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Event and Comment.

Primary Production in Queensland.

In the Annual Report of the Department of Agriculture and Stock for the year ended 30th June last, the general pastoral and agricultural situation is reviewed. Subjoined is a brief summary of the main points of the report:—

The statistical position of the major branches of animal husbandry in Queensland is indicated in the following figures:—Sheep, 23,255,584; cattle, 6,524,550; horses, 387,018; and pigs, 450,391. In the sheep pastoral districts, conditions generally were normal except in the South-West, where scrub and supplementary feeding became necessary on many holdings. Flock losses occurred in places; and to ensure their survival, ewes were frequently left unmated. As compared with the previous year's figures there was a decline in the number of sheep. There also was a slight decline in average fleece weight, largely because of prevailing unfavourable conditions in the South-West area. Fat sheep deliveries decreased slightly, but the condition of the consignments was generally satisfactory. Values varied somewhat, but recent prices were as high as 6d. a lb. dressed weight, plus skin value. There was little increase in the number of fat lambs marketed, but their quality was evidence of good breeding and fattening at the right age. Naturally, the weather and its effects on growing fodder crops has an influence on lamb fattening practice and flockowners in parts of the fat lamb raising districts were at a disadvantage in that regard. Registrations of stud flocks are increasing. They include Merino, Corriedale and British breeds—a very encouraging indication of progress. Field days were held in several sheep pastoral centres for the purpose of giving practical demonstrations in stock disease and pest control. Sheep breeders are taking a keener interest in this important branch of flock

management. Wool appraisals totalled 610,514 bales, valued at approximately £13 million. Production was above normal. Under the Departmental Farmers' Wool Scheme assistance to small flockowners in the get-up and marketing of their clips was continued. The number of bales classed and appraised was 562 and the average price obtained was 13·72 pence per lb.

Cattle values remained at a high level throughout the year and were reflected in increased numbers of stud and herd stock introduced. The demand for both fat and store cattle continued keen. Good quality horses of all classes were in strong demand at good prices. Generally, the condition of livestock was fair, and there were no abnormal losses from disease.

The downward trend in sugar production which started in 1940 continued, and in the 1943 season only 486,447 tons at 94 n.t. were produced. The cane harvested amounted to 3,397,424 tons, consequently 6·98 tons of cane were required to produce one ton of sugar. Shortages of labour, fertilizer and equipment for cultivation were the main reasons for the low tonnage produced. The average price of sugar was £21 1s. 3d. per ton, compared with £18 3s. 11d. for the previous season's output, and the value of the crop was therefore approximately 10¼ million pounds—about £1 million pounds lower than that of 1942.

Climatic conditions were generally favourable in the main cotton growing districts, but in the South Burnett and southern and western areas were less conducive to high production because of excessive wet weather in December. Many farmers averaged yields of 700 lb. of seed cotton to the acre or better and, in some instances 1,200 to 1,500 lb. to the acre. The work of developing improved strains of commercial cotton varieties was continued and some very promising results were obtained. Insect pests were not an important limiting factor in respect of crop yields in the 1943-44 season.

The wheat yield was above average and slightly better than that of the previous year, even though the acreage was smaller. The aggregate yield of over 5 million bushels was, considering all circumstances, highly satisfactory. Although the maize acreage was slightly below average, the total yield of 4½ million bushels was above average. The quality of the grain was excellent and, as with other grains, high values were maintained throughout the season. Grain sorghum production has become a well established industry with an expanding acreage. The yield approximated 1,400,000 bushels. Potato production was a record. In the southern districts, the acreage planted was 15,800, from which a return of 30,680 tons was obtained. In North Queensland, sufficient seed was supplied to sow about 2,000 acres and the prospective yield should not be less than 5,000 tons. Although seasonal conditions were unusually favourable for fodder crop production during the greater part of the year, the quantity of ensilage made was the least for many years. Substantial hay reserves were held, however, on many farms.

Butter output was 101,416,297 lb., valued at £8,546,992, in comparison with 111,511,198 lb., valued at £8,313,827 for 1942-43. Seasonal and wartime circumstances, as detailed in the report of the Director of Dairying, were against the attainment of the butter production objective of 51,000 tons. Despite all unfavourable conditions, however, high standards of quality were maintained.

Cheese production was 24,041,648 lb., valued at £1,159,250, as against 27,730,083 lb., valued at £1,213,183 for the previous year.

Broom Millet.

E. R. HASELER.

BROOM millet is not grown for stock feed, the brushes on which the seed is borne constituting the valuable part of the plant, although both the seed and the stalks have some feed value. The brushes are used in the manufacture of various types of household brooms, of which there is a war-time scarcity.

The acreage under broom millet in Queensland varies considerably according to the seasonal conditions, and is also influenced by fluctuations in the prospects of obtaining profitable prices for the brushes. Because of the limited demand for the brushes in Australia and to the fact that this crop can be produced in other States, over-production occurs at times. This results in a lowering of the returns to the growers, which may be sufficiently serious to cause a reduction in the acreage in this State in the season following that in which low prices had ruled. This variation in crop production and prices tends to affect adversely the development of the broom millet growing industry in Queensland.

Soil Requirements.

Broom millet should be grown on the most fertile alluvial loams of high moisture-holding capacity in order that the plant may make a rapid unchecked growth. The average returns that may be expected in normal times from this crop in most of the broom millet growing districts of the State influences numbers of farmers, however, to devote their fertile alluvial soils to other crops, such as maize, potatoes, pumpkins, and lucerne, which, as a rule, are more profitable than broom millet. Having greater ability to withstand dry conditions than most of the crops just mentioned, broom millet is then often sown on the slopes and on the poorer soils where these crops will not usually yield profitably. Plants on such soils require a more regular distribution of the rainfall than do plants on the fertile alluvial loams and clay loams, hence the yield and the quality of broom millet brushes produced on the slopes and the poorer soils may fluctuate appreciably. Undoubtedly, more definitely suitable soils should be selected for the growing of broom millet if the production of that crop is to be placed on a really satisfactory basis. On some farms, however, it may be necessary to sow the broom millet on the slopes in order that the alluvials can be reserved for the production of fodder crops. In such cases, a suitable rotation should be adopted to increase the fertility of the soil on which the broom millet is to be grown and to improve its

permeability so that a large proportion of the storm rains may be absorbed by the soil. Where such methods are followed, the chances of obtaining satisfactory returns from broom millet under a wide range of climatic conditions will be greatly enhanced.

Preparation of the Seed-Bed.

The methods satisfactorily employed in the preparation of a seed-bed for the sowing of maize also are suitable for broom millet. Because of the necessity of preventing as far as possible, any check on the growth of the broom millet plant, every method of storing moisture in the subsoil, before planting, should be utilised. Where planting is to be done in the early spring, the land should be ploughed in the autumn and left in a rough condition so that the winter rains may be trapped efficiently. Sufficient harrowing and, if necessary, discing should be done through the late winter to control weed growth, and also to gradually firm the seed-bed in time for early planting. With the midseason sown crop, the spring ploughed land should be left in a receptive state for the absorption of rain from early summer storms; and every effort should be made to eradicate weed growth, so that the broom millet seedlings shall not have to compete with weeds for the available soil moisture and plant nutrients.

Time of Planting.

The planting period for broom millet varies according to the district in which the crop is to be grown. It is essential to have fine weather during harvesting, consequently sowings should be so arranged that the crop will be ready for harvesting at a time when weather conditions are likely to be favourable. In the Lockyer Valley and adjacent districts, where most of the broom millet produced in this State is grown, there are, however, two well-defined planting times—namely, August and September for an early crop, and early December for a late one. Crops planted during these months can generally be harvested in more satisfactory weather than is frequently the case with plantings made in other months in the planting period. Moreover the crop has a much better chance of having good growing conditions. The broom millet producer in the areas mentioned plants the early crop on the upper warmer slopes, and the late crop on the more moisture retentive soils of the lower slopes.

Row and Plant Spacing.

Broom millet is sown with one or two row maize planters equipped with plates to sow at the desired spacing of the plants. Usually the rows are spaced 3½ feet apart, but the plant spacing within the rows varies with the time of sowing. Generally, the rate of sowing is that which the experience of the farmer indicates as being likely to give the desired plant spacing for his soil without any thinning of the plants being necessary. As the plants of the early sown crops tend to tiller more than those of the later sowings, a rate of sowing is used in August and September which will space the plants approximately 12 to 15 inches apart. After that, a heavier rate of sowing is used which will leave the plants roughly 9 inches apart. The rate of sowing varies from 2 lb. per acre for the early sowing to as much as 5 lb. for the later plantings.

Cultivation.

The usual methods of cultivation for maize are satisfactory for broom millet. The maintenance of clean cultivation in a broom millet crop is particularly desirable, however, as competition with weed growth for moisture and nutrients during any adverse growing conditions seriously affects the growth of the broom millet plant. This applies particularly during the stage of development of the plant prior to the emergence of the brushes, for then favourable growing conditions are essential for the production of brushes of satisfactory quality.

Head Bending.

The brush of broom millet grows very rapidly during favourable conditions, frequently reaching a length of 30 inches on fertile soils. Any danger of the fibres of the brushes bending because of the weight of the seed can largely be overcome if the brushes are bent over so that the weight of the seed will keep the fibres hanging straight downward and close together. The brushes are bent over when the weight of the seed becomes sufficient to start the fibres of a brush spreading. The operation is done during the hot, sunny part of the day by bending the stalk at a point about 12 inches below the base of the brush, taking care to bend between the joints or nodes of the stalk. The usual procedure is for the operator to hold one arm up in the air with the wrist against the stalk and with the other hand to then bend the stalk down around the wrist, thus preventing the breaking of the stalk or the bending of it at too sharp an angle.

This bending operation is a general practice in some broom millet producing countries such as the United States of America, and could with advantage be practised in Queensland more widely than it is, especially where broom millet is grown on a soil fertile enough to produce a rapid growth of the brushes after good soaking rain.

Harvesting.

The most difficult decision the broom millet grower has to make is the selection of the moment when the crop is in the right condition for harvesting. The best time for harvesting is when the brushes are well developed, but while the fibre still has a nice green tinge, although it is starting to dry out. This stage in the development of the plant is reached before full maturity of the seed is attained, and sound judgment is required to make the right decision as to the suitability of the crop for harvesting. In some seasons, an excessively wet period may make it necessary to harvest before what would otherwise be the correct time, in order to avoid losses caused by moulds attacking the compressed brushes. Again, the occurrence of severe wind storms in crops, in which the brushes have not been bent over, may cause the splitting open of the supporting sheath of the brush, and when this happens it is necessary to harvest as soon as possible in order to prevent the resultant bending of the fibres from becoming permanently fixed. The inexperienced grower of broom millet would be well advised to consult an experienced grower, preferably in his own district, about any of the abovementioned harvesting problems, for by doing so serious losses may be avoided.

In cutting off the brushes, the operator grasps the brush with one hand and cuts through the stalk at least 6 inches below the brush with a suitable cutting instrument, such as a pruning knife. The harvesting should be done on days of bright sunshine in hot, dry weather in order that the curing will be quickly accomplished.

Curing.

The cut brushes are spread out on the stalks which have been bent over for the purpose, care being taken to keep the brushes off the ground so that they may dry out quickly and uniformly. If wet weather threatens, it is necessary to gather the brushes and spread them under cover, as rain both discolours them and may cause the development of moulds. Generally, if harvesting is done in hot, dry weather the brushes are cured sufficiently in two days to allow of their being gathered for the removal of the seed.

Where the curing is done under cover, it will be found that the colour and quality of the brushes are improved, as compared with brushes cured in the field. The cut brushes are first left in the field for a couple of hours to allow some evaporation of moisture to occur, after which they are loosely stacked, about 3 inches deep, on racks under cover. They should be turned at frequent intervals to hasten the drying out and also to prevent the occurrence of heating in any dense brushes. Where the curing is done properly under cover, a tough green brush free of discolouration results which, if of proper length, commands a premium.

Removal of the Seed.

The seed of broom millet is removed by holding the brushes against the rapidly revolving studded drum of a machine commonly called a hackler. The studs or spikes projecting from the drum strip or beat off the seed of the fibres without damaging the latter; in using the hackler the drum should revolve away from the operator. Either hand or power-driven machines may also be purchased for this purpose.

Grading.

It is obviously important that the farmer grade his broom millet brushes carefully according to trade specifications. Green-coloured brush should also be segregated from golden-coloured brush, classing the brushes of each colour into the appropriate grades.

Baling.

The various grades of the different coloured brushes should be baled separately in an ordinary hay press or in a similar type of press. In placing the brushes in the press care should be taken to protect the fibres. The best procedure is to first place a thin layer of the brushes flat in the bottom of the press, with all the butts of the lengths of stalks attached to the brushes facing to one side of the bale. Another thin layer should then be placed on top of the first layer, but with the butts facing to the opposite side of the bale, and with the fibres overlapping those of the previous layer sufficiently to allow the two layers to form the width of the bale. This process is repeated until the press is filled for the compressing of the finished bale. The bales are usually tied with three strands of No. 10 gauge wire. It is advisable also to use cross strands of soft tie wire to prevent the two outside wires from slipping

off the bale. The size of the bale varies according to the grower's requirements, but one with dimensions of 36 inches in length, 18 inches in depth and 30 inches in width weighing from 100 to 112 lb. is satisfactory.

Varieties of Broom Millet.

The variety of broom millet generally grown in Queensland is White Italian. It is suited to the soils of either the alluvials or the slopes, although there are marked variations in the yields obtained on the two types of soils, because of the differences in their fertility and moisture-holding capacity.

Because of the necessity of producing brushes of high quality to obtain the best possible market price, it is advisable to plant the best seed obtainable. Where it is not convenient for a farmer to breed superior seed for his requirements, it is advisable for him to apply to the Broom Millet Board for his seed.

Stock Feed Value of Broom Millet.

The seeds removed from broom millet brushes are of low value for stock feed when the brushes are cut to produce green-coloured fibre, as the seeds are then in the dough stage. Where golden-coloured fibre is produced, however, the seeds are more mature when the brushes are cut and therefore contain a higher amount of nutrients.

Stock may be turned on to the stalks after the brushes are removed from the field if there is a scarcity of feed, as the leaves are of some feed value. It is considered, however, that it is better to cross-disc the stalks and leaves after the brushes are harvested and then plough all the material under in order to improve the condition of the soil.

Plate 65.
Moving Hereford Mothers and Calves on a Downs Property.

Thinning and Early Cultivation of Cotton.

W. G. WELLS, Director of Cotton Culture and Senior Research Officer.

INVESTIGATIONS conducted over an extensive period have demonstrated the necessity of ample supplies of moisture for the cotton crop. It is advisable, therefore, to adopt every practice which will provide adequate soil moisture throughout the development of the cotton plant.

Early ploughing when applied in conjunction with the grassland-cotton rotation materially improves the possibilities of providing a good supply of subsoil moisture prior to planting and growers are increasingly adopting this procedure. Greater attention must be given, however, to conserving the moisture in the upper layers of the soil during the early growth of the cotton plants. Analyses of the yields obtained in October planted cotton on land in the first three years of cultivation after ploughing grassland at the Biloela Research Station have indicated that over an 18-year period good yields have invariably been obtained when good rains fell during October and early November. In other words, frequent penetrating rainfall during the first six weeks of the growth of the October planted cotton has promoted a good early growth which, under the conditions of ample moisture and the favourable balance of plant foods for cotton that exists in the newer cultivations after grassland, later set and developed a satisfactory crop. As the permeable condition of the surface soils in the newer cultivations allows the efficient penetration of the surplus moisture into the lower soils, a good supply of subsoil moisture was also stored for use by the heavily laden plants during stress conditions in summer. Clean cultivation was maintained throughout the growth of these crops and thinning was done when the plants were from 5 to 8 inches tall, both practices assisting in conserving as much as possible the moisture in the surface soils for the use of the rapidly growing plants.

The average yield obtained in these investigations irrespective of the time of planting, has been 750 lb. seed cotton per acre over the 18 year period which has included a wide range of climatic conditions. The results indicate, therefore, the wisdom of practising all methods that will provide and conserve all possible moisture for the use of the cotton plants during their early growth in order that they may develop a good crop of squares and bolls before the onset of the wet season.

Growers should, therefore, keep their cotton crops clean and thin them to suitable spacings, for both practices undoubtedly help to conserve the moisture in the surface soils.

In order to reduce the costs of both the thinning operations and the early cultivations, the suitability of the crop for cross harrowing must be carefully tested. Where the stand of seedlings is thick, and the surface of the field is relatively free from trash and pieces of roots, cross harrowing with a spike-tooth harrow will eliminate many bunches of the cotton seedlings without adversely affecting the stand. The removal of these excess plants prevents the development of spindly growth, which usually occurs when the stand of seedlings is too thick.

The results obtained in a cross harrowing experiment on old, weedy cultivations indicate that a considerable amount of weed growth can also be removed from the young cotton crop without destroying too many of the seedlings, provided a good stand has been obtained. By cross harrowing when the cotton seedlings were 2 inches tall and then cultivating between the rows with a riding cultivator equipped with tynes and guards to allow of the inner tynes being worked close to the row, weed growth was substantially reduced as compared with where only inter-row cultivation had been applied. Two and even three cross harrowings can be made if the original stand is good, without affecting the final stand—three harrowings before the plants were 5 inches tall, on the seedling stand obtained from a planting of 18 lb. of delinted seed per acre left slightly over an average of 2 plants per foot of row.

Plate 66.

A Field of Cotton in Good Condition for Hoe-thinning.—After the thinning is completed this field should be cultivated to establish a mulch around the plants. Note the light goose-necked hoe, which is the most suitable implement for hoe-thinning clean cotton.

Sufficient evidence is not available to indicate whether the stand of plants remaining after a crop has been cross harrowed two or three times can be left without further plants being removed by hoe thinning. Generally speaking, it appears advisable to err on the side of wide rather than too close spacing. It is suggested, therefore, that where, after the last cross harrowing, the stand is still fairly thick or irregularly spaced, so that there is some degree of crowding, the excess plants be thinned out with the hoe to leave the plant spacing mostly used in the district for the particular soil type. The final thinning out with the hoe of any excess plants left by the cross harrowings can be done over a considerable period without adversely affecting crop development. The cross harrowings thus reduce the amount of hoe thinning required per acre and also allow of this thinning being done over a longer period than normally, both of which are factors of great importance under present conditions.

Where either the stand of seedlings obtained is too thin, or the surface of the field is not suitable to allow of a cross harrowing being employed, it is strongly recommended that the plants be thinned out with the hoe to the most suitable spacing. Thinning in this instance should be commenced when the plants are about 5 inches tall and should be completed before they have exceeded 8 inches in height (Plate 66).

The most suitable spacing of the plants depends on the type of growth which may be expected to develop under the usual range of climatic conditions experienced during the growth of the cotton crop. Where large plants can normally be expected, it mostly appears advisable to space out farther than where smaller plants are usually produced. Generally speaking, however, spacings of less than 12 inches and more than 24 inches do not appear to be advisable. The following single-plant spacings in rows 4 to 4½ feet apart are recommended:—

Central District—12 to 18 inches on the fertile soils and 18 to 20 inches on the less fertile, harder soils;

Upper, Central, Coastal, and South Burnett—20 to 24 inches on the fertile soils and 18 to 20 inches on the less fertile soils;

Southern District—20 to 24 inches on all soils;

Western District—15 to 18 inches on all soils.

Early Cultivation.

Early cultivation of the cotton crop is particularly necessary under the climatic conditions of this State. In the districts south of Mackay, early planted cotton can be expected to produce better than cotton planted in late November or December. Most farmers in these areas plant their cotton following the first rains occurring after the first of October, and some farmers plant any time after mid-September, whenever suitable moisture is available. If the planting rains are rather light, planting is frequently done without a pre-planting harrowing in order to obtain the fullest benefit of the moisture present. Consequently, weed and grass seedlings may germinate at the same time as the cotton seedlings, and unless a cross harrowing is made before the latter appear a considerable amount of weed growth may occur in the row of cotton, especially if showery conditions follow planting. If the field is harrowed after the planting rain before the cotton is planted, and no further rain

occurs until the cotton plants are of some appreciable size, no difficulty should normally be experienced in maintaining a clean crop during the early stages of cultivation. Many growers give the early planted cotton crop little attention, however, for some time after planting it, particularly if further rains are experienced, to permit the planting of other crops. This is most inadvisable, as there is always the danger of prolonged showery conditions occuring when the cotton seedlings are small; and unless the field is kept clean prior to this the resultant weed and grass growth may either cause the abandonment of the crop or greatly increase the use of hand labour to clean it. It is highly advisable, therefore, to maintain a clean field of cotton, particularly in its younger stages of growth.

Emphasis has already been placed in this article on the merits of cross harrowing to thin out excess cotton seedlings, and to remove weed growth in the rows of young seedlings. Where it is found that cross

Plate 67.

Cotton Seedlings in a Suitable Stage for First Inter-row Cultivation.—Where the young cotton crop is not cross-harrowed, the first inter-row cultivation should be done when the cotton seedlings are 2 to 3 inches high.

harrowing cannot be practised, then the usual method of inter-row cultivation, for which the farmer is equipped, should be employed as soon as the rows of cotton are discernible (Plate 67). This operation will destroy any weed and grass seedlings germinating between the rows at the same time as the cotton. A similar cultivation should be given following each storm occurring during the early development of the cotton crop. This procedure will not only allow of efficient control of weed and grass growth between the rows being obtained, thereby making more of the moisture present in the soil available to the cotton plants, but the maintenance of the mulch on the surface of the soil will increase the penetration of each rain experienced. It is pointed out, however, that where a disc cultivator is used in cultivating young cotton the small ridge of soil and plants formed by the discs cutting the soil away from it should not be left with the sides exposed for a lengthy period of dry

weather. The ridge will dry out and set so hard under such conditions, particularly if a heavy storm preceded the cultivation operation, that the growth of the young plants will be retarded.

A considerable acreage of cotton is ploughed out each season through the crops becoming over-run with grass and weeds. Undoubtedly, much of this could be avoided if all growers maintained clean cultivation in the early stages of growth of their cotton crops. It is appreciated that, with the present labour position on many farms, it will be difficult to maintain a satisfactory state of cultivation by ordinary methods. It is strongly recommended, therefore, that cross harrowing be employed wherever possible, for a marked reduction in labour requirements to cultivate and thin the cotton crop can be effected thereby.

NORTH QUEENSLAND—A CANADIAN'S IMPRESSIONS.

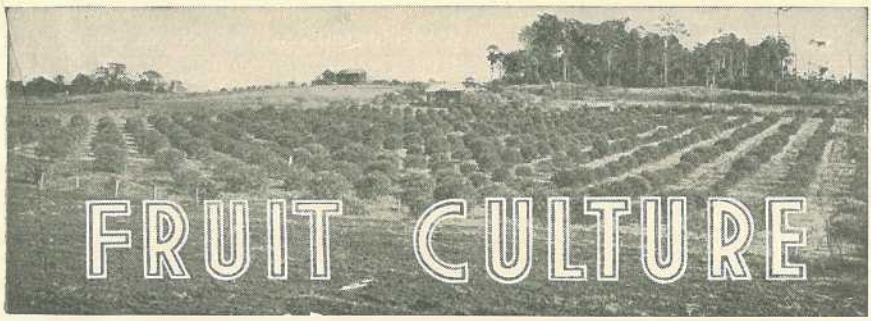
"I was amazed at what I saw—the vastness of the country, the sparsity of the population, the tremendous possibilities of future development which are to be seen on every hand." That is how Northern Queensland impressed the High Commissioner for Canada (Mr. Justice Davies), who returned to Canberra recently from a visit to the North. In the course of three weeks he managed to visit Cairns, the Atherton Tableland, Townsville, Charters Towers, Mackay, and Rockhampton.

"I expected to see tropical production," he said, "but to my astonishment I found the country was not only capable of producing everything that can be produced anywhere in the tropical world, but was also capable of the production of agricultural commodities usually associated with a temperate zone. I doubt whether one can find any place in the world where there is this combination to the same extent.

"On top of that, they have up there what I believe to be the best hardwoods in the world, a capacity for great mineral production, big ranches (or cattle stations, as they are called in Australia), and, over all, a climate that for at least ten months in the year is ideal. They have the benefits of ocean carriage and rail carriage, and there are the possibilities of great, efficient industries. I came away with the belief that there is hardly anything that cannot be produced there. So far as production is concerned, the country I passed through should be capable of sustaining a population as large as the present population of the whole of Australia. Its development, however, will depend upon markets for the commodities that can be produced there in such great quantities. I was greatly interested in the sugar cane plantations and mills. I had never before seen a sugar mill. I was impressed by the tidiness and neatness of the farms and the evident efficiency of the whole industry.

"From the standpoint of scenic beauty, I saw things like Tully Falls on the Atherton Tableland which are equal to anything I have seen anywhere; and in the Barrier Reef islands they have an asset which, to my mind, is unequalled. I know a bit about California and Florida, but they have nothing to approach the things I saw. In my lifetime many Canadians, seeking a warmer climate, have gone to California and Florida. It seems to me most unfortunate that these people, numbering hundreds of thousands, had not been acquainted with the possibilities of Northern Queensland."

The High Commissioner for Canada came back from the North convinced that there are great opportunities for increased trade between Canada and Queensland. Incidentally, he paid a high tribute to the newspapers of North Queensland. "They are a credit to the communities in which they are published," he said. "I was surprised to find such 'up-and-coming' dailies in so many places with a complete coverage of the world's news."



Pineapple Growing in Queensland.

H. BARNES, Director of Fruit Culture.

THE many cultivated varieties of pineapple have been developed from a type native to South America. In Queensland there are only three varieties of commercial importance. These are the smooth-leaf, which is used for both canning and dessert purposes, and two rough-leaved varieties—the common rough and the Ripley Queen—both of which are consumed mainly as fresh fruit. The typical Ripley Queen is larger than the common rough and has larger fruitlets. It tends to be ovate in shape and has a crimson tinge in the leaves, while the common rough has a cylindrical fruit and purple leaves. In the field it is often difficult to distinguish the two varieties.

Suitable Districts.

The pineapple flourishes in the coastal strip from the southern border to the far north, but within this area situations subject to frost and cold westerly winds are unfavourable. The direction of slope of the land is important in southern Queensland: a few degrees of adverse slope have the same effect as several degrees of latitude. A fairly high and regular rainfall is desirable, but with proper cultural treatment, such as the use of paper mulch for the purpose of conserving soil moisture, the crop can be grown in districts of moderate rainfall. Excessive rainfall tends to the production of a soft, watery fruit and also adversely affects soil conditions for the plants.

Soils.

Successful plantations are found on many types of soil, including sandy loams and granitic, basaltic, schistose, and alluvial loams. One feature is common to all, however—a loose, friable texture and good drainage. There should be a fair depth of topsoil and the subsoil should be friable and open. Adequate drainage is of prime importance. A high humus content is also desirable and cultural practices which maintain the humus content should be adopted.

Acidity of the soil is also very important. A good pineapple soil is strongly acid, with a pH of 4·5 to 5 (pH is the soil chemist's measure of soil acidity: a neutral soil has a pH value of 7 and an extremely acid soil a pH of about 4). Lime should under no circumstances be applied to pineapple soils. Should the soil not be sufficiently acid it should be treated with sulphur at a rate recommended by a soils chemist. High soil acidity is necessary to render iron, which is a very important

element in the pineapple, available to the plant. In a few soils the presence of appreciable quantities of manganese prevents response to sulphur applications, and in these cases the crop should be regularly sprayed with a very weak solution of sulphate of iron.

The ideal soil is, therefore, a loose, friable, deep, well-drained yet moisture-retaining, soil overlying a subsoil of similar nature. A high humus content and a strongly acid reaction are essential. Probably the best soil type is a coarse sandy loam.

Preparation of the Land.

On virgin, timbered land the timber is felled, stumped, and the roots run to 18 inches, and burned off. Subsequently the land is broken up and if possible sub-soiled to 18 inches. Fierce fires in clearing are not desirable.

Land preparation should be completed well in advance of planting so as to consolidate the soil and also accumulate a good moisture content to give the young plants a start. When sulphuring is necessary this is done prior to planting. The ground sulphur is evenly broadcast over the prepared surface and very lightly harrowed under.

The most suitable layout of the rows needs to be carefully considered. Drainage, prevention of erosion, and ease of working, are important. Other factors being equal, a north-south alignment is best, but should not overrule drainage or prevention of erosion. Short rows make working and harvesting easier. The headlands or roadways should be sufficiently wide for a cart or truck to pass, but should not exceed 10 per cent. of the area.

The rows are best run up and down hill, and should lead to cross drains, which in turn empty into main drains running parallel with the rows. Naturally, the steeper the slope the shorter the rows and the more cross drains. This layout will prevent erosion, which, contrary to general belief, rows placed across the slope will not do.

The question of replanting pineapple land is of major importance. It has been abundantly demonstrated in Hawaii that, when properly managed, land should increase in fertility with each cycle of pineapples. Briefly, the Hawaiian practice is to limit the cropping cycle to three crops. These secured, the whole of the stand is shredded up and subsequently ploughed into the soil. It is estimated that 150 tons per acre of organic matter is thus returned to the soil. This great amount could never be supplied by green manuring. The humus content of the soil is thus built up with the years and, furthermore, all the fertilizer which grew the stand except that which is removed in the fruit is returned to the soil in readily available form. In some districts in Queensland this is being done by heavy rotary cultivators at contract rates.

In tropical countries the heat and moisture rapidly oxidise the humus when a bare soil is exposed to the sun. This is aggravated in light sandy soils. With a combination of close planting and the returning of the old stand to the soil to rot, land should continue in fertility for an indefinite period.

Planting Material and Planting.

(a) Planting Material.

The pineapple normally perpetuates itself by means of shoots from the stem which in their turn produce fruit and more shoots. These are called "suckers." There are other growths from the fruit stalk called variously "slips," "nibs," &c. Also there is the tuft of leaves above the fruit called the "top." All these three forms of growth can be used to plant a fresh plantation.

Planting material should always be taken from healthy plants in full vigour; that from first-crop plants is best. A grower who selects his planting material for each new planting from his best first-crop plants exhibiting early maturity, free suckering, low stature, and large well-shaped fruit will finally have a stock returning him increasing tonnage per acre, and by producing it in shorter time will increase his profits by reducing costs of production. Whilst almost any sort of sucker, slip, or top may under favourable conditions grow after a fashion, material taken from old, neglected, and worn-out plants will never be fully satisfactory. That from wilted parents will always have a tendency to wilt.

Suckers are robust, stand up best to adverse conditions, and produce their first crop earliest. Slips and tops take longer to bear, but produce a better first crop. Medium-sized suckers are better than large ones. These latter often flower before they are properly established, and the resulting fruit is worthless.

Slips from Smooth-leafs make excellent plants; those from Roughs and Ripleys are usually too small for field planting. The small pinelet at the base of slips is always broken off. The best slips are those which come singly from the lower part of the fruit stalk as distinct from those which come in a cluster around the base of the fruit. This is called the "collar of slips" type and is very undesirable to propagate for several reasons, one of which is that such slips if planted rarely produce suckers for a ratoon crop.

Tops also make superior plants when conditions are good to give them a start. Tops taken from early-maturing, large, well-shaped factory fruit give a good opportunity for plant selection.

Very large suckers near to flowering are often used when other material is scarce. These are best stripped, dried and planted horizontally like cane sets in shallow furrows and covered with 1 inch of soil. Clusters of plants will shortly appear above ground, and some may have to be thinned out.

(b) Storing Suckers, Slips, and Tops.

If it is necessary to store material before planting it will keep perfectly for several months if stacked in a single layer, butts-up in the shade in the open. It should never be set in a nursery bed.

When ready to plant it is very important to strip off the base leaves and dry the butts for several days in the sun. If the former is not done the plants will be slow to start growing, and are liable to "tangle root." If not dried, base rot is likely to destroy the young plant in the soil.

The best practice is not to cut back the leaves very hard; in fact, the leaves of small suckers as well as slips and tops are better left intact.

(c) Planting.

The pineapple is very shallow rooted and should be shallow planted. About 4 inches for suckers and a little less for slips and tops is about correct. Except on land likely to be unduly wet at times, when low ridges can be made, plants should be set out on the ground level. To prevent competition between plants of different sizes to the detriment of the smaller, it is always wise to grade suckers into larger and smaller. The best way to plant is to peg out the land at the required distances and use a line stretched between top and bottom pegs. For well-prepared soil a dibbler in the left hand makes the hole, and the sucker grasped with the right is screwed in. It expedites work if the material is roughly laid out first.

(d) Spacing.

Few operations have been so revolutionised in modern pineapple growing as the spacing of the plants. Formerly it was the practice, developed in the days when stable manure was plentiful, to set the plants out in double or single rows about 9 feet apart. Without stable manure the rows seldom or never closed up, and a great deal of land was wasted, not to speak of the labour in clearing and cultivating unused land. The soil being so exposed to the sun was spoilt for replanting. Furthermore, it has been conclusively proved that pineapple plants as individuals grow better when set close together.

The plant being so shallow-rooted requires the surface layers of the soil to be cool and moist, and one way to achieve this is to set the plants sufficiently close to shade the soil around them, allowing each plant, however, sufficient space to spread its leaves and receive the maximum sunlight. Tests have shown that as much moisture is evaporated from an unshaded soil as would be taken up by pineapples growing thereon.

The double row system has proved best for smooth-leafs. The normal practice is to set the double rows 2 feet apart, with the plants spaced 1 foot in the rows. A 4-foot passage way is left for harvesting and cultivation. This has proved the most satisfactory for the warmer, well-drained light soils. For heavier and colder soils, and for districts of high rainfall, the plants should be spaced 14 inches to 18 inches in the rows, so as to allow more sunlight among the plants, the other distances remaining the same.

For replanting on old land of reduced fertility the rows can still remain at 2 feet apart and the plants 12 inches in the rows, but the passage-way should be narrowed to 3 feet 6 inches.

At planting the line is stretched between the pegs set at 6 feet or 5 feet 6 inches intervals, as the case may be, and the plants set at the correct intervals 1 foot on each side of the line.

Roughs and Ripleys, on account of their prickly leaves, are more conveniently grown in single rows set 4 feet apart.

The following table gives the number of plants per acre at the different spacings:—

Spacing of centres.	Plants per acre.	Chains to acre.	Plants per chain.
	Double Rows—Plants 12 inches apart.		
ft. in.			
5 6	15,840	120	132
6	14,520	110	132
9	9,680	73.3	132
	Double Rows—Plants 14 inches apart.		
5 6	13,440	120	112
6	12,446	110	112
9	8,200	73.3	112
	Single Rows—Plants 12 inches apart.		
4	10,890	165	66
9	4,840	73.3	66
	Single Rows—Plants 14 inches apart.		
4	9,240	165	56
9	4,100	73.3	56

(e) Time to Plant.

The suitability of certain months of the year for planting is governed by the warmth and moisture normally occurring therein. The pineapple being a tropical plant should not be planted until the winter is past, neither as a general rule should it be planted late in the autumn. Generally, early spring is the best, since the maximum period of warm weather will follow in which to make growth. September and October are good months in the southern part of the State.

However, the availability of planting material will exert some influence. Winter tops for spring planting are excellent, if large enough. Summer tops for autumn planting often develop base or top rot, and care is necessary to thoroughly dry them before planting, but otherwise they are usually better developed than winter tops. Sucker growth during the winter months is often backward; during the summer it is more plentiful. Slips, probably the best of all material, are normally scarce on the winter crop, but more plentiful during the summer. They are, therefore, more available for autumn planting than spring, but properly stored can be held until the latter time.

Cultivation and Plantation Management.

The shallow-rooting system of the pineapple is seriously injured by deep cultivation near the plants. Horse-drawn implements and rotary hoes should not be used. Close planting renders them unnecessary, except perhaps when a flush of weed growth during the first couple of months after planting may excuse the use of a light and narrow strawberry cultivator down the centres. The torpedo-shaped Dutch hoe in capable hands is the best tool, but used carelessly can easily damage plants, and for this reason many growers favour the chipping hoe when paid labour is employed.

The tendency should be to work the soil up to the plants as they become older rather than away from them, but deliberate hilling-up is only advisable under special circumstances. The exceptions are generally old-style plantations, where incorrect early treatment has resulted in the plants becoming "leggy." In this case it is often advantageous to shovel soil in amongst the plants with the object of promoting fresh root growths from above-ground nodes.

Paper mulch is of great value on light sandy soils and in districts of low rainfall and porous soil. It pays for itself by reducing weeding costs and producing a greater weight of fruit per acre. It is essential to lay it on well-prepared soil worked to a fine even tilth, and in moist condition. Laid on lumpy, dry soil it is not satisfactory.

Acetylene gas can be used to force flowering in pineapples. Compressed acetylene gas may be used, but there is a simpler method which consists of rapidly stirring a handful of calcium carbide in a kerosene-tinful of water and applying the solution by means of a knapsack spray with a trigger release and a $\frac{3}{16}$ inch tube 2 feet long substituted for the nozzle.

Fertilizing.*

For the modern system of close planting a new type of fertilizer and a different method of application has been evolved.

The pineapple is a humus-loving plant, and if frequent mulchings of well-rotted stable manure, &c., can be given it will stand up to rough treatment otherwise fatal to it. The effects of mulching will be to keep the adjoining soil cool and moist, thus fostering a stronger and healthy root system, to supply readily available plant foods, and what to this specialised plant is most important, to cater for the ancestral habits developed by its forebears in constantly forming new roots into the fresh layers of leaf debris. Stable manure, however is not an all-sufficient fertilizer, and, anyhow, is no longer obtainable in quantity, and other methods are necessary. One already described is close planting to supply the mulching effect. A shorter cycle of cropping will minimise the tendency to become "leggy," while a potash-rich fertilizer will reduce this tendency.

Fertilizers are applied to supply the three elements, nitrogen, phosphoric acid, and potash. Formerly it was the practice to supply the nitrogen and phosphoric acid in the form of blood, bone, and meat-works, in accordance with the accepted practice with many other crops. These, however, must be incorporated in the soil, and it is not possible effectively to do this in an established plantation.

Furthermore, when the feeble root system of the pineapple is weakened by various agencies the plant may be actually starved through its inability to obtain what is in the soil. The modern practice is to apply the elements in water-soluble form, and the formula 10-6-10 is employed. This consists of sulphate of ammonia, superphosphate, and sulphate of potash. It is thrown into the lowest leaves at ground level, and is dissolved by degrees by rain and dew, and is taken up by the roots including those in the lower-leaf bases. In the first application to newly planted tops, slips, or suckers especial care must be taken to place it low down otherwise the tender centre leaves will be damaged.

The first and very important application is made about one month after planting, and consists of 30 lb. to each 1,000 plants. Subsequent applications are at about 40 lb. to 50 lb. per 1,000. In fertilizing full advantage should be taken of the active growing period, and applications are advised in September, November, January, and March. There are

* Under wartime fertilizer rationing the quantities and formulae of fertilizers available to pineapple growers vary from time to time and it may not be possible to adopt the recommendations made in this section.

times when a slight variation may be made such as a light application of sulphate of ammonia alone, just after picking the crop in order to hasten the growth of backward suckers.

Actually the colour and type of growth is indicative of their fertilizer needs, and with experience will be taken as the guide. The colour of the leaves indicates the nutritional processes going on. The deep blue-green of young plants indicates the formation of proteins, and is what should be encouraged. Nitrogen is particularly needed at this stage. As flowering approaches the formation of carbohydrates is necessary, and the process is indicated by the change to an olive-green. When a yellowing of the tips at this stage occurs in plants previously a good colour it denotes the formation of carbohydrates is not sufficient for the needs of the developing fruit, and signifies that potash is lacking.

Improvement of Type.

Under suitable conditions the pineapple produces a few seeds, and it is by crossing different sorts and planting the resulting seeds that new varieties are produced. However, it is a plant which has developed the vegetative method of reproduction to such an extent that offshoots are the normal means of extending plantations.

The plant developed from a seed will blend the characters of both parents, but the plant developed from a sucker, cutting, bud, &c., is actually a part of the original plant, and normally reproduces its characters completely. It sometimes happens, however, that some irregularity occurs in the bud, and the result is a sport or variation. Many of the varieties of bananas, pineapples, and other plants have originated in this way. The variation may be towards improvement or it may be retrogressive.

Occasions may therefore arise when a scion may be either superior or inferior to the stock. Unconscious selection by primitive cultivators over ages of time has resulted in many of the cultivated fruits and plants grown to-day. The pineapple grower is wise, therefore, to cull out all bad types of plants or fruit, so that there will be no risk of their further propagation, and carefully multiply any plant which appears to have superior characteristics. Quite apart from only using planting material from healthy, vigorous plantations, suckers, slips, and tops for extension of areas should be taken only from good average type plants showing desirable characteristics. The removal of tops from factory fruit of eighteen and larger, and their utilization as planting material, offers an expeditious way of selection for size of fruit. Other aspects of plant selection, such as early maturity, low stature, free suckering, disease resistance, &c., need to be considered.

Amongst the bad types of pineapples are Bottle Tops, Long Toms, Tree Pines, Collars of Slips, Albinos, Cripples, and Narrow Leafs.

Diseases.

The chief troubles affecting the fruit and the plant in Queensland are:—Wilt, Top Rot, Base Rot, Black Heart, Black Speck, and Water Blister. Their incidence is largely bound up with cultural operations, and it is fortunate that they can be greatly minimised if not entirely prevented by attention to proper cultural methods, and to packing shed hygiene.

Vegetable Growing in North Queensland.

S. E. STEPHENS, Northern Instructor in Fruit Culture.

PART 6.

Summer Spinach.

THIS is a strictly tropical vegetable that thrives in Northern coastal areas during the hottest part of the year when very few other greens can be produced. It is closely related to the decorative garden plant known by the name Amaranthus, and also to the common garden weed similarly known. The seed is glossy black in colour and very fine. Its small size makes it difficult to sow sufficiently thinly to secure good seedlings. The difficulty may be overcome, however, by stirring the seed in a can of water and watering it on to the seed bed through a medium-fine rose, The seedlings are fit to transplant in two to three weeks after sowing and should be set in the field in rows 18 to 24 inches apart, with 6 to 9 inches between the plants. In about 15 to 20 days from transplanting the plants should have reached a height of 10 to 12 inches, when they are fit for harvest. The whole plants are pulled and, after having the roots washed, are tied into bundles for marketing.

Beet.

Soil for this crop should be well supplied with organic matter and available plant food and should be in good physical condition. The beet is very sensitive to soil acidity, so much so that it will not grow successfully in soils even moderately acid. If the soil is not naturally almost neutral in reaction lime must be added in sufficient quantity to produce such a condition. Soils that tend to form a crust are not suitable for beet growing owing to the weakness of the young seedlings and their inability to break through the crust and produce a good stand.

The usual method of sowing is direct to drills in the field, the drills being spaced to suit the cultivating equipment. As soon as the plants are 3-4 inches high they should be thinned to about 3 to 4 inches apart. If desired, the thinnings may be used for transplants to extend the area under crop. This is not usually payable on large scale beet areas, however, owing to the amount of labour involved in transplanting.

The crop attains its best colour, texture and quality under reasonably cool conditions, therefore its growth should be undertaken during the cooler months of the year. Varieties that give good results in the North are Egyptian Turnip Rooted, Crimson Globe, Detroit Dark Red and Obelisk.

The ideal beet should be uniformly dark red right through the root; pale rings indicate poor type or unsatisfactory growing conditions.

Chard.

This is also known as silver beet or spinach beet. It is grown for the green spinach top. This plant is a more suitable green for North Queensland than the true spinach, which is less adaptable to the range of climatic conditions. Soil and cultural requirements are the same as for table beet. The best variety is Fordhook Giant.

Spinach.

This is essentially a cool weather crop and can only be grown successfully in the highland areas of the North during the winter months. It will not thrive in coastal regions. It is the vegetable popularly reputed of high vitamin content and should not be confused with the spinach beet or silver beet mentioned above.

Similar soils and cultural methods as for the preceding crop are required. Top dressing with nitrogenous fertilizers is recommended to produce the succulent green leaves.

Two types or strains of spinach are available, namely the round seeded and the prickly seeded, the latter of which is usually regarded as the hardier.

Rhubarb.

This also is a cool weather plant and only really thrives in the highlands of the North. In coastal areas it may be grown as an annual in home gardens during the winter months, but a product of commercial quality cannot be expected, therefore its commercial production should not be attempted.

Soil for this crop should be well drained, deep, rich, and of moderate acidity. Heavy dressings of stable manure will assist in the production of large leaf stalks, which is the aim in growing this crop.

A complete fertilizer with a meatworks manure base, in quantities up to half a ton per acre, may be substituted for farmyard manure.

Good varieties are Tops Winter, Ruby Red and Emu Plains Red. The rhubarb plantation should be established with crowns so that a stand of plants true to type may be secured. Seedlings are very variable and cannot be depended upon for the production of good types.

Shallot.

This crop may be marketed either as a salad green or as dry bulbs. The chief demand in the North is for the green vegetable. The main crop should, therefore, be grown for this purpose. The usual and most satisfactory method of propagation is from bulbils or cloves. Each dry bulb will be found to be composed of a number of these cloves and for planting should be divided into its components. These should be set in the field about 9 to 12 inches apart in rows, and planted at least 3 inches deep in rich, well prepared land. Deep planting is recommended so that long, well-blanched and succulent tops may be obtained. In good soil and under good cultural conditions multiplication of the tops is rapid. The whole plant is pulled before the tops begin to yellow.

At this stage the bulbs are still soft and only beginning to develop, the earthed portion of the stalk is white, and the aerial portion quite green. The whole plant is sweet and mild in flavour.

When growing shallots for the dry bulbs, shallow planting must be practised and the soil be gradually drawn away from the plants during their growing period, until, as they approach maturity, they are practically sitting on top of the earth. This treatment encourages the filling out and hardening of the bulbs. Under this method of growing the bulbs are not harvested until the tops begin to dry, indicating full maturity. Such bulbs are used as a mild substitute for onions.

Sweet Corn.

This crop will withstand neither excessive heat nor frost. In North Queensland its cultivation may, therefore, be undertaken in the coastal regions during the cooler months of the year and on the highlands during the summer months. As corn loses its value as a vegetable within a short time of harvesting it should, however, be grown only in close proximity to the market.

Sweet corn requires similar soil and growing conditions to ordinary field maize. The growing period is somewhat shorter and the height of plant is less. Planting distance may, therefore, be closer than for ordinary maize, but overcrowding reduces yield and should be avoided. Ample soil moisture is necessary throughout the growth of the crop so that even and rapid growth may be obtained.

The corn is ready for harvest as soon as the grains become plump and while they are still in the "milk" stage. This stage practically coincides with the browning off of the silks, but some experience is necessary to enable the grower to judge the exact stage for harvesting. Corn in which the grains are becoming mealy is over mature and unfit for market.

Golden Cross Bantam is outstandingly the best variety, but Golden Bantam and Country Gentleman also give good results.

Corn ear worm is usually very prevalent in this crop, practically every ear being attacked in some seasons. However, the corn is usually harvested before the caterpillar has penetrated any distance into the cob, so that wastage is seldom very great.

PLANT PROTECTION

The Control of Locusts and Grasshoppers.

J. A. WEDDELL, Research Officer.

OUTBREAKS of locusts and grasshoppers occur at intervals in most parts of Queensland. The insects commonly seen in plague proportions may belong to any one of the following five species:—the Australian plague locust, the yellow-winged locust, the spur-throated locust, the wingless grasshopper, and the migratory locust.

The *Australian plague locust** (Plate 68) is most injurious in subcoastal agricultural areas and is responsible for damage to pastures, cereals, and fodder crops. It is about one and a-half inches long and can be distinguished from other pest species by the black tip on each hind wing. There are usually three generations annually. The *yellow-winged locust*† (Plate 69) is normally found in pastoral areas with an annual rainfall

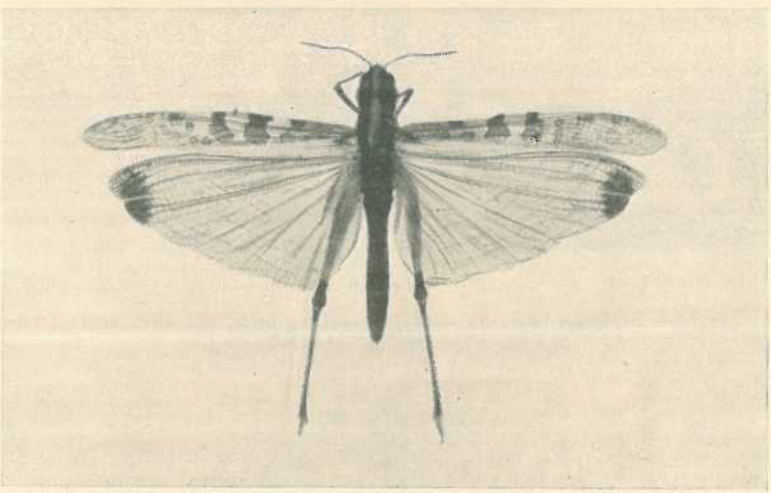


Plate 68.
THE AUSTRALIAN PLAGUE LOCUST.—Note the black-tipped hind wings.

of less than thirty inches, but it occasionally invades the wetter coastal districts of central and northern Queensland. It is about two inches long and the hind wing is typically yellow with a centrally placed dark band and a clear tip. In flight, the adults make a distinct clicking noise. Two generations occur annually. When the insects are swarming, pastures, sorghum, maize, and sugar cane may be destroyed. The *spur-throated locust*‡ is mainly a subtropical and tropical insect which is two

* *Chortoicetes terminifera* Walk.
† *Gastrimargus musicus* Sjost.
‡ *Austacris guttulosa* Walk.

to three inches in length with a large spur under the neck. It swarms in subcoastal areas causing damage to pastures, fodder crops, and cotton; some native trees may also be defoliated during the autumn and winter months. The *wingless grasshopper** occurs in southern Queensland within 200 miles of the coast. It is less than three-quarters of an inch in length and the majority of the insects in any swarm have no wings though odd winged forms may occasionally be seen. There is only one generation each year, but migrations from grasslands to tobacco crops and market gardens sometimes cause considerable damage. The *migratory locust*† is rather more than two inches long and it occurs in coastal areas. Swarms occasionally form in the tropics and these may migrate long distances. Damage to sugar cane has been reported.

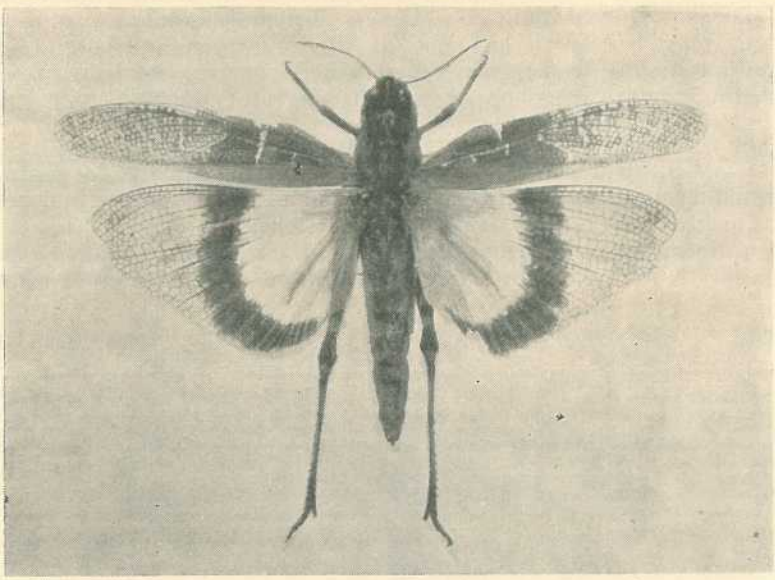


Plate 69.

THE YELLOW WINGED LOCUST.—Note the yellow base, the dark central band, and the clear tip of the hind wing.

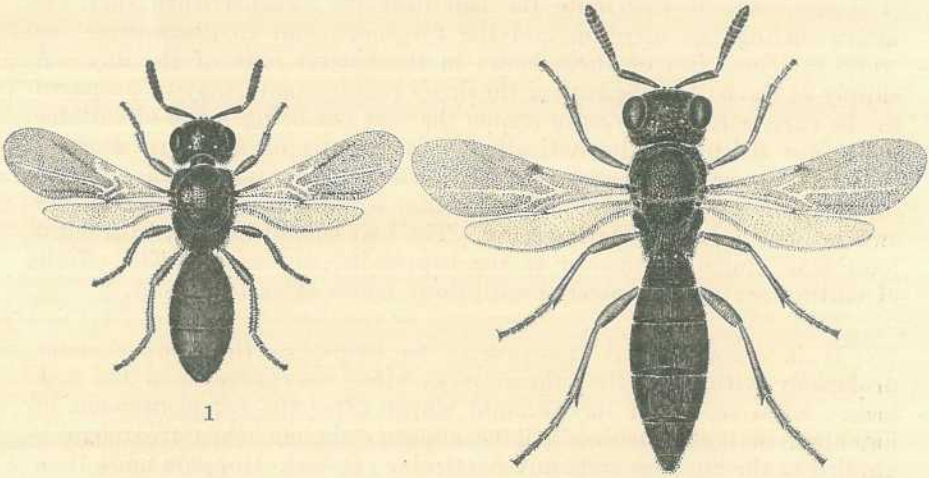
Life History.

For all the species mentioned above, the life history, in so far as it concerns direct control measures, is fundamentally the same. The adult female lays eggs in capsules in the ground. After a period, the duration of which depends on the species concerned and the time of the year, the young hoppers emerge from the eggs and feed for some weeks before the adult stage is reached. Occasionally, one or other of the plague species swarms, and during this phase innumerable adults lay eggs in restricted areas, thus establishing compact egg-beds. The hopper swarms from these egg-beds are very dense and they move slowly at first, but feed over much wider areas as they grow. Once the adult stage is reached, flier swarms may migrate over large distances.

* *Phaulacridium vittatum* Sjost.

† *Locusta migratoria* L.

Locust outbreaks occur at comparatively long intervals and they may last for periods ranging from a few months to three years. These outbreaks are always associated with the phenomenon of swarming which marks the beginning of migratory tendencies in the species and continues during the outbreaks. Swarming usually takes place when climatic factors are continuously favourable for the insect and ceases when populations become small owing to unfavourable weather; the interactions of these factors are very complex and their precise effect on all pest species is not known with any certainty. Egg parasites*, however, often end an outbreak much sooner than would otherwise be expected. Most of these egg parasites are small black wasps (Plate 70) which penetrate the egg capsules in the ground and lay their own eggs within those of the host. The parasites then develop at the expense of the locust eggs. If the parasitic wasps are numerous, they are readily seen working over the egg-beds, particularly when these are first established and again when hopper emergence begins.



1 2

[*Drawings by William Manley.*

Plate 70.

Wasp Parasites of Locust Eggs.—Fig. 1—*Scelio fulgidus* Crawf., from eggs of the Australian plague locust, × 10; fig. 2—*Scelio bipartitus* Kieff. from eggs of the yellow winged locust, × 10.

Control Measures.

Any necessary control measures must be carried out when the swarms are in the young hopper stage. Prompt treatment may be ensured by noting and marking the location of the egg-beds when laying is in progress and later examining these areas regularly for hopper emergence. An effective method of controlling hopper swarms involves the use of a poison bran bait. The bait is easy to mix and apply; it is effective against the insect and not injurious to stock when properly used; it is economical, for no special apparatus or equipment is required; and it does not interfere with the activities of the valuable egg parasites.

* The more important species are *Scelio fulgidus* Crawf. on the Australian plague locust and *Scelio bipartitus* Kieff. on the yellow-winged locust.

The bait consists of ½ lb. arsenic pentoxide, 1 to 1½ quarts of molasses, 2½ gallons water, and 24 lb. bran. The arsenic pentoxide and molasses should each be dissolved in about one pint of boiling water and then added to cold water, bringing up the total to 2½ gallons. This poison solution should then be stirred into the bran which is thoroughly mixed until the whole is a moist but loose crumbly mash. The limits of the hopper swarm should be roughly determined and a strip of 30 feet allowed in front of the swarm. The whole area occupied by the swarm, together with the adjacent strip, should then be baited by broadcasting the poisoned bran thinly and uniformly in a finely divided state, as in the hand-sowing of grain. The quantity of bait prepared from 36 lb. of dry bran is sufficient to cover one acre of ground. During cool weather, the application of the bait should be made during the warm part of the day, preferably between the hours of 9.0 a.m. and 3.0 p.m. In the summer months when the temperatures are high, the hoppers may be inactive during the middle of the day. Under these conditions, it is necessary to distribute the bait over the swarms when they are active during the morning and the afternoon and to discontinue the work for some two or three hours in the hottest part of the day. A supply of the bait, sufficient for the day's requirements, may be prepared in the early morning so as to enable the best use being made of suitable hours for baiting. Alternatively, where groups of men are working together, the several sections of the work may be divided among them by forming a mixing and loading gang, a scouting gang looking for swarms, and a bait-scattering gang. The bait should be kept in a moist loose state during transport to the hopper-infested areas. The effects of baiting are evident about twenty-four hours after treatment.

It is essential that the swarms be baited in the hopper stage, preferably within the first three weeks after emergence from the egg-beds. Even so, a few days should elapse after the commencement of hatching, so that hatching will be almost complete when treatment is applied to the hoppers from any particular egg-bed. Hoppers more than three weeks old will feed on and be killed by the bait but, owing to the spread of the insects from the egg-beds, wider areas will then need to be baited. The young hoppers normally have a distinctive swarming habit and they remain congregated in compact bands for the first week or two after emergence, moving during that time only short distances from the egg-beds. Thus a large hopper population that might later spread and infest a considerable area can easily be controlled before dispersal takes place by dealing with the compact swarms of young hoppers.

The poison should be handled with discretion; the hands may be protected by coating them with vaseline, petroleum jelly or axle grease, and, after mixing or spreading the bait, they should be thoroughly scrubbed. Domestic animals should not be allowed access to bulk supplies of the bait or to mixing sites. Although no absolute guarantee of safety can be given owing to the poisonous nature of the arsenic pentoxide, the danger to stock grazing over *properly baited* ground is practically negligible owing to the small amount of the poison in, and the thin distribution of, the bait.

Downy Mildew and Septoria Leaf Spot of Lettuce.

F. W. BLACKFORD, Assistant Research Officer.

DOWNY mildew and septoria leaf spot are two of the diseases which may attack lettuce crops in this State and their symptoms and the measures which may be taken to combat them are discussed briefly in this article.

DOWNY MILDEW.

Downy mildew can quite often be found in lettuce plantings in Queensland although it only occasionally causes serious damage to the crop. The occurrence of heavy losses is dependent on the prevalence of weather conditions which are favourable to the spread of the disease. It is most frequently encountered in the very young plants in the seed-bed, but well-developed lettuce may also be affected. In the latter case, the lower leaves—which are shaded and thus normally wet for considerable periods after watering, rain, or heavy dew—are the portions of the plant to be attacked. Little loss, however, results from such infection of nearly mature plants, because the mildewed leaves would be removed in any case when the heads are cut for marketing. The disease is most prevalent during the winter and spring months, cool, moist conditions in overcrowded or shaded seed-beds being conducive to a very rapid spread of this mildew.

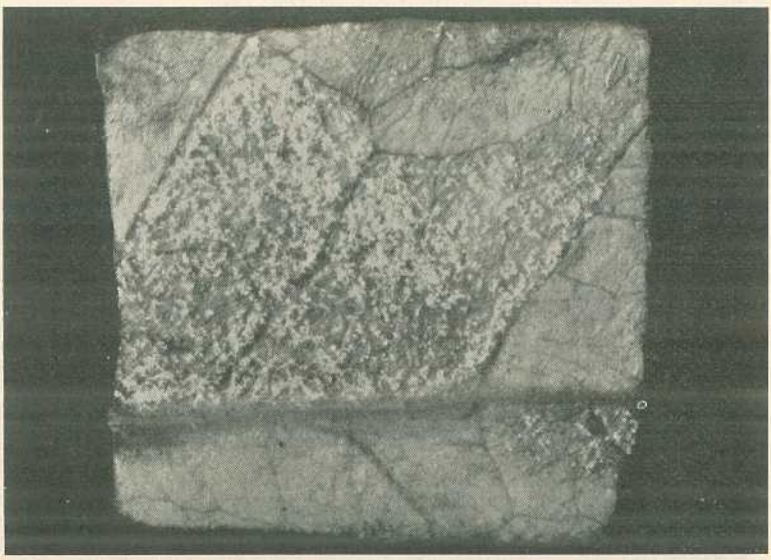


Plate 71.

Downy Mildew of Lettuce.—Underside of leaf showing mildew.

The first symptoms of downy mildew to appear are light-green to yellowish spots on the leaves. The white, downy growth of the causal fungus* may be found on the under surface of these spots (Plate 71) if conditions are at all moist. In severe cases, the whole plant is dwarfed by the infection, and becomes yellow in colour. Affected tissues may turn brown, and, if conditions continue to be wet, a soft, slimy rot ensues.

* *Bremia lactucae.*

Control.

The control of this disease can be materially assisted by sowing the seed thinly and by thinning out the plants as early as possible to permit free circulation of the air and quick drying of the leaves. Another important point is that if the plants are kept healthy during the early stages of growth very little trouble should be experienced later on. If the disease has appeared in previous crops, it is advisable to make one or two applications of a copper spray such as Bordeaux mixture (3-2-40) or home-made cuprous oxide mixture (3-40) in order to minimise the chance of the mildew becoming well established in the new crop. The initial application should be made shortly after the first true leaves have formed and a further one about a week later. If the seedlings are to be transplanted, spraying should be completed three or four days prior to transplanting in order to avoid a double check being administered to the plants.

SEPTORIA LEAF SPOT.

Septoria leaf spot is usually found attacking the lower leaves on which irregularly-shaped, light-brown spots develop as a result of the presence of the fungus (Plate 72). Studding these spots are small, black bodies measuring about a quarter of the size of a pin's head; these are the fruiting bodies of the causal fungus.* They are flask-shaped and, under moist conditions, a curly thread of spores is extruded through a very small hole in the neck of the flask.

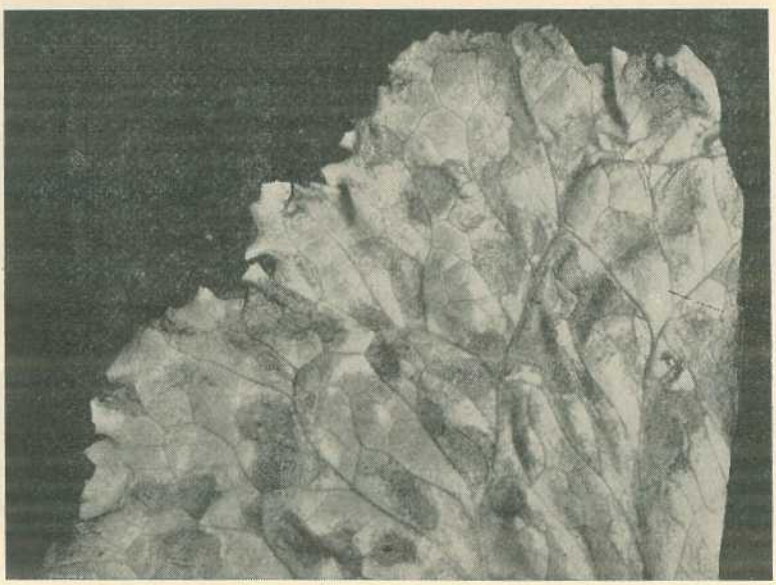


Plate 72.

Septoria Leaf Spot of Lettuce.—Portion of leaf showing spots and fruiting bodies.

Very few plantings of lettuce in Queensland are entirely free from this disease and a close examination of even the healthiest lettuce planting usually reveals its presence on the lower leaves of some of the

* *Septoria lactucae.*

plants. As these affected leaves frequently die before the lettuce is picked, or are stripped before packing, the disease usually is of no consequence. On occasions, however, the trouble is found on leaves which form a part of the marketable head or is well established on half-developed plants, but it is considered that such plants have suffered some check in their growth and that this check has permitted the fungus to attack leaves further up the stalk than is normally the case.

Control.

Where this disease has developed extensively, growers should investigate the possible causes of a check to the growth of the plants. Adverse soil conditions, or insufficient nitrogen or water, or excessive shading in the cooler months of the year, permit the disease to increase in severity, and it can best be dealt with by eliminating these adverse factors.

INFORMATIONAL AND ADVISORY SERVICES.

Information and advice on matters relating to primary production may be obtained from the Department of Agriculture and Stock, William Street, Brisbane, B. 7, or from appropriate officers in country centres. The following list shows where Departmental advisory officers are stationed:—

GENERAL AGRICULTURAL CROPS AND PASTURES: Brisbane (Tel. B 1541); Toowoomba; Chinchilla; Warwick; Laidley; Boonah; Kingaroy; Bundaberg (Court House); Monto; Rockhampton (cnr. Bolsover and Fitzroy Streets); Mackay (Court House); Ayr; Home Hill; South Johnstone (Bureau of Tropical Agriculture); Atherton; and Mareeba.

COTTON: Brisbane (Tel. B 1541); Dalby; Kingaroy; Gayndah (Court House); Monto; Biloela (Cotton Research Station); Home Hill; Ayr. All advisors on general agriculture also deal with cotton culture.

SUGAR-CANE: Brisbane (Tel. B 1541); Bundaberg (Sugar Experiment Station, Tel. 228); Mackay (Sugar Experiment Station, Te Kowai, Tel. 17); Innisfail (Tel. 271); Meringa (Sugar Experiment Station, Tel. Gordonvale 95); Cairns (Tel. 2589).

FRUIT AND VEGETABLES: Brisbane (Tel. B 1541); Coolangatta; Southport; Toowoomba; Warwick; Stanthorpe; Wallangarra; Dayboro; Nambour (Field Station, Tel. 175); Gympie; Gayndah (Court House); Rockhampton; Bowen; Townsville; and Cairns.

Advice on vegetable-growing is obtainable also from general agricultural advisory officers.

INSECT PESTS: Specialist Officers at Brisbane (Tel. B 1541); Gayndah (Court House); Rockhampton (cnr. Bolsover and Fitzroy Streets), Townsville.

PLANT DISEASES: Specialist Officers at Brisbane (Tel. B 1541) and Toowoomba (Long Street, Tel. 1990).

IDENTIFICATION OF PLANTS: Brisbane (Botanic Museum and Herbarium, Botanic Gardens, Tel. B 8243).

BEEKEEPING: Brisbane (Tel. B 1541).

SEED-TESTING: Brisbane (Tel. B 1541).

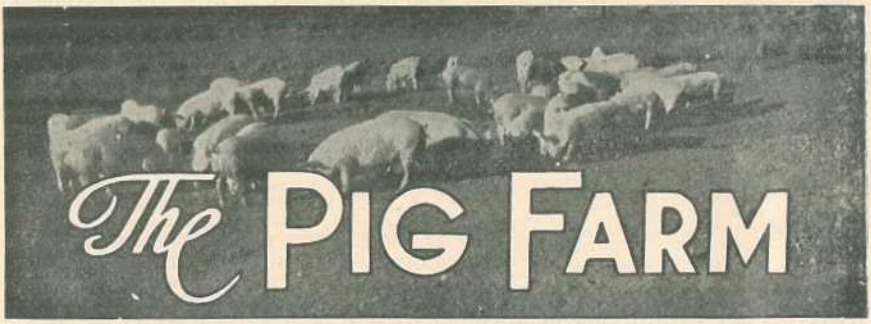
SHEEP AND WOOL: Brisbane (Tel. B 1541); Blackall.

DAIRYING AND CATTLE-RAISING: Officers of the Dairy and Stock Branches are stationed in a large number of country towns.

PIG-RAISING: Brisbane (Tel. B 1541).

POULTRY-RAISING: Brisbane (Tel. B 1541); Boonah (Stock Office).

VETERINARY SERVICES: Brisbane (Tel. B 1541); Yeerongpilly (Animal Health Station, Tel. JY 8005); Toowoomba (Tel. 547); Murgon; Rockhampton; Clermont; Townsville (Animal Health Station, Oonoonba, Tel. Townsville 484); Atherton.



Selection of the Boar.

E. J. SHELTON.

MUCH care has been given to the development of modern types of pigs, especially those now described as "rangy," and animals carrying length and well set up on strong legs and feet. In the production of the class of bacon pig for which there is a constant demand extra length is now regarded as most important. The selection of good type sows is equally one of the essentials in the breeding of first quality commercial bacon pigs and in the term "good type" is bound up those qualifications which the successful breeder looks for.

In recent years, altered market requirements have brought about a continuous demand for long-bodied, fleshy bacon pigs carrying a maximum of meat and a minimum of fat, the later of a firm, white texture and colour and well intermarbled with the lean meat.

Until lately it has been the practice to advise farmers who have brood sows of a thick-set chubby type to select a long-bodied rangy type boar with the idea that such a boar would counteract the tendency to shortness of body and heavy development of fat in the progeny. There is some soundness in such advice, and many farmers have followed it with satisfactory results. However, it should be remembered that feed and environment have an important influence on the development of pigs, and unless care is taken, these factors may largely override the results aimed at in breeding along the lines indicated. Actually, to accord with present requirements, it is better to eliminate short-bodied, thick-set sows in favour of longer-bodied, lighter shouldered animals which when mated with a rangy-type boar will produce long-bodied fleshy progeny—"big lean" pigs as against "short fat" ones. It is not suggested, of course, that pig raisers should at once set about altering the type, because the process is "selective" and so cannot be hastened.

It should be remembered, too, that the mating of a long-bodied rangy boar with long-bodied sows of similar type must be a progressive one, for it may be that some of the shorter-bodied, chubbier type sows actually do produce progeny of a definitely superior type of baconer, and they may even give better returns than would be obtained from rangy type sows.

The market requires a maximum of lean meat and a minimum of firm white fat. If that type of bacon is being produced from existing

breeding stock there would be little or no advantage in making any change until it becomes necessary to introduce a fresh sire or to replace some of the sows. Some pig raisers think that any old boar will do, so long as he will produce enough pigs. This is mistaken policy, for a pig receives about half its inherited characteristics from its dam and half from the sire. Thus, as all the young pigs will have half their characteristics from the one source, the sire, his selection becomes more important than that of the sows, important as that is, because the boar will be the sire of from ten to twenty times as many young pigs as the individual brood sow can produce and rear.

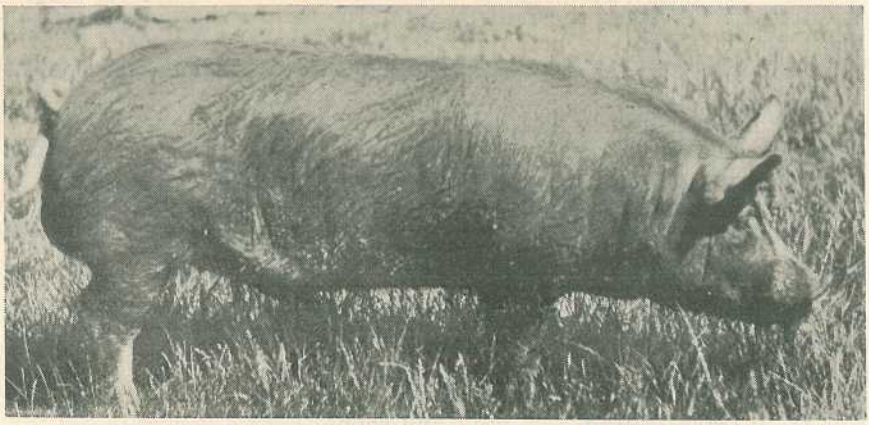


Plate 73.

A Type now Popular Because of Great Length of Body and Lightness of Shoulder.—To Berkshire breeders of an older generation this boar would probably be "counted-out" on the ground that he has not that attractive appearance characteristic of the type of Berkshire popular thirty years ago. But the valuable characteristics of body length, depth of flesh, evenness in conformation should count in his favour.

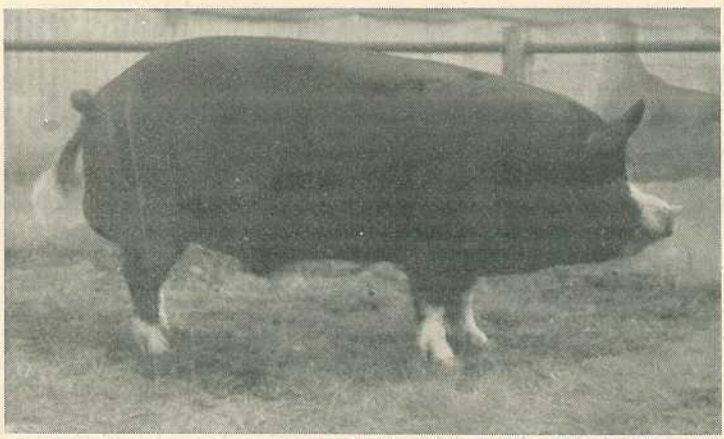


Plate 74.

A Valuable Addition to the Herd.—This boar looks attractive as a show animal, and he is just as good as he looks, and has proved to be a very valuable addition to the herd of Mr. B. A. Schellback, of Kingaroy, Queensland.

Good and Bad Points.

Two points worth consideration in the selection of boars are an undershot jaw and an overshot jaw. Both are serious defects and interfere to a greater or lesser extent with digestion, because pigs which have overshot or undershot jaws cannot as a rule feed properly, and when run with a number of other animals seldom manage to get enough to eat.

There are minor differences in body conformation in the case of a boar as against the sow. There must be present all the characteristics of a good bacon type of pig, and in addition the particular feature common to boars, summed up as "masculinity." For example, the boar is a little more robust in build than the sow, and somewhat heavier in the bone, but definitely not coarse-boned. Again, the head is usually a little larger, and the shoulders heavier. The boar should show signs of a robust constitution, and come from a prolific family. Naturally, he should not be closely related to the sows, as there is always the risk in such cases of weakness in the progeny, and thus less resistant to disease. The boar's behaviour also is important. He should not be vicious, bad tempered, or sulky. The way in which a boar is handled while he is growing will decide to a great extent his temperament, but faults may be inherited. The boar should be active and ready to work; lazy boars are a nuisance, and can upset the planned routine of a breeding season. Sound feet are most important in a boar, and should receive special attention during selection. Heavy shoulders carrying a coarse hard shield should be avoided, and there should not be a crease behind the shoulders.

He should carry himself well, and should have a generally healthy, thrifty, "stylish" appearance, and look definitely masculine. In other words, his character should be apparent from his general appearance. An animal showing signs of rupture or any other obvious physical defect should, of course, be rejected. There should be at least 12 teats evenly spaced in pairs along the belly line, which should be level.

It is advisable to select boars and sows after they are three months old. If selected from a litter which is being weaned at eight weeks disappointment may follow, for often the pig which appeared the best then will not develop as well as one not so attractive at the time of weaning.

Mating should not be allowed until the pigs are well grown, usually after they are eight months old. If mated before this stage, they will still be growing; at the same time they have to meet extra demands on their bodies, and generally it is their growth that suffers. Thus a gilt that has been mated at six months has to gather enough nourishment for her litter and, at the same time, provide for her own body requirements. A far greater strain is imposed when she is suckling a litter. Sows which have had their growth restricted when young, because of too early mating, are usually not as profitable as those which have been allowed to grow well before mating. Therefore, the practice of mating pigs at six months to obtain early results is not economically sound.

When Buying a Boar.

As a good boar will quickly improve the standard of the herd, one should be obtained even if the price may seem high. The outlay involved will prove a sound investment. Under normal conditions, the value of a stud boar (slightly more than that of sows) is based on around one

guinea a month of age, thus a selected boar six months old at six guineas, plus expenses would be normal value; and one twelve months old from ten to twelve guineas, according to quality. The stud book registration fee in Australia is at present 5s. for each eligible pig. To be eligible, the animal must be one of a recorded litter—that is, one sired by, and from registered parents, and from a litter entered up in the litter record books.

Crates, unless paid for, are usually loaned by the vendor for transport, on the condition of prompt return, freight paid (if any).

The Queensland Railway Department has, since 1933, allowed a rebate of 20 per cent. on the transport of boars declared on the consignment note as "for breeding purposes," and a similar concession on breeding sows also is allowed. When stud boars or sows are being sent by rail for breeding purposes, the consignment note should be endorsed accordingly by the railway official receiving the consignment, otherwise the department would have no means of determining whether the pigs were forwarded for breeding purposes or for slaughter, for it is sometimes necessary to transport individual pigs to bacon factories in crates. The Railway Department should always be advised in ample time beforehand when stud pigs are to be consigned, so that suitable arrangements may be made for the quick transport of the animals to their destination.

BREEDING, FEEDING, AND MARKETING PIGS.

The pig industry of Australia was advancing rapidly immediately prior to the war, owing to the development of exports to the United Kingdom. Accompanying the expansion was a decided improvement in the breeding and general management of stock.

The war, unfortunately, brought about a drastic curtailment of the export business. Whatever may happen in the future the industry should always occupy a position of considerable economic importance in the Commonwealth, where there is scope for both increased production and consumption of pig products. To realise the latter, however, breeders will have to study market requirements more closely than they have done in the past. At the same time, production costs will need to be reduced to the lowest possible level by more judicious selection of breeding stock and management of the animals on still better lines.

—E.J.S.

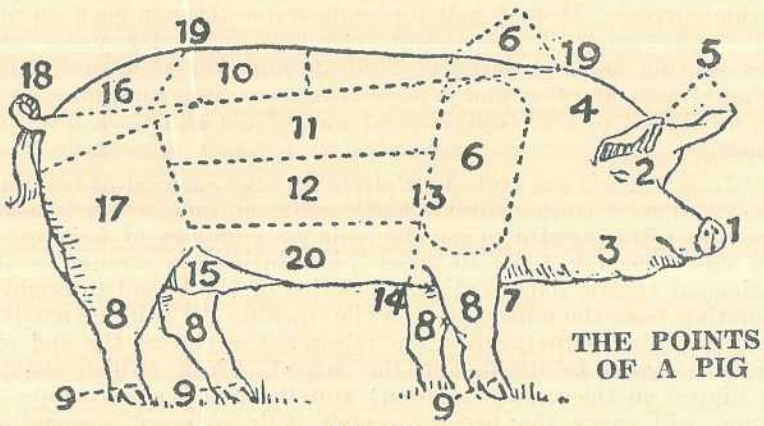
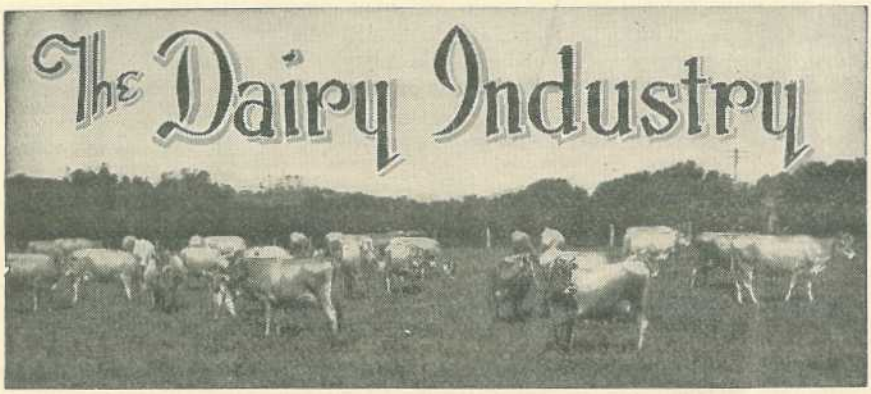


Plate 75.

1. Snout. 2. Face. 3. Jowl. 4. Neck. 5. Ears. 6. Shoulders. 7. Chest. 8. Legs. 9. Pastern. 10. Loin. 11. Ribs. 12. Side. 13. Girth. 14. Fore Flank. 15. Hind Flank. 16. Rump. 17. Ham. 18. Tail. 19. Back. 20. Belly.



The Cleansing of Milking Machines.

THE DILUTE CAUSTIC SODA SOLUTION METHOD.

D. S. ROBERTSON, Dairy Inspector.

SUCCESSFUL operation of a milking machine depends on the care and time given to it. Any neglect in keeping it clean will be reflected in the grade of the cream supplied to the butter factory. The boiling water and caustic soda method has proved efficient in the cleansing of the milking machine, and in order that the method may be simply, yet thoroughly applied, the following essentials are required:—

(1) A steam sterilizer for boiling water and providing steam.
(2) Caustic soda.
(3) An adequate supply of clean water.
(4) A scrubbing brush and a pipe travelling brush.

To simplify this method, a routine system should be adopted, and the following has been found very satisfactory in actual practice:—

(1) Immediately after each milking wash all dirt from the exterior of the rubbers and teat cups, using a vessel and brush kept exclusively for this purpose. Draw 1 gallon of cold water through each set of teat cups; while doing this, withdraw the cups from the water several times, as this causes a surge of fluid through the pipes and rubbers, instead of a steady flow, and is more effective in removing milk. Always start on the set of teat cups farthest away from and work towards the releaser.

(2) After this has been done, draw through each set of teat cups at least 1 gallon of *boiling* dilute caustic soda solution, which is made by dissolving 1 teaspoonful of caustic soda in 4 gallons of *boiling* water. Care should be taken not to make this solution too strong, as strong solutions of caustic soda used over a period of time, tend to remove the tin plating from the milk pipes. While drawing the boiling caustic soda through the teat cups nearest the releaser, the flap at the end of the milk line should be lifted, and the torpedo brush (which should be first dipped in the caustic solution) run through the milk pipe. The vacuum will carry the brush through with sufficient momentum to effectively remove all trace of milk from the interior of the pipe. However, it should be remembered that the cord to which the brush is

attached should be long enough to enable the brush to travel the full length of the milk line. It is useless using a piece of cord which permits the brush to travel along a portion of the milk line and not the whole length. Catch the caustic soda solution and keep it for flushing of air-line.

(3) After running the torpedo brush several times through the milk line, the whole of the milk system should be flushed with clean, *boiling* water, in order to remove all traces of the soda solution. It should be clearly borne in mind that *no* caustic soda must be added to this water. At least 1 gallon, preferably 2, of clean, boiling water should be run through each unit. This water may be caught in a clean vessel and used for flushing the air lines.

(4) After this has been done, the entire milk system should be sterilized with steam from the steam sterilizer, but it should always be remembered that it is harmful to use steam, unless the machine has first been thoroughly cleaned as described above. If steam is applied to the machine before removing all traces of milk, the heat of the steam will bake the casein of the milk on to the interior of the pipes. This casein forms a hard, yellow deposit which is a favourable breeding ground for bacteria.

(5) Draw air through the entire plant for a sufficient time to dry out any residual moisture. This will leave the system completely dry, and thus unfavourable for growth of bacteria between milkings. The air line should be cleaned once a day, by flushing with the soda solution, and the hot water collected from the cleaning of the milk lines.

After all operations have been completed, the engine should be stopped and the releaser removed, dismantled, thoroughly washed, and sterilized with steam. The vacuum tank should then be removed, washed, sterilized, and both it and the releaser should be stored in some dust-free position.

After completing the cleaning of the machine, all rubber stops should be removed, and together with the teat cups and rubbers, should be immersed in lime water. This lime water is made by dissolving 2 lb. of quicklime in 10 gallons of clean water. After the mixture has been well stirred and allowed to settle, the clear fluid is decanted and this is used for the purpose described. Limewater not only assists in keeping the teat cups and rubbers sweet and clean, but also helps to prolong the life of the rubberware. Limewater should be changed very frequently—at least twice a week.

After re-assembling the milking machine and before commencing to milk, it is good practice to flush the milk system with clean, cold water containing a chlorine preparation. The amount of chlorine to be used for this purpose is usually indicated on the label of the package.

Finally, it should always be remembered that the machine should be totally dismantled at least once weekly and thoroughly cleansed and sterilized.

Summarised, the procedure in the cleaning of machines by the dilute caustic soda boiling water solution method is:

(1) Rinse each unit with at least 1 gallon of cold water.

(2) Run through the milk system a boiling, dilute caustic soda solution (1 teaspoon of caustic soda to 4 gallons of *boiling* water), using 1 gallon of the solution to each set of teat cups.

(3) Run plain *boiling* water through each set of teat cups, using at least 1 gallon (preferably 2) of boiling water for each unit. Sterilize the milk system with steam from the sterilizer, and dry by drawing air through the system.

(4) Once daily, clean the air lines in a similar way to that used for the milk system, using the same soda solution and clean boiling water.

(5) Remove and dismantle the releaser and vacuum tank, wash each thoroughly, sterilize with steam and leave to drain in a dust-free place.

(6) Disconnect teat cups and rubbers, and together with all rubber plugs, immerse in limewater. Open up all flaps on the milk lines.

(7) Completely dismantle the machine and clean and sterilize at least once a week.

(8) Just before each milking flush the milk system with clean, cold water containing a chlorine compound in the proportion indicated on the label on the package.

The Sediment Test for Milk.

C. R. TUMMON.

THE sediment test is a simple test applied to liquid milk in order to ascertain the amount of visible dirt in it. It is in no way intended to replace the methylene blue test, which provides an estimation of the amount of bacterial activity, but rather should it be used in conjunction with the methylene blue test for better results. The sediment test is of considerable importance at factories or milk-receiving depots to find out, with a minimum of trouble, the extent of the visible dirt in individual suppliers' milk. Factories might consider the adoption of some method of preserving these filter wads to enable the farmers to see for themselves the condition of their milk when received. The wads could either be sent back to the farmer for his inspection or be mounted on a chart, allotting certain points to each pad according to its condition, and placing it in a prominent position in the factory for inspection by all. This often serves a useful purpose in getting an unsatisfactory producer to bring about the necessary improvement in his supply.

Principle of Test.—In taking a sediment test, a metal tubular container with a capacity of 1 pint, to which a length of rubber tube is attached, is used. The rubber tube fits on to a nipple on the lid of the container. This is to enable pressure to be applied by hand pumping to force the milk in the container through a small cotton wool filter pad in the bottom. This pad is placed between a wire gauze and rubber washer and held on to the tapered end of the container with a special cap, which also has a hole in the centre to allow the milk to pass straight through when pressure is applied. After the milk is forced through, the wad is removed and the amount of visible dirt in one pint of the milk can then be seen.

How to Obtain a Satisfactory Sediment Test.—When a farmer is advised that the sediment test applied to his milk has shown unsatisfactory results, he should carefully check over all his operations in the production and handling of milk, and endeavour to find the cause and remedy it immediately.

In order to ensure satisfactory sediment test results, attention should be given to the following factors:—

1. Most important of all—always wash the cows' teats and udders and dry them before commencing milking. This is necessary in dry as well as wet weather. Dry milking is then an easy matter as the teats are softened by this washing. Milkers' hands should be frequently washed in the course of milking operations.

2. Always strain all milk through cotton wool filter pads. If many cows are being milked the pad should be changed in the course of milking. Use a wide-mesh gauze on the strainer to expedite straining.

3. Do not include milk from cows affected with mastitis. This often shows up as tiny blood spots, or white or yellow deposits on the filter pad of the sediment tester.

4. Keep dust in the yard down to a minimum to avoid its being stirred up by the cattle and settling in milk buckets.

5. Make sure that all milking buckets, cans, and/or other utensils are washed before putting milk into them, as often dust accumulates in utensils between milking.

6. Keep cans of milk in a dust-free place while awaiting transport.

It should be clearly understood by producers that straining is only a precautionary measure. The objective should be to exclude dirt as much as possible by cleanly shed methods, rather than to rely on straining to remove it. The straining merely removes the hairs and larger particles of dirt, but most of the bacteria thereon still pass through the strainer into the milk.

THE HEAD OF THE HERD.

Points to be observed in selecting a good dairy bull are:—

1. That he is pure bred and well bred—the two characteristics go together. Only bulls which have the backing of closely related, good producing ancestors can improve a herd. Most good bulls are registered, but not all registered bulls are good.

2. That he is prepotent and masculine. The bull which is prepotent stamps his calves with his own qualities. To pass on his good qualities, he must be pure bred, well bred, strong, and energetic.

3. That he is well built and full size. Look for a wide muzzle, broad forehead, prominent eyes, deep chest, big barrel, open-jointed frame, and loose skin. Always reject an under-sized bull.

4. That he is healthy and vigorous. For best results, perfect health of the bull, as well as the cow, are most important. Vigour and vitality are necessary. It simply does not pay to persevere with a lazy, sleepy bull.

L. VERNEY.

Queensland Cheese Production, 1943-44.

E. B. RICE, Director of Dairying.

QUEENSLAND cheese production of 24,041,645 lb. (approximately 10,733 tons) for the year ended 30th June, 1944, was decidedly below that of the State's record output of 27,730,083 lb. (12,724 tons) for 1942-43. This decrease was mainly attributable to seasonal conditions, but the closure of cheesemaking annexes at two butter factories, the diversion of some cheese factory milk supplies to supplement the Brisbane city milk supply in the past dry winter and some loss of suppliers in other factory areas were contributory factors.

Production in the first quarter of the year was affected by the unusually dry and cold winter conditions, but output steadily increased after the early spring rains, and during early and midsummer. However, adverse conditions in the late summer and autumn seriously depressed production for the remainder of the year.

The gross value of the year's production was estimated at £1,159,250 and the average price per pound butterfat received by cheese factory suppliers in the year was 2s. 1½d.

Because of the changed position in relation to the overall requirements for butter, whereby the restriction on the export of second grade butter has been lifted and markets are assured for all production, applications from producers for exemption from supplying cheese factories are now treated sympathetically; the satisfactory returns from cheese factories in comparison with returns from butter factories have enabled the former to maintain supplies. Moreover, it is neither necessary nor desirable for any upset in supply arrangements and because of the necessity for the conservation of tyres, trucks, and liquid fuel, duplication of transport services for both milk and cream along roads is not at present permissible.

The total quantity of cheese officially graded by State and Commonwealth officers was 16,591,676 lb., representing 69.01 per cent. of output. The results are summarised hereunder:—

Grade	Choice	First	Second	Third	
Percentage:	1.49	74.16	24.33	0.02	
Number of factories of which output of choice and first grade cheese exceeded 90 per cent.					14
Number of factories of which output was between 80 and 89 per cent.					9
Number of factories of which output was between 70 and 79 per cent.					7
Number of factories of which output was between 60 and 69 per cent.					7
Number of factories of which output was between 50 and 59 per cent.					4
Number of factories of which output was between 30 and 49 per cent.					4
Number of factories of which output was between 10 and 29 per cent.					2
Number of factories of which output of choice and first grade cheese was less than 10 per cent.					3
Number of factories without any choice and first grade					1

The attached table prepared by Miss Horsley of the Dairy Branch contains information respecting the manufacture and gradings of the individual factories; this information should prove of interest to all factories and suppliers.

It also is of interest to record that in addition to small quantities of Gruyere and Roman cheese made in Queensland for some years, two kinds new to commercial manufacture in this State—cottage cheese and homogenised cheddar cheese—were marketed. The homogenised cheddar cheese resulted from attempts to produce a type of cheese capable of withstanding tropical weather conditions without excessive exudation of fat.

PRODUCTION, YIELD, AND GRADINGS OF CHEESE IN ALL FACTORIES FOR TWELVE MONTHS ENDED 30TH JUNE, 1944.

Factory.	Production and Yield.						Gradings.				
	Milk Received.	Cheese Green Weight.	Butterfat.	Cheese Yields per 100 Lb. Milk.	Cheese Yields per Lb. Butter-fat.	Average Test.	Total Lb. Submitted.	Choice.	First.	Second.	Third.
	Lb.	Lb.	Lb.	Lb.	Lb.	%	Lb.				
Aubigny	1,681,520	172,848	61,082	10·28	2·82	3·63	165,373	..	89,839 lb. 54·32 %	75,534 lb. 45·68 %	..
Biddeston	8,271,357	882,110	310,712	10·66	2·84	3·76	718,793	28,318 lb. 3·94 %	638,264 lb. 88·8 %	52,211 lb. 7·26 %	..
Chinchilla (closed Nov., 1943)	1,081,653	110,188	38,816	10·19	2·84	3·59	124,876	..	124,656 lb. 99·82 %	220 lb. 0·17 %	..
Coalstoun Lakes	1,881,577	188,773	70,237	10·03	2·69	3·73	43,842	..	485 1·11 %	42,414 lb. 96·74 %	943 lb. 2·15 %
Daredale	3,183,244	309,992	117,256	9·74	2·64	3·68	279,047	..	200,151 lb. 67·38 %	96,896 lb. 32·61 %	..
Downs—											
Boodua	2,236,024	234,429	88,608	10·48	2·64	3·96	142,396	..	116,383 lb. 81·73 %	26,013 lb. 18·26 %	..
Toowoomba	5,597,243	586,485	..	10·48	..	..	198,286	..	129,666 lb. 65·39 %	68,620 lb. 34·61 %	..
Dundarrah	1,438,767	137,946	52,684	9·59	2·62	3·66	27,693	..	..	20,353 lb. 73·49 %	7,340 lb. 26·5 %
Felton	5,552,286	604,160	212,871	10·88	2·84	3·83	373,743	..	260,999 lb. 69·83 %	112,744 lb. 30·17 %	..
Greenmount	2,896,750	305,887	111,351	10·55	2·75	3·84	117,245	..	720 lb. 0·61 %	113,435 lb. 96·75 %	3,090 lb. 2·63 %
Highgrove	2,237,167	231,232	86,796	10·33	2·66	3·88	163,660	..	4,934 lb. 3·01 %	151,548 lb. 92·6 %	7,178 lb. 4·38 %
Irongate	5,146,830	540,112	191,007	10·49	2·83	3·71	510,613	8,448 lb. 1·65 %	462,890 lb. 90·65 %	39,275 lb. 7·69 %	..
Kooroongarra	5,682,028	578,348	211,359	10·18	2·74	3·72	563,277	18,895 lb. 3·35 %	488,776 lb. 86·77 %	55,606 lb. 9·87 %	..
Lilyvale	3,143,827	332,531	119,156	10·58	2·79	3·79	318,552	..	306,977 lb. 96·37 %	11,575 lb. 3·63 %	..
Malling	5,576,602	536,351	210,067	9·62	2·55	3·77	..	..	..	..	..
Maclagan Valley—											
Maclagan	8,268,988	838,279	310,470	10·14	2·70	3·75	780,040	..	350,223 lb. 44·9 %	429,817 lb. 55·1 %	..
Kulpi	7,268,467	736,099	269,814	10·13	2·73	3·71	578,804	17,561 lb. 3.03 %	410,336 lb. 70·89 %	150,907 lb. 26·07 %	..

PRODUCTION, YIELD, AND GRADINGS OF CHEESE IN ALL FACTORIES FOR TWELVE MONTHS ENDED 30TH JUNE, 1944.

Factory.	Production and Yield.						Gradings.				
	Milk Received.	Cheese Green Weight.	Butterfat.	Cheese Yields per 100 Lb. Milk.	Cheese Yields per Lb. Butterfat.	Average Test.	Total Lb. Submitted.	Choice.	First.	Second	Third.
	Lb.	Lb.	Lb.	Lb.	Lb.	%	Lb.				
Maryborough—											
Kingaroy	3,869,043	379,232	153,577	9·80	2·47	3·97	207,296	..	136,224 lb. 65·71 %	71,072 lb. 34·28 %	..
Tansey	6,661,597	698,115	272,592	10·48	2·56	4·09	553,855	3,308 lb. 0·59 %	547,161 lb. 98·79 %	3,386 lb. 0·61 %	..
Wondai	3,516,810	351,332	136,444	9·99	2·57	3·88	142,336	..	139,126 lb. 97·74 %	3,210 lb. 2·25 %	..
Maxam	6,147,149	647,241	242,477	10·53	2·67	3·94	579,421	..	480,063 lb. 82·85 %	99,358 lb. 17·15 %	..
Moola	6,349,298	643,093	244,361	10·13	2·63	3·85	546,258	..	481,245 lb. 88·1 %	65,013 lb. 11·9 %	..
Mount Sibley	3,310,233	352,550	130,547	10·65	2·70	3·94	343,194	..	268,710 lb. 78·3 %	74,484 lb. 21·7 %	..
Mount Tyson	8,338,424	889,507	313,369	10·67	2·84	3·76	677,442	3,440 lb. 0·5 %	640,208 lb. 94·5 %	33,794 lb. 5·0 %	..
Nanango (closed Dec., 1943)	1,085,606	100,314	35,327	9·24	2·84	3·25	81,157	..	44,584 lb. 54·93 %	35,431 lb. 43·66 %	1,142 lb. 1·4 %
Oakey-Kelvinhaugh	3,243,281	334,964	124,421	10·33	2·69	3·84	317,088	..	268,623 lb. 84·71 %	47,886 lb. 15·1 %	579 lb. 0·18 %
Pauls Ice Cream and Milk, Merrimac	411,685	41,675	15,398	10·12	2·706	3·74	32,127	..	27,654 lb. 86·08 %	4,473 lb. 13·92 %	..
Pittsworth—											
Pittsworth	10,098,185	1,055,542	406,714	10·45	2·59	4·03	582,846	61,893 lb. 10·62 %	519,840 lb. 89·19 %	1,113 lb. 0·19 %	..
Brookstead	3,204,408	333,396	122,970	10·40	2·71	3·84	310,562	7,420 lb. 2·39 %	186,041 lb. 59·9 %	116,061 lb. 37·37 %	1,040 lb. 0·33 %
Linthorpe	3,945,878	401,779	146,705	10·18	2·74	3·72	330,437	..	255,362 lb. 77·28 %	75,075 lb. 22·72 %	..
Scrubby Mountain ..	2,318,146	240,195	88,571	10·36	2·73	3·82	136,073	..	52,057 lb. 38·26 %	81,145 lb. 59·63 %	2,871 lb. 2·11 %
Springside	4,082,980	428,376	149,800	10·49	2·86	3·67	211,822	50,402 lb. 23·79 %	159,370 lb. 75·24 %	2,050 lb. 0·97 %	..
Yarranlea	6,671,691	691,660	252,324	10·37	2·74	3·78	419·924	5,600 lb. 1·33 %	379,655 lb. 90·41 %	34,029 lb. 8·10 %	640 lb. 0·15 %
Port Curtis—											
Bracewell	6,486,196	656,758	242,344	10·12	2·71	3·74	223,143	..	206,200 lb. 92·41 %	16,943 lb. 7·59 %	..
Theodore	2,544,287	265,297	95,325	10·43	2·78	3·75	19,383	..	6,500 lb. 33·53 %	12,883 lb. 66·46 %	..

Queensland Agricultural High School and College	13,040	1,333	547	10·22	2·44	4·19	..	..	..	..	..
Quinalow	7,394,869	742,775	272,322	10·04	2·73	3·68	699,816	..	514,849 lb. 73·57 %	184,967 lb. 26·43 %	..
Ramsay	2,874,914	283,515	109,997	9·86	2·58	3·83	267,560	..	81,648 lb. 30·51 %	182,592 lb. 68·24 %	3,320 lb. 1·24 %
Rockview	2,793,342	298,794	109,058	10·70	2·74	3·9	245,741	..	143,004 lb. 58·19 %	102,737 lb. 41·81 %	..
Rocky Creek	4,576,060	480,071	167,188	10·49	2·87	3·65	431,529	..	346,223 lb. 80·23 %	85,306 lb. 19·77 %	..
Rosemount	4,972,429	503,027	190,173	10·12	2·64	3·82	468,452	..	95,860 lb. 20·46 %	363,467 lb. 77·6 %	9,125 lb. 1·94 %
Southbrook	7,387,090	775,524	274,708	10·5	2·82	3·72	605,112	984 lb. 0·16 %	585,033 lb. 96·68 %	16,867 lb. 2·79 %	2,228 lb' 0·37 %
South Burnett— Goomeri	7,376,108	756,925	294,350	10·26	2·57	3·99	509,628	..	444,624 lb. 87·25 %	65,004 lb. 12·74 %	..
Murgon	6,004,577	592,645	239,844	9·87	2·47	3·99	498,584	..	341,299 lb. 68·45 %	157,285 lb. 31·55 %	..
South Coast Dairy, Southport	11,900	1,200	..	10·08	..	..	..	..	..	..	..
Sugarloaf	2,196,684	227,401	90,023	10·35	2·53	4·09	161,600	..	97,028 lb. 60·04 %	63,842 lb. 39·51 %	730 lb. 0·45 %
Sunnyvale	1,880,580	194,151	73,412	10·32	2·64	3·9	137,440	..	27,495 lb. 20·0 %	106,105 lb. 77·20 %	3,840 lb. 2·79 %
Warwick— Greymare	2,747,998	279,015	103,286	10·15	2·7	3·76	129,786	..	83,667 lb. 64·46 %	46,119 lb. 35·53 %	..
L. J. Swamp	1,326,596	137,404	51,404	10·36	2·67	3·87	3,815	..	3,815 lb. 100·0 %	..	..
Talgai	1,933,050	201,779	74,476	10·44	2·71	3·85	12,336	..	11,698 lb. 94·83 %	638 lb. 5·17 %	..
Victoria Hill	1,169,890	123,068	42,737	10·52	2·88	3·65	..	..	..	..	..
Mill Hill	15,229,989	1,505,224	585,767	9·88	2·57	3·85	543,846	24,024 4·17 %	442,847 lb. 81·43 %	76,975 lb. 14·45 %	..
Woodleigh	2,568,265	258,647	96,049	10·07	2·69	3·74	241,934	..	182,844 lb. 75·57 %	59,090 lb. 24·42 %	..
Yamsion	3,023,199	323,149	114,008	10·48	2·84	3·77	301,431	..	149,398 lb. 49·56 %	152,033 lb. 50·43 %	..
Yargullen	4,888,506	519,205	187,809	10·62	2·76	3·84	493,404	16,411 lb. 3·33 %	363,527 lb. 73·68 %	108,360 lb. 21·96 %	5,106 lb. 1·03 %
Totals	233,798,313	24,041,648	8,712,710	10·28	2·75	3·72	16,591,676	246,704 lb. 1·49 %	12,310,984 lb. 74·16 %	3,987,498 lb. 24·33 %	46,490 lb. 0·02 %

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 Australian Illawarra Shorthorn and Jersey Cattle Societies. Production records for which have been compiled during the month of July, 1944 (273 days unless otherwise stated).

Name.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Mature Cow (Standard 350 Lb.).				
Happy Valley Marcheta 4th	R .R. Radel, Coalstoun Lakes	8,729·44	389·226	Sunnyview Artist
Senior, 4 Years (Standard 330 Lb.).				
Yarranvale Larkspur	W. Henschell, Yarranlea	12,775·5	477·611	Bri Bri Hason
Junior, 4 Years (Standard 310 Lb.).				
Alfa Vale Myrtle 4th	W. H. Thompson, Nanango	12,091·05	532·751	Penrhos Pansy's Pride
Glen Idol Miss Jean	P. Doherty Estate, Gympie	10,138·15	436·676	Blackland's Count
Happy Valley Molly Belle 2nd	R. R. Radel, Coalstoun Lakes	8,104·12	335·94	Sunnyview Artist
Junior, 3 Years (Standard 270 Lb.).				
Tabbagong Ruth 35th	J. Crookey, Allora	8,889·5	363·724	Parkview Consul
Senior, 2 Years (Standard 250 Lb.).				
Yarranvale June	W. Henschell, Yarranlea	7,631·82	279·42	Trevor Hill Bosca
Glen Idol Melba	P. Doherty Estate, Gympie	6,640·6	266·036	Blackland's Count
Junior, 2 Years (Standard 230 Lb.).				
Silver Glen Larkspur (239 days)	V. R. Nugent, Murgon	7,275·8	280·297	Aynsley Renell
JERSEY.				
Mature Cow (Standard 350 Lb.).				
Trecarne Jersey Queen 2nd	T. A. Petherick, Lockyer	7,169·55	384·231	Trinity Some Officer
Trecarne Some Tot 3rd	W. Griesheimer, Leyburn	6,685·6	378·644	Jerseylea Golden Duke

Junior, 4 Years (Standard 310 Lb.).				
Hocknell Waimate Creamery	N. C. Webb, Beaudesert	8,466·85	465·387	Hocknell Golden Surprise
Ashview Larkspur	C. Huey, Sabine	6,932·25	447·648	Lermont Volunteer
Senior, 3 Years (Standard 290 Lb.).				
Kathleigh Ripple	W. Griesheimer, Leyburn	7,309·75	372·52	Calton Larris
Senior, 2 Years (Standard 250 Lb.).				
Ashview Chimes	C. Huey, Sabine	7,331·45	306·69	Trecarne Victor 4th
Lermont Fairy Maid (247 days)	P. H. Schull, Oakey	4,939·6	303·923	Woodside Golden Volunteer
Brooklands Choice Snow Cream	W. S. Conochie, Sherwood	5,527·75	255·608	Brooklands Choice Peer
Junior, 2 Years (Standard 230 Lb.).				
Ashview Mischief	C. Huey, Sabine	6,193·55	328·56	Torquay Prince 2nd
Mayfair Beauty 5th	J. W. Carpenter, Helidon	5,296·25	312·58	Trecarne Golden King 2nd
Mayfair Roseslip 5th	J. W. Carpenter, Helidon	4,534·95	312·38	Trecarne Golden King 2nd
Lermont Dot	J. Schull, Oakey	6,039·45	299·897	Lermont Ambassador
Ashview Fashion	C. Huey, Sabine	5,879·55	295·526	Trecarne Victor 4th
Lermont Model	J. Schull, Oakey	5,277·55	281·206	Selseys Samares Hallmark
Meadowvale Spot	Young Bros., Kingaroy	4,597·3	268·758	Banyule Silver Emblem
Ashview Madeiriatte	C. Huey, Sabine	4,521·61	264·466	Trecarne Victor 4th
Woodview Lynn	P. H. Schull, Oakey	4,447·1	232·977	Lermont Victory

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 and Jersey Cattle Societies, production records for which have been compiled during the month of August, 1944 (273 days unless otherwise stated).

Name.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Mature Cow (Standard 350 lb.).				
Brundah Fancy	C. O'Sullivan, Greenmount	11,686·0	481·675	Greyleigh Eros
Trevor Hill Maple	G. Gwynn, Umbiram	10,361·35	414·759	Corunna Supreme
Senior, 4 Years (Standard 330 lb.).				
Jamberoo Marjorie 6th	M. J. Brosnan, Clifton	9,626·25	427·886	Greyleigh Valiant
Mountain Camp Thelma 26th	W. Caldwell, Bell	9,502·81	349·817	Trevor Hill Reflection
Junior, 3 Years (Standard 270 lb.).				
Navillus Countess	C. O'Sullivan, Greenmount	8,419·5	344·152	Greyleigh Eros
Senior, 2 Years (Standard 250 lb.).				
Yarranvale Melva	W. Henschell, Yarranlea	9,184·65	380·346	Trevor Hill Bosca
Trevor Hill Crystal 2nd	G. Gwynn, Umbiram	8,088·22	346·343	Rosenthal Musketeer
Glen Idol Florrie 6th	Estate of P. Doherty, Gympie	7,382·25	311·605	Blacklands Count
Junior, 2 Years (Standard 230 lb.).				
Navillus Viola 6th	C. O'Sullivan, Greenmount	7,502·0	317·17	Greyleigh Eros
Navillus Daphne 4th	C. O'Sullivan, Greenmount	7,787·0	307·292	Greyleigh Eros
Navillus Countess 2nd	C. O'Sullivan, Greenmount	7,604·0	302·631	Greyleigh Eros
Yarranvale Kitty	W. Henschell, Yarranlea	6,833·43	297·205	Trevor Hill Bosca
Navillus Colleen	C. O'Sullivan, Greenmount	6,682·0	269·85	Parkview Limerick
Beleena Charm 6th	K. Roche, Sladevale	6,592·1	266·523	Tara Governor
JERSEY.				
Senior, 4 Years (Standard 330 lb.).				
Chaldon Young Lady	J. J. Ahern, Conondale	7,438·3	343·958	Yaralla Duke of Gloucester
Junior, 3 Years (Standard 270 lb.).				
Lermont Sunlight	J. Schull, Oakey	7,614·5	346·481	Woodside Golden Volunteer
Senior, 2 Years (Standard 250 lb.).				
Boree Daffodil	W. and C. E. Tudor, Branch Creek	6,470·67	342·642	Maurfield Larkspurs Gift
Lermont Katie	J. Schull, Oakey	5,581·0	270·205	Woodside Golden Volunteer
Junior, 2 Years (Standard 230 lb.).				
Hocknell Bravo Camilla	N. C. Webb, Beaudesert	5,824·7	338·361	Navua Victoires Lad
Lermont Tinklebell	J. Schull, Oakey	6,950·9	329·056	Selsey Samares Hallmark
Lermont Flower	J. Schull, Oakey	6,507·95	278·834	Selsey Samares Hallmark
Tecoma Hawthorn (220 days)	W. J. Semgreen, Coolabunia	4,424·9	244·635	Trinity Golden Royal
Lermont Patsy	J. Schull, Oakey	4,777·0	231·456	Woodside Golden Volunteer

Dentition in Sheep.

J. L. HODGE, Instructor in Sheep and Wool.

THE ages of sheep are generally indicated by the number of permanent teeth each is carrying. This is not strictly accurate as the appearance of the permanent teeth varies to some considerable extent, dependent on the country on which they are raised. Instead of referring to a flock as two-tooth (one year old) or four-tooth (two years old) and so on, it is more accurate to describe the ages in such terms as one year, two years old, and so on up to four years when a sheep is showing eight permanent teeth. However, as mentioned, the practice of indicating the age by the number of permanent incisors is so general that it will be adhered to by most growers. A lamb has all temporary or sucking teeth. At about 13 to 15 months of age, the two permanent incisors appear. The sheep is then called a "two-tooth."

At from 18 months to 24 months of age two more permanent teeth appear, one on either side of the original permanents. The animal is then known as a "four-tooth." At the age of 30 months to three years the four permanent incisors are again added to by two permanent teeth on each side of the original four, thus the sheep becomes a "six-tooth." When a sheep becomes about 42 months old and up to four years, yet another pair of permanent incisors make their appearance on the outside of those already there. The sheep is then referred to as a "full mouth."

It may be thought that the intervals given for the appearance of the teeth are elastic, but this cannot be avoided as so much depends on the country and the state of the pastures.

After four years a sheep is referred to as "aged" and the correct age can be indicated only by the soundness or otherwise of the mouth. It is especially from four years upwards that a prospective buyer gets the benefit of the strictly correct reference to ages in years.

Definition of Ages of Young Sheep.

There is sometimes controversy on the subject of ages and definitions of young sheep. The following may, therefore, prove useful. The term "lamb" as applied in the sheep industry refers to a young sheep of either sex or breed showing milk teeth only and still sucking its mother. Probably the oldest age to fulfill these conditions is five months. In the case of crossbred sheep, lambs at five months would, under ordinary conditions, be marketed as fat lambs, and would therefore miss the "weaner" stage. In merino circles, a lamb becomes a weaner on removal from its mother. In an adverse season, crossbred

lambs have sometimes to be weaned and their condition maintained, if practicable, on fodder crops. These young animals are known as "carry over" lambs and the actual age may vary greatly. At Cannon Hill saleyards the selling agents class anything as a lamb which does not show two permanent teeth.

A hogget is a young sheep of either sex, round about twelve months old, which has not been shorn as a lamb, and therefore, with a twelve months' fleece, still carries a lamb's "tip."

Lamb: Up to five months of age.

Weaner: From weaning time to hogget stage.

Hogget: Round about twelve months old carrying original fleece.

Two-tooth: About fifteen months old carrying two permanent teeth.

Better Merino Flocks.

J. L. HODGE.

WITHOUT taking a pessimistic view of the future of wool after hostilities cease, it may, at least, be said that there is some uncertainty in the position. It is not the present intention in this article to touch on the marketing of the staple, but to remind breeders of the necessity for producing the very best that circumstances and the country grazed will permit. It should be remembered always that only the best of wool will compete successfully with synthetic fibres on a price basis.

Culling the Ewe Flock.

Culling the ewe flock, therefore, has become even more important than formerly. This work should become a permanent part of yearly practice on the station or grazing farm. The work should be entrusted only to first-class men, proved for their ability to not only select the best, but also with a complete understanding of the type to grow in a particular district.

In the forefront of the classer's mind should be type to suit the particular property, and district. To achieve fast and permanent improvement in the flock, this matter of type should be adhered to rigidly year after year. Different localities demand different types of merino sheep to ensure that the best may be got out of a flock. For instance, in the arid regions of the Far-west and North-west to attempt to grow the finest of merinos would be definitely wrong practice. In those regions a sheep requires, above all other characteristics, constitution and size. A sheep should be sound of constitution and hardy enough to stand up to hardships so often encountered in those areas. A strong wool, or a strong medium wool should, therefore, be chosen for the districts under discussion. Nearer in, where the country is suitable and rainfall is more assured, finer merinos may be depastured.

Culling achieves only half its object, unless with it goes the use of better rams. A few guineas in the price of rams is neither here nor there, provided the right sires are purchased to "nick" with a particular line of ewes. Here again it is very desirable that the person buying the rams should have a sound knowledge of the ewe flock with which it is proposed to join them. Money is often wasted in the indiscriminate

purchase of rams, some of which should not see the ewes. This does not altogether mean that the rams themselves are indifferent members of their breed, but that they are of the wrong type for the ewes intended to be mated with them. Having found a stud, the progeny of the rams from which have given satisfaction, the grower is strongly advised to stick to that stud, or at least, should a change be desirable, to purchase from a stud established on similar blood lines. Chopping and changing from stud to stud is a dangerous practice for the beginner, very often resulting in culls out of all proportion.

The Mating Age.

Ewes should be well grown before joining. If well developed, eighteen months of age is the best time. Breeding from young stock often interferes with natural development, and seriously minimises the cut one would expect from a selected line of ewes. Time to join depends, to a great extent, on locality, seasonal rainfall, and to no small extent, the prevalence or otherwise of blowfly attack in the particular locality.

Progeny Testing.

Progeny testing is receiving much publicity these days, and rightly so. However, the practice is carried out to a far greater extent than is generally supposed. It is not often that a stud breeder, purchasing a high-class sire for the stud, joins the ram with his top ewes until he has been tried out on other ewes and his progeny carefully observed.

Within the flock it is thought that much more could be done in the matter of selective breeding, as against the usual practice of indiscriminate breeding. The difference in these two methods consists in the selection of rams for selected ewes to suit them, as against the almost universal practice of joining a certain percentage of rams with the whole ewe flock.

In capable hands, this selective breeding is well worth the extra work involved, and should quickly reduce the proportion of sheep to be culled from a given flock. On large stations it is sometimes an annual practice to cull as deeply as 33 per cent. irrespective of the quality of the sheep. This has its advantages where large numbers are depastured, but the smaller man would be well served with the removal of those sheep not true to type or culled for other outstanding faults.

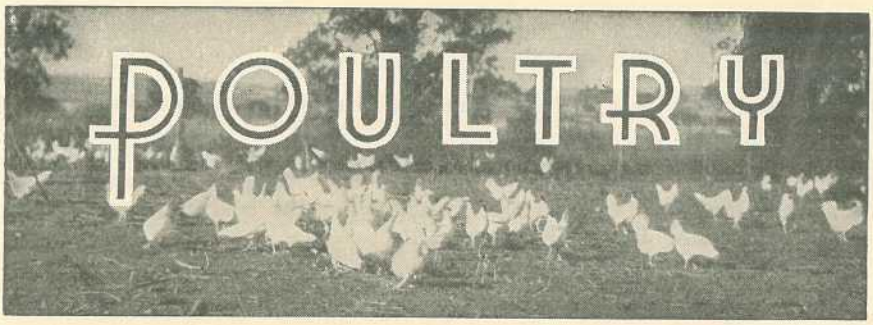
From a State point of view it is very desirable that all culls eventually come into the fat stock market.

TAKING THE FORGE TO THE FARM.

Queenslanders in sheep and cattle country all know the travelling saddler, and how welcome he is on a grazing property when saddles have to be counter-lined and all sorts of leather gear has to be replaced or repaired. Well, in New Zealand, a travelling blacksmith shop is a familiar sight in at least one district where, instead of the farmers going to the blacksmith, the blacksmith comes to them.

An enterprising local lad thought it would be a good idea to provide himself with a portable forge, so he bought a truck and fitted it up as a mobile workshop —anvil, bellows, and all—established a business connection with district farmers, and arranged regular visits to their farms to shoe horses and do general work calling for a blacksmith's skill. The idea caught on with the farmers, and the travelling blacksmith is now regarded as indispensable.

In the slack season the travelling blacksmith does a bit of shearing or takes on tractor-driving to keep going.



Culling.

P. RUMBALL.

POULTRY raisers at this time of the year commence to give serious consideration to removing from their flocks the poorer layers. The practice is generally forced upon farmers due to the fall in egg values in order to make ends meet.

The position is somewhat different today. Egg values are much higher at this time of the year than they normally are, and feed costs have made no corresponding increase. Therefore there may not be the urge to follow usual practices.

The need for culling today is equally as important as at any period. In the first place the best returns cannot be obtained without this practice being followed, and secondly the feed position is not particularly

Plate 76.

THE HEAD OF A GOOD LAYER.—Note the alertness of appearance and freedom from coarseness. The bald head is frequently associated with high production.

Plate 77.

Head of an Alert, Active Bird from which High Egg Production can be Expected.

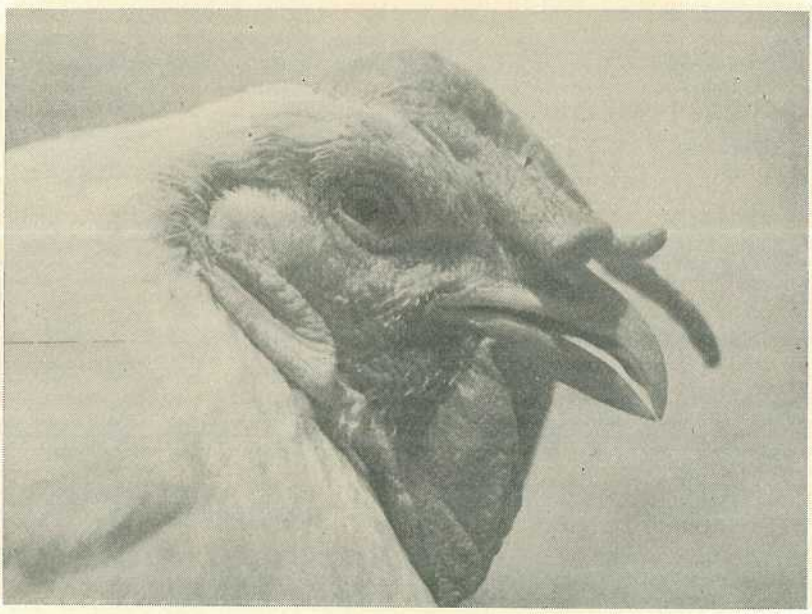


Plate 78.

Head of a Bird Inclined to be Coarse.—A type of head not associated with high production.

bright. To feed the poultry flocks of this State probably something over 2 million bushels of wheat is necessary annually. Most of this has to be brought into the State, and just now all.

Culling reduces the call upon wheat and will assist in avoiding those periods where it has been so difficult to obtain supplies. Protein rich foods are also in short supply. The feeding of indifferent egg producing birds reduces the amount available to the birds that are able to give a good account of themselves if they were supplied with the means to do so.

In egg laying competitions an average individual production of 200 or more eggs is usual. This average is not impossible for the poultry raiser to obtain from a flock of well-managed pullets. However, in the second year of a hen's life production is much lower than in her first. Some excellent first-year producers may be exceptionally poor in their second. A similar relationship exists between the production of the second and third year, but with the difference that third-year birds invariably do not lay enough eggs to warrant their retention in the flock.

Culling, therefore, in the first instance, revolves around the disposal of old hens.

In addition to culling for age, all obviously unfit birds, from chickens to the oldest hens, should be removed from week to week. The main culling should be practised in the summer.

Before culling, the conditions under which birds are housed and fed should be considered. Only well-treated birds can have the external features of a good layer. If the treatment has not been correct this should be remedied, and the birds given at least 6 weeks to respond.

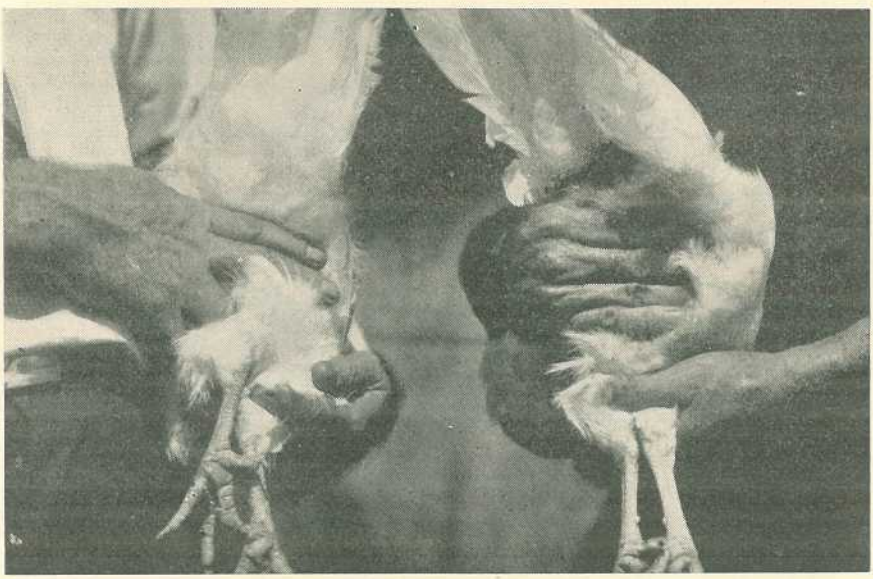


Plate 79.

METHOD OF ASCERTAINING THE DISTANCE BETWEEN THE PELVIC BONES AND THE KEEL REFERRED TO AS CAPACITY.

Well managed and regularly culled flocks require little culling during the summer, apart from culling for age. In badly bred and poorly managed flocks considerable culling is necessary. Hens that have given two years' production should, with few exceptions, be culled for age.

Birds should be gathered and examined on the ground first. A good producer should be bright, alert, and active, and should have length, width, and depth of body. Birds without these characteristics should be rejected. All small, undersized birds, although of active appearance, should be removed. This work may be done best in the fowlhouse. The birds should be caught with a fish landing net. The other birds should be handled, and the best way to catch them is to round them up in a corner, using a piece of 6-feet netting, enclosing 20 to 30 at one time. In the further examination it must be borne in mind that a moulting bird will not have the same measurements as a laying hen. On handling the bird, first its weight should be noted. A good producer will be lean, but not light. Exceptionally light birds should be rejected.

SELECTION CHART.

In this chart the chief differences between the body characters of good and poor layers are so arranged that the flock owner can determine the production value of his birds.

Present Production.

(Applied at any season of the year to distinguish between laying birds and those that are resting.)

Laying.	*Character.*	*Not Laying.*
Large, red waxy	COMB	Shrivelled, pale, scaly
Soft, smooth	WATTLES AND EARLOBES	Rough, dry
Large, oval, moist, bleached	VENT	Small, puckered, dry, and yellow
Wide apart	PUBIC BONES	Close together

Past Production.

(These differences are more apparent in the later summer months.)

Good Layer.	*Character.*	*Poor Layer.*
Bleached, bluish-white	VENT	Yellow pigment present
Thin, bleached	EYE RING	Thick, yellow pigment
Completely bleached	BEAK	Yellow or becoming yellow
Bleached	SHANKS	Yellow
Late, after 1st March	MOULT	Early, before 1st March
Worn, soiled	PLUMAGE	Fresh, oily
Seldom or never	BROODINESS	Often

Rate of Production.

High Rate.	*Character.*	*Low Rate*
Thin, flexible	PUBIC BONES	Thick, rigid
Soft, free from heavy fatty deposits	ABDOMEN	Hard, fatty
3 or 4 fingers	CAPACITY	2 fingers
Thin, soft, loose	SKIN	Thick, hard, dry, and tight
Parallel with back and sloping downward	KEEL	Sloping upward

Ability to Lay.

(For use in selection of pullets or hens.)

Good Layer.	*Character.*	*Poor Layer.*
High vitality	HEALTH	Low vitality
Alert, friendly, active	TEMPERAMENT	Dull, listless, wild
Wide, level, comparatively long	BACK	Narrow, tapering
Wide	RUMP	Sloping
Moderately deep	DEPTH	Shallow
Full, well-sprung ribs	BREAST	Tucked-up, narrow
Fine, lean, clean cut	HEAD	Coarse, shallow, long and narrow
Large, bright, bulging, full	EYES	Small, dull, sunken
Short, stout	BEAK	Long, thin
Close	PLUMAGE	Loose
Flat bone	SHANKS	Round

Health and Vigour.

High.	*Character.*	*Low.*
Broad, deep	HEAD	Long, slim, crow
Bright, prominent	EYES	Dull, sunken
Long, moderately deep	BODY	Short, shallow
Strong, parallel	LEGS	Spindly, knock-kneed
Stylish, upright	CARRIAGE	Droopy
Active	DISPOSITION	Sluggish

EXTENSION SERVICE—VALUE OF PERSONAL CONTACT.

The United States has been divided into 257,000 neighbourhoods, in which leaders have been appointed or elected. The neighbourhoods have not been formed primarily for rural purposes, and they include urban dwellers. This organisation has already been active in such projects as the collection of scrap metal and rubber, cost-of-living surveys, food for freedom, fire control, war stamps, farm labour and farm machinery repair.

Interesting data are available showing the effects of intimate contact with farmers by neighbourhood leaders. Different responses to requests to take part in salvage programmes and "to order fertilizer early" were noted, according to the methods of disseminating information.

The following table shows the percentage of families contacted which responded to requests according to the method of approach adopted:—

Method Used.	Campaign Objective		Effect of Personal Contact.
	Scrap Collections.	"Order Fertilizer Early."	
1. Neighbourhood leader contact and other methods	79%	80%	With personal contact 75%
2. Neighbourhood leader alone ..	67%	75%	
3. Other methods alone	48%	25%	Without personal contact 33%
4. Not contacted	30%	30%	

This information indicates the need for decentralisation of activities designed to encourage practices which are new to farmers. The importance of personal contact is well shown.—*Extension Service Review* (U.S.A.).

Agricultural Chemistry

Arsenic and its Dangers.

W. R. WINKS.

EVERY year Queensland suffers stock losses, many of which could be avoided if stockowners realised how poisonous arsensic is and for how long it persists. Arsenic, the metal or rather the metalloid, is seldom or never seen as such, but various arsenical compounds are used extensively in agricultural, horticultural and pastoral enterprises.

The commonest form in which arsenic is known is white arsenic (arsenic trioxide). Queensland legislation requires poisonous substances to be coloured, so a small quantity of lamp-black is mixed with "white" arsenic to give the "grey" arsenic of commerce. White or grey arsenic is the active constituent of cattle dips and of many weedkillers. It is usually dissolved in either caustic or washing soda to form sodium arsenite.

Being a mineral, arsenic is not readily destroyed and it can remain in the soil for many years. The following example is evidence of the persistent danger from arsenic: A dip was emptied and the fluid run into a nearby depression. The owner, realising that the fluid could be dangerous, fenced off the depression with a sapling fence. Some years later, dairy cows which were being driven to water passed the depression which had collected storm water, and, being thirsty, broke through the fence to drink. A heavy mortality resulted.

Another form in which arsenic is available is arsenic pentoxide. This was first used in quantity for the destruction of prickly pear, but nowadays it is used in the destruction of trees and as a weedicide. Unlike white arsenic which is only sparingly soluble, arsenic pentoxide dissolves readily in water.

When either arsenic pentoxide or sodium arsenite is used for the destruction of timber or weeds, stock should be denied access to the poisoned paddocks until after a good burn and heavy rains, when luxuriant regrowth has become established. The smoke from burning vegetation, which has been killed with arsenical sprays, is dangerous to mankind and should be avoided as much as possible when such material is being burnt, particularly in heaps. Timber which has been poisoned with arsenic against attacks by white-ants can also cause sickness, and even death, if burnt in a stove in an ill-ventilated room.

Cattle suffering from mineral deficiencies sometimes lick the white incrustation found on the earth or stone of the dip drip yard and deaths from this cause have come under the notice of departmental officers.

Arsenic solutions can often cause serious injuries to the body if allowed to come into contact with it, and injuries to the finger nails quite commonly follow the immersion of the hands in such solutions.

Other common arsenic compounds chiefly used as pest destroyers are arsenate of lead; calcium arsenate, a compound of calcium (lime) and arsenic; and Paris green, a compound of copper and arsenic. The chief danger from these compounds is to domestic pets and to fowls. The common baits formed from one or other of these compounds, bran, pollard and molasses and used for the destruction of grasshoppers, cut worms, and other pests, are quite attractive to fowls and even to cats and dogs. It will kill them as readily as it does insect pests and the greatest care should be exercised in distributing such baits. All arsenical preparations should be kept well out of the way of children, and older people should always exercise care by washing the hands before eating food, or even rolling cigarettes, after arsenical preparations have been handled.

The foregoing indicates that, although arsenic is one of the most efficient pest destroyers available at the present time, it may also be a menace if due care and precautions are not taken to ensure that animals cannot have either direct or indirect access to it.

WHITE HIDE.

Following is a method of making white hide by applying the alum "tanning" process:—

(1) Soak the hide in clean water for four hours, then run off the dirty water and cover with clean water; leave for twenty-four hours. This should be sufficient for fresh or salted hides. Dry hides should be soaked for a further twenty-four hours, or until they are soft.

(2) Remove the hair by soaking hides in milk of lime—30 lb. lime per 100 gallons water. Handle each day, and leave until the hair can be removed—about six to seven days in summer.

(3) Remove all flesh and fat by scraping with a knife. Wash well with several lots of water during the twenty-four hours after removing the hair and pieces of flesh, fat, &c.

(4) Tan in a solution of alum (5 lb.), salt (1½ lb.), Glauber salt (1½ lb.), and water (10 gallons). Use enough of the solution to cover the hides. Handle twice daily and allow six days for tanning.

(5) Drain well from the alum and salt solution, but do not wash; then cover both sides with fish oil or neatsfoot oil, and hang up and allow to dry slowly. Tanners have a machine for forcing the oil fats, &c., into the hide.

(6) When dry, stretch until soft. If dry skins are difficult to stretch, sprinkle with water and cover for two days; again stretch and dry.

Alum-tanned leather is sometimes covered with a paste instead of oil before drying. The paste is made up as follows:—

5 lb. flour.
2½ lb. alum.
1 lb. salt.
1 lb. neatsfoot oil.
1 to 1½ gallons water.

Mix the alum and salt with water and then the flour and oil in a separate basin. Add to the flour and oil sufficient of the alum and salt solution to make a paste. Put the hide and paste into a tub, and handle the hide vigorously so as to force the paste into the leather. Hang the leather up and allow it to dry slowly without removing the paste. If the leather is too firm, rub on more fat, such as soft dripping, &c. If possible, stretch the leather just before it is quite dry. After stretching, it can be nailed on a wall or similar surface.

GENERAL NOTES

Staff Changes and Appointments.

The following transfers of Instructors in Agriculture have been approved:—

Mr. W. R. Straughan, from Chinchilla to Warwick;

Mr. G. W. Smith, from Toowoomba to Chinchilla; and

Mr. E. R. Ashburn, from Gatton to Laidley.

Commodity Marketing Boards.

An Order in Council issued under *The Fruit Marketing Organisation Acts* extends the operation of the provisions of those *Acts* for a period of five years from 1st January, 1945, to 31st December, 1949. This, in effect, means that the operations of the Committee of Direction of Fruit Marketing are extended for the period mentioned.

Mr. H. S. Hunter, Director of Marketing, has been appointed a member of the Committee of Direction of Fruit Marketing until 31st August, 1946.

An *Order in Council* has been approved giving notice of intention to extend the operations of the Queensland Egg Board for a further period of three years from 1st January, 1945.

Cheese Board.

The following have been nominated for appointment as members of the Cheese Board:—

Messrs. R. T. Dare (Narko), R. C. Duncan (Pittsworth), M. McIntyre (Mt. Tyson), D. G. O'Shea (Southbrook).

An election, closing at 12 noon will be held on 6th December, 1944. Three members are required.

Butter Board.

The following have been nominated for appointment as members of the Butter Board:—

Messrs. A. H. Bulow (Mulgeldie), S. H. Cleminson (Malanda), J. McRobert (Maryborough), A. G. Muller (Boonah), T. F. Plunkett (Beaudesert), J. Purcell (Toowoomba), W. J. Sloan (Malanda).

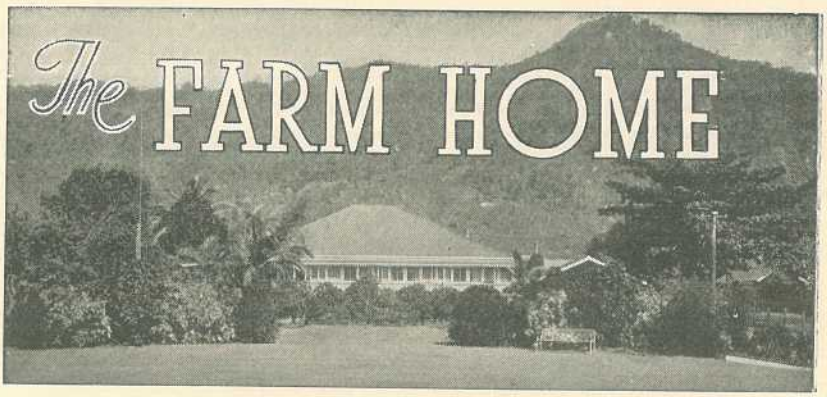
An election, closing at 5 p.m., will be held on 6th December, 1944. Six members are required.

Sugar-mill Technology Scholarships.

The Minister for Agriculture and Stock (Mr. T. L. Williams) has announced a decision of the Government to grant two scholarships in sugar-mill technology, open to undergraduates who have completed at least one year in the School of Applied Science in Industrial Chemistry at the Queensland University. The Minister stated that the Sugar Advisory Board viewed with concern the depletion of the staff of the Technology Division of the Bureau of Sugar Experiment Stations, because, primarily, of the diversion of some members of the staff to other industries. It is proposed that, on the completion of the prescribed course of study and graduation, each scholarship-holder shall serve a specified period of years in the Public Service of the State.

Buffalo Fly Control.

The Minister for Agriculture and Stock (Mr. T. L. Williams) has announced that a regulation has been promulgated under *The Diseases in Stock Acts* prohibiting the carrying, collection, keeping or sending through the Post Office or otherwise of buffalo flies or eggs of buffalo flies. Hitherto, this prohibition only extended to the cattle tick or eggs of the tick, but in view of the necessary to do everything practicable to prevent an extension of the buffalo fly pest, it has now been decided to apply the penalty clauses of *The Diseases in Stock Acts* to the unauthorised carriage of the fly.



Mother and Child.

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

THE CARE OF BABY'S SKIN.

IN last month's article it was pointed out that the baby's skin is extremely sensitive and the special care needed to protect it was outlined. However, it is sometimes necessary to treat skin irritations which have already occurred as a result of lack of knowledge or care, or because the baby's skin is even more than usually delicate. A few of the common skin irritations are:—

Cradle Cap.—The skin on the top of the head is called the scalp and sometimes in very young babies a condition known as cradle cap occurs. This appears as bran-like patches on the scalp and may spread to the forehead and eyebrows. It should be treated as soon as it is noticed, because otherwise it may be difficult to remove. To guard against cradle cap, before the baby's bath each day apply a little warm "baby oil" or castor oil to his scalp and then wash with super-fatted soap. The scalp should be gently rubbed with a soapy hand, and the soap should be washed off carefully before drying with a soft towel. Mothers are usually afraid to touch the "soft spot" on the baby's head, but they can do no harm if they wash and dry the head gently.

If a scurfy patch is observed, remove it by rubbing it gently with the tips of the fingers smeared with a little vaseline. Leave on for some hours and then gently lift the scales with a visiting card; then wash the head with warm water and baking soda (1 teaspoon to 1 pint of water).

Chafing.—This condition occurs in the creases where two skin surfaces come into contact. The skin becomes red and moist and a discharge may occur. The parts generally affected are the creases behind the ears, and the creases of the neck, the armpits, the elbows, thighs and buttocks. To prevent the condition, the baby should be gently soaped all over, particularly in the creases, using a super-fatted soap. After thoroughly washing off the soap, dry the skin very carefully. It is wiser not to use powder in the creases—a thin film of baby oil is preferable.

Napkin Rash.—The area of the skin covered by the napkin may be reddened, because of irritation caused by a wet napkin or after the baby has had a bowel upset. If the baby does not have sufficient cool boiled water in hot weather, the urine becomes concentrated and irritates the skin. Wet and soiled napkins should be removed as soon as possible, and the napkins themselves should be soaked well and then boiled. Never use soda, blue, or soap powders in washing napkins, and see that they are well rinsed and thoroughly dried and aired before use.

Sunburn.—All babies require sunbaths daily, but they should be given very carefully, commencing with one or two minutes on the legs and gradually increasing as the baby becomes tanned. If the baby is exposed too long to the direct rays of the sun, his skin may be badly burned. Sunburn can be just as painful and dangerous as a burn from any other cause, and mothers should be most careful to avoid it. If it does occur in mild degree, apply a little zinc cream or boracic ointment.

Chapped face, hands, or legs.—This usually occurs in cold windy weather and, although not serious, is uncomfortable and cracks in the lips may interfere with suckling. It is a good plan to rub a little good lanoline or cold cream on his face and other exposed parts before taking the baby out on a windy day.

Insect bites.—Bites of mosquitoes, sandflies, fleas, and other insects may cause a rash which may be recognised by the presence of a darker puncture in the centre of each spot. For the irritation, apply a paste made of baking soda and water.

Many common skin conditions of childhood are preventable with proper care. Except where the cause is known and the rash responds to simple treatment, the advice of a doctor should be sought.

Questions on this or any other subject concerning Maternal and Child Welfare will be answered by communicating personally with *The Maternal and Child Welfare Information Bureau,* 184 St. Paul's terrace, Brisbane, or by addressing letters "Baby Clinic, Brisbane." These letters need not be stamped.

IN THE FARM KITCHEN.

Some Unusual Recipes.

In present circumstances, recommendations are subject, of course, to the availability of the ingredients mentioned or of suitable substitutes.

Vegetable and Meat Cakes.

One cup each of cooked mashed potatoes and carrots, 3 or 4 oz. fresh minced meat, 1 tablespoon finely chopped parsley, a little chopped onion if available, pepper and salt, about 1 tablespoon thick sauce. Combine vegetables, meat, parsley, and seasoning and bind together with the sauce if required. Turn on to a floured board and form into flat cakes, dust with flour, and fry in a little smoking-hot fat until lightly browned on the under side; turn and fry on the other side, allowing 12 to 15 minutes' frying in all to cook the meat. Drain and dish the cakes on a bed of green vegetables, with a little brown sauce made from the vegetable stock poured round them. These cakes can be brushed with milk and baked for 20 minutes in a hot oven if preferred.

Canteen Cookies.

Half teacup syrup or treacle, 2 tablespoons milk, 1 teacup rolled oats, ¼ teaspoon baking soda, 1 teacup flour, 4 tablespoons sugar, ½ teaspoon salt, 1 teaspoon ground ginger, 3 tablespoons bacon fat or butter.

Heat the syrup or treacle with the sugar, fat, and milk in a saucepan till the fat is dissolved. Sift the flour with the salt, soda, and ginger; then add alternately with the rolled oats to the fat mixture. Cool. Turn on to a well-floured pastry board. Roll out and cut into small rounds. Bake on greased baking sheet, a little apart, in a moderate oven (Regulo 3) till pale-brown. Cool on wire rack. Store in a tightly closed jar.

These biscuits are handy to serve with coffee or tea or to include in a packed luncheon.

Devilled Mutton.

Cut some slices of cold mutton or lamb, sprinkle them with salt, pepper, and cayenne and a few drops of unsweetened lemon flavouring. Leave for half an hour, then dip in melted butter, coat lightly with browned breadcrumbs, and bake for about ten minutes in a moderate oven.

Escalloped Parsnips.

Cook some parsnips until tender, then dice them quite finely. Put into a dish alternate layers of parsnips and breadcrumbs and butter, salting to taste. Continue until the dish is full, having breadcrumbs and butter on top. Pour over a little milk and bake until brown. Serve in the baking dish.

Girdle Scones.

Rub well together 1 lb. flour, 1 teaspoon bicarbonate soda, 2 teaspoons cream of tartar, 2 teaspoons sugar, and pinch of salt. Rub in a piece of butter the size of a walnut, mix with milk to soft dough, roll out about ¼-in. thick, and cut into triangles. Dust hot girdle with flour and cook slowly on both sides.

Cracked Wheat as a Vegetable.

Use threshed wheat for this.—A cupful will be enough to serve four people. Soak overnight in boiling water and then crack by pressing with a potato-masher or rolling with a rolling-pin. Boil until tender with just enough water for it to absorb slowly. Add salt, pepper, and butter to taste, turn into a covered caserole, pour over a little milk, and bake slowly for half an hour. Serve as an ordinary cereal vegetable.

Egg Noodles.

Sift 8 oz. flour with ½ teaspoon of salt, add 2 egg yolks and a tablespoon of melted butter, and work into a stiff—but smooth—dough. Knead well, roll out, and cut in several portions (say, six); fold lengthwise and cut crossways into narrow strips. Loosen the strips and boil in salted water. Drain and place in saucepan with 1 oz. butter, 1 oz. grated cheese, and 2 tablespoons of sauce and season with pepper and grated nutmeg. Stir over the fire till thoroughly heated, dish up, sprinkle with freshly fried breadcrumbs, and serve.

Savoury Roll.

Take 8 oz. flour, pinch salt, water, 4 oz. finely shredded suet. For the filling, 8 oz. minced raw steak, 2 tablespoons finely diced onion, 2 tablespoons finely diced potato, 1 tablespoon finely chopped parsley, 1 teaspoon finely chopped mixed herbs, salt, pepper, milk.

Mix the ingredients for the filling all together in a bowl. Season generously with salt and pepper and moisten with a little milk, sufficient only to bind the mixture. It should not be sloppy. Sift the flour and salt into a bowl. Rub in the suet lightly and then mix with sufficient water to a firm dough. Roll out in an oblong about half as long again as it is broad. Spread the filling over and roll up the paste. Damp the last edge to make it adhere firmly and press the ends to close them. Put into a dry, well-floured cloth and roll up. Tie securely, leaving just a little room for it to swell. Plunge into a pan with sufficient fast boiling water to cover the roll. Keep the water boiling fairly fast during cooking and replenish with boiling water if it boils away. Cook for two hours. Serve with gravy.

Vegetable Pie.

Into a piedish put left-over cooked vegetables, cutting them neatly into dice. Potatoes, carrots, peas, turnips are all suitable. Make a cup of white sauce, season it well with pepper, salt, and chopped parsley, pour it over the vegetables and finally cover it with a layer of grated cheese and breadcrumbs in equal quantity. Then brown in the oven and serve hot.

Egg Roly-poly.

Six tablespoons self-raising flour, 2 or 3 hard-boiled eggs, 1 onion, salt, cold water, 3 tablespoons shredded suet. Mix flour with shredded suet and salt, mix to a dough with cold water and roll out as for roly-poly. Slice 1 onion thinly, spread eggs (cut in slices) over surface of paste, and place onions on top. Sprinkle well with salt and pepper, roll carefully, sealing edges well, place in scalded and floured pudding cloth, and boil two hours.

Green Pea Omelette.

Put ½ lb. shelled peas through mincer, add a grated onion, little chopped parsley, herbs. Season with salt and pepper. Beat an egg, mix with a cup milk, and pour over peas. Bake until set.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

AUGUST RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.	No. of years' records.	Aug., 1944.	Aug., 1943.		Aug.	No. of years' records.	Aug., 1944.	Aug., 1943.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	0·84	42	1·12	..	Gatton College ..	1·08	44	1·79	1·64
Cairns	1·65	61	1·28	0·03	Gayndah	1·12	72	1·29	0·90
Cardwell	1·22	71	1·73	0·24	Gympie	1·65	73	1·26	1·47
Cooktown	1·17	67	0·54	..	Kilkivan	1·35	62	0 66	0·80
Herberton	0·61	57	0·47	..	Maryborough ..	1·61	72	1·48	0·69
Ingham	1·44	51	1·94	0·13	Nambour	1·88	47	1·80	2·05
Innisfail	4·85	62	6·24	0·32	Nanango	1·29	61	0·78	1·34
Mossman	1·34	19	1·14	0·37	Rockhampton ..	0·82	72	0·90	0·78
Townsville	0·50	72	0·60	0·11	Woodford	1·61	55	1·62	1·54
Central Coast.					*Central Highlands.*				
Ayr	0·58	56	0·66	..	Clermont	0·70	72	0·89	0·25
Bowen	0·72	72	0·58	..	Springsure	0·99	74	0·46	1·02
Charters Towers ..	0·50	61	1·13	..					
Mackay	1·09	72	0·74	0·07	*Darling Downs.*				
Proserpine	1·45	40	2·76	0·01	Dalby	1·16	73	1·90	1·83
St. Lawrence ..	0·79	72	1·12	0·27	Emu Vale	1·06	47	2·74	2·95
					Jimbour	1·10	64	2·01	1·64
South Coast.					Miles	1·08	58	2·01	1·85
Biggenden	1·04	44	0·93	0·55	Stanthorpe	1·73	70	1·95	3·76
Bundaberg	1·27	60	1·61	1·01	Toowoomba	1·58	71	3·24	1·98
Brisbane	1·90	91	2·51	1·42	Warwick	1·40	78	3·65	3·51
Caboolture	1·62	67	1·63	1·05					
Childers	1·21	48	0·96	0·88	*Maranoa.*				
Crohamhurst	2·17	50	1·77	1·70	St. George	0·91	62	2·86	1·86
Esk	1·39	56	1·58	1·18	Roma	0·86	69	2·74	1·57

CLIMATOLOGICAL TABLE FOR AUGUST.

Compiled from Telegraphic Reports.

Divisions and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cairns	..	78	52	84	27, 28	51	28	128	11
Herberton	..	71	50	82	26, 27	37	28	47	6
Townsville	..	77	57	87	27	49	12, 13	60	4
Brisbane	30·16	71	51	84	30	46	5	251	7
Darling Downs.									
Dalby	..	69	42	83	31	34	2	190	6
Stanthorpe	..	61	37	73	31	24	1	195	5
Toowoomba	..	62	45	76	31	40	4	324	8
Mid-Interior.									
Georgetown	30·03	84	55	89	31	43	15	139	1
Longreach	30·16	80	50	92	31	40	12	9	1
Mitchell	30·20	68	42	83	30	31	3	317	8
Western.									
Burketown	..	85	56	91	27	50	11, 12, 13	..	..
Boulia	30·10	79	48	95	31	34	10	..	..
Thargomindah	30·16	70	47	89	31	35	3	248	3

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

OCTOBER, 1944.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			CORRECTION IN MINUTES FOR OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
1	5·29	5·47	Cairns	+ 37	+ 20	Longreach ..	+ 39	+ 31
6	5.23	5.49	Charleville ..	+ 28	+ 27	Quilpie	+ 34	+ 36
11	5.18	5.52	Cloncurry ..	+ 55	+ 44	Rockhampton ..	+ 14	+ 6
16	5.13	5.55	Cunnamulla ..	+ 29	+ 30	Roma	+ 18	+ 16
21	5.07	5.58	Dirranbandi ..	+ 18	+ 20	Townsville.. ..	+ 31	+ 18
26	5.03	6.01	Emerald	+ 23	+ 16	Winton	+ 44	+ 35
31	5.00	6.04	Hughenden ..	+ 41	+ 30	Warwick	+ 4	+ 4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	p.m.	a.m.
1	4.45	4.48
2	5.53	5.31
3	7.01	6.13
4	8.07	6.56
5	9.12	7.39
6	10·15	8.25
7	11.15	9.13
8	..	10·03
	a.m.	
9	12.11	10.56
10	1.01	11.49
		p.m.
11	1·47	12.43
12	2·29	1.36
13	3.07	2.29
14	3.42	3.21
15	4.14	4.12
16	4·46	5.03
17	5.18	5.55
18	5·51	6.47
19	6.25	7.41
20	7.02	8.36
21	7.43	9.32
22	8.28	10.29
23	9.18	11.24
24	10.13	..
		a.m.
25	11·12	12.17
	p.m.	
26	12·14	1.08
27	1.19	1.55
28	2.24	2.40
29	3.31	3.22
30	4.37	4.03
31	5·43	4.45

CORRECTION IN MINUTES FOR SOUTHERN DISTRICTS.

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

CORRECTIONS IN MINUTES FOR CENTRAL DISTRICT.

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	+ 21	+ 15	+ 38	+ 31	+ 12	+ 6	+ 43	+ 35
6	+ 12	+ 26	+ 28	+ 42	+ 2	+ 17	+ 31	+ 47
11	+ 12	+ 26	+ 28	+ 42	+ 2	+ 17	+ 31	+ 49
16	+ 18	+ 19	+ 34	+ 35	+ 9	+ 10	+ 39	+ 40
21	+ 26	+ 12	+ 42	+ 27	+ 17	+ 2	+ 49	+ 30
26	+ 26	+ 12	+ 42	+ 28	+ 17	+ 2	+ 49	+ 30
31	+ 16	+ 21	+ 32	+ 37	+ 7	+ 12	+ 36	+ 42

CORRECTIONS IN MINUTES FOR NORTHERN DISTRICTS.

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	+ 34	+ 20	+ 53	+ 44	+ 39	+ 29	+ 29	+ 18
3	+ 23	+ 32	+ 46	+ 56	+ 32	+ 37	+ 21	+ 27
5	+ 15	+ 40	+ 40	+ 58	+ 27	+ 42	+ 14	+ 35
7	+ 10	+ 47	+ 37	+ 62	+ 23	+ 47	+ 10	+ 40
9	+ 9	+ 49	+ 36	+ 63	+ 22	+ 48	+ 8	+ 41
11	+ 11	+ 46	+ 38	+ 62	+ 23	+ 47	+ 10	+ 39
13	+ 16	+ 40	+ 41	+ 58	+ 27	+ 42	+ 14	+ 35
15	+ 23	+ 33	+ 46	+ 54	+ 32	+ 38	+ 21	+ 28
17	+ 31	+ 24	+ 52	+ 46	+ 37	+ 32	+ 27	+ 21
19	+ 39	+ 17	+ 56	+ 42	+ 42	+ 28	+ 34	+ 15
21	+ 45	+ 10	+ 61	+ 37	+ 46	+ 23	+ 38	+ 10
23	+ 50	+ 8	+ 64	+ 36	+ 48	+ 22	+ 41	+ 8
25	+ 49	+ 9	+ 64	+ 36	+ 47	+ 23	+ 39	+ 10
27	+ 42	+ 14	+ 59	+ 40	+ 44	+ 26	+ 36	+ 14
29	+ 31	+ 23	+ 52	+ 46	+ 37	+ 32	+ 27	+ 21
31	+ 22	+ 34	+ 45	+ 54	+ 30	+ 38	+ 19	+ 29

NOTE.—The plus sign (+) means later than Brisbane time.

PHASES OF THE MOON.

Full Moon, 2nd October, 2.22 p.m.; Last Quarter, 9th October, 11.12 a.m.; Full Moon, 31st October, 11.35 p.m.; New Moon, 17th October, 3.35 p.m.; First Quarter, 25th October, 8.48 a.m.

DISCUSSION.

On 20th October the Sun will rise 10 degrees south of true east and set 10 degrees south of true west.

On 16th October the Moon will rise and set at the true east and west points respectively.

Venus.—The planet this month is observable in the west during the early evening. At the beginning of the month it passes from the constellation of Virgo into the constellation of Libra, setting throughout Queensland generally, about 8 p.m., approximately 15 degrees south of true west. By the end of the month it comes very close to Antares, that brilliant star at the head of the Scorpion; and sets, in Queensland generally, before 9 o'clock, 25 degrees south of true west.

Mars.—During the month Mars is too near in line with the Sun for observation. It sets generally about 6.30 p.m.

Jupiter.—This planet will be conspicuous during the early morning, in the east, in the constellation of Leo. At the beginning of the month it rises in Queensland generally about 5 a.m., but by the middle of the month it rises soon after 4 p.m. (western towns later), approximately 5 degrees north of true east. At the end of the month Jupiter rises in Queensland between 2.45 and 3.30 a.m., the direction of rising then being still about 5 degrees north of true east.

Saturn.—During the month Saturn rises near midnight in the constellation of Gemini, about 25 degrees north of true east.

Direction from Heavenly Bodies.—Since the outbreak of this war much has been heard of the value of being able to find direction from the Sun, Moon, Planets, and Stars without instruments or calculations. While these methods are usually very simple, it is just as simple to be badly misled and to make serious errors, unless the scope of the particular rule is understood. These easy rules are based on some general condition, or circumstances applicable to a particular zone, and how imperative it is to know the limits wherein the rule holds is shown by the following: It is widely known that the stars of Orion's belt always rise true east and set true west. These directions hold good for any position of the observer on this earth, *but it is only when these stars are on the horizon is it so.* As they appear higher up in the sky, their direction changes and the amount of change in a given time now depends on the position on earth of the observer. From a place in Latitude 10 degrees south (Thursday Island), three hours after rising the direction of the belt is 10 degrees north of the true east point; and from a place in Latitude 30 degrees south (Grafton), three hours after rising the direction of the belt is 27 degrees north of true east. It will be seen then that, for a general rule, the direction is limited to when the bodies appear on the horizon and the closer the observation is made to that instant the more accurate will be the result. Furthermore, when the Star, Sun, or Planet does not rise true east or set true west, then the angle north or south of the true east or west again depends on the position of the observer. The further from the equator, the greater is the angle—e.g., the Sun on 23rd December at Thursday Island rises 23½ degrees south of true east; at Sydney on the same date rises 28 degrees south of true east; and at Grafton on the same date rise 26¾ degrees south of true east.

To the average person concerned with direction, however, a standard of accuracy not greater than about 5 degrees is required, and fortunately for Queenslanders it is well within this limit to assume that from any place in this State, the direction up to one hour after rising to one hour before setting is the same as that given for rising and setting. There are even times when, for places in Northern Queensland, the direction of the Sun, Moon, and Planets changes very little from rising till they pass into the western sky, and then changes very little again before setting, but this is confined to a certain place on a certain date and is not general throughout the State, as in the limit of one hour from rising and setting.

Frequent mention has been made this month of the direction at rising and setting of the Sun, Moon, and Planets, and, while this information is of great value, the above warning not to go beyond the limit of the scope of the rule should be carefully noted. The Sun and Moon are easily seen on the horizon and not much difficulty should be experienced in noting the planets very close to the horizon.

Supplied by the Astronomical Society of Queensland.

QUEENSLAND WEATHER IN SEPTEMBER.

Some light showers in the far North Coast and North Peninsula sections gave over-average monthly totals. Mainly because of a fairly general storm distribution just after the middle of the month, figures for the Maranoa, Darling Downs, and South Coast Moreton districts were only slightly under to a little above normal. Favourable conditions were maintained in most other agricultural and dairying sections, chiefly because of the earlier rains of inland tropical source. There has been a marked seasonal absence of any rain influences from southern disturbances. Apart from a few unimportant light over-average showers in the Lower West, little or no rain fell over the greater part of inland pastoral areas. Light September rains are usual, but the early advent of the variable inland storms of October and November would assist the main pastoral districts still in average seasonal condition and be welcomed in southern border areas where August rains were insufficient to maintain proper pasture growth. Further storms on the Darling Downs, however, might reduce the estimated wheat crop of 6,000,000 bushels by hail or rust damage.

Temperatures.—Maximum temperatures were above normal in western districts from 1.6 degrees at Longreach to 2.1 degrees Boulia, otherwise coastal and south-east sections were below normal from 2.6 degrees at Rockhampton and Mitchell to 3.4 degrees Brisbane (record).

Stanthorpe lowest minima (12th), 27 degrees and 20 degrees.

Mitchell Screen 33 degrees (18th), Terrestrial 28 degrees 11/12th.

The rain position is summarised below—

Division.	Normal Mean.	Mean Sept., 1944.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	13	37	185 above
Peninsula South	24	Nil	100 below
Lower Carpentaria	17	Nil	100 ,,
Upper Carpentaria	36	Nil	100 ,,
North Coast, Barron	92	253	175 above
North Coast, Herbert	155	193	25 ,,
Central Coast, East	108	30	72 below
Central Coast, West	70	Nil	100 ,,
Central Highlands	102	32	69 ,,
Central Lowlands	65	7	89 ,,
Upper Western	29	13	55 ,,
Lower Western	44	28	36 ,,
South Coast, Port Curtis	141	81	43 ,,
South Coast, Moreton	206	176	15 ,,
Darling Downs East	167	161	4 ,,
Darling Downs West	104	125	20 above
Maranoa	118	112	5 below
Warrego	88	14	84 ,,
Far South-West	56	5	91 ,,

Commonwealth Meteorological Bureau, Brisbane.