to Queensland are the Burdekin plum (*Pleiogynium solandri*) and the Tar tree (*Semecarpus australiensis*). The former of these produces an edible fruit with a large stone, and is popular with school children. The latter exudes a black tar-like substance from both the bark and the fruit, which may cause a great deal of pain if it comes in contact with the skin.

WINDBREAKS AND SHELTER TREES ON THE FARM.

For the comfort of stock in cold weather windbreaks are a necessity on open plain or high tableland country. In timbered country, provision should be made for windbreaks when the land is being cleared, by leaving suitable stands of the original forest covering. Otherwise, the expense of establishing shelter belts will have to be incurred later on. Meanwhile, stock will have to suffer all the discomfort caused by winter's frigid westerlies, which blow usually for days on end.

In country which has already been cleared the planting of suitable trees on the prevailing windward boundaries of farms on tablelands, plains, and undulating country is, therefore, worth serious consideration. If edible trees are planted they might be used in times of drought. A farmer would naturally hesitate before destroying shelter trees for feeding purposes, but, if the necessity arises, edible trees may be lopped without destroying them.

The undermentioned trees are mainly suitable for planting on the Darling Downs. Edible types are the kurrajong, bottle tree, Portuguese elm, honey locust, and carob bean. Less palatable trees are the cypress (*Cupressus torulosa*), *Pinus radiata*—commonly known as *Pinus insignis*—white cedar, and *Bauhinia hookeri*. The well-known and admirable western tree, the wilga, should be added to this list if it is available in the local forests. Although there is a considerable amount of variation in the palatability of individual trees, the wilga is both a useful and extremely ornamental species.

In most cases the trees mentioned can be purchased from nurserymen. In the event of expense proving an obstacle to adequate planting, the trees can be raised from seed in an improvised nursery on the farm. The seeds could be germinated in shallow boxes or tins about twelve months before the young trees are required for planting. In frost-free areas June, July, and August are suitable months for planting out the young trees in their permanent locations. Some protection must, however, be given to the plants in frost-susceptible districts if midwinter planting is attempted.

Protecting the young trees from stock is most important. If the trees are planted near a boundary fence, it might be found most convenient to erect a second inner fence to keep stock away from the trees until they are high enough to be out of reach. Smaller farm stock, such as sheep, can be let into the enclosure once the trees have attained sufficient height for their foliage to be above the reach of the animals.

—*W. D. Francis.*

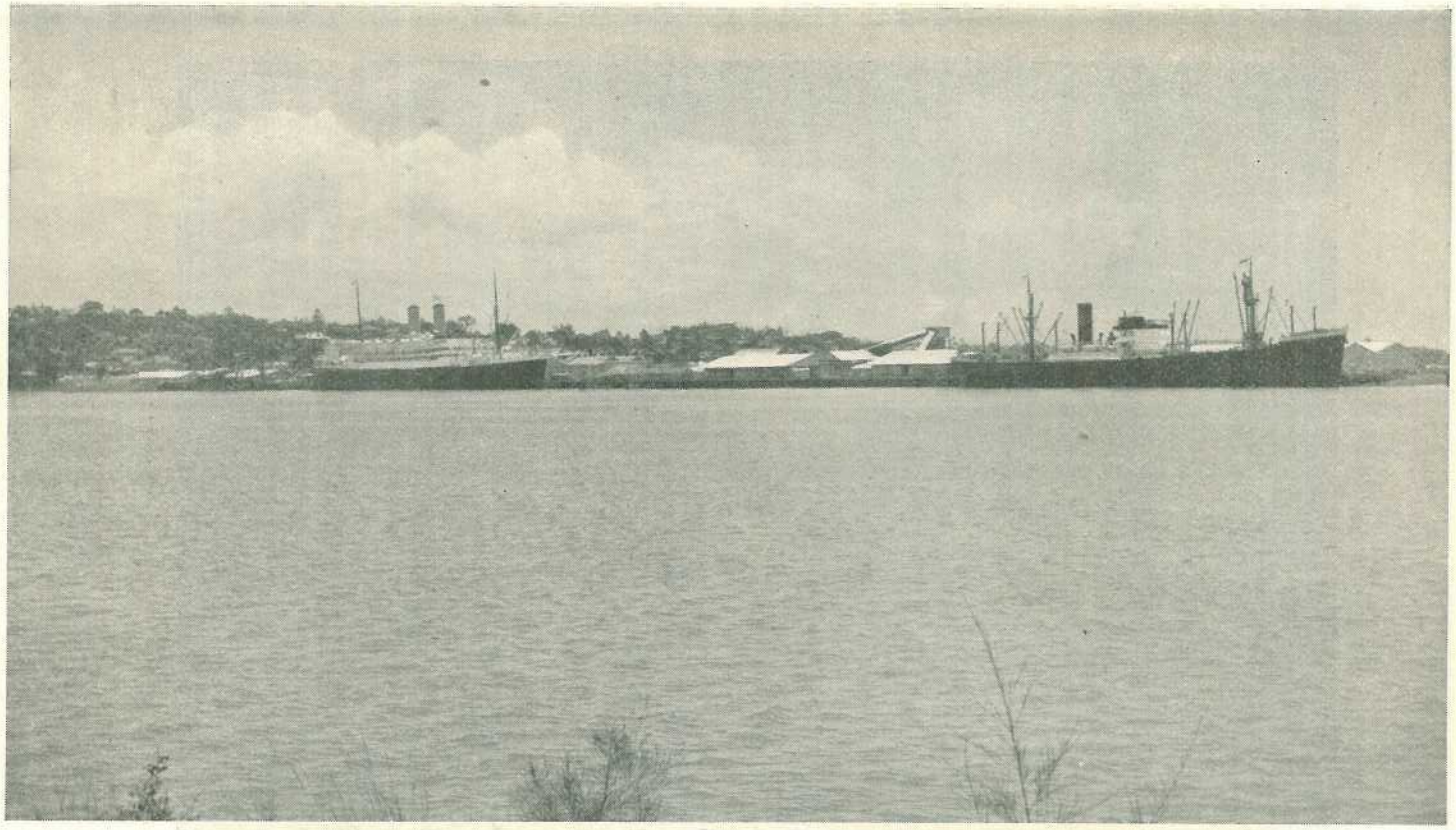


Plate 215.
Overseas boats loading wool at Hamilton Reach, Brisbane River.

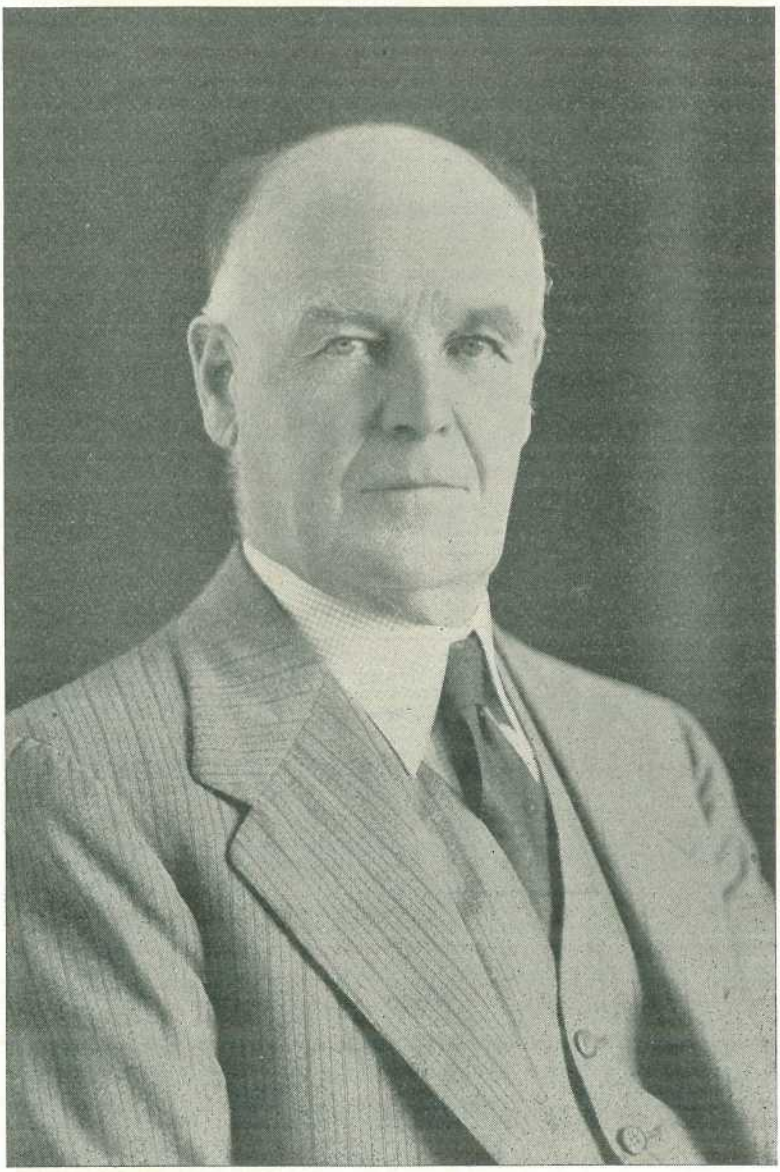


Plate 216.
THE LATE ROBERT WILSON.

In Memoriam.

ROBERT WILSON.

Mr. Robert Wilson, Acting Under Secretary and Director of Marketing of the Department of Agriculture and Stock, died on Wednesday, 19th April, at his home, Kirkland Avenue, Coorparoo. He was actually the executive head of the Department, but as he had almost attained the retiring age when his predecessor, Mr. Ernest Graham, died last year the permanent appointment was not made.

The late Mr. Wilson, who was 65 years of age, was born in the Logan River district, where his father was engaged in cotton and cane planting, and sugar manufacture.

Mr. Robert Wilson was an old Brisbane Grammar School boy. Upon leaving that school and passing the Public Service examination, he was appointed to a junior position in the then infant Department of Agriculture and Stock. By sheer ability he rose step by step in that department, in practically every branch of which he served until he became its principal executive officer. In addition, he held at various times the secretaryships of important conferences, such as those dealing with rust in wheat, and of the Board of Advice under the Diseases in Plants Act, the Meat and Dairy Board, and the Royal Commission on Central Sugar-mills, also of the various annual agricultural conferences held in different parts of the State from 1897 to 1903.

When the State Hansard staff was short-handed, Mr. Wilson, who was an expert shorthand writer, capably filled the vacancy until a permanent appointment could be made.

In January, 1935, Mr. Wilson was appointed Assistant Under Secretary, assuming the administrative responsibility under ministerial direction and by delegation from the Under-Secretary of a great department with activities and influence covering rural industry throughout Queensland. He was a member of the Agricultural Bank Board, Deputy Chairman of the Rural Assistance (Farmers' Rehabilitation Scheme) Board, and a member of the Dairy Products Stabilisation Board. He also was Government representative on the Butter and Cheese Boards, and other commodity boards operating under the Primary Producers' Organisation and Marketing Acts, and related legislation. He frequently accompanied Ministers for Agriculture to the meetings of the Australian Agricultural

Council in the South. For many years he was a member of the Royal National Agricultural and Industrial Association.

The late Mr. Wilson, who was a brother of a brilliant cavalry leader, Brigadier-General L. C. Wilson, served in the Great War with the 47th Battery, 12th Australian Field Artillery Brigade, on the Somme during the 1916-17 winter, through the autumn operations in the Ypres area in 1917, and the subsequent winter campaign, also during the memorable events on the Somme and the Lys in the last year of the war. He was a vice-president of the State Service Branch of the Returned Sailors and Soldiers' Imperial League of Australia.

Mr. Wilson was a prominent amateur cyclist and rower, and also an administrator of those sports. He was at various times treasurer of the Queensland Cyclists' Union; captain, secretary, and treasurer of the Brisbane Safety Bicycle Club; secretary, captain, and treasurer of the Commercial Rowing Club; a member of the Rowing Council; and selector of the Queensland Rowing Association.

In 1903 and 1904 he was champion of the Brisbane Safety Bicycle Club. He won several Brisbane Grammar School old boys' cycle races, and in 1900 was second in the Australian five miles championship.

He also was a member of the champion eight crew of the Commercial Rowing Club of 1909. He was a ground member of the Queensland Cricket Association, and a supporter of Rugby football.

Wherever he was—in the Department, in the A.I.F., in sports (in which for some years he figured so prominently), and amongst his friends—the late Mr. Wilson was noted for his straight-forwardness and his unvarying courtesy.

In official life he lived up to the highest ideals of public service. He was a friend of the junior officers, in whom he took an especial interest, guiding and influencing them in their choice of career in branches of the Department for which they had a natural aptitude. His was an attractive personality, to which occasional flashes of whimsical humour were an additional charm. Those who had the privilege of close association with him, officially and otherwise, revered him for the strength and simplicity of his character, his unfailing fairness, and other qualities of mind and heart which inspired both respect and affection for him.

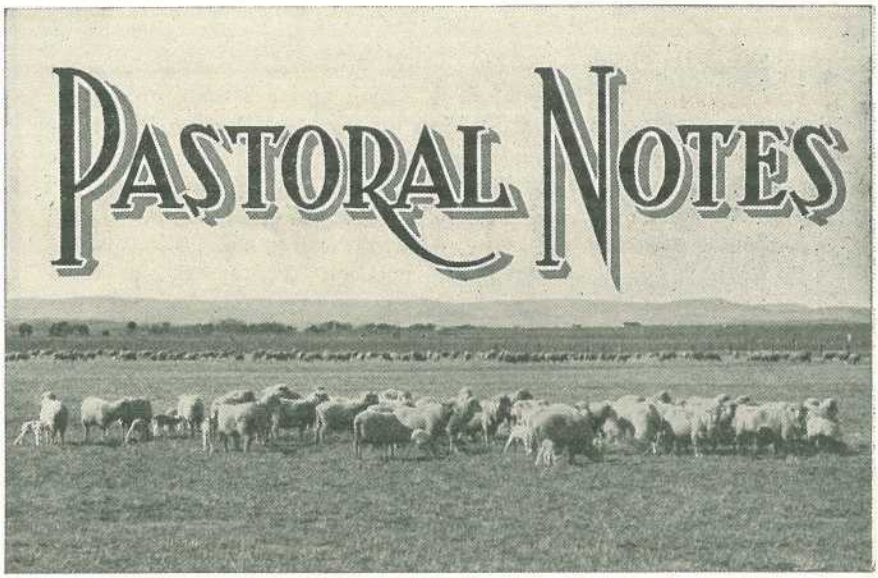
Many hundreds of people in all walks of life attended the funeral on the afternoon of 20th April, and a stream of motor vehicles almost a mile in length was a testimony of public appreciation of Mr. Wilson's long period of service to his native State and his qualities of citizenship. Among the wealth of floral tributes was a wreath from fellow Diggers and inscribed "Mourning the loss of a staunch and well-beloved comrade." The pall-bearers were Brigadier-General Wilson, Messrs. W. Preston, E. McCaskie, J. Smith, C. J. McKeon, and H. J. Freeman.

Among an overflowing congregation in the chapel of the Mount Thompson Crematorium were Hon. D. A. Gledson (representing the State Government), Mr. E. B. Maher (Leader of the Opposition) and many other members of Parliament, Mr. R. P. M. Short (Acting Under-Secretary), and officers of every branch of the Department of Agriculture and Stock, representatives of every other department of the Public Service, of the University of Queensland, of the Council for Scientific and Industrial Research, the Council of Agriculture and associated commodity boards, Ex-students' Association of the Queensland Agricultural High School and College, of the State Service Sub-branch of the R.S.S.I.L.A., and of the professional and commercial life of the city, and of numerous sporting bodies. To Mrs. Wilson and her young family and to other bereaved relatives our very deep sympathy is extended.

The Minister's Tribute.

"Mr. Bob Wilson, as he was known to all his associates, was a white man," said the Acting Minister for Agriculture and Stock, Hon. D. A. Gledson. "No officer of any department was more beloved than he by those with whom he worked, and no one had a closer grip of all branches of the Agriculture and Stock Department. He was personally known to and knew personally every officer. His association with the Minister with whom he served was always the closest. He was not only an officer, he was a kindly friend, and while I only had the opportunity of seeing him as Assistant Minister during his illness, his thoroughness and capable handling of all problems in the department were of the greatest assistance to me in taking over the responsible position which I now hold.

"We all feel that we have lost a dear friend who will be hard to replace, and desire to extend our heartfelt sympathy to Mrs. Wilson and her children in their great loss."



Summary of Position in Regard to the Tick-fevers of Cattle.

DR. JOHN LEGG, Animal Health Station.

MOST stockowners are aware that views regarding tick-fever of cattle have been radically altered during the last few years; for whereas it was originally considered that only one type of tick-fever (piroplasm) was prevalent in Queensland, it is now known that there are three serious types and one practically harmless type—making four altogether. All these findings have been the result of investigations carried out during the last few years.

Of the three serious types, two produce "redwater" in cattle, the third does not. The terms "redwater" and tick-fever are therefore not synonymous. One "redwater" type (piroplasm) has been known to exist here ever since ticks invaded the State; the second "redwater" type (babesiella) was only discovered three years ago. The third, or non-"redwater" type (anaplasm), was discovered five years ago.

Further extensive observations have been carried out, particularly during the last twelve months, and these have brought to light some important facts. Briefly, some of these facts are as follows:—The first type of redwater tick-fever, which was once thought to be the sole and only cause of our tick-fever troubles in Queensland, is found to be relatively rare in outbreaks of tick-fever; the second type of redwater tick-fever is extremely common, and causes more than 90 per cent. of our losses; while the third, or non-redwater type, is like the first—rare. It may be remarked in passing that this third type, although only associated rarely with outbreaks in Australia, is usually very bad in other countries where it occurs, i.e., North and South America, Africa, and the East generally.

The campaign of inoculation has, therefore, to be directed mainly against the second type of redwater tick-fever, the other two types being comparatively less important.

It was originally found that if cattle were inoculated against the first type of redwater tick-fever (piroplasm), they were usually resistant to the second type of redwater tick-fever (babesiella) when inoculated with the latter by means of the hypodermic syringe. The resistance also held fairly well when this inoculation was performed by the tick, but the variation among different cattle was such that quite often the resistance broke down.

The original vaccine, therefore, which contained two types of tick-fever, i.e., the first redwater type of tick-fever (piroplasm) and the third non-redwater type of tick-fever (anaplasm), has been reinforced by adding to it the second redwater type (babesiella).

This means that a more severe type of reaction may follow inoculation, which is a disadvantage, but it is compensated for by the advantage that the animal is more resistant after reacting.

Many important facts have been elucidated regarding vaccination. It has been found that with reservoirs (bleeders) used for bleeding purposes for vaccine preparation the "concentration" of the parasites in their blood varies considerably, so that at times they may not produce "reactions" in susceptible cattle. On the other hand, susceptible cattle may completely fail to react, although the vaccine may be perfectly good, i.e., in these cattle the inoculation does not "take." The reason why is not known, but it is important that it be recognised. It also has been found that infection with any of these types may completely die out, even if the animal remain on tick country. Such an animal again becomes susceptible.

Another very important observation made is that there are numbers of cattle within the tick-infested areas which are continually bitten by ticks and, although susceptible to the various types of tick-fever, they do not become infected, perhaps, over long periods of time. This, of course, occurs mainly in the lightly tick-infested country.

It also has been observed that groups of cattle are very susceptible to inoculation with these various types of tick-fever parasites.

All these facts make the preparation of a "standard" vaccine which will always produce a "good" reaction in susceptible cattle with no or only a very low mortality and, at the same time, leave the animal resistant to all types of tick-fever a very difficult problem. In fact, from some points of view the problem is almost beyond solution, i.e., no one can measure the susceptibility of an animal before inoculation.

Fortunately, the use of acaprin, a drug prepared in Germany, has been found to be very effective against both types of redwater tick-fever. This drug is now used extensively. Owners inoculating should always have it on hand. They should use it without hesitation when the animal is seen to be sick. In many cases its effect has been almost miraculous. In bad cases it may be injected into the vein direct. Under the skin it does not cause the infection to die out, but if injected into the vein it may completely destroy the infection. But in a valuable animal the main point, for the time being, is to save its life. The animal can easily be vaccinated again.

The drug can be used equally well in both natural cases and severe reactions following inoculation, and no owner should attempt the inoculation of cattle without being in the position of obtaining the drug at once, should he require it.

The inoculation for tick fevers and the control of these diseases is being made as effective as possible, but the condition under which cattle are maintained in Queensland, i.e., large mobs and big areas, makes adequate supervision very difficult. Much depends on the assistance of the owners.

MOLASSES AS A STOCK FOOD.

The use of molasses as a stock food received considerable attention during the last dry spell in South-eastern Queensland, when it was probably the most valuable and inexpensive carbohydrate concentrate available. Doubtless this by-product of the sugar industry could be employed much more extensively than at present, for it is valuable not only as an appetiser and conditioner, but as a source of carbohydrate—a most essential energy food.

The sugar industry is able to supply large quantities of molasses annually, the only drawback being the cost of freight involved in transporting it over long distances. There would be no difficulty in stock-owners acquiring large consignments of molasses at £1 per ton at sugar mills, but some provision for containers would be necessary.

Experiments have been conducted at the Mackay Sugar Experiment Station to determine the true value of molasses as a concentrated feed for farm horses. All animals at that station receive the following daily ration while in work:—Chaffed cane tops (chop chop) or panicum grass, 54 lb.: molasses (heavy), 6 lb.; linseed meal, 3 lb.

The chaffed cane tops supply portion of the nutrients as well as the bulk; the molasses provides the extra sugars, an energy material; while linseed meal is an excellent source of protein.

The farm horses have done particularly well on this ration, and at the conclusion of the harvesting season were in remarkably good condition.

Farmers might well compare the costs of this ration with one involving more expensive grains. This is particularly the case in the sugar districts.

HANDLING THE FLOCKS.

Some flock-masters show a tendency at times to leave sheep too long in the one paddock. It is no rare thing, for example, to see sheep shorn, driven to a certain paddock, and left there until next shearing.

Sheep respond quickly to change of pasture, and the change is noticeable both in the health and condition.

A flock will often benefit, even if placed in a comparatively worse paddock than that on which it has been running for a brief period. On a breeding property, provision should be made for the ewes and lambs by spelling a paddock well before lambing time. Should rain fall while the paddock intended for the ewes and lambs is spelling, it is all to the good, as the succulent new growth so much to be desired for ewes and lambs will be in evidence. At weaning time there is again a necessity for fresh feed, for it should be fully realised that as a weaner a sheep is going through its most tender period. Grass seed country should be left severely alone where weaners are concerned.

A Common Winter Defect in Milk and Cream.

Now that cooler weather is approaching, a flavour defect which is likely to be a frequent cause of trouble in milk and cream is tallowiness —a defect which, depending upon its intensity and stage of development, is usually described as metallic, oxidised, oily, mealy, cardboard, and "cappy" taint. Although tallowy and related flavours may be brought about by other influences, they are usually traced to the exposure of milk products to metallic contamination, notably copper from factory appliances and iron from dairy farm equipment.

The more common occurrence of these faults in winter depends upon the ability of minute traces of metals in solution in milk and cream to accelerate chemical changes between the oxygen normally present in these liquids and a certain constituent of butterfat, with the formation of compounds which impart the characteristic flavours. Such low concentrations as 0·2 part per million of copper and 1·5 parts per million of iron will impart an objectionable taint. In summer, when microbial development is most active in milk, the dissolved oxygen is rapidly used up by the organisms for their own growth, and so they actually help to prevent the onset of tallowiness. Their action in this single instance in retarding rather than promoting the deterioration of milk and cream is in striking contrast with their usual behaviour, as they are responsible for almost all the major faults which occur in milk products.

The most up-to-date factory processing is quite unable to renovate tallowy cream, which, therefore, is always classed as second or pastry grade. Dairy farmers should look over all metal utensils with which milk comes into contact, and any from which the tin coating has worn off, or which shows signs of rusty patches, should be retinned if their condition warrants the expense. Any piece of equipment which is too old or in a state of disrepair which does not justify the cost of retinning should be immediately dumped. The continued use of such unsatisfactory utensils during the winter months will almost certainly mean degraded cream and substantial monetary loss.

LOW PRODUCTION COST.

Many dairy farmers supplying milk have cows capable of giving more than the one or two gallons they produce, but an owner is often sceptical as to whether the extra food required will be paid for out of increased production.

A simple trial lasting a fortnight will show how to rearrange both feed and production. Arrange for those cows which can be reasonably expected to produce more to get the extra feed. It should take the form of concentrates. A simple mixture for the production of an extra gallon is 3 lb. of maizemeal and of high-quality meat meal. Gradually bring the animals under test on to the full feed—usually a week is adequate. Test over a further week.

The cost would not exceed sevenpence daily per cow. The increased yield in terms of cash than determines whether the particular cows under test are worth the extra feed. If they are, then it may pay to pension off low producers and apply the cost of their food to the purchase of concentrates for the proved animals.

In practically all cases, the food for two half-gallon cows or one one-gallon cow costs more than the extra feed which is to produce an extra gallon from a better milker.

The saving in labour is also worth consideration.

THE STRAINING OF MILK.

On the most carefully managed farm, a certain amount of visible dirt finds its way into the milk. The term "visible dirt" covers such matter as dust, cow hairs, flies, and manure, as distinguished from bacteria, which are not visible to the naked eye. Bacteria may be present in milk which appears perfectly clean, fresh and pure—and their presence may not be realised until souring begins several hours after contamination. If visible dirt is present in the milk, however, bacteria will be there also, hence the necessity for straining through a suitable strainer. The cotton wool disc type prescribed by the Dairy Regulations is preferable to any other. It can only be used once, and there is no risk of contaminating fresh supplies of milk, as sometimes happens with a cloth strainer which has not been properly washed.

It is better to keep visible dirt out of the milk than to strain it out. Early straining is better than last-minute straining, for to some extent the longer dirt is allowed to remain in the milk the greater will be the number of organisms passing into the liquid. The process may be understood more clearly by a rough analogy with making a brew of tea. If the tea leaves are removed soon after the addition of the hot water, the tea remains weak. If they are stirred in the teapot, or left for any length of time, the brew becomes much stronger. Similarly, if dust and dirt are left in the milk, undesirable bacteria, with which every particle of dirt is teeming, pass into the milk and increase the tendency to early souring.

The milk from each cow should be removed immediately milking is completed and tipped through the straining disc into the receiving tank above the cooler. It will not require a second or even a third straining, for one straining, together with proper cooling, will be sufficient to give the milk a satisfactory keeping quality.

COMFORT FOR COWS ON COLD NIGHTS.

The dairy farmer who rugs his cattle during wintry weather usually reaps the advantage of an undiminished cream return. Many other farmers would like to follow suit, but are deterred by the cost of buying a good warm rug. There is no reason, however, why a farmer so placed should not make his own cow rugs. All that is required are the necessary number of corn sacks, a ball of twine, a packing needle, and ordinary ingenuity.

A warm rug can be made out of two corn bags, but for a big beast three bags might be necessary. Split the bags down the seams, sew them together, and place on the cow. After getting the right fit, cut off a strip of bagging so that the rug will not hang too low. This strip cut off may then be folded and sewn to the rug as a thigh strap. The front of the rug is then fitted by turning up the corners and sewing them to the sides of the rug. This strengthens the rug and obviates the necessity for cutting off the spare portion, which the cow would otherwise tread on. Neck and other fastenings may be easily fashioned to make the rug complete.

This home-made rug will keep the cow warm, and after a few days' wear will become practically waterproof. The rug can be slipped off and on quite easily, and it is advisable to remove it every day, except in bleak or rainy weather. Each cow's name may be painted on its own rug. Rugging will certainly increase winter milk production.

THE MANAGEMENT OF THE BULL.

The bull should be kept away from the rest of the herd in a separate run securely fenced and provided with water and shelter. A small service yard and a crush to facilitate the handling of the bull when necessary, should also be provided.

The advantages gained by keeping the bull away from the herd are:—

1. Calving can be regulated.
2. It is easier to decide whether or not the cow is in calf.
3. The bull's services are controlled and not wasted.
4. There is less likelihood of the cows having to return to the bull.

If the run is placed well away from a public road any annoyance caused by a neighbour's cows breaking into the bull or the bull breaking out is avoided.

CHANGES OF ADDRESS.

Subscribers are asked to kindly notify changes of address to this Department without delay.

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

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

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 24th April, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
J. Caspaney, Kalamia Estate, Ayr	Evlington ..	White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
W. J. B. Foxwell, Coomera ..	Foxwell's ..	White Leghorns and Australorps
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
C. Hodges, Kuraby	Kuraby ..	Anconas and White Leghorns
H. K. Roach, Wyandra	Lum Burra ..	White Leghorns and Australorps

EFFECT OF CLIMATIC CONDITIONS ON DIFFERENT CLASSES OF POULTRY.

Two classes of birds are generally used by commercial farmers—light breeds, such as Leghorns, Anconas, and Minorcas; and heavy or dual-purpose breeds, such as Australorps, Wyandottes, and Rhode Island Reds.

Light breeds, as a rule, are of a "highly strung" nature, and very susceptible to climatic changes, particularly during the early periods of production. Rains and cold snaps will invariably check production with this type of bird. This is particularly noticeable if the birds are not housed under the intensive system. If false moults are to be avoided, the highly strung nature of the birds also makes it inadvisable to alter their location until they have settled well into production and until spring approaches.

If, for any reason, light breeds have to be handled before the middle of, say, July, go about the work quietly and, if at all possible, work only in the afternoon, for most of the birds to lay on that day will have done so by then.

The dual-purpose breeds, on the other hand, are more docile and quiet. They are not so easily disturbed by climatic changes during the early laying stages, but are more susceptible to heat, as many dual-purpose birds lay on fat. In selecting breeders, select against this characteristic and choose the most active, alert birds. Greater liberties can be taken with dual-purpose breeds in relation to change of quarters, but do not worry them or shift them during early winter, as they are not immune from false moults.

NUTRITIONAL REQUIREMENTS OF POULTRY.

Poultry-raisers as a whole have a very fair idea of the principles and practice of feeding, and take into consideration factors which make for efficient and economic production.

The present-day values of cereals may induce some to depart from old and accepted practices in order to reduce costs. There are three points, however, that must not be lost sight of, if the best results are to be obtained and the general health of the stock maintained—viz., the vitamin content of the ration, the protein content, and the quantity supplied.

Vitamins.—Vitamin A is of outstanding importance at the present juncture, for a shortage in the ration may cause outbreaks of nutritional roup as well as lowered egg production. The feeding of yellow maize and green feed ensures a sufficient supply of this vitamin.

On most poultry farms during the winter months green feed is not plentiful; consequently under normal circumstances the loss due to a shortage of maize cannot be overcome. It is therefore of paramount importance that the poultry-raiser should make a special effort to supply the birds with good succulent green feed. Green feed is the cheapest form in which the birds' requirement of this vitamin can be supplied. In cases where home-grown feed cannot be obtained, poultry-raisers should use at least 10 per cent. of good green lucerne chaff or meal in the mash fed to their birds.

Protein.—To obtain the maximum economic production, laying birds should have in their ration (i.e., grain and mash) a total of approximately 15 per cent. of crude protein. Maize has about 10 per cent. and

wheat about 13 per cent. of protein. Where maize has been used extensively and is replaced with wheat it may be desirable to reduce slightly the protein content of the ration. This is most easily brought about by a slight reduction in the meat meal fed.

Generally speaking, however, the protein-rich meat meal is not overfed, and its greater use is advisable in certain circumstances. This is particularly so in the case of the poultry-raiser who feeds extensive quantities of skim milk to his birds. With the approach of winter the milk supply will probably diminish. In such cases the loss of protein of animal origin in the form of milk should be supplemented with meat meal.

Quantity.—Providing the right kind of food is being used, economic production is only possible by feeding the birds all they will consume. Do not be afraid of making your birds unduly fat. The good producer will convert the food supplied in excess of body requirements into eggs. Birds which cannot do this should be culled and sold for table purposes.

MARKING EARLY LAYING PULLETS.

The marking of early laying pullets provides a practical method of selection where the trap nest is not used.

Records obtained by trap nesting in various parts of the world show that—

(1) Early laying pullets are, as a rule, the highest producers;

(2) Birds that lay late into the autumn and are late in moulting are also high producers.

As the early layers and late moulters are high producers, a marking system will assist in distinguishing between profitable and unprofitable fowls.

In one convenient system of marking, a coloured leg band is placed on the left shank of all pullets that start to lay before six months of age. A band of another colour is attached to the left shank of pullets starting to lay when six and seven months of age, and a third coloured band is used for fowls which commence to lay in the eighth month. Pullets that do not lay until after the eighth month should be eliminated from the flock, or kept in a pen by themselves, and forced for egg production.

Pullets which are early layers show the following characteristics:—

(1) A large red comb;

(2) An active disposition and a ravenous appetite;

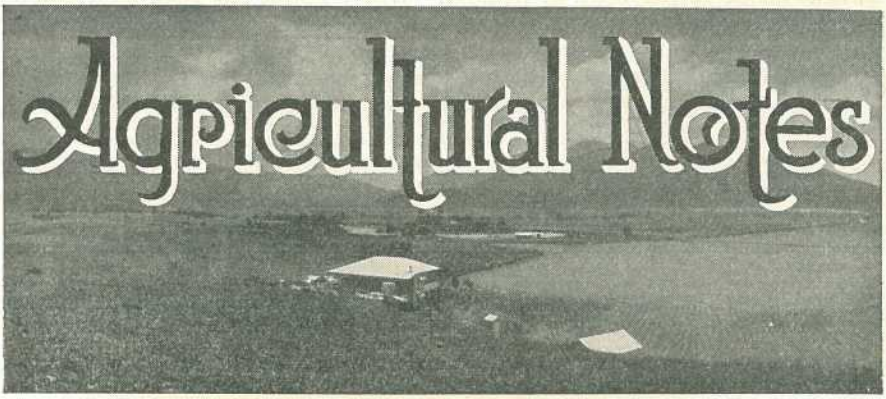
(3) Roominess between the keel and pelvic bones;

(4) An occasional disappearance of the yellow coloration round the vent in some yellow shanked varieties.

In small flocks, individuals showing the above characteristics may be caught in the nest and then marked.

During the following season, all fowls that were marked as late maturing the previous autumn and moult in December, January, and February can be culled. All the early laying birds and those that moult after 1st March may be kept for layers or placed in a special breeding pen and mated to a male known to have come from a high laying hen that has been trap nested. In this way the egg production of the offspring may be raised.

The method outlined is simple and, if properly employed, will raise the level of production in a flock.



Control of Army Worms.

Early action should be taken by any farmer who notices even a small army worm infestation on his farm.

The eggs are laid by the parent moths, and if the caterpillars hatch in any numbers they cluster or group into bands or armies, hence the name "army worm." They feed over the ground outwards from the original centres of infestation, and in a typical attack they form a dense line or band of caterpillars slowly advancing in a face over a grassland or through a crop, often eating the foliage down to ground level. The typical army worm food plants include pasture grasses, fodder crops, and grain crops.

When full grown, the caterpillars enter the soil and change to the chrysalis from which later the moth emerges. Second generation eggs may then be laid. As a general rule, an outbreak runs for a few weeks, at the end of which natural parasites take charge, but, in that period, considerable damage both to pasture and crops may occur, and, for that reason, control measures should always be commenced immediately the caterpillars are seen.

The most effective control measure requires the use of poison bran bait. This should be lightly broadcast along and for a width of about 6 feet in front of the advancing line of army worms when the attack is on grassland. What little of the bait that remains on the baited strip after the caterpillars have fed on it will gradually trickle to ground level out of reach of stock. In the meantime, however, stock should be kept from the baited area, and, in any case, it must be remembered that the bait should be lightly and thinly broadcast, otherwise there may be some danger to stock. If the suitable precautions are taken the bait, however involves no risks. If the bait is applied to a standing crop such as Sudan grass or panicum which is to be fed off or cut for fodder, then some of the poison flakes will lodge in the foliage and may constitute a danger. Therefore, in baiting for an army worm infestation that is invading a crop, the following procedure should be adopted. A strip should be scythed through the crop just in front of the advancing army worms and the cut plants removed or raked aside to expose bare ground. If practicable the soil in this strip area should be stirred. The poison bran bait may then be broadcast on the strip of bare ground.

The bran bait mixture consists of 25 lb. bran, 1 lb. paris green, 4 lb. molasses, 2 gallons water. The bran and paris green should be thoroughly mixed together dry. The molasses should be dissolved in the water. The sweetened fluid should then be poured on to the bran in a suitable mixing vessel and the whole thoroughly mixed to a moist, loose, friable mash.

If paris green is not immediately available and stocks of arsenic pentoxide are on hand, the latter poison may be substituted. Only ½ lb. arsenic pentoxide should be used to 25 lb. bran, and in this case the poison should be dissolved in a little hot water and then added to the molasses solution which is then mixed into the bran.

Both paris green and arsenic pentoxide are arsenical poisons; stocks should, therefore, be stored with care and the mixing vessels and hands should be carefully washed after preparing and using the bait.

In special circumstances it may be desired to use a spray for the control of army worms. Excellent results have been obtained with a crude oil emulsion. This spray is non-poisonous to animals, but it will kill both the caterpillars and the treated portion of the plants. If used it should be sprayed on the strip of pasture or fodder plants that is heavily infested, and, preferably, the spraying should be carried out in the warm part of the day.

The crude oil emulsion is prepared as follows:—Half a pound of hard soap is dissolved in a gallon of water by boiling; the container is then removed from the fire and 2 gallons of crude oil is immediately added to it. The mixture is then stirred vigorously and churned by means of a spray pump for five to ten minutes. The stock solution, when properly emulsified, looks like strong milk coffee. For use, the solution is diluted one part of stock to seven parts of water.

Although the spray formula is given, it must be pointed out that in most cases involving the control of army worms the bran bait method is the most satisfactory. In cases of dense infestation, several repeat sprayings would be necessary in order to deal with the bands of caterpillars reformed from the stragglers.

CROP ROTATION.

Rotation of crops is generally necessary in most systems of farming if the fertility and physical condition of the soil are to be maintained. Apparently, every crop requires some particular combination of plant foods, and by growing the same crop season after season on the same soil, a depletion of the main plant foods required by that crop results. Hence, after continuous cropping for some years, yields may become unprofitable. By growing different crops in rotation, the productivity of the soil may be maintained or even improved in the case of naturally inferior types of soil.

Rotational systems vary with the climatic conditions and the range of profitable crops.

Crops used in rotational systems in various parts of the world are frequently grazed off by stock, or harvested for fodder. Any accumulated manure is thus returned to the land. Where such systems

are practised, the organic matter ploughed in as dung assists in maintaining the soil in a satisfactory physical condition. Where stock-raising is less important, a green manure must be included in rotations, which include nitrogen-requiring crops, to obviate any excessive depletion of nitrogen and organic matter. If climatic conditions are suitable, crops such as cowpea, soy bean, clovers, and other legumes can be grown and ploughed under as green manure. Such green manuring usually increases the yields of the following crops.

In dry areas, green manuring has not proved so beneficial, as the organic matter decomposes rather slowly. Long fallows have therefore been developed, particularly in wheat-growing districts. When the crop is harvested, the land is ploughed as early as possible and left in a rough state to trap all subsequent rains. If the crop is stripped, the standing straw should be burned before ploughing, otherwise it may be difficult to obtain a compact seed-bed, and there is some risk of the following crop being deprived of nitrogen.

Crop rotation has received little attention in Queensland, because of the natural fertility of soils which have only been cultivated for a comparatively short period. Climatic conditions have also favoured the cultivation of a particular crop within a well-defined area. As a result, crops such as wheat, cotton, peanuts, and arrowroot are more or less confined to districts which have proved suitable for their successful production.

The need for a more diversified farming system, using a variety of crops in rotation, is clearly necessary in some old cultivations where specialisation in one crop has both decreased fertility and impaired the physical condition of the soil.

Properly devised rotational systems can be expected to yield larger crops, to ensure economy in the use of manures, and generally result in the more profitable working of the available land.

CROPS FOR WINTER AND SPRING FEED.

For winter and spring feed in coastal areas which usually have a fair winter rainfall, the winter cereals, wheat, oats, barley, and rye, are strongly recommended. If these crops are combined with a legume, such as field peas or vetches, the nutritive value of the fodder is greatly enhanced.

Sowings of these crops may be continued during May. If seasonal rains are delayed, sowings may be extended until early in July, but with such late sowings the crops will only be available for a short period.

In the absence of seed drills, broadcasting is usually adopted, sowing the legume first, and discing or ploughing it under, following with the cereals, which are broadcast and harrowed in.

Suitable varieties are:—Wheat—Florence, Warren, or Warchief; oats—Sunrise, Belah, or Algerian; barley—Skinless. Florence wheat, 30 lb., combined with Dun field peas at the rate of 20 lb. per acre, has proved a suitable mixture, as both are early maturing. Algerian oats, 30 lb., combined with vetches at the rate of 20 lb. per acre, make also a suitable combination, particularly for early sowing, as this mixture is considerably slower in maturing than the former. The early maturing varieties of oats, such as Belah and Sunrise, may also be sown with field peas if desired.

If individual crops are sown, the following rates of seeding per acre are recommended; wheat 60 lb., barley 50 lb., oats 50 lb., rye 50 lb., field peas 40 lb., vetches 30 lb.

The crop should be cut and fed direct to stock as, where grazing is practised, wastage occurs through tramping.

Rape may also be grown now and during the winter months to provide an abundance of succulent feed for both sheep and pigs. Rape is not so suitable for dairy cattle, because of the taint which it may impart to milk, and to its tendency to induce bloat.

Rape may be sown early in May, drilling in 4 to 5 lb. of seed per acre. Broadleaf Dwarf Essex is the best variety.

The root crops, mangels, sugar beet, Swede turnips, and kohl-rabi, may also be sown on land which has been well prepared.

A "Planet Junior" cultivator and seeder is a useful implement for this work, the seed being sown in rows 2½ feet apart, and the plants being thinned out to 1 foot intervals. Sow mangels and sugar beet at the rate of 5 to 7 lb. per acre, Swede turnips 2 to 3 lb., and kohl-rabi 2 lb.

QUEENSLAND SHOW DATES, 1939.

May.

Blackall	8th and 9th
Roma	9th to 11th
Mundubbera	10th and 11th
Beaudesert—	
Show	10th and 11th
Bushmen's Carnival	12th and 13th
Murgon	11th to 13th
Barcaldine	16th and 17th
Goomeri	16th and 17th
Ipswich	16th to 19th
Mitchell	17th and 18th
Gayndah	17th and 18th
Dirranbandi	19th and 20th
Blackbutt	19th and 20th
Warrill View	20th
Kilkivan	19th and 20th
Charleville	24th and 25th
Biggenden	25th and 26th
Gympie	25th to 27th
St. George	26th and 27th
Kalbar	27th
Maryborough	30th and 31st May and 1st June

June.

Biloela	1st and 2nd
Lowood	2nd and 3rd
Childers	5th and 6th
Boonah	7th and 8th
Bundaberg	8th to 10th
Wowan—	
Show	8th and 9th
Rodeo	10th
Gin Gin	12th and 13th
Gladstone	15th and 16th
Rockhampton	20th to 24th
Toogoolawah	23rd and 24th
Mackay	26th to 29th
Kilcoy	30th June and 1st July
Proserpine	30th June and 1st July

July.

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

August.

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

September.

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

October.

Nerang	6th and 7th

Handling of Citrus Fruits.

The harvesting of citrus fruits will soon be in progress, and for several weeks to come growers will be chiefly concerned in the marketing of their crops.

Care in the handling of citrus fruits pays the grower handsomely. Rough handling contributes towards wastage losses in export fruit and in fruit being held by local markets, chiefly because of green and blue moulds, which are familiar to every citrus-grower.

These moulds are fungal parasites disseminated by means of spores which gain entrance to the fruit mainly through bruises and skin abrasions.

The healthy unbroken skin of the orange is proof against almost all decays.

Abrasions may be caused during picking operations by the finger nails of careless pickers, or by allowing the clippers to cut into or prick the rind of the fruit when cutting the stem.

By the use of clippers with cup-shaped blades and rounded points, there is no excuse for the fruit being clipper-cut whilst the gloves on the hands will prevent finger-nail injury.

All stems should be cut off short and smooth, otherwise they are likely to puncture the skin of other oranges during handling.

Another source of damage is protruding nails on the inside of the picking boxes, the points pricking into perfectly good oranges, causing punctures through which spores may enter.

The picking boxes should be well made; the internal surfaces of the boxes should be finished smooth to avoid friction during transit of the fruit from the orchard and the packing shed.

It is not only necessary for the orchardist himself to be careful, but he must also see that his employees are not negligent.

In the packing shed most growers make some provision to ensure cleanliness; nevertheless, there are some who do not appreciate the obvious necessity for hygiene. Occasionally uncovered buckets and tins are observed containing mouldy fruits in various stages of breakdown which are allowed to accumulate from day to day. Where this occurs, those responsible for the cleanliness of the shed fail, apparently, to realise the enormous number of spores produced from mouldy fruit which are dispersed in the form of "mould dust" capable of reproducing the same decay in all punctured and bruised fruit with which it comes in contact. It is essential that all waste and reject fruit which accumulates during each day's work should be effectually destroyed daily by burning. Moreover, a frequent washing of the floors of the packing shed with a ½ per cent. caustic soda solution or other suitable fungicide, will reduce mould contamination within the shed.

TOMATOES IN FROST-FREE AREAS.

Growers in the frost-free areas along the North and South Coast districts will soon be busy with successive plantings of tomatoes.

The tomato does well on several types of soils provided they are well drained, although a rich loamy soil is preferable. The plants should be well supplied with plant foods, but should not be too liberally treated with nitrogen, which will tend to produce a large plant throwing late fruit. Fertilizers should be rich in phosphoric acid and potash, with just sufficient nitrogen to produce a good but not over-luxuriant growth. A complete fertilizer can be made up as follows:—

420 lb. sulphate of ammonia
700 lb. superphosphate
560 lb. bonedust
560 lb. sulphate of potash

2,240 lb. (used at the rate of from 3 to 5 cwt. per acre).

The method of planting will be determined by the system of training to be adopted. Where trellising or staking is to be practised, the rows may be 3 feet apart, and the plants in the rows from 15 to 18 inches apart. The rows should, if possible, run north and south. When not staked or trellised, the rows require to be at least 4 to 6 feet apart and the plants 4 feet apart in the rows.

The tomatoes may be trained on a trellis or staked. In the latter instance, stakes 5 feet long are driven into the ground alongside each plant when they are about 1 foot in height. As the plant grows, the lateral growth produced from the axils of the leaves is removed. Further growth is thus limited to single or double stems, which are tied to the stakes at intervals.

Pruning tends to promote the formation of flower clusters and the setting of fruit. When several flower clusters have been produced, the leader or leaders are checked at one or two leaves above the last flower cluster.

The plants should receive regular attention, and lateral growth should be restrained until it is time to check the leaders. In this way the energies of the plants are directed towards the growth and maturing of the fruits and the tendency to shed first blossoms and fruit is reduced.

Trellising or staking, together with pruning, permits the maximum amount of light and air to reach the plants, thus decreasing their susceptibility to disease.

CABBAGE-GROWING FOR MARKET.

The cabbage is one of the most important vegetables for the market gardener. It grows best in the cooler districts, but by carefully selecting varieties the crop may be grown in most parts of Queensland.

The seed should be sown in beds of well-drained, deeply and thoroughly worked soil. The soil, if heavy, should be improved by the addition of sand or decayed vegetable matter; if poor and sandy, the addition of a loamy soil or well-rotted manure will be beneficial.

The surface of the bed should be fertilized and firmed, and the seed sown thinly in shallow drills about 4 inches apart. After sowing, mulch the bed with well-rotted leaf mould to prevent excessive evaporation of moisture.

The seed-bed must be watered regularly, for a check in the growth of young seedlings is often followed by unsatisfactory results.

When large enough to handle, the seedlings should be thinned to an inch apart, for if grown too thickly they develop into long, spindly, weak plants.

Shading during the hottest part of the day is often necessary, but this shade should be removed as soon as the plants are strong enough to withstand the heat. Overshading also produces spindly plants. Approximately 1 lb. of seed will provide sufficient plants for an acre of cabbage.

In about six weeks the young plants should be large enough for transplanting. They may then be hardened off by restricting water supplies for a day of two before their removal to the field. Transplanting should be done in cloudy or showery weather, but if weather conditions are unfavourable the young seedlings should be watered in, and, as a further precaution, the top half of the leaves may be trimmed off to lessen transpiration until the root system is established.

Loosening of the soil in the seed-bed with a fork before lifting the plants helps to save many of the small roots. If the bed has been well soaked previously, the plants will lift with a ball of soil adhering to the roots, which will help to keep them moist.

The roots of the young plants should be kept damp after removal from the bed, and this may be done by standing them in a bucket containing a puddle of soil and water.

In planting, a hole is first made in the ground with a dibble—an old spade or digging fork handle is suitable. The hole should be only deep enough to allow the roots of the seedling to reach the bottom of the hole. Turn in a little earth, and then draw the plant slightly upwards before pressing the soil firmly around it. This ensures that the main root will not be doubled up.

The plants should be in rows 3 feet apart; in the rows the smaller varieties should be spaced 2½ feet and the larger varieties 3 feet apart. The growth of cabbages should on no account be checked. Regular cultivation and watering are, therefore, essential.

The right varieties should be selected for different times of the year. Winter-planting types should be early and quick maturing.

In the cooler areas, seed of the early varieties is sown during autumn. Main crop varieties are sown between August and December. The coastal districts are best suited to the winter crop.

Cabbage should be marketed as soon as possible after cutting, and only good firm-hearted vegetables should be sent for sale. Care in handling is essential, and when placed in bags for railing they should be packed as firmly as possible.

Recommended varieties are:—

Early.—Early Allhead and Early Drumhead, both of which are large, early, and quick growers.

Main Crop.—Succession is the most popular variety, and may be grown almost any time. It is a good large Drumhead type.

Surehead is slightly larger than Succession. It is hardy, and may be planted closer in the rows, as it has fewer outside leaves.

PARSLEY.

Parsley will grow almost anywhere and on any kind of soil which is not of too stiff a nature, although a partially shaded position and a rich, moist soil suit it best. Being a biennial, it must be sown each year in order to provide a continuous supply. It should be sown twice a year—in March and April for use in winter and spring, and again in August and September for use in summer. Seeds may be sown in shallow drills in the open ground, and the seedlings thinned out to about 6 inches apart. It frequently happens that parsley is sown too thickly and early thinning is neglected, with the result that the plants run to seed prematurely. Instead of sowing a continuous row, drop a few seeds along the drill at 6-inch intervals, and when the seedlings have developed several leaves remove all but the strongest plant in each group.

PARSNIP GROWING.

Although the parsnip is a native of England and must therefore be classed as a temperate climate vegetable, it may be grown with reasonable success in the tropics during the winter season.

Soil for growing this vegetable should be deep, rich, and free. A good sandy loam gives excellent results. The soil should be prepared some months previously by trenching or cultivating deeply, and incorporating a heavy dressing of stable manure. Organic manures should never be applied in considerable quantities immediately before planting this crop, as they frequently induce forking of the roots. At the end of the wet season the ground should be thoroughly worked up and reduced to a very fine tilth. The seed is then sown thinly and very lightly

raked over, after which the soil should be rolled or well packed down with the back of a spade along the drills. The packing is necessary to ensure close contact between the seeds and the soil. A light covering of old horse manure well crumbled or old sawdust will assist germination by preventing the caking of the surface soil.

As soon as the seedlings are well up, thin them out where they are overcrowded and when about 4 to 6 inches high thin out finally to about 8 inches apart.

Parsnip seed is usually of rather poor germinating capacity, and is practically useless unless quite fresh.

WALNUTS.

Walnut trees grow well in the cooler parts of Queensland where there is a plentiful water supply and deep and well-drained soil. The trees are ornamental and shady, and there is a good demand for the nuts. The trees should be planted in August or September about 30 feet apart. For a few years after planting, all the training necessary is to cut out crossing limbs and to top the most vigorous shoots in order to form a well-balanced tree; subsequently, little pruning is necessary. Seedlings may be raised in a nursery bed and planted out when twelve months old, but as these may take many years to come into bearing and may not bear large crops of good nuts, it is more satisfactory to buy worked trees of tested varieties (Wilson's Wonder, Freshford Gem, and Franquette are recommended). The nuts fall to the ground when ripe, and to prevent losses by rotting should be gathered frequently and properly dried before bagging. Nuts to be used for seed should be gathered as soon as they have fallen from the tree, and soaked in water for a week just before planting. The best time to plant the seed is about the middle of July.

SELECTING NEW BANANA AREAS.

With the approach of winter, intending banana-growers would be well advised to give serious consideration to the selection of the areas shortly to be felled for the 1939 planting.

Of late years, bananas have been grown extensively and fairly successfully on inferior forest country, but, in most instances, a suitable aspect, assisted by good cultural methods, has been the chief factor towards success.

The best aspect, of course, is the north-east or northerly slope, with standing timber on all four sides to give the necessary shelter from strong winds, and these aspects ensure the maximum amount of winter sunshine.

With sites facing any further into the east than north-east, great care should be taken that, as far as possible, the area is sheltered from the cold south-east winds. An efficient windbreak on the south side of an easterly patch should, therefore, be provided for in the clearing plan. The site chosen should be so situated that tall timber or hills at the top of the proposed area will not shut out the winter sun at an early hour.

A north-westerly slope is preferable to south-east, south, or south-westerly slopes if heavy belts of timber block the strong westerly winds. Many good bananas have been grown on westerly slopes of this description, chiefly because the areas in question receive the sun during the whole of the afternoon.

All southerly slopes should be definitely avoided, more particularly if there is open country for any distance around the proposed area. Much more timber will have to be felled than actually required for planting, to obviate the long shadows which standing timber at all close to the patch throw over the plantation. The limited period during which they are exposed to the sun is the chief objection to all southerly slopes.

A good warm-slope plantation will produce from two to three bunches to every one on the cold-slope areas. Production costs, particularly to the grower on leased ground, enter so largely into the picture that intending growers with a choice of ground should always choose a warm situation to gain the best results.

BANANAS IN AUTUMN.

During autumn trashing is an important job in the plantation, for it both minimises black end and anthracnose trouble, and allows the free access of air and sunshine, the latter being of the greatest value during cold weather.

Trashing stimulates the rate of sucker growth, and some growers, even though their areas are on unprotected windy slopes, claim that autumn trashing is preferable to treatment at the end of the winter.

In young plantations where growth has been slow, and in which the plants are now carrying their first bunch, an application of fertilizer would be helpful. A suitable dressing would be 1½ lb. of superphosphate, 1 lb. of sulphate of ammonia, and from ½ to 1 lb. of muriate of potash applied per stool and well incorporated with the soil. Such a dressing should have been applied during March, but growers who neglected to treat their plantation, or whose area has suffered a setback through weather conditions, will find an application later on very beneficial. Without some such assistance, it is quite possible that fruit thrown during April will take six months to mature. Very slow-maturing fruit is, of course, undesirable.

In the older plantations, heavy fertilizer applications may be unprofitable. Areas which are not remunerative should, therefore, be eradicated if the financial prospects do not warrant their further maintenance.

It is well worth while tagging a few bunches throughout the whole of the plantation, these tags carrying the date on which the bunch is thrown. When the bunch is cut the period of development can very easily be calculated. In this way the grower can find out which section of the plantation produces more rapidly. These areas will, of course, be the most profitable.

The marketing of immature fruit is undesirable. If necessary during winter, the top hand on the bunch should show traces of colour.

Growers with exposed plantations should, as cooler weather advances, bag their bunches to protect them from the cold. The fruit from bagged bunches matures fairly rapidly, and is very much better in quality than unprotected fruit. Second-hand bags may be used for the purpose, but any cost involved is amply repaid by increased returns to the grower.

RIPENING OF BANANAS.

To ripen bananas on a large commercial scale a properly constructed room, or rooms, with insulated walls are necessary. Probably the most convenient size for such a room would be 12 feet long by 8 feet wide by 7 feet 6 inches high, such measurements allowing for 100 cases capacity. Factors that must be taken into consideration when building ripening rooms are insulation, air circulation, ventilation, cooling, heating, and humidity control. Details are set out in the C.S. and I.R. Bulletin, No. 64, which is available to anyone interested.

To ripen bananas for home consumption, or a small local trade, is an entirely different proposition. Directions covering such work are as under:—

Allow the fruit to become fully matured prior to cutting. After harvesting, cut the hands off and allow them to drain for one hour. Obtain a 50-lb. tea chest or similar box. Stand it upon two pieces of 3-feet by 2-inch timber to permit a current of air to pass between it and the floor. Pack the hands of bananas carefully round the inside of the chest, being sure to leave the centre open. Next, place a small handful of carbide in the centre of the chest and cover over in a manner that makes the inside of the chest or box as near to airtight as possible. Two or three thicknesses of canvas, or four thicknesses of corn sacks, are usually satisfactory.

Take the covering off after sixteen hours and recharge by placing another small handful of carbide on the floor of the chest. Recover it and allow it to stand for a further twelve to sixteen hours, after which uncover it and the fruit then will be almost ready for sale. If not quite ready cover it, but without carbide.

In very warm weather, only one application of carbide may be necessary. Ventilating the chest after sixteen hours is very necessary. Keep the chest in the shade away from the direct rays of the sun.

VARIETIES OF APPLES AND PEARS.

Orchardists in the Stanthorpe district who may be planning a planting programme for the coming season are advised to place their orders with reliable nurserymen without undue delay. Early ordering ensures early delivery of the young trees.

As regards varieties to plant, the Granny Smith is likely to be the best commercial apple for many years to come. If reasonably well treated, it will give a good crop every year.

Some growers are inclined to think that the market will be overloaded with Granny Smith apples when young trees already planted come into bearing. This is not likely to happen.

The Stanthorpe Granny Smith is equal to if not superior to any grown in the Commonwealth. The keeping qualities are good, and far

more should be cool-stored than at present. Stanthorpe apple-growers should try to supply the requirements of their own State with Queensland-grown apples as long as possible by using the available cold-storage facilities.

If the Granny Smith crop in the Stanthorpe district were doubled, or even trebled, there should be no difficulty in marketing the fruit at existing or even enhanced prices.

In addition to the Granny Smith, which should be the main variety, Delicious, Lalla (Red Delicious), Winesap, and Red Statesman are good types.

Red Statesman and, in addition, Dougherty are eminently suitable for the late "private order" trade. Growers who specialise in this trade should cater for their customers over as long a period as is possible. Stocks are frequently exhausted long before they should or need be, and then supplies have to be drawn from elsewhere.

The Gravenstein is a good early dessert apple well worth growing. On account of its susceptibility to gnarl or twist, it is advisable to grow a scaffold tree of another strong-growing variety, such as Delicious, and then rework with Gravenstein scions from selected trees free from the trouble.

Growers should be wary of planting new varieties of apples. Generally it is a good plan to plant only standard varieties and let someone else do the experimenting. Though new varieties may have good characteristics, they are seldom better than those already grown, and being unknown to the trade or the householder the fruit is viewed with suspicion and is difficult to market.

As regards pears, the best commercial varieties are Williams Bon Cretien, Packhams Triumph, and Beurre de Box—all are good growers and croppers.

The Winter Cole is a late-maturing variety which is popular in the other States. Stanthorpe growers should, however, limit their plantings of this variety on account of possible fruit-fly attacks at the end of the season.

—H. St. J. Pratt.

THE "ORPHAN" TREE.

Many failures are observed where replacements are made in a bearing deciduous fruit orchard. Frequently, the young tree remains like an unwanted orphan and shows only stunted growth. If it is to catch up to the other trees and fill in an unsightly and unprofitable blank space in the orchard, careful attention must be given to all details in its management.

The main causes of failure are:—

1. The lack of natural plant food for the young tree.
2. If the old replaced tree died from the attacks of some particular diseases, the replant may be attacked in turn and suffer an initial setback.
3. Searching roots of adjacent trees may compete successfully with those of the young tree for the available plant food.
4. Lack of attention.

When digging out the unhealthy tree, carefully remove and burn all the roots together with the tree. Leave the hole open and exposed throughout the winter, and just prior to planting in spring fill with a

load of virgin soil to which may be added some well-rotted animal manure. Virgin soil is obviously richer in plant nutrients than soil which has been cropped exhaustively for some considerable time.

The young tree is very often forgotten and does not get the necessary attention at the right time. Weed growth may tend to choke it, but this difficulty can be simply overcome by the use of an old fertilizer bag. The bag is opened out and, after making a cut in the middle, is slipped over the young tree. This makes an excellent mulch which keeps down weed growth in the vicinity of the tree and conserves the moisture so necessary for its progress.

THE SUGAR BANANA.

The sugar banana has been grown profitably for all the "bunch" trade markets in Queensland. Small, sweet, and delicately flavoured, this fruit claims many staunch supporters.

For the production of this banana deep, warm alluvial flats, favoured with a generous rainfall or watered by irrigation, are most suitable. As with other varieties, good drainage is essential. As the sugar banana possesses a slender stem, damage by wind must be guarded against, and where there is no permanent windbreak it is worth while establishing one at the time of planting. For this purpose double border rows of lady fingers or sugar banana plants may be planted 7 feet apart in the row and 7 feet between the rows. The spacings in the inner row should actually lie between the spacings in the outside row—i.e., planted according to the septuple system. These two rows close quickly in towards each other and rapidly form an effective windbreak. Of course, the planting of a permanent windbreak of suitable trees would be far more valuable on account of their permanency, provided the cultivated area is reconditioned from time to time.

Prior to planting, the soil should be worked to a depth of at least 12 inches and reduced to as fine a tilth as possible. The holes for the young plants in the plantation area should be 14 feet apart, 15 inches deep, and 18 inches square. The rows should be lined out as straight as possible each way, thus allowing the greatest convenience in working horse-drawn cultivating implements.

Opinions differ somewhat in the matter of selection of planting material, but generally a vigorous young sucker about 4 feet high dug from a matured stool is most favoured. The top portion of the sucker should be removed, leaving a plant of 3 feet in height to place in the hole. The plant is placed in position within the hole and sufficient surface soil placed in around it to fill approximately two-thirds of the actual cavity. The rest of the cavity is filled in gradually as the ground is cultivated during the ensuing year. According to the quality of the soil, one or two followers are allowed to come away, and, normally, the first bunches will be harvested seventeen or eighteen months after planting.

Farmyard manure applied judiciously to sugar banana plantations will repay the grower handsomely. Light horse-drawn implements are satisfactory for cultivating, and green crops, such as Poona and field peas, are excellent soil invigorators, provided they can be turned back into the soil at the correct time—i.e., when still very soft and succulent.

As the sugar banana is usually marketed in the bunch and the fruit possesses a thin, delicate skin, special care in handling is necessary in order to obtain the best market returns. —*E. P. Williams.*

The Fruit Market.

J. H. GREGORY, Instructor in Fruit Packing.

THE rains still continue, the soil being thoroughly soaked for the first time in many years. The feeling of all sections of the community is now one of optimism.

Prices for all fruits are maintaining high levels. Pineapples are in shorter supply and values have risen. Choice bananas are selling well at high values. Custard apples are in full supply. Prices dropped to 2s. 6d. per half-bushel, but returned to 3s. 6d. and 4s. during the last week of April. Early lines contained a high percentage of green fruit. This type of fruit often causes a drop in price during the early part of the season. Papaws are also being placed upon the market in a too green condition, making sales difficult. Apples are returning satisfactory prices. Some excellent lines of Stanthorpe Granny Smiths have been received and sold at satisfactory prices. On the other hand, good fruit has been spoiled by the inclusion of inferior grades. Mixed fruit will only realise the value of the poorest grade in the case.

Avocados are coming on to the market in increasing quantities. Many growers are sending this fruit when it is only half-matured. Nothing will ruin the development of the public taste for this fruit more quickly than following such a practice.

Prices for all fruits at the end of April were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Small, 5s. 9d. to 11s. 6d.; sixes, 9s. to 13s. 6d.; sevens, 9s. 6d. to 17s.; eights, 14s. to 17s.; nines, 16s.

Sydney.—Cavendish: Sixes, 16s. to 18s.; sevens, 18s. to 20s.; eights and nines, 20s. to 22s.

Melbourne.—Cavendish: Sixes, 14s. to 16s.; sevens, 16s. to 18s.; eights and nines, 18s. to 21s.

Pineapples.

Brisbane.—Smoothleaf, 4s. to 7s. per case, 1s. to 5s. per dozen; Ripley, 5s. to 8s. per case, 1s. to 4s. 6d. per dozen.

Sydney.—Smoothleaf, 7s. to 10s. per case.

Melbourne.—Smoothleaf, 10s. to 16s. per case.

Papaws.

Brisbane.—Yarwun, 6s. to 8s. tropical case; Gunalda, 4s. 6d. to 5s. bushel; Local, 2s. 6d. to 3s. 6d. bushel.

Sydney.—8s. to 12s. tropical case.

Melbourne.—14s. to 20s. tropical case.

Custard Apples.

Brisbane.—2s. 6d. to 4s. half-bushel.

Sydney.—2s. to 5s. half-bushel.

Melbourne.—7s. to 9s. half-bushel.

Monstera Deliciosa.

Brisbane.—3s. to 5s. per dozen.

Avocados.

Melbourne.—14s. to 16s. half-bushel.

Granadillas.

4s. 6d. to 6s. bushel case.

OTHER TROPICAL FRUITS.

Rosellas, 2s. 6d. to 3s. 6d. sugar bag.

CITRUS FRUITS.

Oranges.

Brisbane.—Commons, 4s. to 7s.; Navels, 6s. to 10s.; Specials higher.

Sydney.—Queensland Navels, 10s. to 15s.

Mandarins.

Brisbane.—Emperor, 10s. to 12s.; Fewtrell, 5s. to 10s.; Scarlet, 8s. to 10s.

Melbourne.—Fewtrell, 10s. to 12s.

Grapefruit.

Brisbane.—6s. to 8s. bushel.

Sydney.—8s. to 12s. bushel.

Melbourne.—10s. to 15s. bushel.

Lemons.

Brisbane.—Locals, 4s. to 7s.; Byrnestown and Gayndah, 8s. to 14s.; Specials higher.

Sydney.—Queensland, 10s. to 15s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 8s. to 12s.; Cleopatra, 8s. to 10s.; Granny Smith, 7s. to 12s.; French Crab, 8s. to 9s.

Sydney.—Granny Smith, 9s. to 11s.

Pears.

Brisbane.—B.D.C., 4s. to 7s.; Packhams, 8s. to 9s.; W. Cole, 9s. to 12s.; Kieffer, 5s. to 6s.; Howell, 6s. to 7s.

OTHER FRUITS.

Grapes.

Brisbane.—Walthams, 10s. to 12s.; Cervante, 7s. to 9s.; Purple Cornichon, 12s. to 14s.

Tomatoes.

Brisbane.—Ripe, 3s. to 6s.; Green, 2s. 6d. to 5s.; Coloured, 4s. to 8s

Sydney.—2s. to 4s. half-bushel.

Passion Fruit.

Brisbane.—Firsts, 10s. to 14s.; Seconds, 6s. to 8s.

Sydney.—10s. to 20s.

Melbourne.—14s. to 16s.

MISCELLANEOUS, VEGETABLES, &c.

Cucumbers.—*Brisbane*—3s. 6d. to 5s. bushel; *Sydney*—5s. to 7s. bushel.

Pumpkins.—5s. to 7s. bag.

Marrows.—1s. to 2s. dozen.

Lettuce.—1s. 6d. to 2s. 6d. dozen.

Cabbages.—4s. to 6s. chaff bag; Locals, 1s. to 6s. dozen.

Beans.—3s. to 4s. sugar bag.

Peas.—5s. to 6s. sugar bag.

Beetroot.—3d. to 1s. bundle.

Chokos.—3d. to 6d. dozen.

Sweet Potatoes.—3s. to 5s. sugar bag.

Carrots.—3d. to 6d. bundle.

Celery.—South Australian, 12s. to 16s. crate.

TO SUBSCRIBERS.

Subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

PRODUCTION RECORDING.

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

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Mature Cow (Standard 350 lb.).				
Valera Shiela	Sullivan Bros., Pittsworth	12,967·52	661·352	Loyalist Strathdhu
Happy Valley Barbara	R. R. Radel, Coalstoun Lakes	9,303·9	449·469	Molly's Hero of Glenthorn
Rosemount Fancy 19th	H. Seiler, Redbank Creek, Gatton	11,527·73	422·729	Rosemount Radiance
Happy Valley Belle's Molly	R. R. Radel, Coalstoun Lakes	11,623·75	404·46	Molly's Hero of Glenthorn
Cedargrove Venus 6th	P. D. Fiechtner, jnr., Pilton View, Greenmount	9,975·9	392·086	Duke of Cedargrove
Cedargrove Reddy 6th	P. D. Fiechtner, Pilton View, Greenmount	8,629·4	365·071	Duke of Cedargrove
Senior, 4 Years (Standard 330 lb.).				
Tara Laura	Mrs. K. Henry, Watts Siding, Greenmount	10,315·5	409·499	Pansy's Gift of Murray's Bridge
Junior, 4 Years (Standard 310 lb.).				
Trevor Hill Lorna	Geo. Gwynne, Umbiram	7,370·89	332·351	North Glen Emblem
Senior, 2 Years (Standard 250 lb.).				
Rhodesview Primrose 2nd	W. Gierke, and Sons, Helidon	10,042·89	405·768	Blacklands Prospector
Rhodesview Queenie 20th	W. Gierke and Sons, Helidon	8,773·03	323·081	Blacklands Prospector
Palmeto Fashion	Rex Tweed, Palmeto, Kandanga	7,379·85	320·644	Glengallan Major
Alfa Vale Gladys 3rd	J. E. Heath, Merlwood, Murgon	6,278·25	252·627	Reward of Fairfield
Junior, 2 Years (Standard 230 lb.).				
Ehlma Park Red Myrtle (257 days)	N. Bidstrup, Ehlma, Warra	8,488·63	338·707	Mount Blow Monarch
Navillus Nancy 3rd	C. O'Sullivan, Navillus, Ascot	7,855	331·041	Alfa Vale Re Nell
Alfa Vale Blossom 4th (255 days)	F. G. Lamkin, Kaimkillenbun	7,190·73	298·554	Reward of Fairfield
Jamberoo Ruth (256 days)	N. Bidstrup, Ehlma, Warra	6,413·19	264·362	Brooklyn Terrace Banker

JERSEY.

MATURE COW (STANDARD 350 LB.).

Glenview Miss Scott	F. P. Fowler and Son, Coalstoun Lakes	8,572·95	463·864	Trinity Officer

JUNIOR, 3 YEARS (STANDARD 270 LB.).

Trinity Syria	G. A. Champney, Wooroolin	8,376·05	401·678	Trinity Nobly Born

SENIOR, 2 YEARS (STANDARD 250 LB.).

Oak Park Ginger Lass	Miss J. Nowlan, Lindum	6,432·37	294·035	Brooklands Double Ginger
Sea Shell of Palm Ridges	J. Sigley, Millaa Millaa	4,397·95	258·412	Oceanview Merriamber Wait-a-while

JUNIOR, 2 YEARS (STANDARD 230 LB.).

Kathleigh Hetty	C. W. Barlow, Spring Creek, Toowoomba	5,750·5	312·857	Kathleigh Molly's King
Pineview Aster	J. Hunter and Sons, Borallon	5,359·06	307·23	Oxford Aster's Lad
College Milkmaid 2nd	Queensland Agricultural High School and College, Lawes	5,497·4	258·256	Earpart General Beau
Broadview Girlie	W. S. Kirby, Byrnestown	4,053·75	235·366	Glenview Mason

FRIESIAN.

MATURE COW (STANDARD 350 LB.).

Towerlton Anona	F. C. Noller, Kumbia	12,947·5	524·56	Domino Belted King

General Notes

Staff Changes and Appointments.

Mr. W. R. Winks, analyst, Agricultural Chemical Laboratory, Department of Agriculture and Stock, has been appointed also an analyst under *"The Veterinary Medicines Acts, 1933 to 1938."*

Mr. J. L. F. Foran, analyst in the Agricultural Chemical Lobaratory, has been appointed also an analyst under *"The Stock Foods Acts, 1915 to 1935,"* and *"The Veterinary Medicines Acts, 1933 to 1938."*

The appointment of Mr. N. A. Anderson, Burrum, as an inspector under the Diseases in Plants Acts, has been cancelled, and Mr. J. Pedelty, loader for the Committee of Direction of Fruit Marketing at Burrum, has been appointed an inspector under the abovementioned Acts in his stead.

Mr. A. J. Unwin, Treasury Department, has been appointed Deputy for Mr. E. A. Crosser as a member of the Rural Development Board during the latter's absence on recreation leave.

Mr. C. Schindler, inspector, Diseases in Plants Acts, has been transferred from Warwick to Stanthorpe.

Messrs. N. J. McKavanagh (Bunya, via Aspley) and M. Johnson (Manager of Mount Sturgeon, Hughenden) have been appointed honorary protectors under the Fauna Protection Act.

Mr. H. Hallam, of Hayman Island, has been appointed an honorary protector under the Fauna Protection Act and an honorary ranger under the Native Plants Protection Act.

Pleystowe Mill Levy Committee.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts empowering the Pleystowe mill suppliers' committee to make a particular levy on suppliers of sugar-cane to the Pleystowe mill whose cane is loaded at Mirani West railway siding at the rate of 5s. per 100 tons, the proceeds from such levy to be used for the purpose of constructing a grid to assist in the delivery of sugar-cane to the Mirani West railway siding and for the prevention of straying cattle at the siding.

At least 50 per cent. of the suppliers of cane to the Pleystowe mill whose cane is loaded at Mirani West siding may, on or before 15th May next, petition the Minister for a poll on the question of the levy.

Dr. O. Kudelka, who for the past few months has been temporarily employed on investigational work at the Dairy Research Laboratory, Department of Agriculture and Stock, has been appointed bacteriologist, and will carry out investigational work for the Brisbane Milk Board.

Messrs. J. C. Butler and W. F. Benton, of Townsville, have been appointed honorary protectors under *"The Fauna Protection Act of 1937"* in respect of the recently proclaimed sanctuary for fauna at Paluma and Mount Spec. They also have been appointed honorary rangers under *"The Native Plants Protection Act of 1930."*

Mr. L. Healy, a patrolman of the Queensland Main Roads Commission employed on the Nerang-Beechmont road, has been appointed an honorary ranger under the Native Plants Protection Act.

Wild Life Preservation.

Executive Council approval has been given to the issue of an Order in Council under *"The Fauna Protection Act of 1937,"* declaring the Bauple Sugar Mill Swamp and the Tiaro Swamp to be a sanctuary for the protection of fauna. Mr. A. G. Morris, manager of the Bauple Sugar Mill, has been appointed an honorary protector in connection with the sanctuary.

An Order in Council has been issued under *"The Fauna Protection Act of 1937"* declaring portion of the shire of Noosa to be a sanctuary for the protection of fauna. The sanctuary embraces the western part of the shire.

Fruit Marketing Regulations.

The Regulations in force under The Fruit Marketing Organisation Acts have been amended in certain particulars, principally with regard to the fees and allowances payable to members of the Committee of Direction of Fruit Marketing and sectional group committees; the qualifications of voters, and candidates for election to sectional group committees; and the method of counting votes at elections.

Citrus Levy.

The Citrus Levy Regulation, which has been in force for a number of years, and which empowers the Committee of Direction of Fruit Marketing to make a levy to be expended in the interests of the citrus industry of the State, has been reissued for a further period of twelve months. The levy is at the following rates:—

On all citrus sold or delivered, whether by rail, road, or boat to factories, at the rate of 5s. per ton.

On all citrus sold or delivered by rail to firms or persons other than factories, at the rate of 1s. 7d. per ton, with a minimum of one penny (1d.),

On all citrus sold or delivered otherwise than by rail to firms or persons other than factories at the rate of one halfpenny (½d.) per case, with a levy minimum of 1d.

An alteration in the levy issued this year provides that the amount of the levy shall be ½d. per case, instead of 1d. per bushel case, and ½d. per half-bushel case, as previously collected.

The Dairy Products Stabilisation Board.

An Order in Council has been issued under the Dairy Products Stabilisation Acts appointing Mr. C. W. Thiele (Bundaberg) to be a member of the Dairy Products Stabilisation Board to fill the vacancy caused by the death of Mr. R. M. Hill (Bororen).

Trespassing Pigs.

Proceedings under authority of the Queensland Pig Industry Act and which were successful recently in a Northern centre emphasise the importance of effective control of pigs. In the case referred to and in which a fairly heavy penalty was imposed, the owner of the pigs had permitted them to stray to an adjoining slaughter yard paddock where they had access to raw offal and blood. The trespass was an annoyance to the butcher who was endeavouring to observe regulations closely by keeping his yards in a tidy, sanitary condition. In this connection, it is of interest to note that legislative provision exists for the control of live stock and for the impounding of trespassing animals. As an illustration, in Queensland the remedy provided by the law against trespassing pigs is that the owner of property on which the animals are trespassing may take the trespassing animals to the nearest pound and deliver them to the pound-keeper to be impounded by him. Before he can release them, the owner of such animals must pay the cost of driving the animals to the pound, the pound-keeper's charges, and the prescribed rate of damage to the person on whose land the animals were found trespassing. If the owner does not pay these amounts the animals are sold by the pound-keeper.

Alternatively, if a trespassing animal does damage to property the owner of the property may sue the owner of the animal for the amount of damage done.

The proceedings referred to, however, were taken under Regulation No. 5 (2) of the Queensland Pig Industry Act which states: *Pigs shall not be allowed to trespass.*

Barley Board.

An Order in Council has been issued, under the Primary Producers' Organisation and Marketing Acts, amending the constitution of the Barley Board to provide that members of such Board shall hold office for a period of three years.

Messrs. E. Fitzgerald (Felton, Cambooya), P. D. Fiechtner, jun. (Greenmount), and the Acting Director of Marketing have been appointed members of the Barley Board from 24th April, 1939, to 23rd April, 1942.

Mr. J. A. Michelmore (Mackay) has been appointed millowners' representative on the Racecourse Local Sugar Cane Prices Board.

Open Season for Quail in Southern Queensland.

An Order in Council has received Executive approval to-day, providing, under "*The Fauna Protection Act of* 1937," an open season for quail (all species) in Southern Queensland from 1st May, 1939, to 31st August, 1939, both inclusive.

The area in respect to which the season will be opened is approximately that portion of the State south of the 25th parallel of south latitude.

The attention of shooters is drawn to an Order in Council which prescribes that twenty-five (25) quail is the maximum number which any one person may take during a period of twenty-four hours.

Answers to Correspondents

BOTANY.

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

Caustic Plant.

F. (Roma)—

The specimens belong to the caustic plant or bottle-tree caustic (*Euphorbia eremophila*). This is a very common plant in Western Queensland and on black soil plains. It has a milky juice like the other euphorbias. For a long time it has been accused of poisoning stock. So many reports of its poisonous character have been received from different parts of Western Queensland that it would appear highly probable that the plant is poisonous, but we have no experimental evidence to support this. Some time ago in New South Wales Professor Seddon fed this plant to sheep. The only result obtained was scouring.

Guinea Grass. Para Grass.

M.G. (Cooktown)—

1. Guinea Grass (*Panicum maximum*). This is the grass with the large seed-head.
2. Para Grass or giant couch (*Brachiaria mutica*).

Both are good grasses and stock are fond of them. Several varieties of Guinea grass have been introduced in recent years by the Department of Agriculture and Stock, and some of them seem rather better than the ordinary type. A particularly good one is that known as "green panic" (var. *trichoglume*).

The typical form of Guinea grass is a very palatable and valuable grass, particularly for periodical cutting and feeding-off. Para grass is well known in Queensland as *Panicum muticum*. It does well under cultivated conditions, but prefers a rather moist climate; in dry areas it is confined to the edges of creeks and billabongs. It is very frost-tender.

The shrub or small tree specimen has no common name. Its botanical name is *Breynia cernua*. It is not often eaten by stock, which suggests that it is unpalatable. It is not known to be poisonous.

Satinwood or Lignum-vitae.

R.C. (Raglan)—

The specimen is a very common coastal rain-forest tree, commonly called satinwood or lignum-vitae. Its botanical name is *Vitex lignum-vitae*. The wood of this tree is fairly durable, and where better timbers—such as the hardwoods, white beech and crow's ash—are not available, it is sometimes used as fencing posts. No parts of the tree are known to be poisonous. The berries, however, are so rarely eaten that they appear to be at least unpalatable.

Rattlepod.

W.J.L. (Kingaroy)—

The specimen is a native leguminous plant, *Crotalaria Mitchellii*. It is one of the plants commonly known as "rattlepod" because of the seeds becoming loose in the pods and the plant, when shaken, rattles. Rattlepods are very rarely eaten by stock, which suggests unpalatability. One species (*Crotalaria striata*) is poisonous to stock.

A Reputedly Good Sheep Fodder.

J.J.S. (Ilfracombe)—

Your specimen is one of the sensitive plants, *Neptunia gracilis*. It is a native leguminous plant. The late Stock Inspector McCarthy, when he was stationed at Hughenden, reported that this plant was regarded in the Hughenden district as a good sheep fodder.

"Wild Verbena." Mexican Clover.

H.McB. (Millmerran)—The specimens are:—

1. *Heliotropium anchusaefolium*, Wild Heliotrope, "wild verbena" of the Warwick district.
2. *Richardsonia braziliensis* (*R. scabra*), Mexican Clover.

Neither is known to be poisonous to stock. In America, Mexican clover has apparently a good reputation as a fodder plant, but stock do not appear to be very fond of it here. It is a very serious weed in some places, especially in pineapple plantations, and in such situations it is difficult to get rid of. The wild heliotrope is a very bad weed in the Warwick district.

Rag Weed.

A.L.P. (Kingaroy)—

The specimen is rag weed or Canada fleabane, *Erigeron canadensis*. This weed has been spreading in some of our coastal districts for some time. It is not injurious to stock. It is an annual or short-lived plant, and you may find it to be less prevalent in two or three years' time.

Bitter Bark. Chain Fruit. "Kangaroo Apple."

R.D.C. (Murgon)—

Your specimens (submitted by a Kingaroy farmer) have been determined as under—

1. *Alstonia constricta* var. *villosa*, bitter bark.
2. *Alyxia ruscifolia*, chain fruit.
3. *Solanum aviculare*, kangaroo apple.

Nos. 1 and 3 are rarely eaten by stock. Bitter bark contains alkaloids somewhat similar in action to quinine. However, it has not been shown to be poisonous. No. 3 was experimented with in New South Wales by Professor Seddon. In one of the experiments one calf died, but in subsequent feeding trials no deaths occurred. This indicates that evidence of its poisonous character was not confirmed.

THE IMPORTANCE OF MINERALS IN THE MAINTENANCE OF ANIMAL HEALTH.

A few years ago, a New Zealand specialist in animal husbandry was sent to report on farming conditions in the Falkland Islands for the British Government, and he found that imported horses had been reduced to the height of ponies in three genrations, and that both sheep and cattle devoured bones of dead animals, even before the carcases had properly rotted. This visit to the island group at the "toe" of South America was made before the days when the effect of mineral deficiency in pastures was generally appreciated and when comparatively little had been published on the subject. It also was found that grown-up sheep did not thrive in the Falklands, and that the stunted cattle weighed only 500 lb. as fats. Moreover, all the animals on the islands had beaten tracks from the high country to the beaches in search of seaweed and every washed-up oddment. By what we know now, the reason for all that is plain. For forty years stock had been reared and exported from the Falkland Islands, and no attempt had been made to return essential elements to the soil. The deficiency disease in all classes of stock on the islands was the result of insufficient minerals.

The feeding of mineral licks, top-dressing of pastures with lime and phosphatic fertilizers, and drenches and special feeds were among the special measures recommended to combat what was later shown to be a deficiency in the soil of bone-forming elements. And they proved effective. Farm animals increased in size and stock losses were reduced to a normal degree.

In Australia and New Zealand, as well as in other stock-raising countries, the supply mineral licks to stock in districts in which there is a deficiency of essential elements for the full development of animal life is now an established practice. Farming is truly becoming a scientific business!

Rural Topics

Blood Meal Feeding to Dairy Stock.

Blood meal feeding to dairy cattle presents little difficulty when the meal is fresh and free from objectionable odour. It may be incorporated in the regular feed or mixed with appetising foods such as maizemeal, bran, pollard, cottonseed. Care must be exercised, however, to see that the feed box is kept clean.

In the presence of moisture, blood soon fouls and an objectionable smell results from the fermentation. Stock dislike this intensely and considerable difficulty may be experienced in getting animals into the bail where such food has lain.

The Penalty of Neglect.

Neglect to give well-timed attention to some essential item in the care of livestock or production of crops may offset much of the intelligent effort of previous weeks or months. For instance, well-bred sows may receive the best of attention and food during their "in-pig" period, only to lose some of their litters because they were not in the farrowing pen or because the young pigs had not been protected against a sudden drop in temperature. Similar experiences happen with other stock. Some farmers' so-called "good luck" is their knack of looking after essential details in good time, and of noting early symptoms of some condition before it has developed to a serious degree.—*New Zealand Farmer.*

Stud Pig Sales.

Last year no fewer than 612 official transfers were registered in Queensland. Particulars:—

Breed.	Registration.	Litter Records.	Transfers.
Berkshire	.. 122 ..	139 ..	136
Middle Whites	.. 43 ..	30 ..	30
Tamworths	.. 117 ..	110 ..	184
Large Whites	.. 50 ..	55 ..	119
Wessex	.. 62 ..	71 ..	135
Others	.. 16 ..	8 ..	8
Totals	.. 410 ..	413 ..	612

In the December carcase competitions conducted by the Australian Meat Board, the Kingston Pig Farm Co. was awarded second prize in the baconer class and third prize in the porker class. O. F. Haack, of Beenleigh, was awarded first and second in the porker class.

Self-expression through Drama.

A feature of the Caragabal Conference of the Agricultural Bureau of New South Wales was the staging of several dramatic entertainments by the girls of the Leadership Camp of the Bureau, and by members of the Ooma branch. This is a new departure for Bureau members, and a very valuable one indeed.

For young people particularly, a recreational programme which demands a contribution by more than one member, carried out in the form of dramatic effort, is a great aid to self expression, which is necessary if Bureau members are to make their voices heard in the community.

In addition, of course, the entertainment value of such dramatic work is very real, and provides welcome relaxation from the more serious aspects of a conference or branch programme.—*The Agricultural Bureau Record*, New South Wales Department of Agriculture.

Educating the Farmer.

As a result of preaching better farming methods, the north-western wheat region of New South Wales has produced a record harvest. There, the old days of "hit or miss" have gone forever, so far as wheat growing is concerned; droughts have lost their sting, although many problems still remain to be solved. The point is that education cannot stand still, and if it were not for the application of proved methods of cultivation, that record harvest under harsh climatic conditions could not have been bagged.

Farm Notes

JUNE.

THE wheat sowing season normally extends from April to July, with the main Darling Downs sowing being effected during June. Well-prepared fallows should contain sufficient moisture to permit of sowings after light showers only, but on recently ploughed lands it will be necessary to await substantial rains or to commence sowing dry when the surface soil has dried out sufficiently to avoid the malting of grain. Farmers unfamiliar with the various varieties of wheat should remember that in general, early-maturing varieties should be sown late, and slow-maturing varieties sown early.

Of the varieties in general cultivation at present, Florence, Novo, and Seaspray are early maturing, while Currawa and Cleveland are slow maturing.

All others are classified as medium, early, or mid-season, with little difference in the number of days taken to mature under identical conditions.

All seed wheat should be treated for the prevention of ball smut, using copper carbonate or either of the mercury dusts "Agrosan" or "Ceresan."

Where dry conditions have prevented the earlier seasonal sowings of oats, barley, wheat, field peas, &c., there is still time to profit by so doing, choosing early-maturing varieties which will make satisfactory growth before the normal warm, dry spring conditions eventuate.

With all fodder crops utilised for grazing, greater value is obtained from a number of small paddocks which can be fed off in rotation.

Land intended for maize should now be ploughed to a depth of at least 9 inches, and allowed to lie in the rough until early spring, the action of frost and rain having a mellowing effect on the soil.

Paddocks set aside for the July and August planting of potatoes should also receive attention, as the adequate preparation of land is one of the most important factors in the satisfactory growth of all crops.

Farmers desirous of destroying useless green timber or undergrowth with the aid of arsenic pentoxide are reminded that the April to July period is probably the most effective time for carrying out this work. Frill ringing and poisoning of trees with a 20 per cent. solution of arsenic pentoxide has proved very satisfactory, combined with the felling and swabbing of butts in regard to suckers and undergrowth. Shelter belts and shade trees should always be reserved when planning poisoning or ringbarking operations.

The winter months generally prove the best time to undertake the laborious work of ringbarking, clearing, fencing, roadmaking, &c., as much less effort is required than during the heat of summer.

Recently harvested maize grain should be allowed to dry out thoroughly before being shelled, otherwise heating is likely to occur in the bags.

Grain not required for immediate use or sale can be stored indefinitely at no great cost other than the initial purchase of tanks and occasional fumigation to destroy weevils.

THE MACHINE ON THE FARM.

Tractors and improved implements enables the producer to make the most of timely rain, and a great increase in the use of machinery on the land is proof that he is awake to the benefits to be obtained from a propitious season by using suitable modern machines to do the seasonal work quickly, thoroughly, and with the minimum of time, labour, and expense.

It is sound practice to make the best of a good season by building up reserves of fodder against the next dry season; the right kind of machinery enables this to be done.

Orchard Notes

JUNE.

THE COASTAL DISTRICTS.

IF the weather is dry, citrus orchards should be kept in a good state of tilth and any winter green manure crops turned under. Old worn-out trees may be dug out and burnt. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and become valueless. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

The pineapple plantation should be shallow worked and kept free from weeds. The fruit takes longer to mature at this time of the year; consequently it can be allowed to remain on the plant until partly coloured before gathering for the Southern markets.

Banana plantations also should be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now may mean small fruit later on. Bananas should be allowed to become full before the fruit is cut. The necessity of proper handling, grading, and packing of the fruit should be kept in mind. Land intended for planting with bananas or pineapples during the spring should be prepared now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall, they should be watered regularly. Where not already done, vineyards should be cleaned up ready for pruning. It is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Thin out young trees properly, and cut them back hard. Many good trees are spoilt by insufficient or wrong pruning during the first three years. If in doubt as to the correct method of pruning consult the district instructor in fruit culture. In old orchards, do not have too much bearing wood; cut out severely, especially in the case of peaches. Planting may be commenced where the land is ready as early-planted trees become well established before spring, and thus get a good start. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour or badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or phosphates—may be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime may also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees may be pruned now, and vines also may be pruned in any district where there is no risk of late frosts. Prunings should be gathered and burnt, and the vineyards ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the western districts. The trees should be watered if they show signs of distress; otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should have been picked by this time.

FALLOWING.

Fallowing ensures that the crop can be sown at the right time, conserves moisture in the soil by trapping every rain drop, destroys harmful and other weeds, destroys the spores of plant diseases, increases the amount of available plant food, sweetens soil and puts it in the condition of promoting vigorous plant growth.

Our Babies.

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

HEALTHY, HAPPY BABYHOOD.

Baby's Play.

One of the greatest joys of life is the joy of movement, the joy of action. A baby's little life may be said to be made up of a mass of impulses seeking outlets in various directions, and his greatest happiness comes from satisfying these impulses.

The young baby sleeps most of the time. He is not very old before he becomes very active with his mouth and with his vocal organs. Shortly afterwards his eyes, legs, and arms are the seat of almost perpetual motion while he is awake. These activities correspond to the growth and development of his brain and muscles. Soon it becomes necessary for the parents to provide facilities for the regular exercise of his little body. By the time he is six weeks old he should be given an opportunity of lying in a suitable part of the house unhampered by unnecessary clothing for certain periods of the day in order to allow his limbs and body to move freely.

Kicking exercise is the baby's first play. From it he derives numerous sensations which give him pleasure. Later this leads to the discovery of his first and best playthings—his own fingers and toes—best because, in addition to their fascinating habit of unexpectedly appearing and disappearing, he derives twofold pleasure from playing with them, that of touching and of being touched.

Then he comes into the realm of playthings apart from himself. Every object within his reach is a potential plaything, and life consists of one great game—the adventure of satisfying curiosity. This sort of play is utterly satisfying to the unspoilt child. Baby can play at his own will. When he is tired he can stop. If he goes on a little too long Nature steps in and he sleeps till his nervous energy is restored. His developing faculties are stimulated without the slightest danger of over-fatigue of the delicate nervous system.

How different is the situation when baby is played with incessantly whenever he is awake. Stimulation is applied in our time at our pace, and the inevitable result is over-stimulation and over-fatigue, unless the process is kept within strict limits. Just watch a baby responding to prolonged playing of this kind. The eager, responsive type of child quickly reacts, and his chuckling charms us. A little of this may do no harm, but the first signs of fretfulness or wandering attention are signs of fatigue and should be the signal to stop.

Imagine our feelings if a creature of ten times our size and mental capacity insisted on prolonging certain diverting antics beyond our power of spontaneous response! It does not require much effort of the imagination to see that this sort of thing carried to excess may wreck the nervous system. The truth is that many play with babies for their own amusement and not for the baby's pleasure.

We do not mean that baby should receive no attention. Every baby and little child needs proper handling and nursing given by a loving mother and father. A neglected baby grows into a flabby, listless child. But remember that injudicious playing with young babies and toddlers makes them irritable and fretful and disturbs their sleep, rest, and digestion. The one period when a baby should never be played with is immediately after food. Troublesome digestive disturbances may be due to this cause alone and may require prolonged treatment to cure.

Let play be of short duration, not boisterous, and not before a whole gallery of spectators, and, above all, let the little baby learn to play by himself.

You may obtain information on all matters concerning child welfare by visiting the nearest Baby Clinic, or by writing to the Sister in Charge, or by communicating direct with the Baby Clinic Training Centre, Alfred street, Valley, N. 1, Brisbane.

THE CARE OF MILK IN THE HOME.

The keeping quality or "life" of milk is dependent primarily on the care exercised in its production and handling on the farm. The neglect on the part of the householder to observe certain precautions, however, may seriously impair its keeping quality, consequently the milkman is blamed for what should really be the responsibility of the customer.

Every utensil into which milk is put adds its quota of germ life to the milk. It cannot, therefore, be expected that milk, even if produced under careful conditions and thus having a low bacterial count, will keep well if it is subsequently treated carelessly in the consumer's home. The consumer must accept his share in ensuring that this most valuable food is kept as pure as possible. In the home, the prevention

of the introduction and growth of germs in milk depends chiefly on the cleanliness of the jugs or other vessels in which it is contained and the temperature at which it is held.

The cleaning of any vessel which is intended for milk requires a slight modification of the usual procedure in washing dishes and pots and other household articles. The following instructions should be observed:—

1. Rinse with cold water.
2. Wash in hot water or hot water to which washing soda has been added.
3. Scald with boiling water.
4. Invert to dry. Cloths should never be used for drying as they simply reintroduce numerous germs which, if favourable conditions exist, will multiply extensively in and reduce greatly the period of sweetness of milk placed in the vessel afterwards.

Any milk vessel cleaned in the way described will add very few additional bacteria to those already present in the milk on its delivery, whereas a neglected or carelessly washed container might add countless numbers. The influence of an improperly cleaned vessel in reducing the "life" of milk will be appreciated readily if it is remembered that bacteria double in number every twenty to thirty minutes at ordinary temperatures. Their multiplication is markedly restrained at lower temperatures until below 50 deg. Fahr., when it is practically suspended. The object in keeping milk as cool as possible in the home is, therefore, evident.

To preserve the freshness of milk in the home, the chief things to be done are:—

1. Use only vessels free from cracks and chips and cleansed scrupulously in the way already described. Plain vessels are preferable to those of fancy design, because of the greater ease in cleaning them.
2. Keep the milk in a cool, clean place.
3. Always cover the milk jug to exclude insects, particularly flies, as they, especially, transport numerous objectionable bacteria.
4. Since milk fat readily absorbs odours from its surroundings, milk should be kept apart from any substance possessing a penetrating odour, onions, certain fruits—such as pineapple—meats, and fish in any form.
5. Remove the jug from the doorstep, or wherever it is placed, as soon as possible. See that the milk is protected from the sun, preferably in a cool, dark place.

IN THE FARM KITCHEN.

CALLING ALL COOKS!

(Supplied by the Queensland Nutrition Council.)

Like the old grey mare, cooking, modern style, "ain't what it used to be." The cook stove is no longer the only device used in food preparation, and bakedays are losing their terrors.

The cookstove is now only one of a team of food service implements. Of equal status is the refrigerator, the fruit juice extractor, the rotary food grater. But more

important than this is the extent of commercial food preparation and conservation such as the pasteurising plant and commercial refrigerator.

The kitchen need no longer be the hot spot it used to be, and permanent waves are replacing the permanent backaches and wispy hair that used to come from long hours spent over a hot stove.

The idea of the kitchen is changing to the conception of a food preparation laboratory.

A good story is told of a Digger who was paraded before the Commanding Officer for using "language" in the camp kitchen. In his defence, he made it clear that he had not called the cook a ——; he merely asked who had called the —— a cook!

But under modern conditions it might not be necessary to call anyone a cook. It is rather difficult to know what word to use in its place, but a word meaning "a preparer and server of food" would serve the purpose better. Perhaps the word "culinaire" with its French fragrance might be considered.

When the history of cooking and food preparation in Australia comes to be written, the first stage to be chronicled will be that of corn beef and damper.

This was a necessary accompaniment of pioneering period of Australia's development with its household handicaps. Some Australians are still in that stage, in spite of the removal of these handicaps.

Then came the sponge cake period, when no woman worthy of the name dared face her friends unless she could produce a sponge cake 6 inches high, crowned with icing and stuffed with rich filling.

How the festive afternoon-tea table groaned with such confections! Washed down with well-sweetened tea the ladies lulled themselves into a false feeling of nutritional security. Not so bad if indulged in occasionally, but definitely figure-deforming if made a common practice.

While this habit was bad enough for grown ups, it was verging on the criminal for children, whose needs we now know are for the foundation foods if virility is to be built up.

With this period went the white bread, the arrowroot biscuit, and the starchy milk pudding.

While Australian culinary habits have little of distinction to recommend them, one of the chief aspects that will receive comment by chroniclers will be the non-use of Australia's natural nutritional wealth.

Milk there is in abundance. We have a milky munificence that has no parallel in any other country.

Queensland produces three quarts of milk per day per head—and 85 per cent. of it is separated and the skim milk, rich in first-class protein and lime, is fed to stock or otherwise wasted as far as human nutrition is concerned!

And the fruit!

Queensland has the temperate fruitgrowing zones of the Granite Belt and the tablelands to draw on. The coastal areas with their tomatoes and other vegetables, and the tropical pineapples, mangoes, bananas, and papaws.

Production is so prolific, thanks to modern methods of agriculture, that one glut succeeds another almost all the year round.

And yet with all this natural bounty at our very doorstep the demand for refined civilised foods is such that Queenslanders eat over half a pound of white flour per head per day.

The use of white flour and the non-use of the more nutritionally valuable germinal part of the wheat and the outer coverings of the wheat berry, result in a deficiency of the vitamin B—now recognised to be one of the most widespread of the vitamin deficiencies of civilised diets.

The "good cook" of the future would be more accurately described as the "good preparer of meals."

She will earn her reputation not by the fact that she can bake a sponge cake 6 inches high, including a rich and creamy filling, but by the fact that she can set before her family an attractively balanced meal rich in food value and a masterpiece in palatability.

And instead of spending her artistic energy on the complex decoration of an already too-sweet cake, she will use it to devise attractive colour combinations and nutritious dishes which the large variety of fruits and salad vegetables available to every Queensland housewife makes possible.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

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

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of years' records.	Mar., 1939.	Mar., 1938.		Mar.	No. of years' records.	Mar., 1939.	Mar., 1938.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	8·53	38	19·79	1·46	Gatton College ..	3·03	40	..	2·30
Cairns	17·81	57	27·81	3·61	Gayndah	3·01	68	4·08	4·05
Cardwell	15·65	67	20·95	1·39	Gympie	6·18	69	7·32	5·87
Cooktown ..	15·09	63	25·51	2·07	Kilkivan	3·85	60	4·00	3·57
Herberton ..	7·60	53	21·65	0·65	Maryborough ..	5·91	68	9·19	8·72
Ingham	15·86	47	27·55	5·77	Nambour	9·32	43	18·36	12·32
Innisfail	26·46	58	40·42	11·10	Nanango	3·36	57	2·87	4·60
Mossman Mill ..	17·49	26	35·43	0·97	Rockhampton ..	4·42	68	8·31	8·83
Townsville ..	7·11	68	5·56	1·64	Woodford ..	7·73	52	11·25	9·00
Central Coast.					*Central Highlands.*				
Ayr	6·39	52	5·31	1·90	Clermont ..	3·06	68	2·75	2·10
Bowen	5·82	68	3·53	8·22	Gindie	2·58	40	..	2·49
Charters Towers ..	3·76	57	2·94	4·20	Springsure ..	2·91	70	4·76	4·75
Mackay P.O. ..	12·18	68	14·08	20·06	*Darling Downs.*				
Mackay Sugar Experiment Station	11·26	42	10·34	17·82	Dalby	2·69	69	4·58	3·94
Proserpine ..	12·55	36	9·82	13·97	Emu Vale ..	2·27	43	7·28	2·20
St. Lawrence ..	5·28	68	4·83	11·26	Hermitage ..	2·08	33	..	2·73
South Coast.					Jimbour	2·55	51	2·91	5·73
Biggenden ..	4·01	40	3·12	6·76	Miles	2·68	54	3·80	2·24
Bundaberg ..	5·24	56	8·40	8·61	Stanthorpe ..	2·59	66	5·08	0·71
Brisbane	5·60	87	15·72	4·24	Toowoomba ..	3·72	67	7·14	3·89
Caboolture ..	7·51	52	18·79	8·98	Warwick	2·45	74	8·61	0·66
Childers	4·74	44	9·00	8·79	*Maranoa.*				
Crohamhurst ..	11·00	46	18·50	10·89	Bungeworgorai ..	1·78	25	..	0·63
Esk	4·67	52	6·90	4·72	Roma	2·62	65	6·62	1·28

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MARCH, 1939.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·74	87	74	95	5	70	29 to 31	2,551	24
Herberton	..	78	64	89	5	58	14	2,165	19
Rockhampton	29·86	86	70	99	5, 6	67	23, 27, 30, 31	831	18
Brisbane	29·94	81	68	97	6	59	25	1,572	21
Darling Downs.									
Dalby	29·94	83	63	95	6	53	25, 27	458	11
Stanthorpe	..	76	58	90	6	43	25	508	16
Toowoomba	..	77	61	93	6	51	25	714	16
Mid-Interior.									
Georgetown	29·78	90	72	95	10, 14	66	31	432	9
Longreach	29·82	95	71	105	7	65	28	37	4
Mitchell	29·90	86	65	100	7	53	26	164	7
Western.									
Burketown	29·76	91	75	98	10, 13, 18	69	24, 26	516	10
Boulia	29·82	93	71	101	12	62	1	79	6
Thargomindah ..	29·86	90	68	96	6	58	26, 27	112	5

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	May, 1939.		June. 1939.		MOONRISE. May., 1939.	June. 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·18	5·20	6·36	5·3	3·36	4·28
2	6·18	5·19	6·36	5·3	4·17	5·16
3	6·19	5·19	6·37	5·3	5·1	6·8
4	6·19	5·18	6·37	5·3	5·47	7·0
5	6·20	5·17	6·38	5·3	6·35	7·55
6	6·21	5·17	6·38	5·3	7·26	8·48
7	6·21	5·16	6·39	5·3	8·18	9·39
8	6·22	5·15	6·39	5·3	9·10	10·32
9	6·22	5·14	6·40	5·2	10·2	11·20
10	6·23	5·14	6·40	5·2	10·55	a.m.
11	6·23	5·13	6·40	5·2	11·44	12·15
12	6·24	5·12	6·41	5·2	..	1·6
					a.m.	
13	6·25	5·12	6·41	5·2	12·38	1·57
14	6·25	5·11	6·41	5·2	1·29	2·46
15	6·26	5·10	6·42	5·2	2·20	3·52
16	6·26	5·10	6·42	5·2	3·15	4·53
17	6·27	5·9	6·42	5·3	4·12	5·51
18	6·28	5·9	6·42	5·3	5·8	6·52
19	6·28	5·8	6·43	5·3	6·8	7·52
20	6·29	5·8	6·43	5·3	7·8	8·42
21	6·30	5·7	6·43	5·3	8·9	9·31
22	6·30	5·7	6·43	5·3	9·7	10·14
23	6·31	5·6	6·44	5·4	9·58	10·55
24	6·32	5·6	6·44	5·4	10·48	11·36
						p.m.
25	6·32	5·6	6·44	5·4	11·32	12·16
					p.m.	
26	6·33	5·5	6·44	5·5	12·15	12·57
27	6·33	5·5	6·44	5·5	12·57	1·39
28	6·34	5·5	6·45	5·5	1·35	2·24
29	6·35	5·4	6·45	5·6	2·16	3·12
30	6·35	5·4	6·45	5·6	2·57	4·3
31	6·36	5.3			3·42	

Phases of the Moon, Occultations, &c.

4th May	○	Full Moon	1 15 a.m.
11th ,,	☾	Last Quarter	8 40 p.m.
19th ,,	●	New Moon	2 25 p.m.
26th ,,	☽	First Quarter	9 20 a.m.

Perigee, 23rd May, at 10.0 p.m.
Apogee, 11th May, at 3.0 p.m.

Given a clear morning sky and a free eastern horizon on the 16th, about an hour before sunrise Venus and Saturn rising at nearly the same time about 4 o'clock would be seen well up; Mercury nearest the horizon and Jupiter nearly halfway to the meridian. All are still in Pisces, but Mercury hard on the border of Aries. In daylight, at 7 a.m., Venus and Saturn will be separated by only half a degree. At the same time both these planets will be in conjunction with the Moon, three days before New.

On the 17th Mercury and the Moon will meet at midnight, below the horizon.

Mars in Sagittarius, the only planet visible in the evening sky, will not be well seen until Scorpio is high above the horizon in the south-east. Neptune, the invisible, is among the small stars of Leo, near Virgo. Pluto in Gemini has not yet been admitted in Astronomical Year-books as an accredited member of the Sun's retinue.

Mercury rises at 4.15 a.m., 2 hours 3 minutes before the Sun, and sets at 4.9 p.m., 1 hour 11 minutes before it, on the 1st; on the 15th it rises at 4.41 a.m., 1 hour 45 minutes before the Sun, and sets at 4.3 p.m., 1 hour 7 minutes before it.

Venus rises at 3.46 a.m., 2 hours 32 minutes before the Sun, and sets at 3.46 p.m., 1 hour 34 minutes before it, on the 1st; on the 15th it rises at 4.7 a.m., 2 hours 19 minutes before the Sun, and sets at 3.39 p.m., 1 hour 31 minutes before it.

Mars rises at 9.58 p.m., and sets at 11.44 a.m., on the 1st; on the 15th it rises at 9.30 p.m., and sets at 11.10 a.m.

Jupiter rises at 3.7 a.m., and sets at 3.21 p.m., on the 1st; on the 15th it rises at 2.24 a.m., and sets at 2.32 p.m.

Saturn rises at 5.3 a.m., and sets at 4.37 a.m., on the 1st; on the 15th it rises at 4.14 a.m., and sets at 3.46 p.m.

In this month, when the great Orion leaves our evening sky, the finest southern constellations, Scorpio, Centaurus, and Argo Navis, have arisen in the south-east.

2nd June	○	**Full Moon**	1 11 p.m.
10th ,,	☾	**Last Quarter**	2 7 p.m.
17th ,,	●	**New Moon**	11 37 p.m.
24th ,,	☽	**First Quarter**	2 35 p.m.

Apogee, 8th June, at 9.0 a.m.
Perigee, 20th June, at 6.0 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.