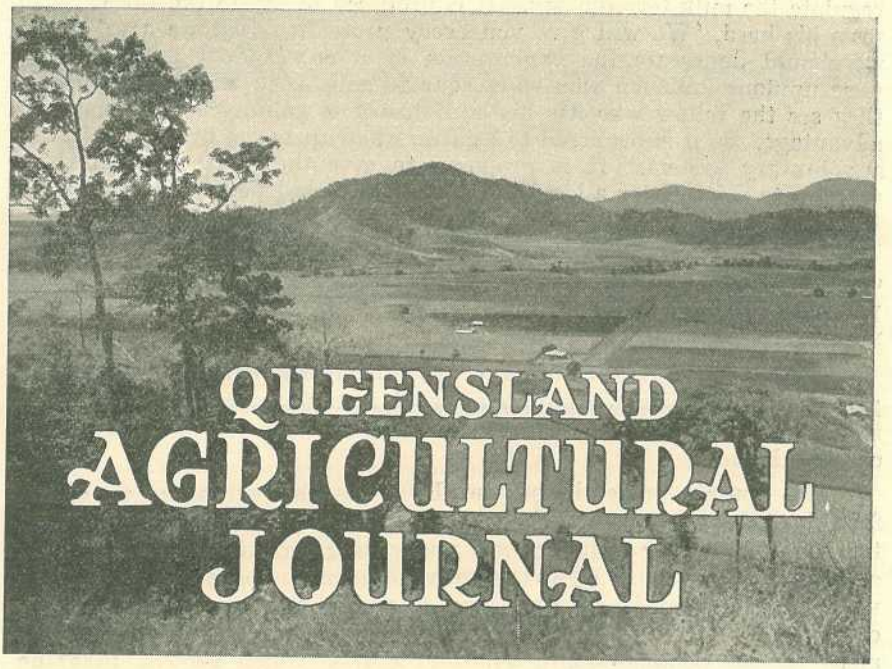
**ANNUAL RATES OF SUBSCRIPTION.**—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.




Vol. L 1 DECEMBER, 1938 Part 6

# *Event and Comment*

**New Dairy Legislation.**

IN the course of the debate in the Legislative Assembly on the Dairy Produce Acts Amendment Bill, which has since become law, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, dealt fully with many matters of especial interest to dairy farmers. The purpose of the new legislation, he said, was to overcome certain difficulties in the dairy industry, and that the first principle applied to the use of colouration agencies and disinfectants. Although in the principal Act there was power to regulate and prescribe the type of disinfectant and colouration agency that should be employed, it contained no power to confiscate disinfectants or colouration agencies that did not conform to the requirements of the regulations governing the standards of these commodities. The result had been that factories have had disastrous experiences, because certain colouration agencies and certain disinfectants which had not measured up to standard had been used. Quite obviously, the factories should get the protection it was intended they should have when the principal Act was passed.

The second principle of the measure was equally as simple, said Mr. Bulcock. It provided for the guaranteed certification of milk from disease-free animals, and that vendors would be fully protected in their use of the trade terms associated with the sale of such milk.

"In other words," he added, "it is proposed under this Bill to regulate the milk terminology. It is proposed to say to the farmer who tests his herd, 'We will give you every protection that we can.' And we should deprecate the exploitation of a non-existent certificate by unscrupulous milkmen who endeavour to gain some advantage because they see the fellow who has his herd tested is gaining a very material advantage. So it is proposed to legalise what up to the present has been a voluntary system. It is proposed to give the certificate issued in relation to this matter a legal status and to forbid people from describing milk in such a way as to falsely represent it and so gull the public. There is, I believe, a very strong and a very wide demand for milk from certified dairies; but it is not reasonable or just that a person should be permitted to say, 'This is a milk from a certified dairy' when it is nothing of the kind."

Continuing, the Minister said that the third principle of the Bill provided for the determination of what is pasteurised milk and what is raw milk; or what is reduced or frozen milk or stored milk, as the case might be.

The fourth principle of the Bill was the extension to cheese factories of requirements that applied to butter factories. It was true that the cheese industry was undergoing something in the nature of a transformation. It was equally pleasing to be able to say that whereas a few months ago there was a general outcry as to the quality of the cheese produced in Queensland there had been a marked improvement in the Commonwealth grading figures, which showed that the cheese industry was definitely on the up grade in respect of quality. When it was considered that the committee for nutrition associated with the Commonwealth National Health and Medical Research Council was specialising in the inclusion of a large cheese ration in the diet, one appreciated the fact that there was a considerable market in Australia that might yet be exploited, but that could be done satisfactorily only if the right quality of cheese were forthcoming.

"In order to discuss this and associated questions," stated Mr. Bulcock, "I attended a conference in Toowoomba, and there it was thought that it was not fair for the butter industry to have certain —shall I say?—restrictions placed on it, e.g., in relation to twenty-eight days' notice before a supplier could leave a factory, when these were not applied to the transport of milk to a factory. It will not be very long before the old practice of the individual taking his milk to the cheese factory will be entirely superseded by a new practice of the factory's making its own arrangements to collect the milk and transport it to the factory. Already there is a tendency in that direction. To-day two or three organisations are maintaining their own road transport and they are obtaining better service and better quality, and generally their practices are more balanced than when they depended on the supplier's turning up at any old time with his milk. Good cheese cannot be obtained, particularly in the summer months when milk has to stand in the vat over a long period waiting for a lagging supplier to arrive with his supplies to complete the vat before rendering it.

"At the request of the cheese industry and of the factories, it is proposed to give the factory the power to organise milk routes on the

same lines as those that have been adopted in relation to butter factories."

Under the new measure, canvassing for cream by the agents of a butter factory in the territory of another butter factory will be suppressed; likewise, other practices which are opposed to the true spirit of co-operation in the dairy industry and which have developed to its detriment in recent years.

## Planned Production.

THE need for a world-wide understanding on agricultural production has become more evident as the result of rapidly changing conditions in world economy. Planning for sugar and wheat production is already the subject of international negotiation, and there is a feeling that the same thing should be done in respect of all other primary commodities for which there is a world market. As far back as forty years ago it was feared that the limit of world production was approaching and that humanity was faced with the possibility of universal famine. Scientific agriculture has dispelled that fear. The actual position now is that, unless we can increase consumption by properly feeding peoples who are now undernourished, we are over-producing many agricultural commodities of which a proportion is deliberately destroyed. A form of international adjustment, therefore, has become an urgent necessity as supplementary to the many national plans already put forward as attempted solutions of national production and distribution problems.

There is just as great a necessity for orderly production as there is for orderly marketing, and some world understanding along these lines will be a further contribution to the world peace—or appeasement—movement. Every country has been forced to consider this problem, and the feeling is growing that the old hit or miss methods of farming, and the folly of haphazard production of essential food crops and its alternative periods of glut and scarcity, must give way to orderly production and orderly marketing on the basis of international planning, understanding, and good will.

## Farming as a Career.

MODERN farming is becoming as technical a business as most other skilled occupations. The tendency on the part of farming communities to send their brighter sons into town jobs is bad business from the farmer's point of view, and is a matter which calls for serious thought.

We want our better brains on the land to-day just as much as in the banks, the engineers' and accountants' offices, or the Public Service. A practical rural bias in our educational system should not only aid substantially in the solution of problems peculiar to farming, but indicate its outstanding advantages as a career for young Queenslanders.

# Pests of the Grape Vine.

J. HAROLD SMITH, M.Sc., Senior Research Officer.

THE grape vine, like many other cultivated plants, is attacked by a wide variety of pests, several of which have been recorded in Queensland. Most of them occasionally appear in odd vineyards, or on merely a few vines within a vineyard, and control measures are usually applied, not in anticipation of an outbreak, but to deal with one already present, and threatening to become worse. Routine treatment for specifically pest control purposes is seldom necessary, but it is most important that the vigneron should keep a sharp look out for any one of the many species partial to the grape, so that losses can be kept to a minimum. In this article the commoner pests will be discussed in their order of importance to the State and not that of any single district.

## The Grape Phylloxera.

The grape phylloxera* is perhaps the most serious grape pest known to the world and during current memory, its advent into various districts and countries has necessitated a complete change in established practices. In this State, an outbreak occurred in 1910, and drastic measures were then adopted in an attempt to eradicate the pest. In 1932, however, the insect was located in grape producing areas in the vicinity of Brisbane, and control methods based on experience in other States and overseas must be adopted if the industry is to persist in the area.

The grape phylloxera (Plate 207) is an aphid with somewhat specialised habits, but it feeds similarly to other aphids by means of piercing and sucking mouthparts, extracting sap from the plant structures that are infested. In some countries phylloxera occurs in two main forms, one of which feeds on the roots and the other on the foliage. Either of these may give rise to the other form. Winged insects which can be responsible for more widespread infestations may also occur. Fortunately, only the wingless root-infesting form has, as yet, been located in Queensland, and as it can only be distributed with planting material, the risk of the insect spreading to other areas, provided plants or cuttings are not moved from district to district, is comparatively slight Colonies of the minute, yellowish insects cluster together on the roots, and as a result of mass feeding over long periods these develop irregular lumps, somewhat similar to those caused above ground by the allied woolly aphis on deciduous fruit trees. As a sequel to the attack, the vines show symptoms of failure. New canes lack vigour, the leaves acquire a yellowish tint and the spring growth is sub-normal. Occasionally heavy crops may be borne by the vine before death occurs and the grower seldom appreciates the real position

* *Phylloxera vitifoliæ* Fitch.

DESCRIPTION OF PLATE 207.

THE GRAPE PHYLLOXERA (*Phylloxera vitifoliæ* Fitch).—Fig. 1, Egg x 60. Fig. 2, First Stage Radicicole x 60. Fig. 3, Later Stage Radicicole x 60. Fig. 4, Adult Radicicole x 60. Fig. 5, Nymph, ventral view, x 60. Fig. 6, Portion of Grape Vine Root showing Radicicoles and Eggs *in situ* x 4. Fig. 7, Nodosities on Rootlets x 4.

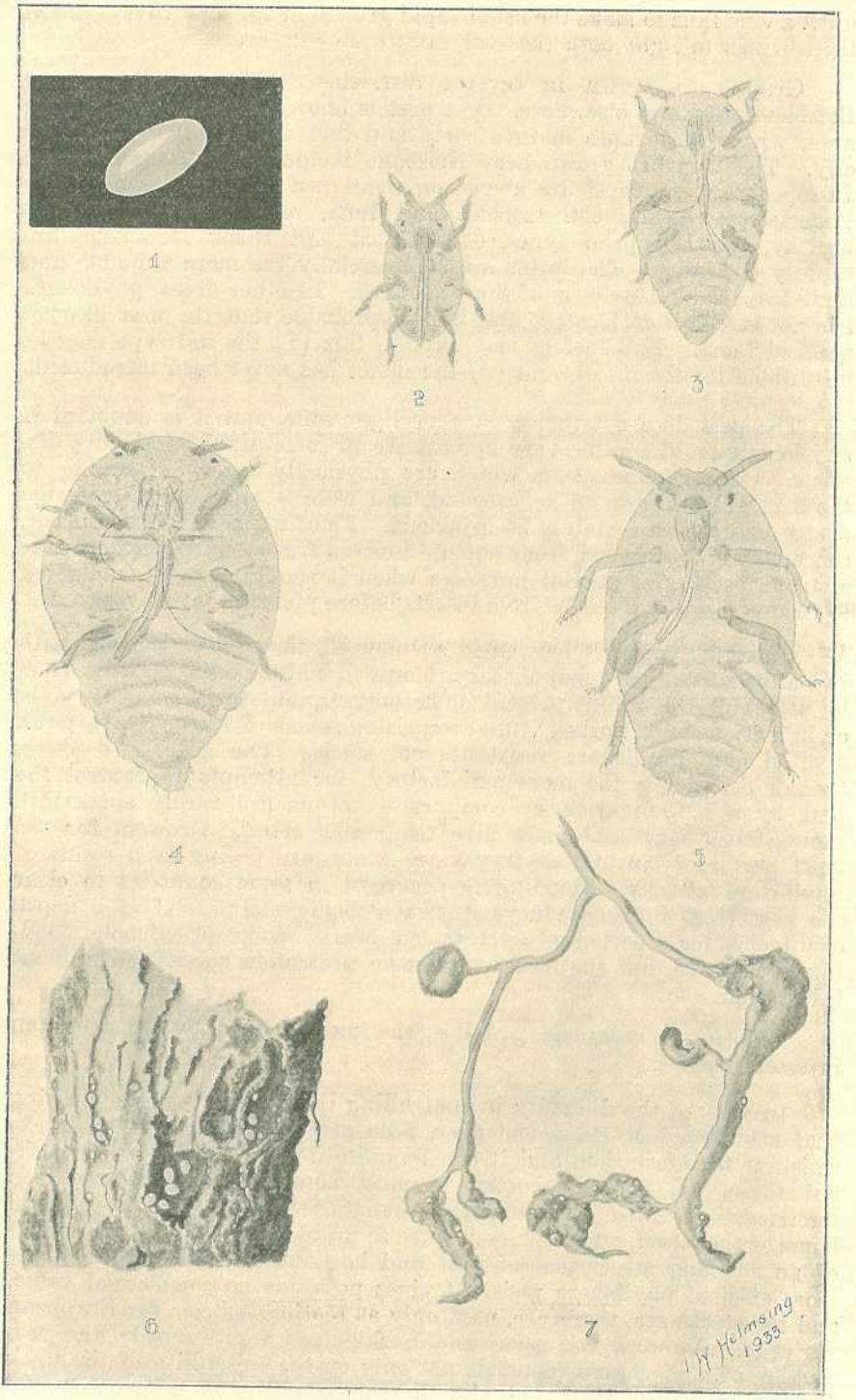



Plate 207.

until a vine fails to make the usual rapid growth in spring. Investigation then brings to light both the root failure and its cause.

Grapes are grown in several districts—Stanthorpe, Roma, the Brisbane area, and elsewhere. The pest is known only in the Brisbane area, where the grapes mature early and find a ready market in the city. The varieties grown near Brisbane include both American and European types. Most are grown on their own roots, and though the American varieties, e.g. Isobella and Iona, are still comparatively healthy, the European types, e.g. Muscat and Black Hamburg, are rapidly declining. The latter are commercially the more valuable and their loss to the district is of some moment. In other areas, phylloxera has not so far been located, and it is improbable that the pest has yet reached them. Two factors may explain this (1) the soil type may be unsuitable for the insect, and (2) the insect has never been introduced.

The pest does not thrive on very light soils, and it is doubtful if phylloxera could become very destructive in some grape producing districts. Others possess soils which are physically somewhat similar to those in areas known to be infested, and were it once introduced, the pest would almost certainly be injurious. Planting material should not, therefore, be purchased from outside sources for use in phylloxera-free districts except for special purposes when it should first be fumigated to ensure absolute freedom from insects before planting in the vineyard.

Once phylloxera is located in a vineyard, the grower is faced with two alternatives. He may either attempt to maintain the existing vines by attacking the aphids present or he may replant the vineyard wholly or in sections with worked vines comprising scions of European varieties grafted onto phylloxera resistant root stocks. The latter procedure, though drastic, is the more satisfactory, for attempts to control the pest by soil fumigation or comparable means are rarely successful, though they may sometimes give temporary relief. Growers for the most part root out and destroy vines which are failing as a result of phylloxera attacks. Flooding is practised in some countries to clear the pest from infested vineyards, water being maintained at a depth of 6 inches for a period of seven to ten days. Where practicable, flooding is effective, but the method gives no protection against subsequent infestation.

Existing regulations prohibit the movement of vines from an infested district.

In view of the difficulty in controlling the pest, it is not surprising that attention has, the world over, been given to the merits of stocks resistant to infestation, and it can be quite definitely stated that without these, the grape industry in most countries would have been irretrievably ruined. These stocks emanate from America, the original home of the insect, and their resistance to infestation may be the product of an age-long association of pest and host. The fruit borne by the more efficient phylloxera resistant vines possesses no commercial value, and the stocks are, therefore, used only as rooting systems for European varieties. As stock and scion relationships are very variable, the production of a good plant depends not only on the suitability of the stock for any given soil type, but also the compatability of scions with the approved stocks.

In countries and states where phylloxera has been a problem for some time, accumulated cultural studies and grower experience now permit the use of approved resistant stocks with each of the more important commercial scions. In Queensland, phylloxera attacks are comparatively recent, and the value of successful stock and scion combinations elsewhere has yet to be demonstrated or fresh combinations developed for use in areas infested at the present time. Preliminary work has already commenced with a number of selected resistant stocks, including Riparia Rupestris 3309, Riparia Rupestris 3306, Aramon Rupestris Ganzin No. 1, Mouvedre Rupestris 1202, Rupestris du Lot, and Riparia Berlandieri 420 A. Various types of scion such as the Muscats, Madeline Royal, and Black Hamburg are being worked on to these stocks, and it is hoped that enough data will later be available to permit precise recommendations for the area at present infested with phylloxera. In the meantime, growers in the Brisbane district who wish to replant land from which dead vines have been removed should first seek information on suitable varieties from the Department of Agriculture and Stock. The selection of phylloxera resistant vines can then be narrowed down to those showing promise in official experimental work.

## Fruit Fly.

The grape is by no means a favourite host of the Queensland fruit fly*, but in years when the pest is abundant, losses may be severe. In some districts, the fruitgrower interested in a variety of crops generally regards infestation in grapes as a portent of heavy losses in later maturing fruits, the inference being that if the fruit fly population is high in early summer, the position will be more serious in late summer and autumn maturing crops.

The grape cannot be considered an ideal host for the pest, as the development of the insect is seldom completed in the fruit. Eggs are laid in the grapes as they approach maturity. These hatch and young larvæ emerge, but the conditions within the fruit are apparently unfavourable for development and the maggots die. The stung grapes show some discolouration round the egg puncture and sunken spots develop. Stung fruit is quite unmarketable, and must be trimmed from the bunches prior to packing.

Control measures should not normally be necessary, but when the pest is serious, vanilla-ammonia lure traps developed for use in fruit trees should be placed in the vineyard. These can conveniently be suspended to the wires along which the vines are trained and should be hung in shaded positions close into the plant.

## Grape Thrips.

In some years, the grape thrips† is very destructive to the vine during the flowering period. These insects attack the young growth in spring, producing flower drop, faulty setting, and occasionally leaf fall and malformations in the growing point of the vine. The injury is due to mass feeding by innumerable thrips, the under-surface of the young leaves being eroded and the essential structures of the flowers destroyed. Outbreaks are rather sporadic, the most recent being in the year 1937.

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* *Chætodacus tryoni* Frogg.

† *Haplothrips froggatti* Hood.

The insects are approximately one-twelfth of an inch in length, dense black in colour, and move with a distinctive skipping flight. The eggs are laid within the tissue of the leaves or flowers through a saw-like ovipositor which makes the necessary incision in the surface. In hatching from the eggs, the young force their way to the outside of the leaf and commence to feed. After growing through a succession of moults, the wingless larvæ reach the pupal stage and finally transform into the winged adults.

The rapid rate at which these insects increase in numbers is such that control measures must be applied promptly if losses are to be kept within reasonable bounds. The grower may use either sprays or dusts for the purpose, and his choice will, in practice, depend on the facilities available in the vineyard. Nicotine sulphate is the most effective insecticide. Several proprietary nicotine dusts of varying strengths are on the market and the brand selected should contain not less than 2 per cent. of nicotine. A comparable spray can be prepared to the following formula:—nicotine sulphate, ½ pint; water, 50 gallons; soft soap, 2 lb. The soap is thoroughly dissolved in the water and the nicotine sulphate is added, the spray being then applied immediately.

Though both sprays and dusts are effective against adults and larvæ, the eggs survive treatment. At least two treatments are therefore, necessary to give complete control.

### Mites.

A variety of mites attack the grape vine. One, the vine leaf blister mite,* is associated with the phenomenon known as erinose and occurs in colonies within blister-like erinia or felted galls on the under surface of the leaves, each erineum having a felt-like appearance due to abnormal leaf hair development on the attacked area. Two other species are relatively common. One† is more or less elongate, creamy white in colour and feeds on the leaves; the second‡ is larger, somewhat squarish in shape, transparent pink in colour and is generally found associated with scarred fruit.

All the mites of economic interest on the grape are very small and difficult to detect with the naked eye. Some types of injury are, therefore, frequently attributed to dry weather. This is partly due to the fact that under such conditions the mites are very prolific and the population increases rapidly to pest proportions. The mass feeding of innumerable mites on the under surface of the leaves induces a yellow colouration which is frequently most intense in the vicinity of the veins. In the more severe instances, dead tissue may appear in the leaf. The general effect on the vines is not unlike that caused by prolonged hot weather, and careful observations are, therefore, necessary to confirm the presence or otherwise of the pests. In the absence of special facilities, the grower should examine closely the under surface of the leaves, particularly in the vicinity of the veins, for signs of surface breakdown. The break in colour between attacked and healthy portions of the leaf is also much more clear cut than in dry weather effects, which produce tip and marginal yellowing in the

* *Eriophyes vitis* Land.
† *Phyllocoptes sp.*
‡ *Tenuipalpus sp.*

leaf in the initial stages. These symptoms are sufficiently diagnostic for ordinary purposes to indicate the necessity or otherwise for insecticidal control measures.

Mite attacks may cause some diminution in the area of effective foliage on the vine. In acute cases there may be actual shedding, but as a rule the leaves persist, though not functioning normally. The whole vine is consequently impoverished and the quality of the fruit suffers, the grapes being under-developed and lacking in juice content.

Mite populations fluctuate to some extent with weather conditions but the grower cannot rely on weather changes to rid his vines of these pests. Dilatory action may have undesirable consequences. Control measures should, therefore, be applied as soon as the mite damage is detected on the growing plants. Sulphur dusts are normally effective and if applied when necessary before flowering, subsequent treatments required for the control of powdery mildew should obviate any further trouble.

Though the infestation of a vineyard develops quickly the mites are frequently present on the plants even though no damage is apparent. Their seasonal importance depends to some extent on winter survival. During this period the vine leaf blister mite shelters under cover of the scales of the dormant buds, while other species find protection under loose bark on the older arms of the plant. A lime sulphur spray, prepared by adding one part of the commercial concentrate (polysulphide content not less than 16 per cent.) to ten parts of water and including an appropriate spreader, should therefore be applied before the buds commence to swell, if the pest has previously been troublesome. Such a precautionary measure will minimise the risk of damage during the growing period later in the year.

### The Grape Vine Soft Scales.

The grape vine soft scales* are not uncommon in Queensland, though usually most prevalent in small orchards or private gardens where the vines are of little commercial importance and do not receive adequate attention.

The two more important species differ considerably in both size and shape, but possess somewhat similar habits. They are frequently clustered round the older canes and sometimes completely cover the underlying wood. They are brown in colour. In common with all scale insects they possess piercing and sucking mouth parts which abstract juice from the plant and to some extent weaken it. This phase of their activity is, however, less important than the marked development of sooty mould fungi which is usually associated with the insects. These fungi thrive on exudations from these scales and cover leaves, twigs and fruits of infested vines with a dirty coat consisting of matted fungal strands. These adhere closely to the fruit and affected bunches are unsuitable for either market or private use.

Control is relatively simple. The pest is commonly confined to a single vine and sometimes to a single cane. These latter should be cut out and destroyed when observed, particularly during normal winter pruning. If sprays are necessary, a miscible oil should be applied at a strength of 1 in 20 in the dormant period, after pruning operations have been completed. During pruning operations, the vigneron can

* *Saissetia nigra* Nietn. and *Lecanium persicæ* Geoff.

easily detect the presence of the scale and assess its probable importance in the following season. If only a few vines are attacked and pruning does not remove all the infested wood, the plants should be distinctively marked so that they can receive the appropriate spray treatment later on when convenient. Should control measures ever be necessary during the growing season, a 1 in 60 white oil spray should be reasonably effective.

### Grape Vine Moths.

Quite frequently, grape vines are defoliated by the larvæ of various moths. The several species fall for the most part into two groups, the hawk moths and the large day flying Agaristids.

The hawk moths* are large heavy bodied insects which occasionally come to lights at night. The name very appropriately describes the distinctive shape and sweeping flight of the insects which distinguish them from most other moths. The larvæ are formidable looking creatures which grow up to three inches in length and possess a centrally placed recurved spine at the rear end of the body. Two or three of the greyish-green drab-coloured larvæ can completely defoliate a vine in a very short time. When full fed they descend to the ground and pupate under any available debris at the base of the plant.

The day flying Agaristids† are represented by two pests of the grape vine. The more common species has a wing span of approximately two inches. The colour of both body and wings is a rich black, but the forewings have large yellow flecks. A tuft of reddish hairs occurs at the tip of the abdomen. The eggs are laid either on the vines or on the stakes supporting them. The newly-hatched larvæ are more or less black, but as they grow, yellow, green and other tints are imposed on the deeper background and the fore part of the body is suffused with red. Growth is rapid and considerable injury may occur before development is complete. The larvæ then descend to the ground and pupate in earthen cocoons from which the adults subsequently emerge.

The larvæ of any of the leaf-eating grape vine moths can be controlled by applications of a lead arsenate spray prepared by mixing 1½ lb. of lead arsenate with 50 gallons of water and adding the appropriate amount of some suitable spreader. As an alternative, lead arsenate may be added to Bordeaux sprays, applied early in the season for the control of fungous diseases, at the rate of 1 lb. to each 40 gallons of the fungicidal spray. Outbreaks usually take place in spring before the fruit has set and the spray can then be safely used. Toxic deposits may accumulate on the fruit if spraying is attempted later in the season. Arsenical sprays must, therefore, be dispensed with on vines bearing fruit, and handpicking should be adopted. As the larvæ of most grape vine moths are large and distinctive, handpicking as a supplement to spraying in the spring is quite practicable.

### Other Pests.

A number of beetles are occasionally injurious to the vine, sometimes as strays attacking odd plants here and there in the vineyard, sometimes as definite pests necessitating the use of control measures over the whole area.

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* *Hippotion celerio* L. and *Theretra oldenlandiæ* Fabr.
† *Phalænoides glycinæ* Lew. and *Agarista agricola* Don.

The red shouldered leaf beetle* may invade the vineyard at almost any time of the year, particularly in the coastal areas in the south. Only the adults are concerned and these arrive in immense numbers to attack the young growth. The losses may be severe on individual properties, though rarely over the whole district. A dust containing equal parts of pyrethrum and kaolin gives effective control and is best applied early in the morning. As a small proportion may survive the treatment of the vine, additional dust should be immediately blown over the stupified insects which fall to the ground when the dust is first applied to the vines.

A smaller, related, species† has sometimes been troublesome in inland districts and the same treatment would doubtless be effective in controlling it.

* *Monolepta rosea* Blkb.
† *M. divisa* Blkb.

## FRUIT AND FLOWERS BY AIR—NEW MARKETS FOR AUSTRALIAN PERISHABLES.

One of the most interesting developments on the Empire air routes is the experimentation in the transport of fruit and flowers over distances hitherto considered far too great for their successful carriage.

On the Qantas Empire Airways section of the Sydney-Southampton route, the carriage of perishables has already passed beyond the experimental stage and there is a regular interchange between Malaya and Australia of mangosteens, orchids, and oysters.

With the extensive development in recent years of Australia's internal air lines providing rapid connection with the flying boat ports, the results achieved in this class of traffic on other sections of Imperial Airways' world network of services should be of interest to Australian growers and exporters.

Between South Africa, India, and Egypt, there is already a considerable development in perishable traffic. The growth of a large regular trade in these freights depends on the solution of commercial problems involving quality, condition, and cost.

Malayan orchids, costing 1½d. in Singapore and selling from 2s. 6d. upwards in Paris and London, are already a firmly established market. Cost of packing and carriage from Malaya to London does not exceed 3d. a bloom on large consignments, and packed in light lath crates the flowers travel well and last up to 14 days in a cold climate. Transport of Queensland orchids to New Zealand, for instance, may thus form a profitable export trade when the trans-Tasman service is established.

Similarly encouraging results have been achieved in the transport of fruit.

Paw-paws from South Africa have proved a profitable air freight for France and England. If picked slightly before maturity, they seem to require the minimum of preparation or special packing, and allow a good margin of time both for travel and for any reasonable delay in sales.

Figs and grapes, like flowers, are also reaching London from Egypt, but one of the lessons which has been learned is that air freighting of such goods does not absolve the shipper from paying attention to competition in his export market from hothouse and other forced-growth products.

Within those considerations there seems to be ample scope for the development of highly profitable long-distance export for a wide range of goods which have, up to the present, been confined to a limited sales area because of their perishable nature.

# Studies on the Coliform Bacteria Found in Butter.

E. B. RICE, Dairy Research Laboratory. (Dairy Branch.)

THE object of this investigation, which is based on the results obtained from the biological examination of 131 samples of salted butter submitted in three competitions organised by agricultural show societies and factory managers' associations in Australia, was to determine—

1. The incidence of coliform bacteria in butter.
2. The effect on coliform bacteria of holding butter at 14° F. and 60° F.
3. The types of coliform bacteria present.
4. The relationship, if any, which exists between plate counts and the extent of coliform infection.

In view of the number of samples of butter examined from factories situated in all parts of Australia, the results should be fairly representative of the biological quality of butter made in this country.

*Outline of Manufacture.*—The butters were all manufactured from cream spontaneously ripened on the producing farms. The usual factory procedure is to standardise the cream to about 34 per cent. fat content, partially neutralise to about 0·1 to 0·15 per cent. calculated as lactic acid, then to pasteurise by the Flåsh process, or by a combination of pasteurisation and vacuum treatment, at temperatures varying from 185° F. to 200° F. These exposures are now almost universally used in factories with the exception of a few smaller plants which still use the Holder method.

*Sampling.*—Upon arrival at the Cold Stores the boxes of butter were placed in cold storage until all entries arrived. Before grading they were allowed to thaw for about four days in a room maintained between 50° F. and 60° F. Samples were taken just before grading commenced. The possibility of growth of bacteria in the butter during thawing must be kept in mind in interpreting the results of the investigation, although, because of the low plate counts obtained on many samples, it seems reasonable to assume that the alteration in the bacterial flora during the thawing of salted butter is slight, and indeed, as will be observed from Table 4, that the changes in coliform content even after an extended holding period at room temperature are almost insignificant.

## Method of Isolation.

Portions of plugs of butter drawn with a sterile trier from the centre and one corner of each 56 lb. box of butter were melted in sterile 4 oz. pomade jars in a waterbath the temperature of which was thermostatically controlled at 42° C. 1 ml. of melted butter, and serial dilutions in warmed saline tubes were inoculated into tubes of

(*Note.*—This paper was completed while Mr. Rice was at the National Institute for Research in Dairying, University of Reading, and was read before the annual meeting of the Society of Agricultural Bacteriologists, Edinburgh, July, 1937.)

MacConkey's bile salt lactose broth containing Durham's fermentation tubes. The tubes were incubated at 37° C. for twenty-four hours, the presence of acid and gas after this period being noted as a positive presumptive test. Tubes not giving a positive reaction were returned to the incubator for a further twenty-four hours to determine whether slowly growing types were present. Confirmation of the presence of coliforms was established by streaking from the positive tubes on to eosin methylene blue agar plates (8) and, when colonies developed, examining them microscopically for gram negative rods and culturally for their ability to produce acid and gas in lactose broth.

## Occurrence of Coliform Bacteria in Butter.

The distribution of coliform bacteria is set out separately for the samples submitted in each competition in Table 1.

TABLE 1.

Distribution of Coliform Bacteria in Samples.

| Coliform Titre. | Competition No. 1. | Competition No. 2. | Competition No. 3. |
|---|---|---|---|
| | Samples. | Samples. | Samples. |
| Absent in 1 gm. .. .. .. .. .. | 7 | 42 | 21 |
| 1–10 per gm. .. .. .. .. .. | 4 | 7 | 7 |
| 11–100 per gm. .. .. .. .. .. | 5 | 4 | 8 |
| 101–1,000 per gm. .. .. .. .. .. | 11 | 1 | 1 |
| 1, over 1,000 per gm. .. .. .. .. | 8 | 2 | 3 |
| Total Samples.. .. .. .. .. | 35 | 56 | 40 |

It will be observed that, in contrast to the first competition where 80 per cent. of the butters were infected with coliforms, only 25 per cent. and 47·5 per cent. respectively, of those which entered the second and third competitions contained these organisms. It should be mentioned that in the first competition the thirty-five factories were taking part in such a contest for the first time, which probably accounts for the more extensive contamination of the samples submitted. Butters from many of these factories entered in subsequent contests were, bacteriologically, just as satisfactory as the majority of the samples; this, incidentally, indicates the value of making bacteriological examinations, in conjunction with the usual system of scoring for flavour, as a means of encouraging improvement in factory sanitation

## Relationship Between Coliform Contamination and Plate Counts of Butter.

The distribution of samples in accordance with plate counts and coliform titre is shown in Table 2. The plate counts were made on standard agar (pH 6·8), the values recorded being the mean of duplicate plates.

Although this table reflects a fair correlation between the extent of coliform infection and plate counts, there are marked discrepancies in individual samples. There is, however, a distinct tendency for high plate counts to be accompanied by large numbers of coliform bacteria.

TABLE 2.

DISTRIBUTION OF COLIFORM BACTERIA TO PLATE COUNTS.

| Plate Count (per gm.) | Number of Samples. | COLIFORM TITRE (PER GM.) | | | | |
|---|---|---|---|---|---|---|
| | | Absent. | 1–10. | 11–100. | 101–1,000. | Over 1,000 |
| Less than 50,000 .. .. | 67 | 50 | 9 | 5 | 3 | .. |
| 51,000–100,000 .. .. | 16 | 7 | 1 | 5 | 3 | .. |
| 101,000–200,000 .. .. | 17 | 6 | 3 | 2 | 3 | 3 |
| 201,000–300,000 .. .. | 6 | 2 | 1 | .. | 1 | 2 |
| 301,000–400,000 .. .. | 5 | 1 | 1 | 2 | .. | 1 |
| 401,000–500,000 .. .. | 3 | .. | 1 | .. | 1 | 1 |
| 501,000–750,000 .. .. | 5 | 1 | .. | 1 | 2 | 1 |
| 751,000–1,000,000 .. .. | 3 | 1 | .. | 1 | .. | 1 |
| Over 1,000,000 .. .. | 9 | 2 | 2 | 1 | .. | 4 |
| | 131 | 70 | 18 | 17 | 13 | 13 |

Biological surveys of butter factories have shown wide variations in the counts on the cream immediately after pasteurisation, ranging from less than 1,000 to 80,000 per ml., depending upon such factors as the kind of pasteuriser used, the temperature attained and the numbers of heat resistant organisms originally present in the raw cream. Pasteurisation at temperatures near 200° F. immediately followed by treatment under vacuum, which is becoming increasingly common, gives a greater reduction in numbers than ordinary flash pasteurisation. The mean count on eight samples of cream from different factories pasteurised by the former method was 4,800 per ml. compared with a mean count of 27,500 per ml. for twenty-seven samples of cream from other factories flash pasteurised at 185° F. Although in the churning of the cream a large proportion of the surviving organisms will be carried away in the buttermilk, there will still be widely varying counts on the freshly churned butter, even if post-pasteurisation contamination be avoided. It is apparent, therefore, that the plate count cannot be regarded as a true index of hygiene in butter manufacture, but reflects rather the conditions of handling of the cream at the factory and prior to its arrival there.

It is considered that the presence of coliforms in a sample of butter may be presumed to indicate post-pasteurisation contamination, since numerous factory biological surveys have shown the efficiency of the pasteurisation exposures used in eliminating coliform bacteria. Of over 100 tests on treated cream taken directly from the outlet pipe of the pasteuriser at more than thirty factories a positive coliform reaction has not yet been recorded in 1 ml. Because of the ubiquitous occurrence of coliform organisms, and especially their presence on unsterile utensils and in impure water a search for these bacteria is recommended as a useful supplementary test for the biological control of butter manufacture.

In some countries the yeast and mould count of butter is alone used to judge factory sanitation. The experience in Australian factory control is that this is chiefly a guide to churn sanitation, the yeasts inhabiting the wooden churns.

### Relationship between Coliform Bacteria and Grade Points.

There was no significant difference in grade points (score) between butters seriously contaminated with coliform bacteria and those in which these organisms were relatively few in numbers or entirely absent, or, indeed, between butters of high and low plate counts. This was more or less expected, as the butters were graded before the organisms had had time to proliferate.

### Effect of Holding Butter at 14° F.

This part of the investigation was confined to thirty-five butters. After the arrival of the boxes at the Cold Store samples were taken for plating, the boxes were then placed in a refrigerated room at 14° F. for eight weeks, and when removed, further samples were taken and again plated. This temperature and period of storage were chosen to simulate conditions to which Australian butter is subjected on the voyage to Britain. Twenty-eight or 80 per cent. of the samples were infected with coliforms before going into cold storage, while these bacteria persisted in reduced numbers in 25 or 71 per cent. after their removal from the freezing room. The distribution of coliform bacteria in the butter, before and after cold storage, is set out in Table 3.

TABLE 3.

EFFECT OF EIGHT WEEKS' STORAGE AT 14°F. ON COLIFORM BACTERIA.

| Coliform Titre. | Number of Samples. | |
|---|---|---|
| | Before Storage. | After Storage. |
| Absent from 1 gm. .. .. .. .. .. .. | 7 | 10 |
| 1–10 per gm. .. .. .. .. .. .. .. | 4 | 6 |
| 11–100 per gm. .. .. .. .. .. .. .. | 5 | 5 |
| 101–1,000 per g.m. .. .. .. .. .. .. | 11 | 8 |
| Over 1,000 per g.m. .. .. .. .. .. .. | 8 | 6 |
| | 35 | 35 |

The decrease in coliform bacteria in butter which has been held in cold storage is in accord with the findings of Grimes and Hennerty (2) with Irish butter. Members of both the coli and aerogenes subgenera were detected in the samples after cold storage.

### Effect on Coliform Bacteria of Keeping Butter at 60° F.

Plate counts and coliform tests by the dilution technique were made on eleven samples of salted and six samples of unsalted butter. The samples were then placed in an incubator at 60° F. and re-examined at varying intervals over a period of twenty-one days.

TABLE 4.

CHANGES IN PLATE COUNT AND COLIFORMS OF SALTED BUTTER HELD AT 60°F FOR 21 DAYS.

| Age (days). | —— | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .. | Plate Count .. .. .. .. | 164,000 | 19,000 | 1,472,000 | 66,000 | 14,000 | 1,000 | 128,000 | 2,000 | 328,000 | 24,000 | 9,000 |
| | Coliforms .. .. .. .. | ++++ | + | ++ | ++ | + | − | ++ | − | ++ | + | − |
| 3 | Plate Count .. .. .. .. | − | 540,000 | .. | 240,000 | 90,000 | 10,000 | 190,000 | 30,000 | 300,000 | 210,000 | 19,000 |
| | Coliforms .. .. .. .. | ++++ | − | .. | ++ | − | − | +++ | − | − | + | − |
| 7 | Plate Count .. .. .. .. | 170,000 | 740,000 | 1,000,000 | 60,000 | 790,000 | 107,000 | 820,000 | 10,000 | 520,000 | 270,000 | 74,000 |
| | Coliforms .. .. .. .. | ++++ | − | ++ | +++ | − | − | +++ | − | − | + | − |
| 14 | Plate Count .. .. .. .. | 1,060,000 | 849,000 | 590,000 | 400,000 | 670,000 | 440,000 | 2,269,000 | 660,000 | 5,200,000 | 150,000 | 92,000 |
| | Coliforms .. .. .. .. | ++++ | − | + | ++ | − | − | +++ | − | − | − | − |
| 21 | Plate Count .. .. .. .. | 6,300,000 | 1,170,000 | 719,000 | 289,000 | 690,000 | 580,000 | 630,000 | 130,000 | 1,290,000 | 280,000 | 910,000 |
| | Coliforms .. .. .. .. | +++++ | − | ++ | ++ | − | − | ++ | − | − | − | − |

− = Coliform bacteria absent in 1 gram.
\+ = Coliform bacteria present in 1 gram.
++ = Coliform bacteria present in 1/10 gram.
+++ = Coliform bacteria present in 1/100 gram.
++++ = Coliform bacteria present in 1/1,000 gram.
+++++ = Coliform bacteria present in 1/10,000 gram.

TABLE 5.

CHANGES IN PLATE COUNT AND COLIFORMS OF UNSALTED BUTTER HELD AT 60°F. FOR 28 DAYS.

| Age (days). | —— | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| .. | Plate Count .. .. .. .. .. .. .. | 390,000 | 230,000 | 120,000 | 145,000 | 134,000 | 664,000 |
| | Coliforms .. .. .. .. .. .. .. | − | ++++ | ++++ | +++ | ++ | ++ |
| 3 | Plate Count .. .. .. .. .. .. .. | 14,000,000 | 9,000,000 | 8,000,000 | 25,000,000 | 5,000,000 | 4,000,000 |
| | Coliforms .. .. .. .. .. .. .. | +++++++ | ++++++ | +++++++ | ++++++ | +++++ | ++++ |
| 7 | Plate Count .. .. .. .. .. .. .. | 18,000,000 | 42,000,000 | 32,000,000 | 45,000,000 | 51,000,000 | .. |
| | Coliforms .. .. .. .. .. .. .. | +++++++ | +++++++ | +++++++ | +++++++ | +++++++ | .. |
| 14 | Plate Count .. .. .. .. .. .. .. | 39,000,000 | 16,000,000 | 212,000,000 | 98,000,000 | 114,000,000 | 19,000,000 |
| | Coliforms .. .. .. .. .. .. .. | +++++++ | ++++++ | ++++++++ | +++++++ | +++++++ | ++++++ |
| 21 | Plate Count .. .. .. .. .. .. .. | 10,000,000 | 12,000,000 | 24,000,000 | 38,000,000 | 82,000,000 | 5,000,000 |
| | Coliforms .. .. .. .. .. .. .. | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ | ++++++ |

− = Coliform bacteria absent in 1 gram.
\+ = Coliform bacteria present in 1 gram.
++ = Coliform bacteria present in 1/10 gram.
+++ = Coliform bacteria present in 1/100 gram.
++++ = Coliform bacteria present in 1/1,000, gram, etc.

*Salted Butter.*—It is clear from the results given in Table 4 that coliform bacteria are able to tolerate for lengthy periods the brine concentration in salted butter, but their reproduction is almost suspended. If the butter is kept at 60° F. for twenty-one days their numbers change only slightly; in some cases there is a slight increase, while in others there is a slight decrease. Other microorganisms, notably chromogenic micrococci, seem better adapted to the environment, for the total count tends to increase during the keeping period. In this connection, it should be pointed out that Australian butter provides conditions rather suitable for the development of bacteria, as (1) the pH usually falls within the range of 6·4 to 7·4 which is near the optimum for the bacteria commonly found in butter, (2) the moderate salt content, of about 1·0 to 1·5 per cent., does not completely inhibit bacteria. Since the growth of coliforms in salted butter is inhibited at ordinary temperatures, while other types of bacteria may multiply, the coliform test may be of some value in attempting to assess the actual hygienic condition under which butter, held for some time at temperatures permitting multiplication of bacteria, was manufactured.

*Unsalted Butter.*—For comparative purposes, six samples of unsalted butter were examined at the same time as the salted samples. Table 5 shows that the coliform bacteria multiplied very rapidly in the unsalted butter kept at 60° F. In every case the plate count also increased enormously.

## The Classification of Coliform Bacteria Isolated from Butter.

*Isolation Technique.*—About a week before they were required, plates of Levine's eosin methylene blue agar (8) were poured. They were placed in the 37° C. incubator (which had been disinfected with formalin) for forty-eight hours, the covers being raised to allow moisture to evaporate and the agar to harden. The covers were then replaced, the plates incubated another four days at 25° C. and any plate which showed any sign of contamination was discarded.

A flamed platinum loop was inserted into a tube of bile salt broth which had given a positive presumptive test, withdrawn and transferred to a tube of saline. A loopful of this dilution was placed in the centre of a prepared agar plate and spread over the surface of the medium by means of a glass rod bent at right angles (2). The plates were incubated at 37° C. for forty-eight hours.

To purify, the cultures were re-picked and re-streaked in some instances as many as five times, but never less than three times, in order to resolve them as far as possible. Previous work (3) has shown the necessity to adopt special measures to purify cultures of coliform bacteria. Where there appeared to be more than one colony type on the original plate, fresh plates were prepared from each colony type. Observation under the low power of the microscope indicated only one type to be present on each final plate and, if the organisms were gram negative rods which produced acid and gas in lactose broth, a portion of a colony was streaked on to an agar slant for study of its biochemical reactions.

## Biological Tests for Identification.

The organisms were classified according to the scheme devised by Malcolm (4), based on their ability to grow in Koser's citrate medium,

(5), production of indole (6), methyl red-Vosges Proskauer reaction (7) and the fermentation of inositol.

Altogether 107 cultures isolated from the sixty-one coliform positive butter samples, were studied and the results are classified in Table 6.

TABLE 6.

CLASSIFICATION OF COLIFORM BACTERIA FOUND IN BUTTER.

| Name of Organism. | Number of Cultures. | Percentage. |
|---|---|---|
| Bact. coli .. .. .. .. .. .. .. .. | 63 | 58·9 |
| Intermediate (Citrobacter spp.) .. .. .. .. | 25 | 23·3 |
| Bact. aerogenes .. .. .. .. .. .. .. | 3 | 2·8 |
| Bact. oxytocus .. .. .. .. .. .. .. | 11 | 10·3 |
| Bact. cloacae .. .. .. .. .. .. .. | 5 | 4·7 |

## Summary and Conclusion.

The investigation revealed that coliform bacteria, in widely varying numbers, were present in sixty-one, or 46·6 per cent., of the 131 samples of butter examined. The mean total count was 245,000 per gram, the extremes being 670 and 3,800,000 per gram. Higher numbers of coliform bacteria usually accompanied high plate counts.

Members of both the coli and ærogenes sub-genera persisted in butter cold stored at 14° F. for eight weeks.

There was rapid multiplication of coliform and other bacteria when unsalted butters removed from cold storage were held at 60° F.

Although coliform bacteria persisted for lengthy periods in salted butter held at 60° F. their reproduction was practically suspended. The plate count, however, tended to increase.

The coliform bacteria isolated from butter have been classified.

It is concluded that a search for these organisms is a valuable supplement to other bacteriological examinations in assessing the hygiene of butter manufacture.

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# Observations on the Dairy Industry of Denmark.

E. B. RICE, Dairy Technologist.

*After attending the World's Dairy Congress, held in Germany in August of last year, Mr. Rice toured Denmark with a view to observing at firsthand the dairy industry of that country. In this article he gives an interesting account of his impressions and experiences, which will be read with appreciation by Queensland dairy farmers.—Ed.*

THIS article is simply an attempt to give some impressions of the Danish dairy industry. Naturally, the widely different geographical situations, economic considerations, climates, and other factors of Australia and Denmark have resulted in the development of the industry, both in respect of farm and factory methods, along entirely different lines in the two countries. There are, however, many points in Danish dairy practice which, by suitable modification, could be applied to the industry in Australia.

Denmark consists of numerous small islands—about one third of the total area of the country—and Jutland, on the mainland, which occupies rather more than two-thirds of the area. The climate is warm and pleasant in the summer, but the country is subject to severe winds which make the winter rather bleak and necessitates the keeping of the cows under cover for about eight months of the year. The country is flat to undulating and the soil generally cannot be classed as rich, but good husbandry has improved its fertility. The neat, whitewashed cottages, usually with thatched roofs, and the well-kept farm buildings are a pleasing sight on one's first acquaintance with rural Denmark. The utmost use is made of every square yard of the farm, as intensive farming methods are necessary to provide sufficient fodder for the stock on the small areas usually occupied by each farmer. Another fact which soon impresses the visitor is the absence of fences to mark farm boundaries, and hedges so common to the English countryside. The tethering of the cows in the fields during the summer makes fences or hedges quite unnecessary.

## DANISH DAIRY FARMING.

The prime importance of liberal feeding and scientific breeding in successful dairying is fully appreciated by the Danish farmer, and both are practised probably more extensively than in any other country. Every effort is made to grow as much as possible of the fodder required for stock feeding on the farm. The only cattle foodstuffs bought are cake concentrates. As the local production of these is insufficient to meet the country's requirements, a small quantity has to be imported. The cultivation of lucerne is becoming of increasing importance, because the feeding of this legume avoids some of the outlay for concentrates. Permanent pastures exist on comparatively few farms. Perennial ryegrass and red clover appear to be the most important constituents of pasture seeds mixtures, with timothy, trefoil, and other grasses, and the

trend is towards a simple rather than a complex mixture. Generally a seven or eight years' crop rotation is practised, there being a variety of choices as to the actual crops in the rotation. Oats, barley, rye and wheat are the cereals mainly grown, while roots are grown everywhere in abundance as they are looked upon very favourably as supplying succulence to the winter ration. Sugar beet is grown in some districts, the tops and factory residues being relished by stock. Silage is made on the larger farms, the A.I.V. method being mainly adopted. This method, propounded by Professor A. I. Virtanen, of Finland, consists in adding a dilute solution of hydrochloric acid to the material being ensiled for the purpose of adjusting the pH (acidity) to a point which checks plant respiration and inhibits the growth of certain bacteria which deteriorate the silage, but enables the desirable lactic acid fermentation to take place. It is also claimed that the nutritive value, especially the protein content of the silage, is enhanced by this process.

As in all European countries, haymaking is considered a farm practice of paramount importance in order to conserve fodder for the winter months when, unlike Australia, there is a complete absence of pastures. Because of the limited amount of sunshine, the Scandinavian hay-making method of hanging up the grass to dry on wires stretched between posts is adopted. Hayricks are not seen at all on the fields, as all hay is stored in lofts above the cowsheds.

Plate 208.

Red Danish dairy cattle on a farm in Denmark.

Another interesting feature of Danish dairying is the practice of tethering the cows on ropes in the fields, hence the reason for doing without fences. For about four months in the summer the cows are tethered in the fields night and day, being changed frequently from place to place. Consequently, the fields are grazed evenly and completely. The grass is fed off at its maximum nutritive stage, and

the manure also is spread evenly over the fields. The milkers go out into the fields three times daily to milk the cows there, and a cart is driven round to pick up the milk. Milking is done almost entirely by hand. The average farm probably has a herd of about fifteen to twenty cows in milk. During the remaining eight months of the year, the cows are housed indoors and are never taken out into the fields. The modern cowsheds are roomy and well lighted, and the standings provide ample space for each animal.

While the cows are out at grass, concentrates may be given to the highest producers, but the others rely entirely on grass. In the winter, hay and roots, and silage on farms where it is made, are given for maintenance; and cake concentrates, according to milk yield, are fed for the production ration.

### Danish System of Food Standards.

The Danish system of compounding rations is simple and has been found satisfactory in practice.

The standard is taken as the quantity of food required to produce one pound of milk.

The equivalents of some foods commonly used in the country are:—

2½-3 lb. of good meadow hay equals one standard.
4 lb. poor hay equals one standard.
10 lb. swedes equals one standard.
12 lb. white turnips equals one standard.
4 lb. potatoes equals one standard.
10 lb. green fodder equals one standard.
6 lb. buttermilk or skim milk equals one standard.
12 lb. whey equals one standard.
1 lb. new milk equals one standard.

Plate 209.
Stacks of winter feed on a dairy farm in Denmark.

For the cow's maintenance one standard of bulky food or roughage is needed for every 150 lb. live weight, and for the production portion of the ration one standard of concentrates for each pound of milk yielded.

### Effect of Foodstuffs on Butter Consistency.

Exhaustive feeding experiments were carried out some years ago to determine the influence of the various feeding stuffs included in the cows' rations on the firmness of the butter. According to their effects, foodstuffs were classified into three classes, (*a*) those causing softness in butter; (*b*) those giving dry and crisp butter; and (*c*) those producing normal butter. As many of the foods experimented with are rarely used in Australia, it is not proposed to refer to them individually here. The proportions of the different constituents in the concentrates and other foodstuffs distributed by stock food manufacturers are now carefully controlled, to ensure that the cows' rations will be without detriment to the body and texture of butter.

### Cattle.

The dairy cattle in the country number about 1,750,000. The chief breed is the Red Danish, which seems to be almost exclusively kept on the islands, while the Jutland, a black and white animal, is kept largely on the mainland. The animals of both breeds are comparatively large. The pursuance of a policy of systematic and energetic herd testing over many years has considerably improved the average yield of Danish cows, which is about 700 gallons yearly, equivalent to

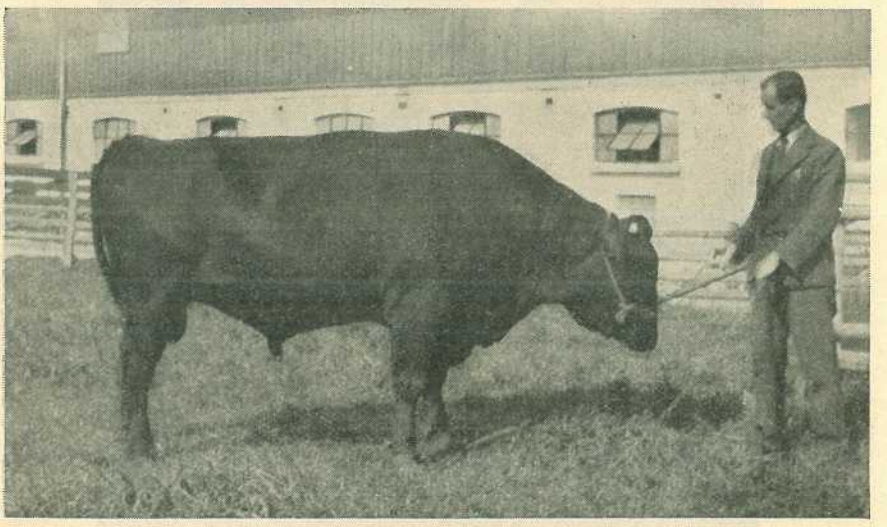


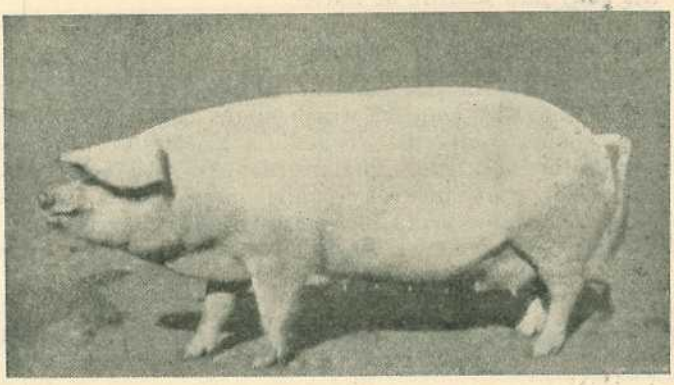
Plate 210.
A typical bull of the Red Danish breed of dairy cattle.

300 lb. butterfat. These figures very clearly emphasise the benefit to be derived from herd testing, combined with culling, sound feeding, and scientific breeding practices. Besides the two native breeds, shorthorn cattle are kept in fair numbers, as well as the Channel Island breeds on a few farms. All cattle entered in cattle shows are judged, not alone on their

exterior appearance, but also on the milk yield. This characteristic feature of Danish cattle shows is considered to have been a factor of great importance in the development of cattle breeding. Nowadays, size and conformation are the only points on which judgment is placed, no consideration being given to head, horns, eyes, skin, and coat, or the indirect milk signs, such as milk veins, milk wells, &c. Of all the milk produced, about 80 per cent. is converted into butter, 10 per cent. is used on the farms and the liquid milk market, and the remaining 10 per cent. goes into cheese-making and manufactured milk products.

## Pig Breeding and Feeding.

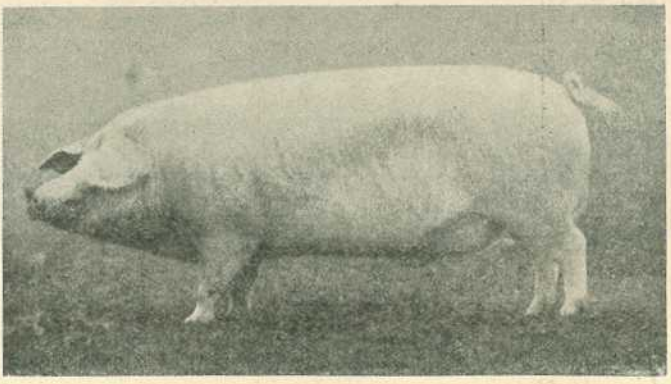
With an abundance of separated milk, which is always available from the buttermaking industry, it is only natural that pig raising is an important branch of dairy farming in Denmark. Whole milk is delivered by the farmers to the creamery, where it is separated and the separated milk is returned on the following day to the farmer.



[*Photo.: Pig Breeders' Annual (England).*

Plate 211.
A Danish Landrace sow.

The national breed of pig is the Landrace, which has developed as a cross between a native breed and the Yorkshire Large White.



[*Photo.: Pig Breeders' Annual (England).*

Plate 212.
A typical pig of the Danish Landrace breed which was evolved from the old Landrace and Large White Yorkshire cross. The Danish Landrace is a uniform and regular breed which increases weight quickly and yields a good bacon quality.

Government control of the pig industry, by regulating the production of bacon to satisfy local and export requirements only, is designed to avoid over-production.

The meal mixture, fed to pigs with skim milk, is crushed on the farms from home grown cereals. Roots and potatoes form the balance of the ration.

With the object of preventing the dissemination of disease—tuberculosis particularly—among livestock, the pasteurisation by the creameries of all separated milk before its return to the suppliers is legally enforced. The creameries also add a "starter" of lactic acid bacteria to the separated milk which causes it to sour before the farmer receives it. This fermentation checks the activity of harmful bacteria, which, if allowed to multiply in the buttermilk, may cause digestive disorders or more serious illnesses in pigs consuming it.

## Calf Rearing.

It is customary for the farmer to breed all his own stock. The heifer calves are retained for replacements in the herd, while only the bull calves from high-producing dams and sires of proved prepotency for high milk production in their female offspring are reared for breeding purposes. Autumn is calving time for most of the cows, so that the calves, after spending the winter indoors, can be put out to grass in the spring when they are about six months old and are able to use the pasture growth to full advantage.

## Progeny Testing of Bulls.

The progeny testing of bulls, or, as it is often called, bull indexing, enables the breeding value of a dairy bull to be assessed by a comparison of the yields of its progeny with the yields of their dams. Progeny testing is receiving consideration in many countries at the present time, but although it appears to be a simple matter to make the comparison just mentioned, in practice there are many difficulties in the way of obtaining reliable figures, for, among the many factors which affect the data, investigators have pointed out the following:—(1) identification of the daughters; (2) reliability of the milk records; (3) definition of lactation period; (4) adjustment of lactation yields for age; (5) adjustment of lactation yields for dry period and service period; (6) adjustment for frequency of milking; (7) variation in management conditions; (8) number of daughters required to prove a bull; (9) consideration of the yield of the dam; (10) quality of the milk, such as fat percentage, &c.; (11) the breed type and conformation of the daughters.

When the true merit of a bull is discovered by the test, which is not until his first lot of daughters have completed a lactation period, the bull will be about five years old, and to retain it for some years afterwards creates certain difficulties, such as the management of an old bull and the risk of inbreeding. However, these problems, which are not insoluble, are all being closely studied, and no doubt much greater significance will in future years be attached to progeny testing, and prepotent bulls capable of siring daughters whose yields surpass their dams will be retained as long as they are useful, while others will be slaughtered before they can cause any serious decline in the productivity of a herd.

### Bull Clubs.

Since the earliest times, because of the small area of each farmer's holding, it has not been usual for the individual farmer to own a bull. A number of farmers in a community co-operate to form what is known as a bull club, which purchases one or more bulls for the use of members of the club. The bull clubs, which are assisted by Government grants, have had a very strong influence on the raising of the Danish dairy stock to their present high standard, for the bulls in the possession of the clubs are obviously of superior quality.

### Artificial Insemination.

In Russia and Denmark artificial insemination of dairy cattle has advanced beyond the experimental stage. On one of the Danish islands 1,200 cows were artificially inseminated in a year, two bulls only being used for the purpose. The utmost use which may be made of bulls out of high-producing dams and sires of proved prepotency for high milk yields in their offspring is a special feature of artificial insemination. In very closely settled farming communities in some European countries, this method may become more general.

### Herd Testing.

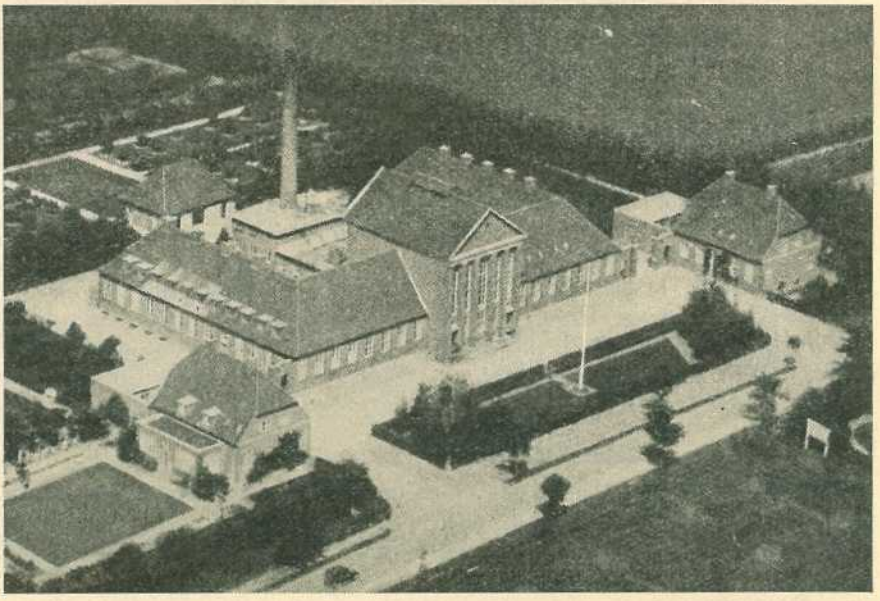
In no other country in the world has herd testing made greater progress than in Denmark, where approximately 40 per cent. of all milch cows have been entered on the milk recording societies' registers. The following table taken from the International Review of Agriculture, February, 1935, illustrating the development of herd testing in various countries, is, it is thought, well worth inclusion here:—

| Country. | Year. | No. of Farms. | No. of Cows. | Approximate No. of Cows per Head. | Average Percentage of Cows Tested. |
|---|---|---|---|---|---|
| England and Wales .. | 1932–33 | 4,958 | 135,902 | 29 | 4·7 |
| Scotland .. .. | 1933 | 741 | 32,456 | 44 | 13·0 |
| Northern Ireland .. .. | 1934 | 2,544 | 15,050 | 6 | 6·0 |
| Irish Free State.... .. | 1934 | 4,186 | 49,052 | 12 | 4·0 |
| Canada .. .. | 1933–34 | 4,351 | 58,571 | 13 | 1·7 |
| New South Wales .. | 1932–33 | 2,500 | 69,096 | 28 | 6·8 |
| Victoria .. .. | 1932–33 | 3,383 | 108,733 | 32 | 13·4 |
| New Zealand .. .. | 1932–33 | 6,332 | 278,104 | 44 | 16·6 |
| Denmark .. .. | 1933–34 | 49,903 | 701,087 | 14 | 39·6 |
| Finland .. .. | 1931 | 20,456 | 239,069 | 12 | 18·4 |
| Netherlands .. .. | 1932 | 15,185 | 159,157 | 10 | 12·2 |
| Sweden .. .. | 1932–33 | 17,803 | 300,855 | 17 | 14·7 |
| United States .. .. | 1934 | 13,694 | 335,437 | 25 | 1·3 |

## BUTTER MANUFACTURING IN DENMARK.

There are 1,700 creameries (butter factories) scattered over Denmark, the capacity of most of which is very small compared with that of Australian factories. Probably no farmer lives further than five miles from the creamery he supplies, and the farmers deliver their milk daily to the creamery. The creameries are almost entirely owned co-operatively by the suppliers, and in fact, Denmark affords an excellent example of successful achievement by co-operative enterprise in many spheres.

The geographical situation of the country—Danish butter arrives at the English seaports within thirty-six hours of its shipment—permits the manufacture for export to the United Kingdom of starter-ripened "lactic" flavour butter. This kind of butter undergoes deterioration if held in cold storage, so that the butter exporting countries of the Southern Hemisphere have had to evolve a type—neutralised and pasteurised cream butter—which remains fresh after cold storage during the long sea voyage to Britain. Danish butter is actually shipped direct to the eastern seaports of Britain, only a small proportion going to London. On the other hand, Australian and New Zealand butter is mainly shipped to London. Resulting from marketing organisation, British consumers' preferences in the matter of butter flavour can be divided into two sections. In Scotland, Northern England, and the North Midlands, consumers, through long use of Danish butter, have acquired a liking for the fuller aroma and "lactic" flavour, while in the South Midlands and Southern England a neutralised cream butter, like Australian, is more sought after. In the South, Danish butter is eaten only by a small proportion of the people who are prepared to pay a slightly higher price for it, because of the reputation for uniform quality which it has had for many years.



*[Photo. by courtesy of The Agricultural Council, Copenhagen.*

Plate 213.
The Government Experimental Dairy, Hillerod, Denmark.

Consumers are also critical of butter colour. In Northern Britain, people accustomed to the paler European butters often look with suspicion on richly coloured butter from the southern hemisphere. Evidently they have not been educated on the relationship existing between degree of colour (provided annatto or other colouring substance is not added) and vitamin content of butter, research having shown that the deeper yellow Australian and New Zealand butters, produced from the milk

of cows which are pasture fed in the sunshine throughout the year, possess higher vitamin contents than butter from countries where the cows have to be stalled and hand-fed during a long period every year.

### Sampling, Grading, and Method of Payment.

Each supplier's milk is sampled daily, the sample being placed in a composite sample bottle containing preservative and the fat determined on the composite sample by the Gerber method each week. Payment is based on the fat content and hygienic quality as judged by the methylene blue reductase test, which was devised by Professor Orla Jensen, the eminent Danish dairy bacteriologist. The test depends upon the ability of bacteria to decolourise a dilute solution of methylene blue, a dye substance, the rate of reduction of the colour being proportional to the numbers of bacteria in the milk. According to the test, which is made of each supplier's milk every week, the milk is classified into four grades, as under:—

Grade 1.—Milk having a reduction time of more than five hours;

Grade 2.—Milk having a reduction time between two and five hours;

Grade 3.—Milk having a reduction time between twenty minutes and two hours;

Grade 4.—Milk having a reduction time less than twenty minutes.

Suppliers whose milk falls into either grade 3 or grade 4 are penalised by receiving a somewhat lower rate of payment for all milk supplied in the succeeding week.

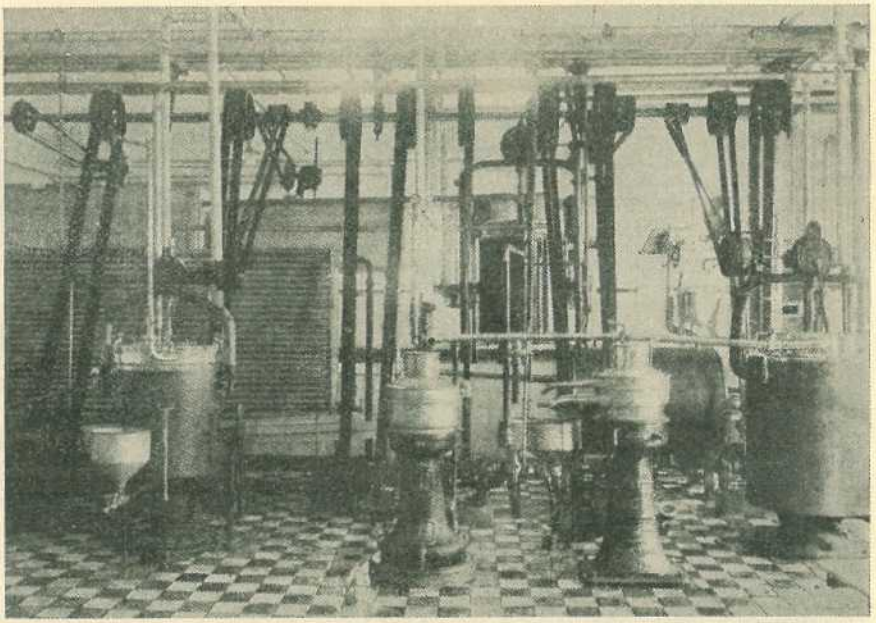
The delivery of whole milk and its separation at the creamery enables the manager, by the use of a mixed culture of bacteria as "starter," to have full control of the cream ripening and so develop the most desirable aroma and flavour. This is undoubtedly a distinct advantage which the Danish factory manager has over the Australian manager, for, because of the rapid expansion of dairying in sparsely settled districts, daily delivery of cream is an impossibility at the present time in many parts of Australia.

### Pasteurisation and Cream Ripening.

Factory design, the layout of equipment and the system of butter manufacture are fairly uniform throughout Denmark. The milk after being sampled, is tipped into a weighing vat, the weight recorded, and it then goes into a holding vat.

Neutralisation is, of course, unnecessary. The whole milk is pasteurised at 176 deg. Fahr., cooled to about 100 deg. Fahr., and immediately run through the separator, which is regulated to deliver a cream of about 25 per cent. fat test. The separated milk is pumped away to holding tanks outside the factory, while the cream is passed over a second pasteuriser having its temperature raised to 190 deg. to 200 deg. Fahr. It is shock-cooled to about 40 deg. Fahr. and pumped to cream ripening vats. After two or three hours to enable the fats to partially solidify the cream is warmed to about 60 deg. to 70 deg. Fahr., about 4 per cent. of starter added, and ripening allowed to proceed for about ten or eleven hours. There are, however, modifications of this ripening procedure in different factories, necessitating the

use of up to about 10 per cent. of starter and different ripening temperatures. When the desired acidity is reached—that is, about 0·45 per cent. calculated on the fat free cream (so that actual acidity allowed to develop in the cream depends upon its fat test)—the cream is cooled down to churning temperature or slightly lower, varying from 48 deg. to 56 deg. Fahr., and maintained at this temperature overnight.



[*Photo. by courtesy of The Agricultural Council, Copenhagen.*

Plate 214.
Interior of a Danish dairy.

The bulk starter added to the vat has an acidity of about 0·9 per cent., it being ripened to this extent to allow certain of the constituent bacteria which produce diacetyl—to which butter chiefly owes its aroma and flavour—to establish themselves.

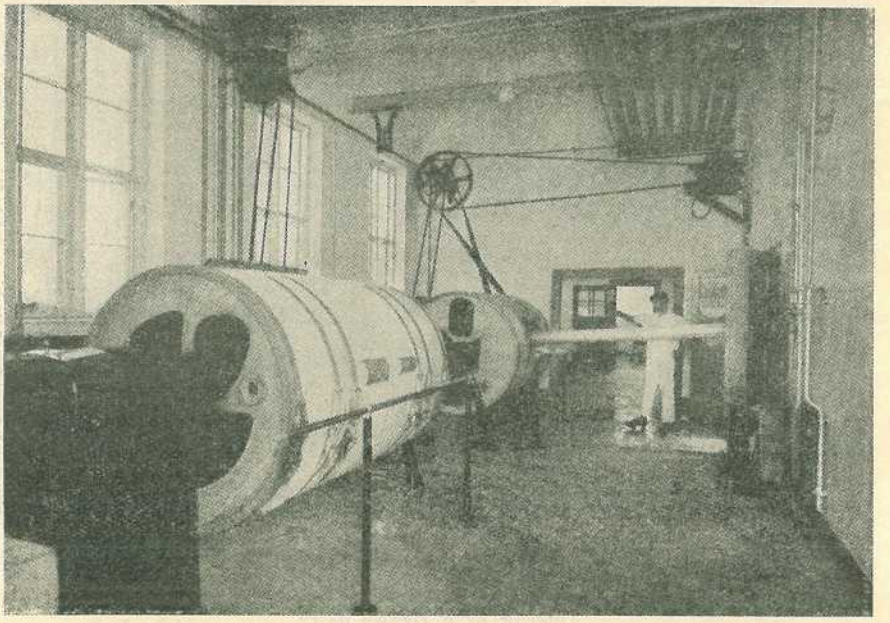
It will be evident that considerable attention is imperative if a uniform quality butter of this type is to be produced, for any carelessness leading to over-development of acidity, contamination of starters, &c., quickly spoils the quality and especially the keeping properties of the butter; but in the important operations of cream ripening and starter propagation, Danish buttermakers possess high technical skill.

## Churning, Working, and Salting.

Churning temperatures are higher than in Australia, ranging from 48 to 57 deg. Fahr., according to the season of year and other well known factors, but in other respects—such as size of grain, relationship between washwater and churning temperature—there is not any very great difference.

The Danish Butter Control Station attaches importance to the thorough working of butter, as butter containing free moisture or large droplets is more susceptible to bacterial deterioration than butter in which the moisture droplets are very finely dispersed. All samples at this station are subjected to a test which shows up underworking by placing paper saturated with an indicator solution on an exposed surface. Overworking must also be avoided, and so it becomes necessary for the buttermaker to judge the point at which the moisture is just completely incorporated.

Most Danish butter is unsalted, although a small quantity is lightly salted, averaging, I was informed, only 0·6 per cent. salt.



[*Photo. by courtesy of The Agricultural Council, Copenhagen.*

Plate 215.

Butter churns at the Government Experimental Dairy, Hillerod, Denmark.

At the Danish Experimental Creamery at Hillerod, the churn-room is supplied with near-sterilized filtered air to reduce the degree of mould and bacterial infection of the butter. For the purpose of comparing the relative costs of various sources of power, electric, steam and diesel power plants are being operated in turns of a week each over a period of twelve months.

A stassaniser is operated at this creamery for the pasteurisation of milk for liquid consumption. In this system the milk is heated in narrow tubes to 167 deg. Fahr. for fifteen seconds, a temperature sufficiently high to destroy pathogenic bacteria without imparing the cream line or affecting the vitamins.

### Danish Butter Control Station.

This station controls the quality of all butter made in Denmark, and, based upon the results of its examinations, the right to use the "Lur"

brand is conferred on creameries. Periodically, and never less than three times yearly, creameries receive a telegram to forward a cask of the butter in stock to the station; the date upon which the butter must have been made is stated. Formerly, the cask of butter had to remain in a room at 57 deg. Fahr. for two weeks before scoring began, but now as soon as the cask arrives a piece is bored from the centre with a large trier, and the remainder either sold or returned at once to the creamery. The sample is held at 57 deg. Fahr. for two weeks, being scored upon arrival and at the end of a fortnight. A panel of ten judges, representative of exporters, creamery managers, and Government officials does the grading. The judges are divided into batches of three, the individual judges examining each sample independently, and all samples being examined by all ten graders. Any creamery of which the product falls below standard more than three times, is liable


[*Photo. by courtesy of The Agricultural Council, Copenhagen.*

Plate 216.

Butter cask with Lur-brand and control slip.

to forfeit the privilege of using the "Lur" brand. The members of the panel, except the Government official in charge, are changed from time to time.

During examination, the samples are simply marked by a number so that the judges are unaware of their identity.

At the end of the holding time, samples of all butter are submitted to the following bacteriological tests:—Catalase test to afford a measure of bacterial activity; a test for the presence of moulds able to grow on butter; and the test for extent of working referred to previously. Danish butter is much less susceptible to bacterial deterioration than the low acid Australian butter, but, on the other hand, moulds and yeasts are often a serious problem with this type of butter.

### Marketing.

All butter exported must bear the "Lur" brand on the staves of the cask, the date of manufacture, net weight, and the creamery's official distinguishing number. The "Lur" mark, therefore, like the Australian Kangaroo mark, is a national guarantee of quality. The export of butter is handled by a number of co-operative export associations formed by a group of about 100 creameries. In addition to the Government control scheme, these associations conduct a weekly scoring contest of their members' butter and pay a small bonus for quality.

### Cheese.

Only brief mention needs to be made under this heading, for only about 5 per cent. of the milk produced is made into cheese, and cheddar cheese, almost the only variety produced in Australia, is not apparently manufactured in Denmark. Germany is the chief purchaser of Danish cheese, but England takes a small quantity. The kinds made are Danish Swiss (Gruyere), Gouda, Edam, and Danish Blue (Roquefort type).

### Dairy Training and Education.

There are numerous schools in Denmark for the training of young people in agriculture, dairying and related subjects, and the courses range from elementary to post graduate research work. There are two special dairying schools and two schools for training milk recorders (herd testers). The Royal Veterinary and Agricultural College, Copenhagen, offers a degree course in dairying to selected youths who have had practical creamery experience. Graduates of this college usually find employment in the Government service. Various schemes, such as apprenticeship on large holdings, are designed to ensure that young farmers will gain sound practical experience.

### Research Institutes.

The State Experimental Dairy at Hillerod receives milk from about 120 suppliers and is managed exactly as any commercial creamery. When it is desired to test on a large scale the results of any bacteriological, chemical, or other technical research applied to manufactured milk products, the investigations are made at this creamery. Adjoining the creamery are two State experiment farms, where investigational work on dairying and pig raising is carried out. Professor Orla Jensen, one of the world's foremost dairy bacteriologists, who is attached to the Technical High School, Copenhagen, and Professor Soncke Knudsen,

of the Royal Agricultural College, who has made many notable contributions to applied dairy bacteriology, both work in close collaboration with the Experimental Creamery and the Control Station, and have been responsible for introducing many of the routine tests now carried out at the creameries and the Butter Control Station.

**Acknowledgment.**

It is desired to make grateful acknowledgment to all Government officials, members of staffs of the Royal Agricultural College and the Technical High School, factory managers, and others with whom I came into contact during my visit to Denmark, for hospitality extended and for information and literature made available to me; and also for their help in planning an itinerary that permitted me to see so much of the dairy industry of a remarkably interesting country, and of its fine and progressive people.

Plate 217.

Bingil Bay, North Queensland.—This view is typical of the scenic charm of a thousand miles of Queensland coastline inside the Great Barrier Reef, which has been described as "the eighth wonder of the world."

# Fodder Storage.

## A DARLING DOWNS FARMER'S EXPERIENCE.

*Following is a report by Mr. W. Newman, of St. Athan, Wyreema, a well-known Darling Downs farmer, on large-scale fodder conservation as practised on his own property. Mr. Newman's account of his methods, and of the work and costs involved, which he has submitted through Mr. Philip Round, Dairy Inspector, Pittsworth, will be read with interest by farmers who are contemplating the establishment or extension of their own fodder reserves, and will be appreciated generally.—Ed.*

HAVING had very bad seasons in 1934-35-36, during part of which we were hand feeding 150 milkers as well as dry stock, I decided that I would have to conserve a lot more fodder than ever before and, to feel safe, that it would be necessary to do it on a larger scale and in a shorter time than would be possible with lucerne or other hay.

1936, it will be remembered, was a very bad year, but, with the use of an old corn binder in harvesting, I was able to fill a gravel pit with 350 tons of green fodder. The enterprise proved successful, and, with the experience thus gained, I planted 70 acres of broadcast saccaline and 40 acres of maize in the following year. With a good harvest in prospect, provision for more extensive fodder storage was then decided on, and a second-hand slide scoop of 1¼ yards capacity was bought.

Using a 22-36 tractor, four pits on the trench style, 30 feet wide, 6 feet deep and varying in length from 90 to 180 feet were scooped out. The total capacity of the four pits was over 3,000 cubic yards. To get the sides of the pits nearly vertical, I think it is necessary to use a slide scoop, so as to get close to the banks. (Plates 218 and 219.)

Plate 218.
The slide scoop in operation.

The 22-36, being a wheel tractor, needs careful handling with this large scoop to prevent sinking into the loose dirt, but, after the first pit, we had no trouble and could get out about 200 yards a day.

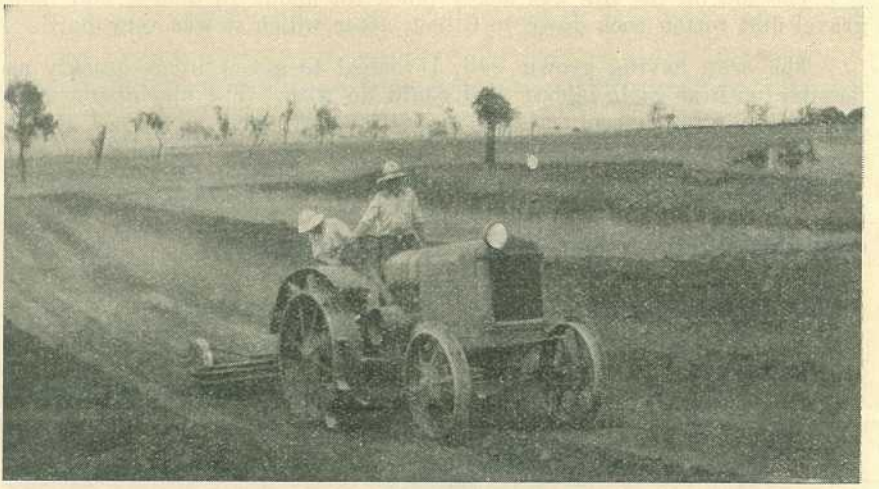


Plate 219.
Excavating a trench pit with a tractor-drawn scoop, showing roadway at the side of the trench.

On each side of the pit, about 12 feet (Plates 219 and 220), was kept clear of spoil from the excavation. This space was for use as a roadway for the truck and wagons. The dirt taken from the pits was tipped on the outside of these tracks for the full length of the pit, so as to facilitate the covering of the ensilage when the pit was full.

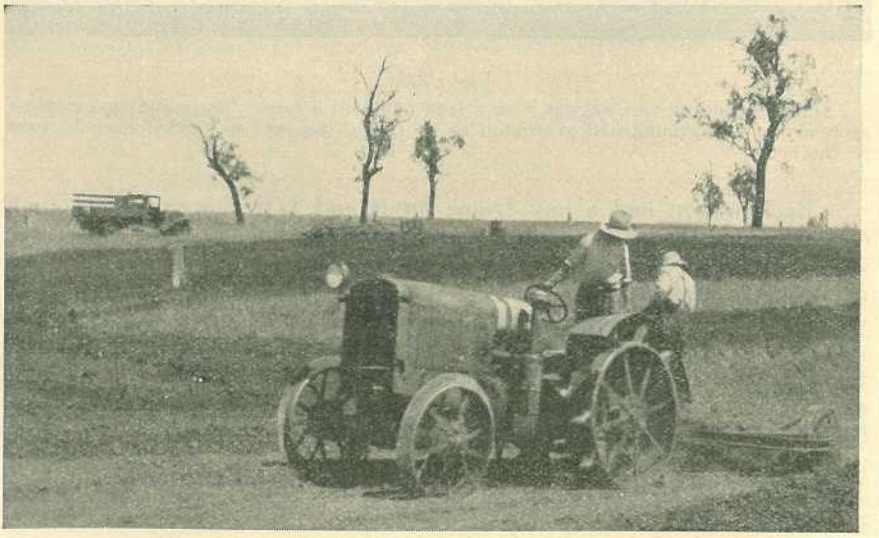


Plate 220.
On the up-grade; note the clear ground on the edge of the excavation.

The soil on the site was heavy black for about 18 inches, and then gravel and rotten rock down to 6 feet, after which it was very hard.

The crop having grown well, I wished to get it in as quickly as possible with as little labour as I could do with. The machinery used included a 22-36 wheel tractor; a McCormick corn binder; a 6-feet McCormick grain binder; a 30-cwt truck, with 2-3 ton wagons.

From my experience last year, I realised that it took longer to unload the wagons than it took to load them, so it was decided to try to overcome this delay as well as easing the work.

Plate 221.

Tractor hauling two wagons with a load of about 6 tons. The standing saccaline crop in the background had grown up to 12 feet in height; it yielded over 15 tons to the acre.

Each wagon had a hay frame on it and I tied 5 ropes (1½ inch circumference) equally spaced to the main side member on the right side under the floor. The ropes were then taken outwards and then up over the hay frame and across to the left side of the wagon. They were then tied to a piece of hardwood (4 x 4, the same length as the wagon). The ropes were just long enough to allow the 4 x 4 hardwood to lie on the ground. On this plank a strong ring about 3 feet from either end was fixed. This plank was then hung on hooks from the hay frame and was carried all the time in that position, and the load was placed on top of the ropes lying in the floor. I had about 30 feet of ½-inch wire rope with a large hook at both ends. This rope passed through a pulley block which evened up the pull to the 4 x 4 plank and to the hook of the pulley block. Another wire rope with a tractor D on the other end was attached; this second rope was about 45 feet long, long enough to pass over the pits comfortably.

Plate 222.

Another view of the tractor train in action. Note the extension rim on the rear wheel of the tractor.

### The Harvest.

Six men were all that were needed at any time after we started. The poles on the corn binder and grain binder were altered so that they were pulled behind the tractor.

The tractor and binder with two men cut a quantity of the crop, while the other four men carted with the truck. When enough for about a day's carting had been cut the tractor was hooked on to the two wagons, drawn one behind the other—the second wagon being pulled by a wire rope direct from the tractor and passing under the front wagon. All six men then loaded these two wagons and they were pulled to the edge of the line. (Plates 221, 222, 223.)

Plate 223.

Tractor and two wagons, showing rope attachment to the second wagon, and also a 4 x 4 board extending from the wagon frame.

The tractor was then unhooked and taken to the other side of the pit and hooked on to the D on the wire rope. The 4 x 4 beam was dropped on to the ground, the wagons being pulled in so that they dropped on the side away from the pit. The wire rope with the hooks on either end was passed over the load and the hooks put in the rings on the 4 x 4 beam. The tractor then moved slowly away from the pit and the load was rolled off into the pit. The same method was used to unload the other wagon, it was unnecessary to separate the wagons and they were in position to be hooked straight on to the tractor after the loads were off. (Plates 224, 225, 226.)

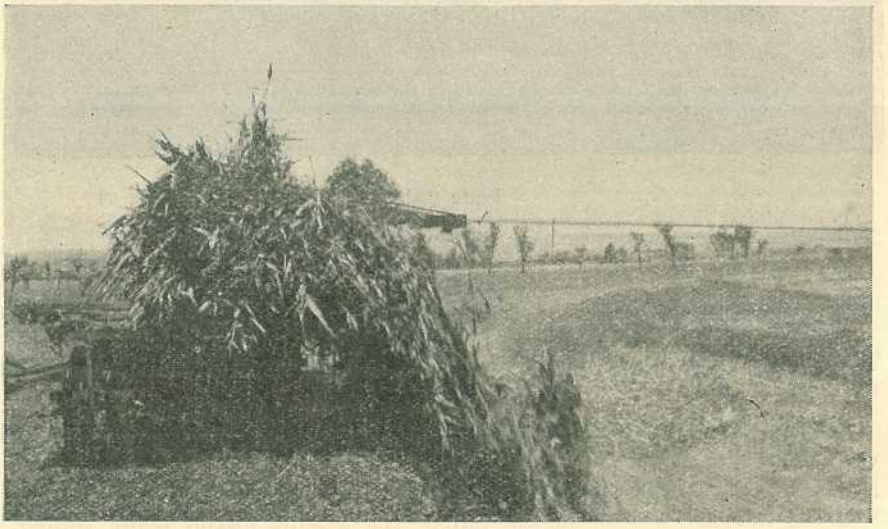


Plate 224.
Tipping the load into pit by tractor power.

To prevent the wagons from being rolled over into the pit, two 12 feet lengths of 3 x 2 wire passed into the undercarriages of the wagons and two men sat on the ends of each plank. (Plate 226.)

To simplify the rolling of the loads, we always loaded the wagons with the sheaves running longwise. With the heavy green crop we got good loads on without any sign of their falling off. The tractor then pulled the wagons back to the paddock for another two loads. Five men went with the wagons and one stayed at the pit to level off the loads just tipped in. We found that with a good crop and the pit not too far from the paddock that five men could get two loads (about 6 tons) every 45 minutes. In this time, the man at the pit could have the previous two loads spread. Of course, it was not necessary to move all the sheaves in the spreading when we had unloaded for the full length of the pit from one side; when that had been done, we pulled the wagons in on the other side, but heading in the opposite direction. It was only necessary then to carry the wire ropes across the pit and by unloading from both sides we found that it helped to keep the material level, so that it would sink evenly.

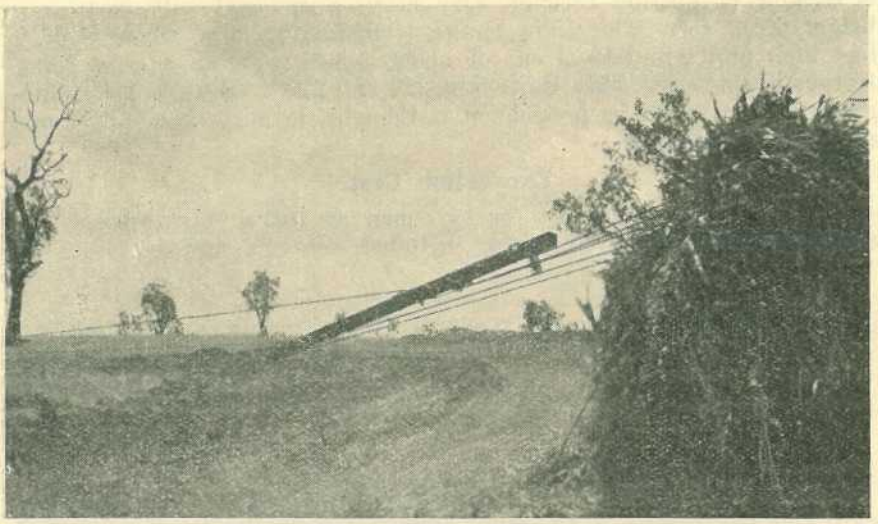


Plate 225.
Another view of the tipping operation.

The pits were filled until the material was 3 feet above ground level and solid. We then ran the tractor with the extension rims up (Plate 222) and down the pit to press the material down further.

Scooping from either side, about 2 feet of soil was placed on the heap and the top finished off with a camber like a graded road. As the soil settled in the pit, more was scooped on top to preserve the camber of the covering and the run-off for rain.

Plate 226.
Off-loading. The weight of the two men sitting on the sprag rails keeping the wagon on an even "keel."

In harvesting the corn binder will only cut crops set in rows, but is capable of putting through very heavy crops and will work to a height of 14 feet. The grain binder is limited to crops about 8 or 9 feet high and will take a cut of about 3 feet wide in a crop going 15 tons to the acre. (See Plate Nos. 227 and 228). With a few simple alterations it would be possible, it is thought, to make it handle crops up to 10-12 feet high.

### Excavation Cost.

Costs, including wages for two men at 10s. a day, worked out at 7d. a cubic yard. This also included kerosene and oil, but not

Plate 227.
Grain binder in a 15-ton-to-the-acre saccaline crop up to 9 feet high.

depreciation on tractor or scoop. We averaged 250 cubic yards per day. It would of course be cheaper and quicker with a crawler tractor and would also be cheaper again with shorter pits as there would not be so much travel for each load. The Department of Agriculture advise that 1 cubic yard holds half a ton of ensilage so that the pits cost 1s. 2d. ton capacity. The pits are really improvements as they should last for many fillings with only a small amount of cleaning out before each filling.

### Harvesting Cost.

The harvesting outlay included cost of ropes, forks, twine, repairs, and alterations, all of which were written off completely, although they were far from worn out. I included the depreciation on binders and scoop at 25 per cent. which is really excessive. The tractor costs were taken at 25s. per day, and as we only used 10 gallons of kerosene this should be ample. The wages were 10s. a day for each man, without keep. The cost worked on this basis was 4s. 4d. per ton which included covering over the first time. Since then we have spread a little more earth on the pits when they sank, but only took two days to top up all the pits.

We have now finished off the last pit and consider it should be safe there for years, if not wanted in the meantime. In all, 1,200 tons of ensilage have been stored this year and it is regarded as an excellent insurance against drought.

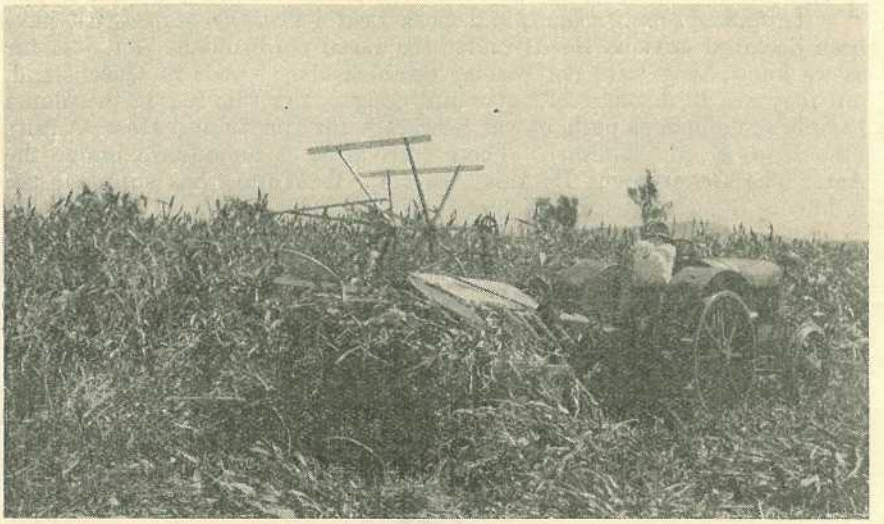


Plate 228.
Grain binder.

Any farmer with grown-up sons would, of course, be able to cut these costs considerably, for most of the expense was for labour, all of which was hired. My own wages were put down at 10s. when arriving at these costs.

Most farmers would probably use horses for at least part of the work; this may reduce the costs, but on the other hand it might slow the work down so that the costs would be as high if not higher. Such details would of course have to be determined by each individual farmer for himself, but whatever the costs, my experience has confirmed a belief that the method of fodder conservation described is not only practicable but highly profitable, especially from the drought insurance point of view.

# Indian Hemp, Opium Poppy, and Coca Leaf.

THE plants known as Indian Hemp (*Cannabis sativa*), Opium Poppy (*Papaver somniferum*), and Coca Leaf (*Erythroxylon coca*), have been declared noxious weeds under the Local Government Act. So far as we know, they have not become established as weeds in Queensland, but they are all a source of important drugs. For this reason the plants have been defined as pests by the Secretary for Health and Home Affairs (the Hon. E. M. Hanlon). Their cultivation is an offence under the Act. The Government Botanist (Mr. C. T. White) has supplied the following descriptions and notes:—

## Indian Hemp (*Cannabis sativa*).

The Indian Hemp is a robust plant, 3-10 feet high. The bark is very fibrous. The leaves are composed of 5-7 slender leaflets radiating out from the base like the fingers of a hand. The individual leaflets are 3-6 inches long and ¼-1 inch wide. Male and female flowers are borne on distinct plants. Both are insignificant. The plant bears an abundance of small seed-like nuts, about ⅛ inch long. Indian Hemp is

Plate 229.
*Cannabis sativa* (Indian Hemp).

widely cultivated in tropical and sub-tropical countries. It is probably more extensively grown in India than anywhere else. Its principal use is for the fibre produced from the inner bark. The gum or resin is an important drug, like opium it produces in small quantities an agreeable form of intoxication. It acts upon the nervous system producing hallucinations and afterwards lethargy. It is an official drug and the medicine is used as a sedative in madness and hysteria. It is also used in deadening pain.

* Three plants declared noxious throughout Queensland by *Government Gazette* issued on 22nd October, 1938, p. 1706.

**Opium Poppy** (*Papaver somniferum*).

The Opium Poppy is a robust annual plant, 3-4 feet high or more. The stems and leaves are of a pale-bluish or whitish-green colour. The leaves are large and coarsely toothed. The flowers are large, red, pink, or white. The centre of the flower is occupied by a large number of stamens, usually white, in the centre of which is the ovary, surmounted by 8-15 stigmas. The seed-capsule is about the size of a child's fist, and

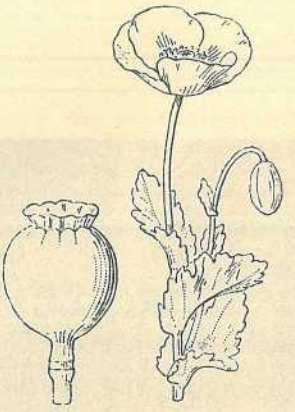


Plate 230.
*Papaver somniferum* (Opium Poppy).

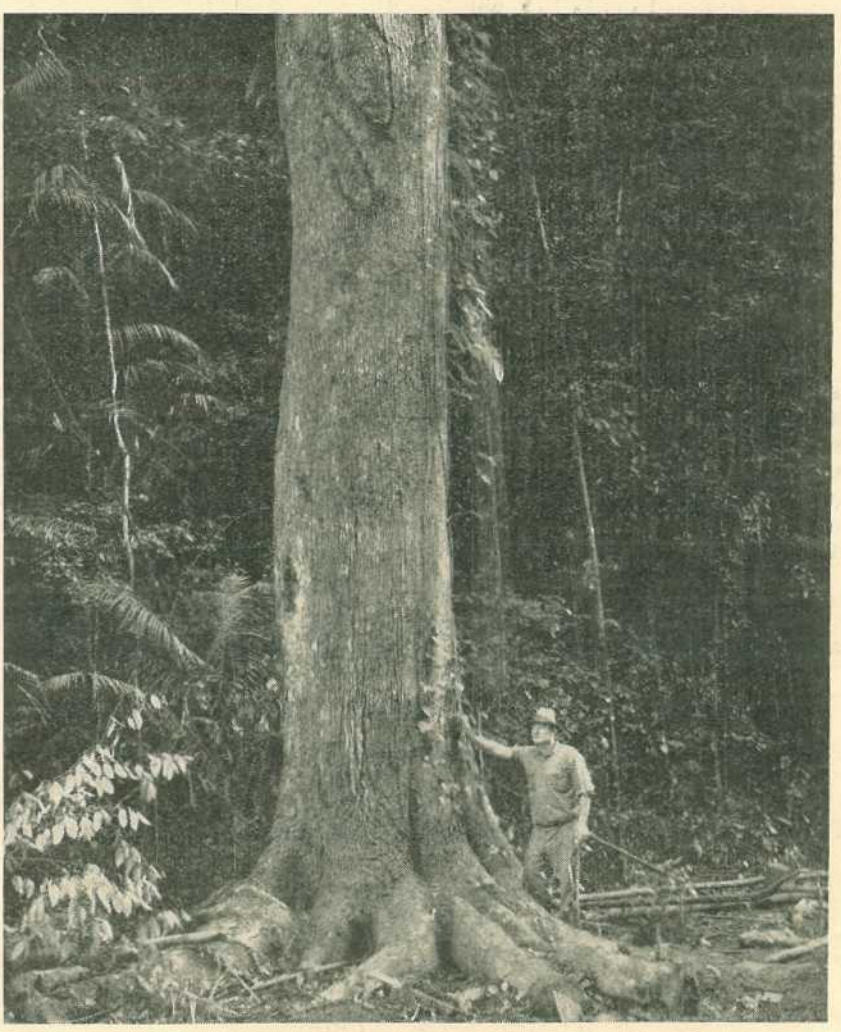
contains a very large number of small rounded seeds. Several double-flowering varieties are cultivated as garden annuals. The Opium Poppy is a native of Asia Minor, but is now cultivated in many tropical and sub-tropical countries, particularly India and China. The resin obtained by scratching the seed-capsules is the source of opium, the principal constituent of which, from a medicinal point of view, is the alkaloid morphine.

**Coca Leaf** (*Erythroxylon coca*).

Coca Leaf is a shrub 6-8 feet high or more. The leaves are of a rather thin texture, oval in shape. The characteristic feature is that

Plate 231.
*Erythroxylon coca* (Coca Leaf).

two of the veins, in addition to the midrib, run parallel with the margin. The flowers are small, white, and are produced in little clusters, mostly in places where the leaves have fallen away. The fruit is about ½ inch long, pointed at the top and surrounded at the base by the persistent calyx. It is red, with a scanty flesh, and contains a single seed filling the whole fruit. Coca Leaf is a native of South America and is very extensively grown in many South American countries. It is now scarcely known in the wild state. The leaves contain a crystalline alkaloid, cocaine.



[*Photo.: J. A. Lunn, Lands Department.*

Plate 232.

A GIANT OF THE JUNGLE.—On the edge of a road clearing through the rain forest at Danbulla, North Queensland.

# Lime for Agricultural Purposes.

F. B. COLEMAN, Officer in Charge, and R. A. TAYLOR, A.A.C.I., Inspector and Examiner, Seeds, Fertilizers, Veterinary Medicines, Pest Destroyers and Stock Foods Investigation Branch.

UNDER "*The Fertilisers Act of* 1935," lime for agricultural purposes is dealt with very comprehensively.

The classification set out in the Act with respect to the types of lime for agricultural purposes is as follows:—

(1) Burnt lime, caustic lime, or quicklime—consisting chiefly of lime in the form of calcium oxide (CaO); or

(2) Slaked lime, air-slaked lime, mild lime, hydrated lime—consisting chiefly of lime in the form of hydrate of lime ($CaOH_2$) and/or carbonate of lime ($CaCO_3$), obtained by the slaking of burnt lime; or

(3) Processed lime—consisting of a by-product from a process—chiefly lime in the form of hydrate and/or carbonate of lime; or

(4) Pulverised limestone, marble, coral, or shells—consisting chiefly of lime in the form of carbonate of lime ($CaCO_3$) obtained by crushing or pulverising; or

(5) Earthy lime—consisting chiefly of lime in the form of carbonate of lime ($CaCO_3$) obtained by excavation of the natural substance; or

(6) Gypsum—consisting of lime in the form of hydrated sulphate of lime ($CaSO_4.2H_2O$).

The classification of lime, as shown above, is based upon terms in common use, which describe the process of preparation or manufacture to which the limes concerned have been subjected.

In order to fully understand the article, it is necessary to note that 56 per cent. calcium oxide—or lime (CaO) as it is commonly known—is equal to 100 per cent. calcium carbonate ($CaCO_3$); this may be explained by saying that 56 tons of pure burnt lime, containing 100 per cent. lime (CaO), is equal to 100 tons of pure limestone, containing 100 per cent. calcium carbonate ($CaCO_3$).

As lime (CaO) is present either free or combined with other elements, in all limes for agricultural purposes, it is used as a unit of measurement by analytical chemists in order to evaluate these materials.

Thus, pure limestone is not stated on analysis to contain 100 per cent. calcium carbonate ($CaCO_3$), but to contain 56 per cent. lime (CaO) as or in the form of calcium carbonate.

A description of limes for agricultural purposes and matters dealing with their origin, composition, and value are dealt with below.

## BURNT LIME.

Burnt lime is obtained in the following way:—Limestone is first quarried and broken into fairly small pieces. These pieces are placed in alternate layers in a kiln with fuel—in Queensland usually wood—which is ignited. The heat serves to liberate the carbon dioxide from the calcium carbonate, leaving calcium oxide and a quantity of impurities proportionate to the purity of the original limestone.

Pure limestone would contain 56 per cent. lime (CaO) and 44 per cent. carbon dioxide; pure burnt lime would contain 100 per cent. lime (CaO) actually in the form of calcium oxide. In actual fact the minimum purity of good burnt lime can be accepted as 90 per cent. lime (CaO). It should be emphasised that the impurities mentioned above, consisting of iron, alumina, magnesia, silica, &c., are naturally present in limestone, and cannot without great expense be removed; moreover, in normal proportions they do no harm and can be disregarded.

It is essential that the limestones should be completely burnt, otherwise the purchaser is buying some of the original limestone at the price of burnt lime.

In this connection it may be mentioned that limestone (or coral) can only be completely burnt in a properly constructed brick kiln; "open-kiln" burning as practised in the past (consisting of logs built round the broken material) is not successful in giving a complete "burn."

An analysis of burnt lime indicates whether the limestone has been completely burnt; even if the burnt lime has been partially slaked it is still possible to determine this, providing the sample analysed is representative of the bulk.

In addition, a physical examination of badly burnt lime reveals in the resultant product "cores" of unchanged limestone which will not break down on slaking.

Burnt lime slakes under normal atmospheric conditions, taking in carbon dioxide and water from the aid and "altering" from calcium oxide to a mixture of calcium hydroxide and calcium carbonate. This slaking may be considered in two steps:—

At first the calcium oxide alters to calcium hydroxide and calcium carbonate, with calcium hydroxide in much greater proportion than calcium carbonate.

An analysis would show, say—

50 per cent. lime (CaO) as calcium oxide.
30 per cent. lime (CaO) as calcium hydroxide.
4 per cent. lime (CaO) as calcium carbonate.

When the whole of the oxide has "altered," the proportions of the hydroxide and carbonate would be represented by, say—

0 per cent. lime (CaO) as calcium oxide.
60 per cent. lime (CaO) as calcium hydroxide.
10 per cent. lime (CaO) as calcium carbonate.

This slaked lime would then gradually "alter" until it becomes all carbonate, an analysis revealing, say—

55 per cent. lime (CaO) as calcium carbonate.

This is then a stable article, and undergoes no further change under atmospheric conditions.

Following on the above, it may be assumed that an analysis of—

50 per cent. lime (CaO) as calcium oxide,
30 per cent. lime (CaO) as calcium hydroxide,
4 per cent. lime (CaO) as calcium carbonate,

represents a well-burnt lime that has partially air-slaked.

An analysis such as the following, however, would indicate by the excess of calcium carbonate, compared with calcium hydroxide, the presence of unburnt calcium carbonate, and consequently could be assumed as being a partially-slaked, badly burnt lime:—

50 per cent. lime (CaO) as calcium oxide.
7 per cent. lime (CaO) as calcium hydroxide.
22 per cent. lime (CaO) as calcium carbonate.

Of course the following—

70 per cent. lime (CaO) as calcium oxide,
0 per cent. lime (CaO) as calcium hydroxide,
16 per cent. lime (CaO) as calcium carbonate,

is obviously a freshly-prepared, badly burnt lime.

It must be noted that the percentages given are *calcium oxide* (CaO)—not calcium hydroxide ($Ca(OH)_2$) or calcium carbonate ($CaCO_3$).

When a farmer realises that burnt lime slakes even under normal atmospheric conditions, and its percentage of calcium oxide (CaO) and its neutralising value become lower, it is easy to see that burnt lime should be packed and railed as *freshly burnt* material. If the material has started to slake before being packed and weighed, the purchaser is buying and paying freight on partially slaked lime, which, as above stated, has a lower percentage of lime (CaO) and lower neutralising value.

Thus, a person who pays for burnt lime and asks the manufacturer to slake it for him, unless he gets the *increased "weight equivalent"* of slaked lime, is losing badly on the proposition; in any case he is paying freight on carbon dioxide and water that could be added to the burnt lime on his own property.

*Burnt lime should be purchased on the basis of net weight at the place of burning*—which in North Queensland is usually some distance from the coast—as, during transit to the coast, an increase in weight could occur (due, as above stated, to taking up of carbon dioxide and moisture) before weighing; if weighed at the coast this increase would be included in the net weight charged for. In other words, 10 tons of burnt lime at the kilns could weigh 11 tons on the coast, with a consequent increased cost to the purchaser.

**Ground Burnt Lime** is, as its name indicates, burnt lime that has been pulverised by machine without first slaking. One such product is now being offered for sale in Queensland.

The farmer in this case must weigh the additional cost of the material against any advantage in fineness, taking into consideration the facts that although he can easily slake unground burnt lime on his own property, there is no additional freight cost (as with slaked lime) involved with ground burnt lime, providing it is bagged and railed immediately.

Of course the fine state of division would accelerate slaking considerably, and this would not be apparent from appearance—as the original material is already in a fine state.

Packing in water-proof paper bags (similar to cement bags), however, eliminates any disadvantages that may normally be associated with such an active substance in transit, storage, or handling.

## SLAKED LIME.

This may be of two main types:—Air-slaked lime and hydrated or water-slaked lime.

**Air-slaked Lime.**—This, as mentioned above, is obtained by exposing burnt lime to the slaking effects of the atmosphere. An explanation of the action has been set out previously.

The slaked lime made by farmers from burnt lime is usually air-slaked lime, that is, the burnt lime is dumped in heaps on the field, allowed to break down, and then spread and worked in.

The proportion of calcium oxide present and the forms in which it occurs at the time of application to the soil vary with the progress made in the process of slaking; this, of course, causes complications with respect to the amount of lime to be applied.

If burnt lime is purchased, the purchaser should apportion the lime actually applied to the soil into the same number of units as he planned for the original burnt lime.

For instance:—

A farmer buys 10 tons of burnt lime with a neutralising value of 160, planning to apply $\frac{1}{2}$ ton per acre to 20 acres.

When slaked ready for use the total weight may have increased to, say, 12 tons with a neutralising value of $133\frac{1}{3}$—which figure was, of course, reduced from 160 by the slaking.

The neutralising value will be *reduced* by the slaking.

The lime should still be divided into twenty lots and applied as planned, but the actual weight per acre will now be $\frac{12}{10} \times \frac{1}{2} = \frac{12}{20}$ ton = 12 cwt. instead of 10 cwt.

The actual weight of lime (CaO) applied to the soil will be the same, however.

This is demonstrated thus:—

10 cwt. x neutralising value 160 = 1,600
12 cwt. x neutralising value $133\frac{1}{3}$ = 1,600

The neutralising value bears an approximate ratio to the lime (CaO) percentage.

If burnt lime is emptied direct from the bags into heaps on the ground to which it is to be applied, any increase in weight, &c., need not be considered.

**Hydrated or Water-slaked Lime.**—A more rapid and effective method of slaking can be obtained by adding measured amounts of water to burnt lime; this produces a rapid chemical change, with evolution of heat, and results in a fine, even, white powder, termed hydrated or water-slaked lime.

With a correctly made water-slaked lime the amount of water added is about one-third of the weight of the original burnt lime. The resultant product should be practically all calcium hydroxide ($Ca(OH)_2$), and should give a minimum analysis of 70 per cent. lime (CaO) as calcium hydroxide.

Possibly owing to lack of experience in this method of slaking, and the necessity for careful control with respect to proportions, &c., in

order to obtain a consistent product, water-slaked lime for agricultural purposes is very scarce in Queensland.

To correctly manufacture commercially, an hydrating plant is necessary; to date only one such plant is installed for this purpose in Queensland.

Of course, although hydrated lime is more active and more water soluble than air-slaked lime, it gradually alters to air-slaked lime on exposure, changing in time from practically pure calcium hydroxide to practically pure calcium carbonate.

There is not much of any slaked lime sold in Queensland.

## PROCESSED LIME.

In certain industries various forms or compounds of lime are used in chemical processes, and a resultant lime by-product is obtained. The common types of "processed" limes—as these are designated—are set out below.

**Gas Lime.**—In the ammonia-recovery process associated with the gas industry, burnt lime is used; the spent lime consists chiefly of calcium carbonate and hydrate together with certain impurities such as sulphides—when freshly run off. On exposure to sun and air, however, the material becomes practically all carbonate, while the impurities are oxidised to harmless compounds. A recognised lime for agricultural purposes is obtained after drying and grinding.

**Carbide Lime.**—In the manufacture of acetylene, calcium carbide and water are used, giving as a waste by-product—when fresh—lime chiefly in the form of hydrate.

This lime also needs to be exposed to the atmosphere, dried and ground. Obviously, after long exposure, carbonate would be formed.

This form of processed lime is, in Queensland, naturally limited in supply, and to date it has not been considered worth commercialising.

## LIME CARBONATES.

**Pulverised Limestone, Pulverised Marble, Pulverised Coral,** or **Pulverised Shells** are the respective natural materials after treating by passing through a crushing or pulversing machine.

The percentage of lime (CaO) varies according to the purity of the original material; the lime is in the form of calcium carbonate. *Pulverised limestone* varies in quality, but, generally speaking, is a fairly high-grade source of lime. It must be ground in a pulverising machine, as is explained elsewhere under the heading of "*Fineness.*"

The degree of fineness is an important factor governing its value. The natural impurities usually present are chiefly magnesia, iron, alumina and silica.

**Coral.**—Coral lime can be obtained at low tide from reefs in the tropics by a process of quarrying aided by explosives.

It has in the past been loaded on barges, taken to the mainland, and pulverised; in certain cases it has been broken into pieces and burnt—vide "Burnt Lime."

A product of coral formations found in shallow water in certain parts of the sea bed along the Queensland coast is also used as lime for agricultural purposes. This is handled by dredging, and although fairly dirty in appearance, it may be made to analyse fairly high in lime content by selection, washing, &c.

The lime is all in the carbonate form, as in the original coral. As fairly large pieces of coral are present, drying and grinding are necessary.

**Earthy Lime** consists of lime carbonate which is in a naturally disintegrated or friable condition, and is dug out after removal of the "overburden." It is comparatively impure and of a softer nature than limestone. It needs very little treatment before being offered for sale; sieving is sometimes sufficient to obtain a satisfactory degree of fineness —to which importance should be attached.

The lime (CaO) content varies according to the purity of the material—as in pulverised limestone—and is wholly present in the form of calcium carbonate.

Earthy lime must always be ground and/or screened before being bagged ready for sale.

## MAGNESIAN LIMES.

**Magnesium or Dolomitic Lime Carbonates.**—A number of natural limestone or earthy lime deposits contain an appreciable quantity of magnesia. When this type of material is marketed in Queensland the maximum percentage of magnesia (MgO) as well as the minimum percentage of lime (CaO) must be declared on the label for the information of the purchaser, who may decide from these percentages whether the product is suited for his particular purpose or otherwise. The neutralising value to which both the lime and magnesia contribute must be declared also.

Of course, practically all naturally occurring lime carbonates contain a small amount of magnesia.

Fineness is of the same importance with all of these carbonates.

It should be noted that the maximum percentage stated on the label refers to magnesia (MgO)—not magnesium carbonate ($MgCO_3$). This is comparable to the declaration of the percentage of lime (CaO) and not calcium carbonate ($CaCO_3$), as explained under "*Labelling.*"

The percentage of lime (CaO) and magnesia (MgO) together found on analysis must amount to at least 35 per cent.

## GYPSUM.

Gypsum is a naturally occurring form of lime, and may be described as dihydric calcium sulphate ($CaSO_4.2H_2O$).

It is very little used in Queensland, and although it has a minimum lime content of 25 per cent., it has no actual neutralising value.

No material is registered in Queensland under this name.

## MISCELLANEOUS LIMES.

From time to time limes for agricultural purposes are placed on the market that owing to the quality of the material used, or difficulties

involved in the process of manufacture or preparation, or other factors, do not compare with limes in the group to which they purport to belong.

In these cases they are classified as miscellaneous to allow purchasers to value them on their own merits apart from any group in which they would appear out of line.

## NEUTRALISING VALUE.

The term neutralising value applies to all limes for agricultural purposes, except gypsum, and affords a means of comparison applicable to these limes.

It is a comparative figure which denotes the ability of the lime in question to neutralise acidity, which is one of the main purposes for which lime is used.

It is a figure ascertained practically, and would include any other carbonates or basic materials present.

The standard of comparison is 100 per cent. pure calcium carbonate, which would have a neutralising value of 100.

Comparative neutralising values would be:—

| | |
|---|---|
| Burnt lime .. .. .. .. .. | 160 |
| Slaked lime .. .. .. .. .. | 120 |
| Pulverised limestone .. .. .. .. | 90 |
| Processed lime .. .. .. .. .. | 86 |
| Earthy lime .. .. .. .. .. | 80 |

## FINENESS.

With respect to lime sold for agricultural purposes, fineness is of importance with earthy lime, pulverised limestone, pulverised marble, and other pulverised carbonates, and also processed lime.

Magnesian limes are, of course, included here.

"Fine" means particles that will pass a sieve with apertures $\frac{1}{100}$ inch square.

The whole of the limes to which fineness applies must pass a sieve with apertures $\frac{1}{8}$ inch square.

Burnt lime is not affected by fineness, and the resultant slaked lime is also exempt from this provision.

Carbonates with equal neutralising values may be compared on a fineness basis.

The reason why fineness applies to earthy lime, processed lime, pulverised limestone, and other pulverised carbonates, and not to burnt or slaked lime, may be set down as follows:—

It has been repeatedly proved *that lime carbonates, unless in a fine state of division, are not rapidly absorbed by the soil, being insoluble in pure water and only slowly soluble in slightly carbonated water—that is, water containing carbon dioxide in small quantity.

* "Value of Different Forms of Lime," by Dr. H. W. Kerr and C. R. von Stieglitz, Farm Bulletin No. 6, Bureau of Sugar Experiment Stations.

The following extract from "Farm Bulletin No. 6," by Dr. H. W. Kerr and C. R. von Stieglitz—"The Value of Different Forms of Lime"—is not only well worth repetition but should be very carefully borne in mind by every lime purchaser.

> "Other things being equal, the finer the condition of the agricultural lime, the quicker will favourable results be obtained. Particles coarser than $\frac{1}{20}$ inch in diameter are practically worthless, and in a country where lime costs are so high the farmer should pay particular attention to this consideration."

Artificial grinding (or screening) is therefore necessary with these materials.

Burnt lime, however, is in large lumps when sold, and of its own accord breaks down on slaking—either artificial or natural—to a fine powder. This powder being usually largely hydroxide when applied, is fairly water-soluble, and is absorbed readily by the soil. Also, the fineness of the powder is greater than could be obtained by normal grinding processes.

No artificial grinding is therefore necessary, and a fairly uniform absorption by the soil is obtained from all burnt or freshly slaked limes.

The table at the end of this article sets out the various limes being offered for sale within the State.

## GROUP NAMES.

The use of names indicating the groups to which the particular limes relate is of importance.

For instance, a purchaser uses the name "Burnt Lime." Now, providing names used are a correct indication, any burnt lime registered would have a neutralising value that should be associated with burnt lime, e.g., say, at least 160.

If he orders a pulverised limestone, irrespective of "specific designation," he would get a material with a neutralising value of, say, at least 90, and with earthy lime, say, 70 to 90.

In addition, with the use of the name "Burnt Lime," he can dispense with fineness, whereas, with pulverised limestones, earthy limestones, &c., he has two factors of importance—neutralising value and fineness.

In short, limes may readily be compared with other limes in their own respective groups, and the strict adherence to this grouping with respect to the names used on the labels is of importance in allowing this comparison to be easily made.

## LABELS.

The method of labelling lime with respect to lime content (as indicated in the Table) is as follows:—

The percentage or percentages of lime (CaO) and the respective forms in which it occurs must be stated. This means that, with slaked limes or carbonates, not the percentage of calcium hydrate and percentage of calcium carbonate should be stated, but the percentages of calcium oxide—lime (CaO)—that are present in each of those forms.

Let us take a partially air-slaked lime for an example. This may consist actually of—

50 per cent. calcium oxide,

40 per cent. calcium hydroxide, and

5 per cent. calcium carbonate,

with, say, 5 per cent. impurities.

Now, in the calcium hydroxide and calcium carbonate, only the percentages of calcium oxide (CaO) can be called active constituents.

To compare with burnt lime containing, say, 90 per cent. lime (CaO), all as calcium oxide, this lime must be reduced to a common basis. In other words, to compare with a material that has lime present only as calcium oxide (CaO), the percentages of calcium hydroxide and calcium carbonate must also be reduced to the amount of calcium oxide (CaO) that they contain—the forms in which the calcium oxide (CaO) occurs being, of course, also stated.

Thus, the label would read—

50 per cent. lime (CaO) as calcium oxide
30 per cent. lime (CaO) as calcium hydroxide
2·8 per cent. lime (CaO) as calcium carbonate

Total 82·8 per cent. lime (CaO).

On this figure the material can then be compared with any other lime on a total lime (CaO) basis.

Of course, the neutralising value gives a definite method of comparison, but it includes magnesia and other neutralising material, and is a comprehensive figure only; also, of course, the neutralising value does not indicate the form or forms in which the calcium oxide occurs, and is of value only with respect to neutralising soil acidity.

It is provided by the Fertilisers Act that all limes for agricultural purposes shall be labelled in such a manner as to set out:—

The kind of lime;

The percentage of lime (CaO) and the form or forms in which it occurs;

The maximum percentage of magnesia (MgO);

The neutralising value;

The net weight;

The percentage of fineness (except in the case of lime which has been burnt); and

The name and address of the manufacturer or dealer.

The following sets out examples of labels:—

BURNT LIME FOR AGRICULTURAL PURPOSES.

When packed, lb. net.

90 per cent. lime (CaO) as Calcium Oxide.

Neutralising Value, 160.

(*Name and Address of Manufacturer or Dealer.*)

PULVERISED LIMESTONE FOR AGRICULTURAL PURPOSES.

When packed, lb. net.

50 per cent. lime (CaO) as Calcium Carbonate.

Neutralising Value, 90.

Fine, 80 per cent. Coarse, 20 per cent.

(*Name and Address of Manufacturer or Dealer.*)

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EARTHY LIME FOR AGRICULTURAL PURPOSES.

When packed, lb. net.

45 per cent. lime (CaO) as Calcium Carbonate.

Neutralising Value, 80.

Fine, 65 per cent. Coarse, 35 per cent.

(*Name and Address of Manufacturer or Dealer.*)

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MAGNESIAN EARTHY LIME FOR AGRICULTURAL PURPOSES.

When packed, lb. net.

43 per cent. lime (CaO) as Calcium Carbonate.

7 per cent. Maximum Magnesia (MgO) as Magnesium Carbonate.

Neutralising Value; 85.

Fine, 60 per cent. Coarse, 40 per cent.

(*Name and Address of Manufacturer or Dealer.*)

---

This article deals only with the legislation controlling the sale and quality (both chemical and physical) of the various limes for agricultural purposes, that are sold within this State.

Any information desired as to the actual use or application to the land for specific purposes should be directed to the other branches of the Department that are concerned.

## SUMMARY.

The chief original source of lime for agricultural purposes in Queensland is limestone rock.

The principal kinds of lime derived from this are as follows:—

**Burnt Lime.**—This is made by burning lumps of limestone, and providing it is packed and railed when freshly burnt, is a "concentrated" source of lime. It is to the farmer's advantage to slake burnt lime on his own property. Unfortunately the distribution of slaked lime is a very disagreeable undertaking. Ground burnt lime allows the application to be made by machine in one operation eliminating most of the objections.

An average quality burnt lime should analyse—

90 per cent. lime (CaO) as calcium oxide, and neutralising value, 160.

**Processed Lime** is the resultant by-product obtained after burnt lime has been used in certain chemical processes; the lime (CaO) is chiefly in the form of carbonate.

An average quality processed lime should analyse:—

46 per cent. lime (CaO) as calcium carbonate, neutralising value, 86; fine, 50 per cent.; coarse, 50 per cent.

**Pulverised Limestone** is the original rock quarried and ground. An average quality material should analyse: —

50 per cent. lime (CaO) as calcium carbonate, neutralising value, 90; fine, 80 per cent.; coarse, 20 per cent.

Other important limes for agricultural purposes are:—

**Earthy Lime**, which is an impure form of lime carbonate that can easily be worked by digging, being softer than limestone, and usually requiring screening only. An average quality material should analyse:—

45 per cent. lime (CaO) as calcium carbonate, neutralising value, 80; fine, 65 per cent.; coarse, 35 per cent.

**Magnesian Limes for Agricultural Purposes,** which are pulverised limestones or earthy limes containing appreciable quantities of magnesia.

The maximum percentage of magnesia (MgO) as magnesium carbonate as well as the minimum percentage of lime (CaO) as calcium carbonate must be declared on the label, and this should be considered by the farmer with a view to the application of the material for particular purposes.

**Efficiency of Lime for Agricultural Purposes.**—Limes which have been burnt may be compared on a neutralising value basis only.

Other forms of lime may be compared within their own respective groups on a neutralising value and fineness basis, except where the percentage of magnesia is appreciable, when this must be treated as another important factor.

**Labels** should set out the—

Kind of lime,

The percentage of lime (CaO) and forms in which it occurs,

The maximum percentage of magnesia (MgO),

The neutralising value,

The net weight,

The fineness (unless prepared by burning),

The name and address of the manufacturer or dealer.

Buyers of lime of a greater value than 10s. should receive an invoice bearing the warranty required by the Act with respect to the quality of the article.

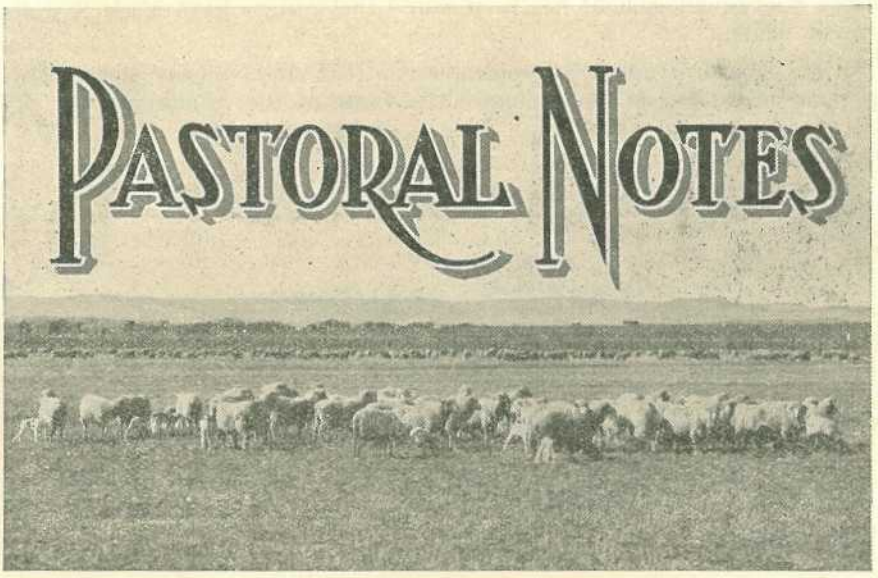
*On no account should purchasers accept delivery of lime for agricultural purposes that is not labelled and invoiced in the manner outlined above.*

All complaints or inquiries should be addressed to the Seeds, Fertilizers, Veterinary Medicines, Pest Destroyers, and Stock Foods Investigation Branch, Department of Agriculture and Stock, Brisbane.

LIMES FOR AGRICULTURAL PURPOSES.—REGISTERED UNDER THE FERTILISERS ACT OF 1935 FOR THE YEAR ENDING 31ST DECEMBER, 1939.

| Name and Address of Dealer. | Brand. | Guaranteed Analysis. | | | | | |
|---|---|---|---|---|---|---|---|
| | | Lime (CaO). | In the Undermentioned Form. | Magnesia (MgO) as Magnesium Carbonate. | Neutralising Value. | Fine. | Coarse. |
| | | Minimum % | | Maximum % | Minimum. | Minimum % | % |
| **Burnt Lime—** | | | | | | | |
| Ambrose Lime Works Pty. Ltd., Ambrose | Ambrose | 90 | As oxide | .. | 160 | .. | .. |
| Crotty Lime Works, Alma Den | Crotty | 90 | As oxide | .. | 160 | .. | .. |
| Demchok, M., Mungana | Mungana | 90 | As oxide | .. | 160 | .. | .. |
| Gore Lime Products, Gore | Gore | 90 | As oxide | .. | 160 | .. | .. |
| Ryan Lime Co. Pty. Ltd., Townsville | Ryan | 90 | As oxide | .. | 160 | .. | .. |
| Tamaree Lime Works, Tamaree | Tamaree | 90 | As oxide | .. | 160 | .. | .. |
| Webb & Son, Reid River | Webb & Son | 90 | As oxide | .. | 160 | .. | .. |
| **Burnt Lime—Pulverised—** | | | | | | | |
| Ryan Lime Co. Pty. Ltd., Townsville | Ryan | 85 | As oxide | .. | 150 | .. | .. |
| **Slaked Limes*—** | | | | | | | |
| Hydrated— | | | | | | | |
| Gore Lime Products, Gore | Gore | 70 | As hydroxide | .. | 125 | .. | .. |
| Air-slaked— | | | | | | | |
| Gore Lime Products, Gore | Gore | 50 | As hydroxide | .. | 107 | .. | .. |
| | | 10 | As carbonate | | | | |
| Tamaree Lime Works, Tamaree | Tamaree | 60 | As hydroxide | .. | 110 | .. | .. |
| | | 3 | As carbonate | | | | |
| **Processed Lime—** | | | | | | | |
| A.C.F. and Shirleys Fertilizers Ltd., Brisbane | A.C.F. | 47 | As carbonate | .. | 88 | 50 | 50 |
| Australian Chemical Co., Brisbane | Acco | 47 | As carbonate | .. | 88 | 50 | 50 |
| Barry & Roberts, Brisbane | Barry & Roberts | 47 | As carbonate | .. | 88 | 50 | 50 |
| Michael, E. (Miss), South Brisbane | Processed Lime | 47 | As carbonate | .. | 88 | 50 | 50 |
| Rose, M. G., Brisbane | Rose | 47 | As carbonate | .. | 88 | 50 | 50 |
| Wynn, H. A., South Brisbane | A.C.F. | 47 | As carbonate | .. | 88 | 50 | 50 |
| **Pulverised Limestone, Marble, &c.—** | | | | | | | |
| Ambrose Lime Works Pty. Ltd., Ambrose | Ambrose | 50 | As carbonate | .. | 90 | 84 | 16 |
| Crotty Lime Works, Alma Den | Crotty | 51 | As carbonate | .. | 92 | 77 | 23 |
| Fertiliser Distributers Pty. Ltd., Brisbane | F.D.L. | 50 | As carbonate | .. | 90 | 84 | 16 |
| Gibbs, Bright & Co., Brisbane | S.C. | 50 | As carbonate | .. | 91 | 60 | 40 |
| Gore Lime Products, Gore | Gore | 50 | As carbonate | .. | 90 | 38 | 62 |
| Marberete Co. Pty. Ltd., Brisbane | Marberete | 55 | As carbonate | .. | 99 | 80 | 20 |
| Robbins, W. G., Mowbray, Port Douglas | Robbin's | 51 | As carbonate | .. | 92 | 40 | 60 |
| Ryan Lime Co., Townsville | Ryan | 50 | As carbonate | .. | 90 | 50 | 50 |
| **Earthy Lime—** | | | | | | | |
| Bowen District Limes Pty. Ltd., Brisbane | Bowen | 39 | As carbonate | .. | 73 | 41 | 59 |
| Bryant, C. J., Didcot | Didcot | 47 | As carbonate | .. | 80 | 74 | 26 |
| Marmor Lime Co. Pty. Ltd., Mackay | Marmor | 51 | As carbonate | .. | 90 | 70 | 30 |
| Ryan Lime Co. Pty. Ltd., Townsville | Ryan | 45 | As carbonate | .. | 80 | 50 | 50 |
| Webb & Son, Reid River | Webb & Son | 48 | As carbonate | 1 | 83 | 80 | 20 |
| **Magnesian Limes—** | | | | | | | |
| Brett & Co. Pty. Ltd., Brisbane | Limil | 42 | As hydroxide | 5 | 110 | 85 | 15 |
| | | 15 | As carbonate | | | | |
| Giffard, A. C., Inkerman | Giffard | 45 | As carbonate | 5 | 85 | 60 | 40 |
| Inkerman Lime Co., Inkerman | Inkerman | 43 | As carbonate | 7 | 85 | 60 | 40 |
| Metropolitan Lime and Cement Co., Brisbane | Curlew | 21 | As carbonate | 21 | 78 | 60 | 40 |

* Also Limil—see Magnesian Limes.




## Cattle Fattening.

THERE are large tracts of well-grassed land in South-Eastern Queensland on which fattening of bought store cattle is practised. These cattle are usually animals which fatten into "heavies." Older stock can "handle" roughage much better than yearlings, and it takes less time and trouble to get them ready for market; but, in general, they do not give as good a net return as "baby beef."

The reasons are:—

(1) Buying of stores is a more speculative business and the outlay greater.

(2) Disease, drought, and other retarding influences make the money loss, if any, greater.

(3) The trade does not favour "heavies."

(4) Although the relative cost per 100 lb. is higher with the "young stuff," more can be bought for the same money.

(5) The young animal lays on both flesh and fat—i.e., it fattens while it grows.

(6) The trade pays more for the finished carcase.

(7) There is *always* a market for well finished lightweights.

There are certain requisites for turning off baby beeves the year round:—

(1) On the part of the buyer, a sound knowledge of what "good doers" look like;

(2) On the property—well-planned subdivision, improved pastures, cultivation, and fodder conservation.

Improvements require a considerable outlay of capital, but in all cases where management has been sound the returns have made it well worth while.

It should always be remembered that the improvements are permanent, and that they enhance the value of the property.

## CARELESS BRANDING.

Slovenly methods in the branding of stock, particularly cattle, are in evidence far too frequently, the results being most undesirable in many respects. Quite often the carelessness with which the branding irons are applied involves cruelty, although it may be unintentional.

It is cruel to hold the hot iron on an animal until the skin is burnt through, and it cannot be justfied on the score of necessity. This practice may be due to underheated irons, but, on the other hand, it may be due to over-hot irons held on the skin a fraction of a second too long, or with too much pressure. Such branding causes blotches, and very often the actual letters or figures are undecipherable. The skin in the area involved is ruined for tanning purposes, and festering sores may result. Identification of the animal by means of such a brand is rendered very difficult, if not impossible.

It is a well-known fact that, on large stations, where thousands of calves are branded yearly, and where speed is a factor in the handling of large mobs, the standard of branding is much higher than on some small holdings—such as farms, where only two or three calves may be branded at irregular periods.

## FEEDING FARM HORSES.

It is not unusual to see a farm-hand pitchfork hay into a yard over which manure is thickly scattered. This is a source of risk and loss. Much of the hay is trampled into the dust or mud and rendered unusable. Ensilage, too, may be wasted in this way. A far greater, although more indirect loss to the stockowner, is caused by the contaminated feed. Many farm horses are infested with worms of various kinds, and dirty yards may teem with the parasites in their initial stages. These parasites get into hay, or other feed tossed on to the ground, and are swallowed by stock, often with disastrous results. Heavy mortality among farm horses has been traced to worm infestation, and owners should take every care in feeding their working animals. A rack or a trough ensures greater cleanliness and saves waste of good feed.


# The Effect of Seasonal Conditions on Sheep Parasites.

SEASONAL conditions must be taken into consideration when attempting to protect sheep against likely losses from blowfly strike. During the winter, rains were fairly frequent in many localities, while mild weather was the general experience. These conditions were generally conducive to a heavy fly infestation in the spring.

Where rain has occurred during the spring, the resultant warm, moist conditions may be regarded as favourable to a big increase in flies. Fresh green vegetation, which has since sprung up, is likely to cause scouring in flocks in localities in which those conditions are prevailing. Graziers who have benefited by the spring rains may, therefore, expect trouble amongst their sheep with wool sufficiently long and, probably, dirty.

To treat the odd sheep in a flock is only putting off the evil day, and much greater benefit will follow the effective treatment of the whole mob. Shearing is a great protection, but as this is only an annual job, the long interval between shearings must be considered. In places where dipping for lice and ticks is necessary, it has—if a good arsenical mixture is used—a most protective effect on the sheep, besides killing many of the flies. Dipping, from this point of view, is most satisfactory when the sheep are carrying at least six weeks' growth of wool. Crutching is a sanitary and useful method likely to give some protection against fly strike, but, as it does not kill the pest, the protection will be of short duration in a bad fly season.

Jetting with a regulation ·8 per cent. arsenical mixture will not only protect the sheep from maggots, but also will destroy large numbers of flies which suck the poisonous moisture from the wool. Because of the strength of the mixture, the wool surrounding the usual places of attack will carry arsenic in sufficient quantity for some weeks to kill

any maggots which may be deposited after jetting. Jetting does not prevent strike, but will destroy the maggots before they do harm to the sheep. The important point is for the flock owner, where early storms are experienced, to apply his favoured method of protection to all his sheep as soon as convenient.

The same seasonal conditions, and this year they are common to a large area of the State, are also conducive to an increase in internal parasites. The worms which usually cause trouble in a flock become numerous while the sheep are still doing well on fresh green feed. Consequently, the risk of pasture contamination is serious. When the grass becomes dry and less nutritious as the season advances, the wormy sheep will suffer severely, while heavy lamb losses may be expected. Early drenching for the control of stomach worms will do much to protect the sheep. Where necessary, drenching should be continued at monthly intervals until, say, next June.

*—Jas. Carew.*

## SHEEP ON THE FARM.

Sheep should have a permanent place on any farm on which conditions are suitable. One of the advantages of sheep is that they provide two distinct sources of income annually—wool and mutton—besides their natural increase.

In Queensland, merino sheep constitutes about 97 per cent. of our total number. This breed is especially adapted to conditions in the central and western districts of the State, but when forced to breed and develop in an unsuitable environment, constitutional weakness is a real risk.

British breeds have been developed and maintained under conditions where environment has influenced adaptability to Queensland conditions. In mixed farming districts these breeds—especially the pure bred rams—can be used with advantage. The Corriedale originated in New Zealand and the improvement of the breed has been progressive, both there and in Australia. In Queensland, the Corriedale is regarded as a dual purpose sheep coming between the merino and pure British breeds, overlapping both in adaptability to a considerable degree.

In sheep breeding, local conditions should decide the system of production.

Sheep breeding under diversified farming conditions where the British breeds are used is entirely different from merino breeding in the West. The merino is bred under purely pastoral conditions, and the progeny is retained for wool and mutton production. With the imported mutton breeds, the aim of the farmer is to dispose of the progeny at the earliest marketable age. To do this successfully, two major points should be observed:—

(1) The use of pure bred rams of quick-maturing qualities suitable to location and conditions.

(2) Availability of suitable pasture or cultivated crops for ewes as soon as their lambs are dropped, and for topping off the lambs.

Other considerations of importance are the suitability of the ewe flock for wool production as well as for breeding; economy in pasturing the ewe flock from the time the lambs are taken off until the next drop of lambs; the general health of the flock and freedom from parasites; fodder provision for carrying the flock successfully through periods of scarcity; and culling the breeding flock for age while they are still capable of being fattened and sold at a profit. To start successfully in breeding, whether for wool, mutton, or for fat lambs, healthy sheep are essential. This may mean paying more for young sheep, but it will generally prove the best and safest policy.

—*Jas. Carew.*

## MERINO TYPES TO SUIT COUNTRY AND CONDITIONS.

In merino sheep it is not always advisable, or even possible, to breed the type one would wish. To be successful, a farmer should realise that the type should be chosen to suit his country and local conditions. For instance, it should be obvious that the sheep carrying the clothing wools of Western Victoria would prove a failure in the western districts of Queensland.

In selecting a type, the first consideration should be constitution. In the West sheep frequently have comparatively long distances to go to water. A sheep then should be introduced that is fitted by nature to withstand this hardship. Judged from a financial point of view—and, after all, everything practical in the industry comes back to a matter of pounds, shillings, and pence—consideration should be given to the type of animal which gives the yield per head rather than price per lb.

Having evolved a type suitable to his particular conditions, it is important that the farmer should stick to the stud supplying the rams. It takes a man of experience in breeding to successfully maintain a flock while chopping and changing about from stud to stud.

Pay the price for the better-type rams and, if necessary, pay the right man to select them, having regard to the type of ewes with which they are to be mated.

—*J. L. Hodge.*

## THE CORRIEDALE AS A FARMER'S SHEEP.

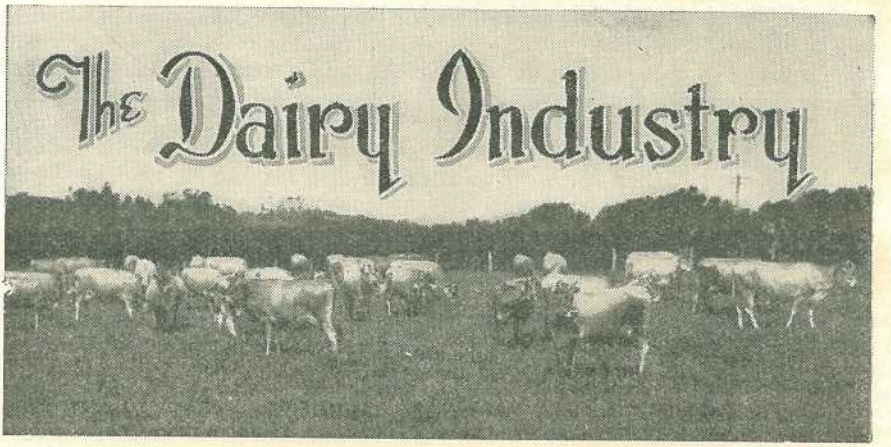
As an all round general utility farmer's sheep, nothing beats the Corriedale. There is no better ewe for the production of fat lambs. Joined with one of the Downs rams—such as the Dorset Horn or the Southdown—the lambs it produces are first class.

Corriedale ewes are docile, good doers, and great milkers.

In Queensland there is a tendency to breed the Corriedale too fine, thus defeating the object for which the breed was evolved.

No finer wool than a 56 counts should be tolerated in the Corriedale stud. To get the fleece as fine as merino counts can only be done at the expense of constitution, one of the Corriedale's most important characteristics. Growers of pure bred Corriedale sheep would be well advised to cull rigorously any animal showing too fine a tendency.

—*J. L. Hodge.*




# Bobby Calves.

IF a substantial and lasting success in the development of a trade in veal is to be achieved, the greatest care must be given to methods of feeding, and the condition in which calves are marketed. The trade has already increased the income of the dairy farmer; hitherto it has been the practice on many farms of limited carrying capacity to kill all calves at birth.

Some farmers, unfortunately, have made a practice of sending calves to the meatworks as soon as they are born, and that accounts for the high percentage of condemnations, of which the principal cause is immaturity.

The milk of a newly-calved cow is fed to pigs and poultry, and therefore is not wasted, but it should be borne in mind that this milk would show a better return if fed to the new-born calf than if fed to pigs. The value of this milk is often not so much as a weight increaser as a preventer of weight loss. This is true of the larger breeds. With the smaller breeds its value is, of course, primarily for growth.

The law provides for a dressed weight of not less than 40 lb., and an age of not less than fourteen days.

Condemned calves are a direct loss to the farmer, and they also involve the meatworks in loss on account of wasted effort and loss of time.

Mature veal is a wholesome food article, while immature veal, which has a laxative effect on the consumer, is not allowed on the market for consumption.

This loss, due to immature calves, can be avoided if the calf is fed for a few days on its mother's milk. The calf should weigh 80 lb. or more before being sent to the meatworks. This live weight will give a dressed carcase of approximately 40 lb.

## SOME CAUSES OF DIMINISHED DAIRY PROFITS.

It is a mistake to think that higher prices offer the only solution of the dairy farmer's problems. Increased and cheaper production per acre also is of importance. Better methods of management, and the cutting out of all waste can do much to make dairying profitable. Sick and low-producing cows are among the biggest charges in the profit and loss account of every dairy farm.

It is very important, too, to guard against disease infection—especially mammitis and other disorders that spread rapidly through a herd.

By isolation and careful management, it is possible to keep dairy stock diseases down to a minimum. A close study of feeding methods will help to keep a herd healthy and in good condition, and thus render the animals less liable to contract infectious or other diseases.

The unprofitable cow is one of the dairy farmer's worst handicaps, economically speaking. Frequently she is a cow that pleases the eye, yet deludes her owner into the belief that she is filling the bucket with the rest of the team. Each herd collectively must show profitable returns to the owner, otherwise he soon may be asking his bank for an overdraft. How many farmers can show that they are getting a profit from each cow in the herd?

It costs no more to own, feed, or milk, profitable cows, so it is obviously unwise to persevere with unprofitable ones. The adoption of herd recording, therefore, needs no argument to commend it.

A registered pure-bred bull of known production record is a decided advantage, and farmers who will persist with a bull of unknown quality are certainly risking heavy loss.

## LUBRICATING THE SEPARATOR.

Before the separator is used, it should be seen that the sight feed lubricator is working satisfactorily. It is absolutely necessary for the machine to receive the correct flow of oil from the lubricator before the separation process begins, otherwise the spindle—one of the most expensive parts of the machine—will show signs of wear long before it is due. Ten drops of oil a minute is a satisfactory adjustment to make on the lubricator. Any increase in this number of drops will not help in the lubrication, although the oil will not go to waste, for it drops into the reservoir at the bottom of the machine.

As soon as separating is finished, the lubricator should be shut off to prevent any more oil from dropping into the machine.

It is advisable to form a habit of cleaning the working parts—the parts that have to be oiled—at the beginning of every month. Take

the back cover off the machine, drain out the oil, put in a cup of kerosene or petrol and give the machine a good turn, so that all the moving parts will be thoroughly cleansed. Drain off the kerosene or petrol in the same way as the oil, then replace it with clean, fresh oil, turn the machine again, so as to distribute the oil over the parts, then stop the machine and drain again. This will leave the separator in a thoroughly clean condition, ready to receive fresh oil that will give 100 per cent. lubrication.

Another important point to remember about separator lubrication is that the particular type of oil used must be suitable for high speed lubrication. Cheap, thick oil should not be used as it may reduce very considerably the efficiency of the separator.

The whole of the cleaning-out and renewing of the oil can be done well within half an hour and the time spent will be more than repaid.

## REGULATION OF PRODUCTION.

The United States Government has found that it cannot constitutionally directly limit or regulate production, but it is tackling its farm problem from the angle of soil conservation, of which regulation of production is described as a by-product. Farmers who limit production through the soil conservation formula receive direct monetary grants from the Federal Treasurer as compensation. As the Australian Constitution is based largely on that of the United States, it is of interest to note that the State power in relation to the planning of agriculture has been upheld there.

The State of Califorina has problems similar to those of Queensland. At times there are inconvenient farm surpluses. The Government there has passed legislation which gives power to limit the quantity of produce offered for sale. This applies only when the majority of producers approve.

Similarly, in Canada there are constitutional difficulties. The Natural Products Act, designed to plan the production and marketing of natural products, has been found to be beyond the powers of the Dominion Government, as it interfered with the prerogative of the Provinces over production given, curiously enough, under section 92 of the Canadian Constitution. There seems to be a sort of fatality about section 92! On the contrary, the power of the Provincial Governments have been upheld quite recently. British Columbia has obtained the approval of the Privy Council for its own Natural Products Act, including the State power to levy production.

Britain, too, has its production problems and is no way behind in efforts to assist agriculture. Huge subsidies are granted from the Treasury, and almost every line of produce is now under some form of marketing control. This organisation is quite recent, for the first Agricultural Marketing Act was passed by the British Parliament as recently as 1931. In the case of hops and potatoes, there is a tendency towards placing commodities under commission control, but many marketing boards, with producers in the majority, still continue.

In other European countries the "home consumption price" has also been adopted. Its application is of particular interest in Holland and Denmark, which, with their dairy produce, compete with that of Queensland on the British market. Holland has taken complete powers to plan agriculture, despite the fact that the country's policy is traditionally free-trade. Denmark has its local price for butter—usually higher than the export price. Both countries regulate production of farming commodities where it is deemed necessary. France and Italy now limit their output of wine. Scores of similar instances of production control could be quoted. Even Baghdad has its Date Board!

It is interesting to recall that Queensland's primary producers' organisation and marketing legislation has had some influence on the passage of similar legislation in the United States, and, possibly, some other countries.


## Size of Breeding Sows.

SIZE is an important feature in breeding pigs, yet some breeders do not give it sufficient consideration.

One of the chief objectives in pig raising is to get pigs to marketable weights in the shortest possible time. To obtain the desired rapid development and still have a finished pig with a light covering of fat, it is necessary to breed from pigs which are big within their class. That is to say, pork type breeding stock—such as Middle Whites—should be big animals of their category if their progeny are to grow quickly to porker weights. Bacon type breeding stock—such as Large Whites—also should be big of their type if their progeny are to develop similarly to baconer weights. The extreme bacon type of breeding stock could, of course, be used to produce fast growing porkers, but such porkers, under normal feeding conditions, would not be sufficiently mature to give good carcases at porker weights. Breeding pigs should be big within their type.

Size is inherited in pigs as it is in horses, and trying to grow a small type pig into an extreme bacon type is like trying to make a pony into a draught horse.

Observations lead to the belief that size within a breed is frequently lost through mating stock before they are sufficiently grown.

A large breeding sow, provided she is not too fat and clumsy, is more likely to produce a litter of large pigs and to be able to suckle them better than a smaller sow, under similar conditions.

Records of a large number of breeding sows show that sows which are mated when between nine and twelve months old are more productive throughout their breeding career than sows mated earlier or later.

Under Queensland conditions, it is common to see sows mated at five to six months old when they are barely bacon weight, but this practice does not give the sows a chance to develop and become productive mothers.

The best recommendation is to mate sows when they are about nine months old, or when they have reached a live weight of approximately 250 lb. In cases where sows are mated when very young, either by accident or design, they might be given a chance to develop by withholding them from service for some weeks after their first litter has been weaned.

*—E. J. Shelton.*

## ROUNDWORM IN PIGS.

Frequently pig farmers ask for an explanation as to why their young pigs do not grow at a normal rate and do not reach bacon weight till, perhaps, about twelve months old. Some also state that losses among their young pigs have occurred at intervals over a number of years.

One of the chief causes of these troubles is a roundworm which is often found in large numbers in the small intestine. When a herd is infested the worms are frequently passed by the pigs, and as they may measure up to 15 inches in length, are easily seen in the dung in the sties. The animals become infested through swallowing an egg which contains a very minute worm. These eggs hatch in the small intestine, and the small worms to which they give rise burrow into the intestinal wall and are carried by the blood stream into the liver and lungs. The young worms then leave the lungs and crawl up the windpipe into the mouth. They are then swallowed, and so reach the intestine once more, and this time they settle down and grow to maturity. The presence of the young worms in the liver and lungs causes serious disorders which may cause death, usually from pneumonia. If the animal survives, it remains stunted and sickly, and may have a short, hard cough.

This worm is, fortunately, in a way, harmful only to animals under about four or five months' old, and in these young animals the effects of an infestation may be very prominent just after weaning.

The worms are easily removed with oil of chenopodium. Details of treatment with this drug may be had on application to the Animal Health Station, Yeerongpilly.

Treatment, however, should not be regarded as the only measure to be adopted for the control of this worm. Prevention of infestation is far more important, and this can only be ensured by strict attention to sanitation and other measures aimed at preventing the young pig picking up the worm eggs which are passed out in the dung. The regular removal of all manure, the maintainance of a high standard of sanitation in the sties and yards, and a paddock system of rearing go a long way to keep the infestation below the point at which it becomes harmful. Furthermore, the fact that pigs on a good balanced ration can fight more effectively against the evil effects of the worms than animals which are regarded as merely farm scavangers, should not be overlooked.

*—F. H. S. Roberts.*

## RISK OF FEEDING RAW OFFAL TO PIGS.

On many farms a fat beast is killed occasionally for domestic use. Portions of the carcase and viscera are sometimes fed raw to pigs. These form a valuable pig food, if cooked; but, if fed raw the health of animals may be endangered. For example when an animal is affected with tuberculosis, the primary lesions in the organs, being small, may escape detection. Although the carcase may not be grossly affected, there is a real danger to pigs—especially young ones—if fed with uncooked material from a diseased beast.

Under the Cattle Slaughtering Act, the Diseases in Stock Act, and the Pig Industry Act, the feeding of any meat offal or blood to pigs, unless it is thoroughly cooked, is a serious offence.

## SHADE FOR PIGS.

During the summer adequate shade for pigs should be provided. The ordinary sty, particularly if it has an iron roof, is very hot, and some other shade is necessary in the heat of the day. If there are no trees near by, a wooden shed will answer the purpose.

Another important aid to the health and comfort of pigs is a bath in which they can lie in hot weather. To wallow in the mud is the pig's natural method of cooling itself. Unfortunately, the wallow sometimes seen on the pig farm is a filthy puddle-hole. If there is infection of any kind in the yard, it is to be found in just such a place. Dirty wallows should be drained and filled in, and a concrete or similar bath provided. This can then be kept clean, and the liability to infection will be diminished.

Comfortable and hygienic conditions are most important in maintaining the health and wellbeing of pigs.

—*E. J. Shelton.*

## FEEDING SLOP TO PIGS.

Pouring wet hog feed all over one's shoes in trying to satisfy a lot of crowding, squealing pigs need not be a part of every day's work. A trough that will give the animals their swill without the usual mess, and that will save a great deal of feed and temper is shown in the illustration. It can be made from an old trough plus a piece of rain-spout and an old barrel or box. If the trough is made double, as shown, there will be much less crowding, and the feed will be distributed more evenly. A

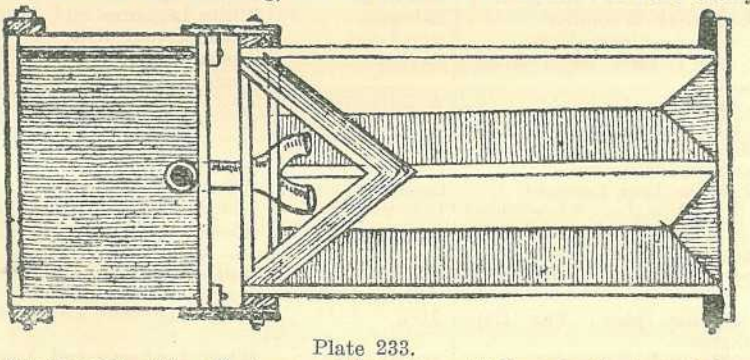


Plate 233.

piece of rain-spout with a Y at one end lets the swill down to the trough from the barrel or box in which it has been mixed. Each opening of the tube opens into one of the troughs and the openings are protected with a V-shaped guard made of boards. After the swill has been well mixed the plug is drawn from the bottom of the box, and the swill runs into each of the troughs, which can be made any length.—"Country Gentleman."


# Registered Hatcheries.

FOLLOWING is a list, giving the names of the owners of hatcheries registered up to and including 31st December, 1938:—

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

| Name and Address. | Name of Hatchery. | Breeds Kept. |
|---|---|---|
| F. S. Morrison, Kenmore .. | Dunglass .. | Australorps, Brown Leghorns, and White Leghorns |
| F. J. Mottram, Ibis avenue, Deagon | Kenwood Electric Hatcheries | White Leghorns |
| J. W. Moule, Kureen .. .. | Kureen .. | White Leghorns and Australorps |
| E. K. Pennefather, Oxley Central | .. | Australorps and White Leghorns |
| G. Pitt, Box 132, Bundaberg .. | Pitt's Poultry Breeding Farm | White Leghorns, Australorps, Langshams, White Wyandottes, Sussex, Rhode Island Reds, and Brown Leghorns |
| C. L. Schlencker, Handford road, Zillmere | Windyridge .. | White Leghorns |
| E. E. Smith, Beerwah .. .. | Endcliffe .. | Australorps and White Leghorns |
| T. Smith, Isis Junction .. .. | Fairview .. | White Leghorns and Langshans |
| H. A. Springall, Progress street, Tingalpa | Springfield .. | White Leghorns |
| W. J. B. Tonkin, Parkhurst, North Rockhampton | Tonkin's Poultry Farm | White Leghorns and Australorps |
| T. Westerman, Handford road, Zillmere | Zillmere .. | Australorps and White Leghorns |
| P. A. Wright, Laidley .. .. | Chillowdeane .. | Brown Leghorns, White Leghorns and Australorps |
| R. H. Young, Box 18. P.O., Babinda | Reg Young's .. | White Leghorns, Brown Leghorns and Australorps |

## SOME POINTS IN POULTRY MANAGEMENT.

In poultry farming, culling serves two important purposes. By getting rid of the culls, all of the feed goes to the laying hens; and only the best hens remain in the flock to serve as future breeding stock.

Other sound points in poultry farming include care in the handling and marketing of eggs. Eggs are considered to be one of the best of foods, yet in spite of that fact the quantity consumed by Queenslanders (estimated on an annual per capita basis) is extraordinarily low. Why more eggs are not eaten is probably because their regular dietary value is not more widely appreciated. There are other reasons, too; for instance, the delivery of dirty-shelled eggs and the production of fertile eggs in hot weather. Clean nests, clean floors, and clean containers will soon overcome the dirt difficulty; while selling off all the male birds at the close of the hatching season is the answer to the other problem. Eggs should be gathered two or three times daily, and marketed at least twice weekly in hot weather.

In looking after poultry, even with the best of care, we often overlook a very common source of trouble, and that is the house fly. Flies can go a long distance and carry germs and contamination from a diseased flock, or from microbe-infested filth. The industrious pullet will chase and catch flies just for the fun of it, and, at the same time, take in all sorts of germs or worms. So it would be wise to clean up every attraction for flies and spray the fowl houses just before cleaning them out. For general health reasons, apart from the requirements of the fowl run, it pays handsomely to swat the fly.

## CARE OF GROWING PULLETS.

Any special attention or care given to pullets during their growing stage will be well repaid by greater production when they come into profit.

The main points in management which ensure profitable pullets are: —Perching early, separation of sexes, small units, feeding, and sanitation. Pullets should be taught to perch as soon as possible after they have been removed from the brooder. The earlier they become accustomed to perching, the more they spread at night. This prevents crowding and ensures a good air supply for all.

The separation of sexes as soon as the males can be distinguished, gives them a much better chance of making good development. Small units also assist in their development and decreases the percentage of stunted pullets, which is the usual result when large numbers are housed together. It is advisable not to house more than 100 pullets in any one unit.

Feeding also is important. The ration should be correctly balanced and the birds given as much food as they will eat. The birds should be given as much mash as they will consume in about 20 minutes; if they require more, it should be supplied. It is advisable to give two meals of wet mash, one early in the morning and the other at midday.

In no circumstances should wet mash be left lying about as it sours rapidly and puts the birds off their food. Dry mash hoppers should be kept well filled and always open. The feeding troughs of both systems should be long enough to provide ample feeding space. Lack of sufficient feeding space is a very common error in dry mash feeding. At least 1 foot of space should be allowed for each ten birds.

Green feed may be supplied with the midday meal, unless the birds have access to a well-grassed run. Wet mash should form the bulk of the midday meal, unless the dry mash method is used. In dry mash feeding a small quantity of mash mixed with the greens will tend to increase the consumption of greenstuff. As an evening meal, the pullets should be given as much grain as they will consume.

Clean, cool, fresh water should always be supplied daily, and the drinking vessels should be kept in a shaded position.

Coarse sand, shell grit, and charcoal should always be available and kept in suitable containers. Each of these materials has an important influence as an aid to digestion and assimilation of food, and is, therefore, invaluable in maintaining health in the flock.

Sanitation also is important and covers the regular cleaning of pullet pens. Wet patches should not be allowed to surround the drinking vessels, and the treatment of perches with creosote to prevent an invasion of blood-sucking parasites should not be overlooked.

*—J. J. McLachlan.*

## PROTECT EGGS FROM MOULD.

Under humid summer conditions, eggs are more prone to decomposition than at cooler periods of the year. This is not because of the effect of the climate on the egg itself, but because of the rapidity with which mould growths develop during warm weather. If it were practicable to prevent the egg coming in contact with moulds, decomposition of the egg from this cause would not occur.

If fowl yards are allowed to become littered with straw, dry grass, and similar material, mould spores will develop abundantly. Consequently, the poultry farmer is advised to clear away all rubbish, and do all that he can to prevent the development of moulds.

Dampness in any degree is conducive to the rapid growth of moulds, consequently every precaution should be taken to ensure that the nesting material is dry and clean, and that the eggs and fillers used for packing them are dry.

Two recent examples of how easily the quality of eggs may be depreciated are cited:—In one case it was found necessary, because of a muddy poultry run, to wash every egg. The washing was well done, stains were removed with an odourless sandsoap, and the eggs were clean when packed; but, unfortunately, they were packed in strawboard fillers, with a slight bead of moisture on the shell. In the course of two days, when these eggs had reached the market, quite a number of rots had developed. As the poultry farmer concerned had a reputation for marketing good eggs, the agent retained the eggs that were apparently good on arrival for a further two days, but, on testing, many more rots were found.

The second case was that of a farmer who had well-grassed runs for his fowls. Although nests were provided, many of the hens nested in the grass. Complaints as to the quality of the eggs were received by the agent to whom these eggs had been consigned, with the result that the next consignment to reach the floors was carefully candled. Candling disclosed a number of rots. Eggs which were in apparently good condition were retained on the floors for another two days and again candled, when more rots were revealed. This led to an investigation by the Department of Agriculture and Stock, when it was found that only the eggs that had been laid in the grass were affected, and that the rottenness was caused by mould growths which had gained access through the pores of the shell. Providing the hens with more clean nests and so discouraging them from laying in the grass corrected the trouble.

These examples indicate how easily the quality of eggs can be affected, and that it is essential—particularly during hot, humid weather—to protect eggs from decomposition caused by moulds.

—*P. Rumball.*

## MARKETING TABLE POULTRY.

To obtain the highest returns, it is necessary to market table poultry in the best possible condition. The term condition covers the state of the feather, flesh, and age of the bird. If culling of the layers is given the attention that it should, little can be done to improve the returns from culled hens.

Experiments have indicated that the flesh carried by a well-fed hen that has finished egg production cannot be increased economically by extra feeding, because the hen that has lost weight through regular laying takes too long to respond. The best practice, therefore, is to market culled hens before they become a mass of pin feathers. This condition applies particularly about this time of the year.

The right marketing of cockerels is of particular importance. This class of fowl sells reasonably well at any stage of development, if it is sold before it reaches what is known as the "staggy" stage. This term is applied to birds commencing to show spur development. To obtain the maximum value for cockerels for table purposes, they should be sold while the spur is still in the bud stage. Many breeders keep cockerels until this stage has passed, and, consequently, do not get top prices.

In the marketing of cockerels, it is well to examine the feather growth. Cockerels with a lot of pin feathers do not dress attractively. This applies particularly to birds such as the Australorp, because of the colour of the plumage. Pin feathers on white feathered birds are not so noticeable.

Again, certain breeds are not well-fleshed at all times. This applies generally to the bigger birds—such as the Light Sussex and the Rhode Island Red.

To summarise—poultry raisers with cockerels to market should, firstly, bear in mind the fact that birds with indications of spur development do not realise the maximum value; secondly, that the rate of development of cockerels from twenty to twenty-four weeks of age is not as great as that which takes place earlier, consequently any increase in body weight is at a greater cost; and, thirdly, that it is undesirable to market cockerels carrying a lot of pin feathers, and those that are scraggy and not well fleshed.

—*P. Rumball.*

## BLACK COMB DISEASE IN FOWLS.

Black comb disease in poultry occurs frequently throughout the State from October to March. It usually affects laying hens, and is responsible for heavy losses to the industry either by death or decreased egg production.

Where treatment is prompt the mortality does not appear to be as extensive as when treatment has been delayed. Again, early treatment appears to assist in getting affected birds back into production much more quickly than when it has been deferred.

The first indication of the disorder is a bird's pronounced loss of appetite, followed in the course of a few hours by a darkening of the comb. In fact, it is not uncommon for 25 per cent. of the flock to have a very darkened comb within 24 hours of the first sign of the trouble.

In the early stages of this disease the temperature of sick birds rises. This induces thirst. As the disease develops, little desire for water is in evidence, and as treatment for this trouble is given by means of the drinking water, the necessity for prompt action is obvious.

On further examination of the sick birds, it will be found in most cases that the crop is full, an indication of the suddenness of the attack. This condition of the crop has caused many breeders to attribute the trouble to the food and water. As the disorder advances the legs of the Leghorns particularly become very much darkened in colour; and if the feathers of a bird of any breed are turned back, the skin will be found to be darker than usual. Diarrhœa has been observed in some cases, but it is not apparent in all affected flocks.

The mortality from this disorder appears to be governed largely by the general condition of the flock, and the rapidity with which treatment is applied. Where prompt measures have not been taken, losses have been as high as 20 per cent.; but where early treatment is given deaths have been as low as 1 or 2 per cent. The loss from deaths, however, is not the only important factor. Egg production has been observed to fall from 60 to 5 per cent. within six or seven days.

*Treatment.*—Several proprietary mixtures are used with apparently beneficial results, but in preference to deferring treatment until these mixtures are procurable, the breeder is recommended to administer Epsom salts to the birds in the drinking water at the rate of 1½ to 2 oz. to the gallon.

—*P. Rumball.*

## GRASS INVESTIGATIONS.

Depending on pastoral production so much as we do—most of our wealth comes from grass—in fact grass is our best crop—the value of pasture investigations and improvement has long been realised. In Queensland we are becoming particularly active in this field, and included in the work now in hand are:—

Top-dressing of natural pastures.

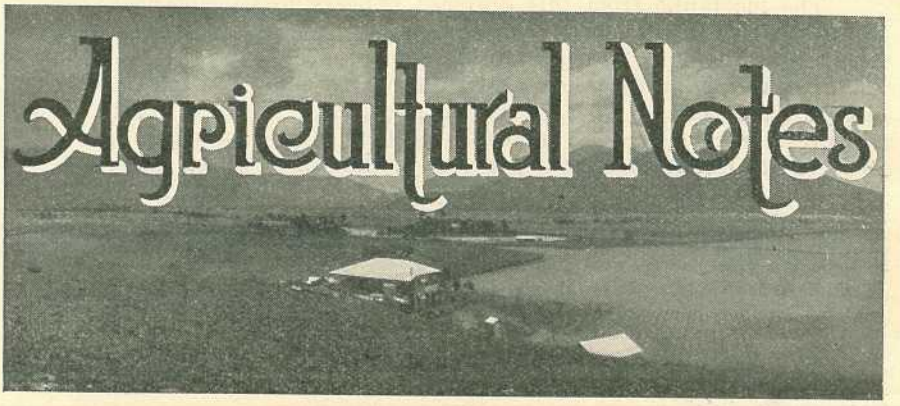
The sowing down of pastures with mixtures of species adapted to specific climatic and soil zones.

Development of improved strains of the more valuable species.

Pasture management involving rotational grazing and conservation of surplus fodder.

In general, however, these developments have been restricted very largely to regions of fair to heavy rainfall.

Plate 234.
The Staff of the Esk Butter Factory, Brisbane Valley.




## Lucerne Hay.

BALED lucerne hay or lucerne chaff, and maize grain are now recognised as among the bases of supplementary or drought feeding, if the fodder has to be transported over long distances. Increased attention is, therefore, being given to the production of good-quality lucerne hay. Good hay containing 45 per cent. to 50 per cent. of leaf will always command a good price, while a weathered or sweated consignment will be hard to sell.

Very careful handling is required from the time lucerne is cut until it is stacked or baled for market. Prime lucerne hay should be green in colour, dry, free from weeds or rubbish, and should contain a high proportion of leaf. Prevailing climatic conditions are naturally an important factor, and, whenever possible, cutting should commence in bright, fine weather. Lucerne should be cut shortly after the first flowers have appeared, when numerous young shoots will usually be observed at the base of the crowns. When the plants are allowed to become over mature, actual loss of weight and feeding value occur, as leaf will be lost, and the stems will harden, thereby becoming largely indigestible. It is customary to commence mowing in the morning, as early as possible, after any heavy dew has evaporated. During fine, hot weather, raking may commence about midday. Raking into windrows should, if practicable, be completed by nightfall as much leaf may be lost if the lucerne is left too long in the swath. After wilting for a few hours in the windrows, fork into high narrow cocks which encourage the natural transpiration of moisture better than if broad flat cocks are made. If rain occurs the lucerne will require turning to prevent the formation of mould, but during fine, hot weather it is possible to stack within two days of cutting. Excess moisture will induce mould, and possibly combustion in the stack, while if the lucerne is allowed to become too dry, it will lose appreciatively in palatability, weight, and appearance. Before carting, the stems should be tested by twisting them between the hands, when any excess moisture will become evident.

Wherever possible, lucerne hay should be stored in sheds, but if it becomes necessary to stack it in the field, a framework of logs should be laid down, care being taken to keep the centre of the stack high

during building. Large stacks which are likely to be held for some years may be protected by thatching or by a temporary galvanised iron roof.

Proximity and accessibility to the chief markets is obviously an important factor in the profitable production of lucerne hay for direct sale.

## GRASS HAY IN THE MARANOA.

On many Maranoa properties a start in storing excess grass may now be made. If any surplus of nutritious grass is not cut soon, it will mature and lose much of its feeding value.

Excellent hay can be made from common native grasses—such as love grasses, early spring grass, and star or windmill grasses. Where good stands exist on cleared areas—such as old cultivation paddocks and creek flats—and a mower and rake are available, the grass can be conserved at little cost and will prove of value when natural feed again becomes scarce.

The grass cures very quickly and, in most cases, should be in the stack the day after cutting. Harvesting is, consequently, a relatively simple operation. The palatability and keeping qualities of the hay may be improved by sprinkling the several layers with a small quantity of salt as stacking proceeds. The merits of this cheap method of fodder conservation are realised by many farmers and graziers, but its more general adoption is warranted in view of its dual advantages of elimination of waste of good feed and inexpensive provision of fodder reserves.

*—C. H. Defries.*

## GOOD SEEDS.

Although nearly everyone will agree that better seeds mean better crops, it must not be overlooked that better cultivation means better seeds.

Seeds to be good must have a high germinating capacity, be true to variety name, and free from weed seeds, inert matter, and disease or insect infestation. No matter how careful the grower may be, all crops will contain some plants other than those which it is intended to produce. A cleaning machine should, therefore, be used before the seed is offered for sale. In Queensland, as in every other part of the world, the most critical buyers will be found among the merchants with efficient cleaning machinery.

A modern seed-cleaning plant can make good samples of uncleaned seeds better, but it cannot make bad samples good. With a full knowledge of their machinery possibilities most merchants are willing to buy on a clean seed basis. They are not, however, inclined to purchase poor samples, and the usual market for seeds of indifferent quality is with dealers who have little appreciation of impurities. The actual seed user who insists on buying his supply on a price rather than on a quality basis encourages the vendors of goods of inferior quality. Unfortunately, seeds of indifferent quality usually carry a large profit to the seller.

Good seeds cost money to produce and money to clean, and the general improvement of farm seeds rests largely with the farmers themselves. When practically every farmer insists on a high-grade product the demand for poor-quality seeds will cease. Only the best-quality seeds are worth buying.


## Marketing Bananas.

DURING hot weather, bananas which have been cut and left exposed to the sun for only a short period soon become quite unfit for sale, and the pulp is eventually reduced to a soft, "boiled" condition. Cutting should be done in the early morning, before the heat becomes severe, and care should be taken to keep the fruit covered completely, even from the early morning sun, while waiting to be carried or wired to the packing shed.

The fruit should at all times be handled with the greatest care—in fact, the less it is handled the better—and for this reason it is wise to have the packing shed right in the plantation, if possible. On cutting the bunch it should not be laid carelessly at the foot of the stem, which usually means it rests on a bed of sticks and dead weeds. A bed of leaves is easily and quickly formed if the bunch must be set down in the plantation, although a better plan is to carry it straight into the shed or to the end of the wire and there place it upright on bags or trash with the stalk leaning against a rail provided for the purpose. In this way possible damage will be reduced to a minimum.

On being dehanded, the fruit should be allowed to "drain" for a few hours. Packing immediately after dehanding sweats the fruit in the case and makes bruising much easier. Care should be taken to ensure that fruit which is "sprung" or in the early stages of ripening is not packed, as it will quickly be reduced to pulp and be unsightly in a case of otherwise sound bananas. No fruit should be packed for Southern markets from bunches in which some of the fingers are already showing colour indicating ripening. The fruit should be dehanded just at the collar joining the fingers to the main stalk. The most suitable knife for this work is one of a sharp, flexible, and very narrow type.

There is a right and wrong way to separate the hands into singles, if a "single" pack is desired. Tearing the bananas apart endways often peels part of the skin from the fruit and also bruises the stem,

thus setting up an entrance for organisms which cause blackend. The correct method of separating into singles is to grasp the cluster firmly with both hands at the stem end, then twisting one hand forwards and the other backwards, the fruit is separated easily and without any damage to the stalk end.

On completion of packing the cases should be packed on their sides in a cool, shady position to await transport to rail or market.

Should it be desired to use the "cluster" pack, the same method should be adopted, separating three or four instead of the single finger. If a cluster of three or five is used, a single banana should be added to make it a four or six. The secret of clusters is to have the fruit in twos, or multiples of two up to six. Very even types of fruit will sometimes pack in clusters of eight.

*—Jas. H. Gregory.*

## A SEASONAL REMINDER TO BANANA GROWERS.

With a change to warmer seasonal conditions following the recent good rains, an increase in the incidence of bunchy top may be anticipated in all districts where this disease is known to exist. Growers, therefore, are advised to spare no effort to keep infection down to an absolute minimum.

Banana-growers in districts where bunchy top is present are advised to patrol their respective plantations at least one day a week, examining each plant in every stool for symptoms of the disease. Every plant showing signs of infection and every plant with which it is vegetatively connected should be immediately kerosened and afterwards destroyed in the proper way.

Plants infected with the disease will be recognised by an absence of the downward curl of the tip of the leaf, with the blade turning hard back against the mid-rib, then abruptly curling out again, whilst its outer margin is somewhat wavy and chlorotic (i.e., loss of green colouring) in appearance. A closer inspection of the leaf of an infected plant will reveal the dark-green, Morse-code-like streakings running horizontally across the blade between the fibres, turning abruptly down into the amber line running up either side of the mid-rib. The amber line in a leaf taken from a healthy plant will be devoid of the green streaking.

The recommended method for the control of bunchy top is as follows:—Pour down the central foliage of each bunchy-top-diseased plant, and each plant with which it is vegetatively connected, at least ½ pint of pure kerosene. Within twenty-four hours remove from the soil the corms of all such diseased plants and cut the corms into pieces not more than 2 inches in any diameter.

By patrolling their respective areas each week, growers will keep bunchy top infestation within reasonable control on their own plantations and lessen the infestation throughout their districts, while, at the same time, materially assist in preventing the spread of this disease to unaffected areas.

Too much emphasis cannot be placed on the need for giving effect to the foregoing recommendations if complete control is to be maintained over this disease.

*—J. McG. Wills.*

## LADY FINGER BANANAS—CULTURAL METHODS.

The fruit of the Lady Finger variety of banana has a very pleasant flavour, its keeping qualities are good, and it is always in demand.

Alluvial flats with a subsoil of free clay suit the variety best, but it can be grown successfully on hillsides of even contour where the rainfall is copious and regular, and where shelter is provided from heavy winds.

Thorough preparation of the soil is necessary, and where possible it should be worked to a depth of at least 12 inches. Healthy butts at least nine months old, with a minimum diameter of 6 inches, are the best planting material. On the loamy flats, the distance apart should be 18 feet by 16 feet, with three followers; on hillsides and other less favoured sites, 15 feet by 15 feet, with two followers.

To prepare for planting with two followers, the butt should have about 2 feet of the pseudo stem left and all visible eyes or buds gouged out with the exception of two which should be on opposite sides. The same method is adopted for three followers, except that three buds are left spaced equally round the butt.

Two, or, as the case may be, three suckers will appear in a short time after planting, and these are allowed to grow, but all other growth must, for at least nine months, be removed as soon as convenient after it appears above the soil. After the selected suckers have made two-thirds of their growth towards maturity, giving them a height of approximately 8 feet, a follower can, under favourable conditions, be selected on each plant in a straight line away from the parent plant and left to form the fruiting material for the second crop. The growth habit by which successive suckers may be selected in a straight line away from the original plant will persist for the life of the plantation, and all other growths should be removed as soon as possible. By careful attention to this and other cultural methods, maximum returns can be expected and realised.

Periodical applications of fertilizer, when the soil is of average fertility, will have beneficial results.

Cultivation should be shallow to avoid destroying the root system.

The planting of Mauritius beans down the centre of each row at a distance of 30 inches between plants would ensure a good mulch during hot summer weather and considerably retard weed growth.

Covering of the fruit with a suitable material, as advocated for Cavendish and Mons Marie varieties, during their maturing periods amply repays the grower.

*—H. J. Freeman.*

## THE AFTER CARE OF GRAFTS.

Any deciduous fruit trees which have been grafted this season should be examined from time to time, and when the growth is about 8 inches long the wax cloth and string should be cut through with a sharp knife to allow for expansion; otherwise the string will cut into the bark and ruin the graft. Many grafts are ruined each year because of growers omitting to do this necessary work.

When cutting, first cut through the wax cloth and string only; do not remove the wax cloth. The scion will push it off, and until then it serves a very useful purpose in protecting the cut surface of the limb from the sun and spores of fungus diseases.

Many fungus diseases are what might be called wound parasites, and an unprotected cut surface is an easy place of entry for them.

Do not allow shoot growth from the stock to overcrowd or rob the scions, and when checking any such growth, note whether any grafts have failed; if so, thin out the shoot growth so as to allow two or three shoots to develop sufficiently and in the right place, so that they can be budded to take the place of the dead graft.

The best time for the budding of these shoots will be from the end of January to the middle of February. The shoots to be budded must be making growth, or else there will be no sap flow to form the union.

The buds should also be taken from the current season's growth, and from shoots that are still making growth. The buds should be cut from about the centre of the shoot, as they will prove more satisfactory than those taken from near the base or tip.

*—H. St. J. Pratt.*

## MARKETING PASSION FRUIT.

With the coming of warmer weather, passion fruit growers should exercise greater care in the harvesting of their fruit. Fruit should not be allowed to fall from the vines as fallen fruit quickly becomes crinkled, reducing its size and value to the retailer. By picking the fruit when it is showing half colour its marketing life will be greatly increased, and its selling value raised. Where a grower has a percentage of crinkled fruit, it should be included with marked and blemished fruit and packed separately from the uncrinkled fruit. While most retailers have no outlet for crinkled fruit, there is, however, a good market otherwise for fruit of this description.

All fruit should be carefully handled and packed on the diagonal system, which gives the fruit the maximum of protection and display value, thereby enhancing its general appearance.

*—J. McG. Wills.*

# The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

THE stone fruit season is now in full swing; cherries, peaches, plums, and apricots are now making their appearance in increasing quantities on the market. Remembering the troubles of oversupply of these fruits usually experienced during the December holidays, one is tempted to ask what will we do about it this year? If the problem is to be solved, now is the time to evolve something. There is no doubt that the thousands of people at holiday resorts cannot easily obtain supplies at reasonable prices. Investigations over a number of years confirm this. Whilst glut conditions have ruled in the markets retail prices at the seaside have remained too high for people with large families. Cheaper fruit would help greatly towards clearing the markets of oversupply. It should not be difficult to organise a scheme. The recent strawberry and pineapple distribution campaigns have indicated what can be done. Extra publicity on the part of all concerned in the industry soon cleared the markets, prices firming to payable levels. Some nice pineapples from Magnetic Island have come to hand, and have sold at top market price.

With early consignments of cooking apples from the Granite Belt to hand growers are advised not to send small, immature fruit to the market. It will lower values for apples as the season advances, creating a handicap which will be hard to overcome.

Mangoes have increased in supply. Small and bruised lines are now hard to sell. Growers are warned against sending common varieties to Southern markets, where only best types are saleable.

Good quality papaws are selling well, although at present there are too many lines of inferior fruit. Local papaw growers do not appear to make any effort in producing a better type of fruit. Destroying trees which consistently carry poor type, hard, soapy, or soft, flavourless fruit would be a start towards improving the quality of fruit on the market, and would go a long way towards the elimination of the wide range of prices noticed on the market.

Growers in the deciduous fruit districts are advised to get their packing sheds ready for the coming season. Machinery should be conditioned, pits dug, and picking equipment mended and sterilised. Care in doing this will greatly assist in reducing the incidence of brown rot.

Oranges are still selling at moderate prices, small fruit still being hard of sale.

Bananas have eased slightly in price. Quality fruit is easy to dispose of at satisfactory prices.

Pineapple growers' attention is drawn to the complaints of water blister in Southern markets. Only careful handling, plenty of wood wool padding when packing and a clean packing shed will help to reduce this trouble. Benzoic acid assists to control the trouble, but its efficiency must be assisted by carrying out the above precautions.

Prices during the last week of November were:—

## TROPICAL FRUITS.

### Bananas (Cavendish).

*Brisbane.*—Smalls, 4s. 6d. to 6s. 6d.; sixes, 5s. to 9s.; sevens, 7s. to 11s. 6d.; eights and nines, 8s. to 13s.

*Sydney.*—Sixes, 6s. to 10s.; sevens, 11s. to 14s.; eights and nines, 15s. to 17s.

*Melbourne.*—Sixes, 8s. to 11s.; sevens, 10s. to 13s. 6d.; eights, 11s. to 14s.; nines, 13s. to 15s.

*Adelaide.*—17s. to 18s. per case.

### Pineapples.

*Brisbane.*—Smoothleaf, 7s. to 10s. per tropical case, loose, 2s. to 8s. per dozen; Roughs, 8s. to 11s. per tropical case, loose, 3s. to 7s. 6d. per dozen; Northern Roughs, 9s. to 12s. per case.

*Sydney.*—Smoothleaf, 10s. to 16s. per tropical case.

*Melbourne.*—Smoothleaf, 10s. to 15s. per case. Many lines affected with water blister.

*Adelaide.*—Smoothleaf, 16s .to 18s. per case.

### Papaws.

*Brisbane.*—Yarwun, 5s. to 7s. per case (tropical); Gunalda, 3s. to 4s. per bushel case; Choice locals, 2s. 6d. to 3s. per bushel case; second grade, 1s. 6d. to 2s. per bushel case and hard of sale.

*Sydney.*—8s. to 12s. per tropical case. Inferior, lower price and hard to sell.

*Melbourne.*—6s. to 9s. per tropical case.

### Mangoes.

*Brisbane.*—Townsville, 6s. to 7s. per bushel case. Small and bruised fruit hard to dispose of.

## CITRUS FRUITS.

### Oranges.

5s. to 8s. 6d. per bushel case.

### Lemons.

Locals, 6s. to 9s. per bushel case; Specials higher, to 13s.

### Grape Fruit.

Palestine grape fruit are selling on the Melbourne market at 40s. per export case (1⅓ bushel). This should indicate to local growers the prices which can be obtained for quality fruit.

## DECIDUOUS FRUITS.

### Apples (Southern).

*Brisbane.*—The quality of imported apples is rapidly falling off, and quality new season's fruit will be welcomed. Jonathan, 9s. to 14s. 6d. per bushel case; Granny Smith, 12s. to 16s. per bushel case; Sturmer, 6s. to 11s. per bushel case; Tasma or Democrat, 10s. to 14s. per bushel case; Crofton, 11s. to 14s. per bushel case; Yates, 9s. to 15s. per bushel case; Stanthorpe cookers, 14s. to 16s. per bushel case.

The warning expressed last month to select hard varieties of quality for shipment to Brisbane is repeated.

### Pears (Southern).

*Brisbane.*—Winter Cole, 12s. to 17s. per bushel case; Winter Nelis, 10s. to 14s. per bushel case; Broom Park, 9s. to 14s. per bushel case. All fruit should be wrapped.

### Peaches.

Stanthorpe Mayflower, 4s. to 9s. per half-bushel case; Sneyd's 3s. 6d. to 5s. per half-bushel case; Local China Flats, 2s. to 4s. a tray.

### Plums.

Wilson, 10s. to 12s. per half-bushel case; Early Gem, 3s. to 4s. per half-bushel case; Greengages, 6s. to 8s. per half-bushel case.

### Apricots.

Warwick, 4s. to 9s. per half-bushel case.
New South Wales, 6s. to 12s. per half-bushel case.

### Cherries.

New South Wales, 5s. to 8s. per tray.
Stanthorpe, 5s. to 7s.

## OTHER FRUITS.

### Passion Fruit.

*Brisbane.*—8s. to 10s. per half-bushel case; second grade, 5s. to 7s.
*Sydney.*—Queensland, 8s. to 14s. per half-bushel case.
*Melbourne.*—Queensland, 14s. to 20s. per half-bushel case.

### Tomatoes.

*Brisbane.*—Coloured, 2s. to 4s.; green, 1s. 6d. to 4s.; ripe, 1s. to 3s.
Heavy supplies have been maintained since the second week of the month, which caused prices to fall to the above levels. Poor quality fruit should be kept off the market, which would help in its recovery.
*Sydney.*—2s. to 4s. per half-bushel case.

## MISCELLANEOUS VEGETABLES, &c.

(Brisbane prices, unless stated otherwise.)

### Pumpkins.

*Brisbane.*—4s. to 5s. per bag.
*Sydney.*—8s. to 10s.

### Marrows.

*Brisbane.*—6d. to 1s. 6d. per dozen.
*Sydney.*—3s. to 4s.

### Water Melons.

Small, 3s. to 9s.; large, 12s. to 22s. per dozen.

### Cantaloupes.

4s. to 5s. per bushel case.

### Lettuce.

*Brisbane.*—9d. to 2s. per dozen.
*Sydney.*—2s. to 4s.

### Cabbage.

Locals, 9d. to 2s. per dozen; Stanthorpe, 3s. to 4s. per chaff bag.

### Beans.

*Brisbane.*—3s. to 5s. sugar bag.
*Melbourne.*—2d. to 6d. per lb.

### Peas.

3s. to 5s. per sugar bag. Inferior, lower price.

### Beetroot.

2d. to 4d. a bundle.

### Rhubarb.

6d. to 1s. per bundle.

# Live Stock in Queensland.

THE following tables show the numbers of horses, cattle, sheep, and pigs in Queensland at 1st January, 1938, as compiled by the Government Statistician from stock returns. Comparative figures for 1937 and 1938 are given in the first table for horses, cattle, sheep, and pigs in statistical divisions of the State. Detailed information for cattle and sheep in petty sessions districts is given in the second table.

The statistical divisions consist of twelve groups of petty sessions districts, the first five representing South Queensland, the next three Central Queensland, and the remaining four North Queensland. In each of the three cases the statistical divisions are arranged in order from the east coast to the west.

## HORSES.

Horses have shown an increase for the first time since 1922. The total declined steadily each year from 747,543 in 1922 to 441,536 in 1937, but the figure of 446,777 for 1938 shows an increase of 5,241 or 1.19 per cent. compared with the previous year. The Central Western, North-Western, and Edgecumbe Divisions registered increases of 4, 3, and 2 per cent., respectively, and most of the other divisions showed small increases.

## CATTLE.

Generally herds declined in the south-western corner of the State, and in the dairying districts of the south-east and far north, while throughout the centre and central coast beef herds showed some increase. The net result was that the total number of cattle remained practically steady at 5,959,165, compared with 5,950,572 in 1937—an increase of 8,593. Increases were recorded in the North-Western, Central Western, Port Curtis, Maranoa, and Edgecumbe Divisions, but these gains were largely offset by decreases in all the other divisions of the State. The North-Western Division showed an increase of 44,354, or 5 per cent.; Central Western 24,526, or 6 per cent.; and the Port Curtis, Maranoa, and Edgecumbe Divisions registered increases of 2, 4, and 1 per cent., respectively. The greatest decrease was experienced in the South-Western Division, where the total declined by 31,787, or 18 per cent. The Petty Sessions Districts of Thargomindah, Augathella, Cunnamulla, and Quilpie, in this area, showed decreases of 12, 15, 29, and 29 per cent., respectively. The adjoining Petty Sessions Districts of Boulia, Diamantina, and Windorah, in the far western area, showed decreases of 30, 11, and 12 per cent., respectively. Most of the petty sessions districts in the dairying divisions of Moreton, Downs, and Wide Bay registered slight decreases.

## SHEEP.

The 1938 total of 22,497,970 shows a substantial increase of 2,486,211, or 12.42 per cent., compared with the total of 20,011,749 for 1937. Only in two previous years has this total been exceeded—in 1915 and 1931, when the totals were 23,129,919 and 22,542,043, respectively.

The Central Western Division of the State showed an increase of 629,848, or 11 per cent.; Maranoa 606,969, or 19 per cent; North-Western 569,746, or 21 per cent.; Downs 535,579, or 21 per cent.; and Far Western 316,811, or 17 per cent. The other sheep-raising division, South-Western, showed a decrease of 188,905, or 5 per cent. Increases ranging from 22 to 34 per cent. were recorded in the adjoining Petty Sessions Districts of Cloncurry, Julia Creek, Richmond, and Winton. Substantial increases were also registered in the Blackall, Longreach, and Muttaburra districts, in the Central Western area and the Dirranbandi, St. George, Surat, and Mitchell districts in the Maranoa Division. The totals for the Petty Sessions Districts of Eulo and Quilpie, in the South-Western area declined by 16 and 28 per cent., respectively.

## PIGS.

The 1938 total was 282,941, compared with 290,855 the previous year—a decrease of 2.72 per cent. Most of the pig-raising is done in the adjoining divisions of Moreton, Downs, and Wide Bay, and these three together account for 243,476, or 86 per cent. of the total pigs. As of dairy cattle, slight decreases of pigs were recorded in these divisions, but most of the other divisions registered increases.

# Registered Stallions.

Subjoined is a list of stallions in respect of which Certificates of Registration were issued under "*The Stallions Registration Acts,* 1923 *to* 1934," during the year 1938-39:—

BLOOD STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1938-39.

| Name. | No. | Age. | Colour. | Owner. |
|---|---|---|---|---|
| Archer | 2099 | 5 | Black | L. Gossow, Maidenwell |
| Backare | 2195 | 5 | Bay | E. L. Ramsay, Umbiram |
| Beebo Shell | 2135 | 5 | Chestnut | D. W. Bell, Beebo |
| Ben Braggie | 2136 | 6 | Bay | A. G. F. Munro Estate, Goodar, Goondiwindi |
| Bernor | 2259 | 6 | Bay | C. Meehan, Toonpan |
| Blandon | 2196 | 5 | Bay | P. P. Venaglia, Rous Street, Hendra |
| Bon Aero | 2180 | 5 | Bay | P. Brennan, Jimboomba |
| Brownfelt | 2197 | 5 | Bay | L. Dixon, Freestone Crescent, Hendra |
| Brown Laddie | 2181 | Aged | Brown | D. Beattie, Kenilworth |
| Bustle On | 2198 | 6 | Bay | J. Y. Shannon, Rodney Downs, Ilfracombe |
| Buzwind | 2199 | 5 | Bay | W. Rankin, Queen Street, Brisbane |
| Buzzard King | 2200 | 6 | Chestnut | P. J. O'Shea, River Road, Toowong |
| Chinga | 2182 | 5 | Chestnut | D. Jackson, Dulacca West |
| Chrysobus | 2137 | 5 | Bay | C. Zacka and E. Leslie, Goondiwindi |
| Contadino | 2201 | 6 | Brown | W. Hennessey, Hardy Street, Hendra |
| Craftmaster | 2100 | Aged | Chestnut | L. E. J. Dingle, Abercorn |
| Crydown | 2219 | Aged | Bay | J. J. O'Sullivan, Many Peaks |
| Dan Scorn | 2101 | 6 | Brown | W. P. Linnane, Berajondo |
| Darby II. | 2138 | 5 | Grey | M. G. Yorston, Gladfield |
| Deer Gun | 2202 | 5 | Brown | P. P. Venaglia, Rous Street, Hendra |
| Deer Pride | 2170 | 5 | Chestnut | W. Manz, Lowood |
| De-Wedge-Man | 2139 | 5 | Bay | R. A. Newman, Goondiwindi |
| Diamond Heather | 2220 | Aged | Black | W. Besch, Bajool |
| Diomedes | 2260 | Aged | Bay | L. D. Lucey, Strathvale, Mt. Garnet |
| Dundas | 2171 | Aged | Bay | M. M. Bowman, Mt. Byron, Esk |
| Emborough | 2075 | 6 | Chestnut | A. H. Maguire, Kialla, Greenmount |
| Feather Dust | 2218 | 5 | Brown | J. C. Stockden, Cinnabar |
| Flash Boy | 2237 | 6 | Bay | W. J. Wright, Glen Isla, Proserpine |
| Foundation | 2172 | 5 | Bay | L. Shine, Fernvale |
| Gallant Blanck | 2140 | Aged | Bay | J. S. Canavan, Warwick |
| Glyfield | 2221 | 5 | Brown | C. F. G. Collins, Strathmuir |
| Golden Valley | 2183 | 5 | Brown | L. K. Jeffery, Pomona |
| Grand Sequel | 2222 | 6 | Chestnut | W. Beak, Denham Street, Rockhampton |
| Head Count | 2203 | 5 | Black | H. P. Bailey, Ulmarra, N.S.W. |
| Jacko | 2261 | Aged | Brown | F. Carrington, Liontown, Charters Towers |
| Jovial Monk | 2204 | 5 | Black or Brown | E. L. Ramsay, Umbiram |
| King's Colours | 2238 | 5 | Bay | G. M. Myers, Poitrel, Nebo |
| K. V. | 2262 | 6 | Chestnut | Mrs. Jane Black, Pajingo, Charters Towers |
| Lord Bine | 2206 | 5 | Brown | W. C. Krimmer, Willowburn |
| Lord Bradford | 2102 | 6 | Bay | J. Collins, Nanango |
| Magnifier | 2263 | Aged | Bay | Kilpatrick Pty., Southedge, Mareeba |
| Malt Pie | 2267 | Aged | Black | V. Rowe, Bowraville, N.S.W. |
| Marilla Lad | 2076 | 6 | Chestnut | F. Turner, Chinchilla |
| Monarch | 2223 | Aged | Brown | H. C. Cox, Ambrose |
| Mondacre | 2208 | 6 | Brown | O. G. Ridge, Argyle, Toowoomba |
| Music | 2264 | Aged | Chestnut | Natal Downs Pty. Ltd., Charters Towers |
| My Crusader | 2224 | 5 | Chestnut | C. Hotz, Wumalgi |
| No name | 2241 | 6 | Chestnut | E. Y. Shannon, Tierawoomba, Nebo |
| Nut Shah | 2077 | 5 | Chestnut | J. W. H. Blackley, Wandoan |
| One More | 2209 | 6 | Bay | J. Gahan, Lilley Street, Hendra |
| Palfresco | 2173 | 5 | Brown | A. Wienholt, Kalbar |
| Peterborough | 2078 | 5 | Chestnut | J. Scotney, Greenmount |
| Pilgrim | 2174 | 5 | Grey | D. D. Logan, Pineview, Kilcoy |
| Ramillies | 2079 | Aged | Bay | J. Stuart, Glen Alvon, Meandarra |
| Realhead | 2210 | 5 | Brown | P. P. Venaglia, Rous Street, Hendra |
| Redcoat | 2225 | 6 | Chestnut | J. Y. Shannon, Rodney Downs, Ilfracombe |
| Reklaw | 2103 | 5 | Bay | L. C. Walker, Bingera |
| Ribbleson | 2211 | 5 | Brown | H. N. Ballantyne, Gladstone |
| Royal Address | 2226 | 6 | Chestnut | J. Hanrahan, Rundle Street, Wandal |
| Royal Rivoli | 2212 | 5 | Bay | Carr and Postle, care of L. Dixon, Hendra |
| Royal Scot | 2104 | 5 | Bay | A. Guiney, Tingoora |
| Sarnix | 2227 | 5 | Iron Grey | Camboon Pastoral Co., Camboon |
| Sarwell | 2239 | 5 | Iron Grey | W. H. Gillham, Suttor Creek, Nebo |
| Scappolo | 2265 | 5 | Chestnut | Natal Downs Pty. Ltd., Charters Towers |
| Scholar Chief | 2228 | Aged | Brown | W. J. Kelly, Banksia, Kunwarara |
| Sir Edmund | 2266 | 6 | Chestnut | J. Bell, Cardigan, Charters Towers |
| Sir Norwich | 2229 | Aged | Brown | W. H. Coe, Norwich Park, Clermont |
| Speed On (Imp.) | 2080 | Aged | Chestnut | A. Langmore, Prospect, Jondaryan |
| Starlight | 2105 | 5 | Black | L. J. Mackaway, Goomeri |
| Sunnie | 2106 | 5 | Chestnut | E. N. Sawtell, Coolabunia |
| Tantitha | 2107 | 5 | Bay | F. R. Briggs, Mount Perry |
| Undiger | 2108 | Aged | Chestnut | F. R. Briggs, Mount Perry |
| Vain Star | 2081 | Aged | Brown | V. P. Shannon, Wongongera |
| Verberry | 2240 | Aged | Brown | F. G. Schilling, Bowen |
| War Path | 2213 | 6 | Bay | O. G. Ridge, Argyle, Toowoomba |
| White Flag | 2175 | 5 | Chestnut | R. Jackson, Munbilla |
| Wonderland | 2214 | 5 | Bay | E. S. Cox, No. 10 Macartney Street, Paddington |

PONY STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1938-39.

| Name. | No. | Age. | Colour. | Owner. |
|---|---|---|---|---|
| Bonnie Boy | 2090 | 5 | Brown | H. Taylor, Gayndah |
| Brigalow Bill | 2032 | 6 | Black | H. Willacy, Brigalow |
| Cabulcha Stibnite | 2179 | 5 | Iron Grey | J. M. Newman, Caboolture |
| Chips | 2083 | Aged | Bay | Jas. McLellan, Goranba |
| Danny Boy | 2091 | Aged | Brown | L. G. Bishap, Maidenwell |
| Gloaming | 2084 | 6 | Bay or Brown | T. Bishop, Rocky Glen, Cooyar |
| Lieutenant Jim | 2235 | 5 | Bay | W. G. Blomfield, Miriam Vale |
| Mac's Choice | 2085 | 5 | Chestnut | S. H. Reynolds, 3 Glasgow Street, Toowoomba |
| Master Hero | 2092 | Aged | Brown | J. H. Bucholz, Gayndah |
| Playmate | 2093 | 5 | Piebald | J. J. Bauer, Watulgan |
| Pride of Allamby | 2086 | 5 | Bay | H. C. Sperling, Mountain Camp, Crow's Nest |
| School Boy | 2236 | 5 | Blue Grey | W. T. Brown, Meadbrook, Calliope |
| Silver | 2176 | Aged | Taffy | B. Hogan, 20 Moffatt Street, Ipswich |
| Silver King II. | 2094 | 6 | Dappled Taffy | E. Grace, Emu Creek, Degilbo |
| Silver Laddie | 2087 | 5 | Grey | H. F. Dornbusch, Yargullen, *via* Oakey |
| Springmeade Black Fox | 2088 | 5 | Black | E. F. Tuckey, Middle View ,Square Top |
| Timothy | 2089 | 5 | Brown | Sarah Elizabeth Kineavy, Rocky Creek |

TROTTER STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Broad Don | 2095 | 5 | Chestnut | F. Otto, Inverlaw, Kingaroy |
| Broad Findon | 2096 | 5 | Brown | E. J. Campbell, Kingaroy |
| Derby Cole | 2142 | 5 | Bay | F. K. Weidman, Logan Road, Clifton |
| Joker's Echo | 2097 | 5 | Bay | T. Renfrey, Degilbo |
| King Wilkes | 2177 | Aged | Bay | A. V. Baker, Grandchester |
| Raven Lad | 2098 | Aged | Brown | J. Warnick, Gayndah |
| Yankee Sparks | 2178 | 6 | Bay | W. Smith, care of A. Yarrow, Mount Walker West |

DRAUGHT STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Abbotsford Reformer | 2143 | Aged | Bay | B. O. Elsley, Belmore, Yelarbon |
| Airedale | 2100 | 5 | Bay | R. S. McKenzie, Maroondan, Gin Gin |
| Aldoman's Hope | 2242 | 5 | Bay | A. A. Brooks, Coningsby, Mackay |
| Bally | 2053 | 5 | Brown | Patch and McCrae, Emu Creek, Crows' Nest |
| Bally | 2267 | Aged | Bay | A. E. Carter, Box 143, Home Hill |
| Barney | 2110 | 5 | Brown | T. Embrey, Kingaroy |
| Baron Dale | 2287 | Aged | Bay | Kilpatrick Pty. Ltd., Mareeba |
| Barron Pear | 2054 | 6 | Bay .... | V. P. Shannon, Wongongera |
| Ben Bold | 2144 | 5 | Bay | E. Austin, Flemingdale |
| Benefactor | 2145 | 5 | Bay | G. McArthur, Maryvale, Warwick |
| Bennie Boy | 2111 | 5 | Bay | Jackson Bros., Durong |
| Bob | 2184 | 5 | Bay | G. Singh, Canungra |
| Bold Favour | 2268 | 6 | Brown | Pioneer Sugar Mills Pty, Ltd., Brandon |
| Boxvale Barron Bank | 2112 | 5 | Bay | F. Burton, Durong |
| British King | 2146 | 5 | Bay | T. J. Ryan, Clintonvale |
| Briton | 2243 | 6 | Bay | D. Hadlow, Kelsey Creek, Proserpine |
| Canberra Duke | 2055 | 5 | Bay | H. A. Koelher, Yamsion |
| Captain | 2147 | 5 | Bay | B. G. Erhart, Goomburra |
| Captain | 2269 | 6 | Bay | A. H. MacDonald, Barringha |
| Carlisle Boy | 2148 | 5 | Bay | J. H. McIvor, Emu Vale |
| Carrington Flash Cavalier | 2113 | Aged | Chestnut | W. E. Webster, Sarum, Kingaroy |
| Christian | 2270 | 5 | Bay | Mrs. E. C. Clarke, Maryvale, Charters Towers |
| Cloverdale Stamp | 2215 | Aged | Bay | D. Davidson, Walcha, N.S.W. |
| Clyde | 2056 | 5 | Bay | C. Barber, Rywung |
| Coilsfield Prince | 2150 | 5 | Bay | Estate Scott McLeod, Terrica, Goondiwindi |
| Craig Hero | 2057 | 5 | Bay | Derrick Bros., Bell |
| Craig Son | 2058 | 5 | Bay | G. A. Lewis, Canning Creek, Milmerran |
| Crest Vale Nobility | 2152 | 5 | Roan | A. Ritson, Clifton |
| Crystal MacBride II. | 2059 | 5 | Bay | Amelia Kewley, Glen Mona, The Gums |
| Culverthorpe High Opinion | 2114 | 5 | Bay | S. B. Trigger, Lakeside |
| Dalkerk | 2115 | 5 | Bay | R. G. Allen, Mount Perry |
| Dark Chief | 2060 | 5 | Brown | M. Stower, Linthorpe, Pittsworth |
| Dobin | 2244 | 5 | Brown | G. M. Myers, Poitrel Nebo. |
| Don | 2116 | Aged | Bay | A Sanderson, Monto |
| Donald | 2271 | 5 | Light Bay | W. M. Jackson, Box 191, Ayr |
| Dooling Major Lee | 2117 | 6 | Bay | M, Lobwein, Kybong |
| Duke II. | 2185 | 6 | Bay | J. J. Kirk, Kenilworth |
| Earl Dale | 2161 | 5 | Black | E. C. A. Zillman, Hatton Vale |
| Eureka Walter | 2230 | 5 | Liver Roan | C.Q.M.E. Co., Fitzroy Vale, Rockhampton |
| Fairymead Success | 2245 | 5 | Bay | R. Smith, Box 87, Bowen |
| Farleton John | 2272 | 6 | Brown | A. P. Nelson, Box 101, Charters Towers |
| Farmer | 2246 | 5 | Roan | A. Welsh, Mia Mia, Mirani |
| Fashion's Prince | 2153 | 5 | Bay | T. J. Brosnan, Killarney |
| General Kerr | 2162 | 5 | Bay | A. F. Schimke, Summer Hill, Laidley |
| Glen Donald | 2061 | 6 | Bay | G. Knauth, care of J. Zella, Middle Ridge, Toowoomba |
| Glen Lock | 2118 | 5 | Bay | C. F. Schmid, Nikenbah |
| Goldmount Prince | 2062 | 5 | Brown | C. Mesken, Maclagan |
| Gold Nought | 2154 | 5 | Chestnut | D. Sullivan, Allora |
| Intent | 2273 | Aged | Black | Egera Pastoral Co., Charters Towers |
| Jackson | 2063 | 5 | Bay | D. W. Kirstenfeldt, Kulpi, Cooyar Line |
| Joe | 2274 | 5 | Bay | Natal Downs Pty. Ltd., Charters Towers |
| Kadlunga Topnote | 2275 | 5 | Grey | J. Allingham, Hillgrove, Charters Towers |
| Kairi Prince | 2276 | Aged | Chestnut | T. S. Heale, Fleetwood, Kureen |

DRAUGHT STALLIONS CERTIFICATED FOR LIFE DURING 1938-39—*continued.*

| Name. | No. | Age. | Colour. | Owner. |
|---|---|---|---|---|
| Kerrston Carlisle | 2163 | 5 | Bay | J. M. Newman, Caboolture |
| Kerrston's Prospect | 2247 | 5 | Black | C. D. Loadsman, Orkabie |
| Kerrston's Viceroy | 2120 | 6 | Black | W. D. Porter, Kumbia |
| Kerrstop | 2122 | 5 | Brown | C. F. McInnes, Gooroolba |
| Kerwein | 2164 | 5 | Bay | H. Schultz, Morton Vale, Gattton |
| King | 2186 | Aged | Iron Grey | H. Bernier, Whiteside |
| King Hope | 2123 | 5 | Black | J. H. Powell, Kumbia |
| Lad | 2231 | 6 | Black | W. C. Geddes, Balmoral, Glen Geddes |
| Laurel Wedgewood | 2277 | 6 | Chestnut | Bluff Downs Pastoral Co., Charters Towers |
| Lehmanni Tenor | 2064 | 5 | Black | Mrs. R. V. Breydon, Brooklyn, Haden |
| Lion | 2065 | 5 | Bay | H. Simmons, Yandilla |
| Logan | 2248 | 5 | Black | Wright and Davidson, Kemmis Creek, Nebo |
| Logan Prince | 2187 | 5 | Bay | J. N. Bell, Rathdowney |
| Lomond Douglas Bold | 2189 | Aged | Bay | Palen Creek State Farm, Palen Creek |
| Lord Kerrston | 2066 | 5 | Black | J. R. Anderson, Southbrook |
| Macadair | 2124 | 5 | Bay | J. Bishop, Maidenwell |
| Major | 2125 | 5 | Bay | W. R. Gordon, Shirley, Gayndah |
| Major | 2126 | Aged | Black | R. J. Brown, Brooweena |
| Major | 2127 | 5 | Brown | T. Turner, Kumbia |
| Major | 2249 | 5 | Bay | D. J. McLean, Gumlu |
| Marshall Gaiety | 2165 | 5 | Bay | C. A. Martens, Marburg |
| Marshall Ney | 2250 | 5 | Roan | M. R. Shannon, Olive Downs, Nebo |
| Martindale | 2067 | 5 | Bay | W. D. Specht, Avonmore, Milmerran |
| Maydale Knight | 2128 | Aged | Bay | L. C. Walker, Bingera |
| Merlwood's Desire | 2129 | 5 | Bay | H. H. Hayden, Bancroft |
| Negro | 2278 | 5 | Black | M. Lyons, Wambiana, Charters Towers |
| Nelson | 2251 | 5 | Chestnut | D. Hadlow, Kelsey Creek, Proserpine |
| Noble | 2068 | 5 | Bay | R. Mitchell, Pinewood, Millmerran |
| Noble | 2252 | 6 | Brown | G. Shinn, North Side, Mackay |
| Noble | 2279 | Aged | Bay | C. Brownson, Slogan Downs, Charters Towers |
| Noble Intent | 2253 | 5 | Brown | A. F. Clausen, Homebush Road, Mackay |
| Peri Paddy | 2254 | 5 | Brown | G. J. Roger, Peri, Mackay |
| Poplar | 2255 | 5 | Blue Grey | E. Collins, Gumlu |
| Premier Pride | 2130 | 5 | Bay | A. Tanner, Bundaberg |
| Prince | 2069 | 5 | Bay | N. Thornton, Rocky Creek |
| Prince | 2070 | 5 | Black | E. H. Budden, Pelican |
| Prince | 2155 | 5 | Bay | J. O. Coleman, Cobba-da-mana |
| Prince Charlie | 2156 | 5 | Bay | Gross Bros., Campbell's Plains |
| Prince Dudley | 2280 | Aged | Bay | R. J. Atkinson, Cashmere, Mount Garnet |
| Prince George | 2131 | 5 | Bay | W. H. White, Prawle, Maryborough |
| Prince Rocket | 2132 | 5 | Bay | McCauley and Stewart, Mundubbera |
| Robin Dale | 2190 | 5 | Bay | J. L. Everdell, Woodhill |
| Rob Roy | 2071 | 5 | Black | A. H. Gierke, Chinchilla |
| Rocket | 2157 | 5 | Bay | A. W. Naumann, Mount Kent, Nobby |
| Ron | 2133 | 5 | Bay | D. C. Myles, Mungungo |
| Rose Farm Bold Kerrston | 2166 | 5 | Bay | J. W. Evans, Boonah. |
| Royal Dale | 2072 | 5 | Black | I. N. Kahler, Geham |
| Royal Dale | 2281 | Aged | Bay | R. J. Atkinson, Cashmere, Mount Garnet |
| Royal Dan | 2158 | 6 | Bay | W. J. Agnew, Talgai Farm, Allora |
| Royal Intent | 2159 | 5 | Bay | H. J. Pacholke, Five Ways, Clifton |
| Royal Kerr | 2232 | 5 | Bay Roan | F. R. Lehmann, Biloela |
| Royal Richard | 2160 | 5 | Bay | H. Butler, Pozieres |
| Royal Scott | 2167 | 5 | Bay | J. L. Strack, Mount Whitestone, Grantham |
| Sailor | 2233 | 5 | Brown | R. J. Collins, Yeppoon |
| Shepherd Hill Sandy Kerlin | 2256 | 5 | Brown | C. Johnson, Gargett |
| Shepherd's Pride | 2073 | 5 | Brown | H. A. Nauschutz, Canaga, *via* Jandowae |
| Sirdar | 2286 | 6 | Bay | Mavis Cassady, Mungalla, Ingham |
| Sirvale | 2257 | Aged | Brown | F. McNeil, Bowen Road, Proserpine |
| State Insignia | 2191 | Aged | Bay | L. K. Jeffery, Pomona |
| Sydler | 2258 | 5 | Brown | J. Dalton. Pleystowe |
| Talgai Hero | 2074 | 5 | Black | W. Freyling, Hodgsonvale |
| Tarzan | 2168 | 5 | Bay | Roderick Estates, Wilson's Plains |
| Thunder | 2282 | Aged | Brown | J. Coleman, Glen Haughton, N.Q. |
| Toby | 2192 | 5 | Bay | J. Herron, Closeburn |
| Tom | 2193 | 5 | Bay | S. Lahrs, Norwell |
| True Blue | 2194 | 5 | Grey | B. T. Smiles, Palen Creek |
| Ulupna Glade | 2283 | 5 | Bay | W. C. Storer, Upper Barron, Atherton |
| Victoria Flash Game | 2284 | 6 | Bay | R. J. Atkinson, Cashmere, Mount Garnet |
| Wickside Brilliant Son | 2134 | Aged | Bay | S. E. Strong, Proston |
| Wolsingham Gold Miner | 2285 | 5 | Bay | M. Marnane, Atherton |
| Young Kerrston | 2169 | 5 | Bay | R. Mahaffey, Grantham |
| Young Times | 2234 | 5 | Brown | J. Carmody, Theodore |

BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Bright | 1762 | 3 | Bay | J. A. Collett, Pomona |
| Brownlot | 1800 | 4 | Brown | Langan Bros., Alice River, Townsville |
| Cannon Fly | 1661 | 3 | Chestnut | S. Otto, Bum Bum Creek, Crow's Nest |
| Capple Bar | 1678 | 3 | Brown | H. G. Stockill, Proston |
| Coonan Valley | 1679 | 4 | Bay | C. E. K. McCord and Co., Eidsvold |
| Fern Coolin | 1700 | 4 | Black | P. A. Wright and Sons Ltd., Kindon, Goondiwindi |
| Gold Dust | 1749 | 3 | Bay | A. H. Kunde, Hazeldene, Kilcoy (Provisional) |
| Goldhunter | 1662 | 3 | Brown | B. H. Brown, Wandoan |

BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1938-39—*continued.*

| Name. | No. | Age. | Colour. | Owner. |
|---|---|---|---|---|
| Goodlad | 1801 | 4 | Brown | F. R. Wieland, Herberton |
| Great Scott | 1793 | 4 | Chestnut | F. A Ross, Waitara, Nebo |
| King's Command | 1811 | 4 | Bay | B. Wagner, Brighton, Sandgate |
| Knightguard | 1750 | 3 | Bay | F. P. Buhle, Boonah |
| Mannar | 1681 | 3 | Chestnut | W. Titmarsh, Yerra |
| Natural Silver | 1751 | 4 | Chestnut | P. M. Ryan, Viewland, Gatton |
| Pavonian Prince | 1782 | 4 | Chestnut | E. T. Kelly, Glen Isla, Kunwarara |
| Peter Pan | 1682 | 4 | Bay | T. J. Scott, Ivanhoe, Proston |
| Picamar | 1781 | 4 | Bay or Brown | Ramsay Bros., Oondooroo, Winton |
| Saracen | 1703 | 3 | Grey | J. T. Scrymgeour, Warwick |
| Some Day | 1683 | 4 | Brown | R. Pickels, Coolabunia |
| Somerset | 1752 | 4 | Grey | W. Armstrong, Glencoe, Esk |
| Tony | 1684 | 4 | Chestnut | W. H. Sawtell, Wondai |

PONY STALLIONS CERTIFICATED FOR THE YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Bernie Star | 1670 | 3 | Brown | N. H. L. Robson, Crawford |
| Black Jewel | 1753 | 4 | Black | A. J. Anderson, Teape Street, Silkstone |
| Black Prince | 1671 | 4 | Black | A. J. Manning, Mondure |
| Beau-Saada | 1663 | 3 | Creamy | G. McCorry, Bringalily, Milmerran |
| Cabulcha Cinnabar | 1759 | 3 | Chestnut | J. M. Newman, Caboolture |
| Comet | 1672 | 3 | Black | A. F. W. Pool, Wondai |
| Dynamite | 1754 | 4 | Bay | J. H. Parfitt, Murrumba, Esk |
| Gold Cuffs | 1701 | 3 | Taffy | E. E. Belford, Wilga Park, Texas |
| Jubilee | 1755 | 3 | Black or Brown | E. Clarke, Thornton, Laidley |
| Khedive | 1673 | 3 | Grey | R. B. Jefferies, Nanango |
| Little Jim | 1756 | 4 | Bay | J. C. Logan, Rosefarm, Gatton |
| Master Don | 1665 | 3 | Brown | W. J. Smith, Pittsworth |
| Master Signet | 1702 | 4 | Bay | F. Burns, College Road, Stanthorpe |
| Model | 1757 | 3 | Bay | E. Hansen, Old Township, Laidley |
| Playmate | 1780 | 3 | Black | R. W. Pitman, Mulgowie |
| Prince Carda | 1791 | 4 | Brown | C. H. Hammond, Ubobo |
| Shaza | 1664 | 4 | Iron Grey | Jean Thomas, Toowoomba |
| Sheik | 1674 | 3 | Grey | R. B. Jefferies, Nanango |
| Silver King | 1675 | 4 | Chestnut | E. Litfin, Mondure |
| Silver Thread | 1792 | 4 | Taffy | F. W. Tully, East End, Mount Larcom |
| Sparkler | 1676 | 4 | Chestnut | S. B. Trigger, Lakeside |
| The Imp | 1704 | 3 | Dapple Grey | A. J. Savage, Cooinoo, Gore |
| Theo | 1666 | 4 | Creamy | E. G. Lister, Shenstone, Warra |
| Tommy | 1701 | 4 | Iron Grey | E. V. Dwyer, Tuchekoi, Pomona |
| Wee Jim | 1705 | 4 | Chestnut | R. A. Newman, Goondiwindi |

TROTTER STALLION CERTIFICATED FOR THE YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Arrow Lad | 1667 | 3 | Black | H. C. Hope, Irvingdale, Bowenville |
| Broadwood | 1677 | 4 | Bay | A. C. Underwood, Tingoora |
| King David | 1758 | 4 | Black | P. Staines, Templin, Boonah |
| Sparkling Arrow | 1668 | 3 | Black | T. Walker, Maclagan |
| Sparkling Wilkes | 1669 | 4 | Brown | E. Darr, Mount Irving |

DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Abbey Gift | 1646 | 3 | Bay | J. V. Willis, Meringandan |
| Admiral Gaiety | 1723 | 3 | Bay | G. Winks and C. Boyle, Harrisville |
| Ajax | 1645 | 3 | Bay | F. Cuskelly, Box 16, Cooyar |
| Alan | 1794 | 4 | Brown | E. G. Lascelles, Goorganga, Proserpine |
| Alta Craig Lustre Dignity | 1774 | 3 | Brown | J. Hunter, Mulgowie |
| Ardlaw's Son | 1706 | 3 | Bay | B. Hegarty, Back Plains, Clifton |
| Arolla's Heir | 1707 | 4 | Bay | D. Ryan, Allora |
| Back Plains Banker | 1708 | 3 | Bay | C. Lack, Back Plains, Clifton |
| Balmedie Superb | 1647 | 3 | Brown, grey hairs | Mrs. R. V. Breydon, Haden |
| Balwherrie Intent | 1685 | 4 | Bay or Brown | F. Tucker, Ellesmere |
| Baron Favourite | 1710 | 4 | Bay | P. Fogarty, Headington Hill, Clifton |
| Barron Chief | 1724 | 4 | Bay | T. M. McGrath, Kalbar |
| Berriew Premier | 1725 | 4 | Bay | F. D. Arthur, Stockyard Creek, Helidon |
| Black Boy | 1795 | 4 | Black | E. G. Lascelles, Goorganga, Proserpine |
| Bold Dignity | 1648 | 3 | Bay | G. and H. Tews, Springside, Pittsworth |
| Bold Exchange | 1686 | 4 | Bay | H. V. Petersen, Kolan River South |
| Bonnie Charlie | 1649 | 4 | Bay or Brown | C. H. Barrett, Bruan Park, Tara |
| British Prince | 1687 | 3 | Bay | W. J. Brims, Blackmount, N.C.L. |
| Brookville Gaiety | 1763 | 3 | Brown | Walsh Bros., Laravale |
| Bully Bar | 1783 | 4 | Bay | V. R. Katte, Kola Bar, Dingo |
| Captain | 1784 | 4 | Bay | W. J. White, Ivanhoe, Milman |
| Captain | 1785 | 4 | Bay | C. T. Johnson, Gracemere |
| Captain Lustre | 1764 | 3 | Bay | J. T. Collett, Pomona |
| Castlemaine | 1660 | 4 | Bay | E W. Watson and Son, Welford, Nangwee |
| Clinker | 1786 | 4 | Bay | J. Moran, Taragoola |
| Cornish Laddie | 1726 | 5 | Bay | H. O. Mischke, Veradilla (Provisional) |
| Croydon Gaiety de Luxe | 1727 | 3 | Bay | A. I. Titmarsh, Roadvale |
| Dale Pride | 1728 | 4 | Bay | A. R. Zischke, Hatton Vale |
| Darcy | 1688 | 3 | Bay | M. F. Tobin, Wallaville |
| Dark Chief | 1802 | 4 | Black | H. Webb, Reid River, G.N.R. |
| Don | 1711 | 4 | Bay | W. A. Lyell, Boney Mountain, Cunningham |
| Donald Intent | 1729 | 3 | Bay | J. Coyne, Grandchester |

DRAFT STALLIONS CERTIFICATED FOR THE YEAR 1938-39—*continued.*

| Name. | No. | Age. | Colour. | Owner. |
|---|---|---|---|---|
| Duke | 1730 | 4 | Bay | H. Bullock, Murrumba Road, Esk |
| Duke of Suffolk | 1731 | 4 | Chestnut | Ivy May Arndt, Rosewood |
| Duke of Windsor | 1765 | 4 | Bay or Brown | C. Maas, Waterford |
| Dunure's Delight | 1803 | 3 | Brown, grey hairs | B. A. Lynn, Box 163, Ingham |
| Extent | 1766 | 4 | Black | B. T. Smiles, Palen Creek |
| Fabric's Gaiety | 1732 | 3 | Bay or Brown | H. Fritz, Teviotville |
| Fairholme Eclipse | 1689 | 3 | Bay | A. and J. Sippel, Redgate, Murgon |
| Fairval Noble | 1733 | 3 | Bay | H. Warneminde, Toogoolawah |
| Fairymeade Bold Lorraine | 1787 | 4 | Bay | H. C. Dougal, Littlemore |
| Gaiety's Favour | 1734 | 3 | Bay | W. F. Ehrich, Kulgun |
| Glenbar Baron Kerr | 1712 | 3 | Bay | A. Jensen, Swanfels |
| Glen Kerr | 1735 | 4 | Black | P. Ryan, Viewlands, Gatton |
| Glenmore II. | 1788 | 4 | Black | A. Ziebarth, Biloela |
| Hiawatha | 1690 | 3 | Brown | F. E. Mitchell, Byee |
| Homedale Honour | 1796 | 4 | Bay | S. McLennan, Red Hill, Nebo |
| Irton Choice | 1736 | 3 | Bay | A. Joseph, Lockrose, Forest Hill |
| Johnnie Walker | 1659 | 4 | Brown | E. W. Watson and Sons, Welford, Nangwee |
| Jolly Gloucester | 1767 | 4 | Bay | S. O. Mear, Maleny |
| Jondaryan Cheers | 1651 | 3 | Brown | Jondaryan Estates, Jondaryan |
| Jondaryan ? | 1656 | 3 | Brown | Jondaryan Estates, Jondaryan |
| Kadalunga Son | 1804 | 3 | Grey | Ryan Grazing Co., Manton, G.N.R. |
| Kerrston's Joker | 1737 | 3 | Bay | P. W. Krause, Marburg |
| King Billy | 1768 | 4 | Bay | A. O. Bishop, Caboolture |
| Knight Superb | 1691 | 4 | Bay | A. Tanner, Bundaberg |
| Leeds Grove Slade Alba | 1692 | 4 | Bay | Fairymead Sugar Co. Ltd., Bundaberg |
| Lochiele | 1805 | 3 | Bay | S. W. Smith, The Wattles, Ravenshoe |
| Lord Nelson | 1652 | 3 | Brown | E. M. Schefe, Coalbank, *via* Wutul |
| Loyal Carlisle | 1713 | 4 | Black | W. Doro, Glassy Mountain, Pozieres |
| Major | 1693 | 4 | Bay | C. A. Taylor, Brooloo |
| Major | 1806 | 3 | Bay | Spotswood Bros., Home Hill |
| Major Wallace | 1738 | 4 | Bay | B. C. Zislowski, Lilyvale, Helidon |
| Maxwell | 1739 | 4 | Bay | M. W. Kruger, Coleville, Harrisville |
| Napuna Lad | 1714 | 4 | Brown | P. Fogarty, Headington Hill, Clifton |
| Noble | 1715 | 4 | Bay | M. McMahon, Sladevale |
| Noble King | 1716 | 3 | Bay | D. C. O'Leary, King's Creek |
| Oxford Don | 1694 | 4 | Bay or Brown | S. J. and C. Jenkins, Theebine |
| Pigeon's Pride | 1789 | 3 | Bay | W. T. Brown, Meadowbrook, Calliope |
| Pride of Marcellus | 1769 | 3 | Black | W. and J. Welk, Nambour |
| Prince | 1740 | 4 | Bay | D. B. O'Day, Linville |
| Prince | 1770 | 3 | Bay | N. V. Burnett, Rathdowney |
| Prince | 1807 | 4 | Blue Grey | A. J. Buck, Barringha, G.N.R. |
| Prince Wallace | 1797 | 4 | Bay | A. Carena, Inneston, N.C.L. |
| Prospect | 1717 | 3 | Bay | R. E. Gillespie, Junabee, Warwick |
| Punch | 1653 | 3 | Bay | J. Wharram, Wellburn, Jandowae |
| Rana | 1808 | 4 | Grey | Mrs. E. C. Clarke, Maryvale, Charters Towers |
| Ranger | 1695 | 3 | Bay | H. C. Taske, Bundaberg |
| Rare Gaiety | 1741 | 3 | Black | R. Harsant, Warril View, Harrisville |
| Red Robin | 1718 | 4 | Bay | W. A. Deacon, Allora |
| Rex | 1742 | 3 | Bay | S. Walker, Woodford |
| Rich Lad | 1696 | 4 | Bay | H. Welsh, Proston |
| Rosefarm Regal Lustre | 1743 | 3 | Bay | R. Drew, Forest Hill |
| Royal Chief | 1699 | 5 | Chestnut | W. R. Lester, Monduran (Provisional) |
| Royal Duke | 1771 | 3 | Bay | F. Paulger, Kidman Creek, Obi Obi |
| Royal Kerrston | 1772 | 4 | Brown | W. and S. Welk, Nambour |
| Royal Reserve | 1744 | 3 | Bay | J. Morrow, Peak Crossing, Ipswich |
| Royal Scotch | 1809 | 3 | Grey | P. Kidd, Malanda |
| Royal Stephan | 1654 | 4 | Bay | S. T. Evans, Seven Oaks, Chinchilla |
| Scottish Farmer | 1745 | 4 | Bay | Mrs. G. Montgomery, Laidley |
| Sergeant Bruce | 1655 | 4 | Bay | A. J. P. Kruger, Greyhurst, Goombungee |
| Squaredale Pride | 1719 | 4 | Bay | B. A. Hoffman, Emu Vale |
| Square William | 1720 | 4 | Bay | G. H. Rattke, Emu Vale |
| St. Helen's Cavalier | 1775 | 4 | Bay | Baumgarten Bros., Meandarra |
| St. Hilda's Nugget | 1746 | 3 | Bay | W. Profke, Glamorgan Vale |
| Talgai Duke | 1657 | 4 | Bay | J. D. Learmonth, Springside, Pittsworth |
| Tent Hill Victory | 1747 | 4 | Bay | W. H. Grams, Upper Tent Hill |
| Top Boundary | 1748 | 3 | Bay | A. Wienholt, Kalbar |
| Trementheere Royal | 1697 | 3 | Light Bay or Roan | A. H. Tanzer, Abercorn |
| Westphalia Laddie | 1776 | 4 | Bay, grey hairs | F. A. Lehmann, Lismore, Victoria |
| Wheatley Lustre's Pride | 1810 | 3 | Brown | L. Favier and Sons, Kairi |
| Wigton's Pride | 1721 | 3 | Bay | W. V. Noble, Freestone |
| Willowbank Footprint | 1798 | 4 | Brown | N. F. McLennan, Gargett |
| Wolsingham Imperialist | 1760 | 3 | Bay | T. Clark, Wietalaba |
| Wolsingham Links Maker | 1777 | 3 | Bay | T. Robson, Crow's Nest, N.S.W. |
| Wolsingham Money Boy | 1778 | 3 | Brown | T. Robson, Crow's Nest, N.S.W. |
| Wolsingham Superb | 1779 | 4 | Black | T. Robson, Crow's Nest, N.S.W. |
| Woolamia Lionel | 1722 | 4 | Bay | W. Gunn, Kildonan, Goondiwindi |
| Woolamia Peter | 1799 | 4 | Bay | D. A. Roberts, Bundara, Nebo |
| Young Douglas | 1773 | 3 | Bay | J. Martin, Tamborine |

## REJECTED STALLIONS.

List of Stallions in respect of which Certificates of Registration were refused on account of either lack of type and/or conformation, lack of size or unsoundness, during the year 1938-39. These horses are prohibited from service, either public or private:—

BLOOD STALLIONS REJECTED DURING THE YEAR 1938-39.

| Name. | Age. | Colour. | Reason for Rejection. | Owner. |
|---|---|---|---|---|
| Cruger | 4 | Black | L. T. and C. | R. O. Bayntun, Didcot |
| Cryptic | Aged | Iron Grey | L.C. | A. Ferman, care of J. H. Louis, Glen Ray, Mundubbera |
| Flying Scotchman | 3 | Chestnut | L.S.T. and C. | W. J. Stephen, Yarraman |
| My Gun | Aged | Brown or Black | L.C. | L. W. Taylor, Dulbolla |
| The Sheik | 3 | Bay | L.S.T. and C. | W. Boles, Emu Vale |
| Vivian's Choice | 5 | Chestnut | L.T. | V. C. Fogg, Samsonvale |

PONY STALLIONS REJECTED DURING THE YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Mickey the Mouse | 3 | Skewbald | L.T. | H. Simmons, Yandilla |
| Pepper | 4 | Black | Unicrypt. | C. E. Wein, Derra, Mundubbera |
| Sentinel II. | 4 | Bay | L.T. and C. | G. A. F. Bourne, Biggenden |
| Zulu | 5 | Brown | L. T. and C. | F. A. Chardon, Mount Morgan |

TROTTER STALLION REJECTED DURING THE YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Spot | Aged | Skewbald | L.T. and C. | S. Russell, Chinchilla |

DRAUGHT STALLIONS REJECTED DUPING THE YEAR 1938-39.

| | | | | |
|---|---|---|---|---|
| Baron Bruce | Aged | Dark Chestnut | L.T. and C. | S. F. Booth, Gin Gin |
| Baron Model | 4 | Bay | L.T. and C. | T. H. Oberhardt, Pittsworth |
| Baron Trump | Aged | Bay | S.B. | W. C. Walz, Marian, Mackay |
| Billy | 3 | Brown | L.T. and C. | T. C. Hughes, Upper Barron, Atherton |
| Birm II. | 4 | Bay | L.T. and C. | G. Wilson, Degilbo |
| Black Kerr | 5 | Brown | L.T. and C. | J. C. Webster, Gargett |
| British Lad | 4 | Bay | L.T. and C. | F. E. Turner, Chinchilla |
| Bully | Aged | Brown | L.T. and C. | S. Searle, Home Hill |
| Captain | 5 | Bay | L.T. and C. | D. Stone, Killawarra, Miles |
| Captain | 4 | Brown | L.C. | D. Miles, Pimpama |
| Crystal Blaze | 5 | Bay | S.B. | E. Cooper, Senr., Pratten |
| Daniel Dale | 4 | Bay | S.B. | J. Campbell, Djuan, Haden |
| Don | 3 | Dark Bay | L.T. and C. | W. J. McLelland, Box 192, Ayr |
| Don | Aged | Bay | L.T. and C. | F. Wieland, Herberton |
| Duke | Aged | Bay | L.T. and C. | E. L. Risdale, Balfe's Creek |
| Duke | 5 | Roan | L.T. and C. | H. J. Read, Gregory River, Strachaka |
| Duke | 6 | Bay or Brown | L.T. and C. | J. E. Eite, Maleny |
| Duke | 5 | Bay | L.T. and C. | G. Low, Pomona |
| Glen Dale | 5 | Bay | S.B. | P. W. Bermingham, Ivy Bank, Greenmount |
| Gowrie of St. Helens | 3 | Bay | Unicrypt. and L.C. | O. A. G. Free, The Hermitage, Warwick |
| Havelock | 4 | Bay | L.C. | D. H. Butler, Yellowstone, Miles |
| Irton Glen | 3 | Bay | Unicrypt. | A. Joseph, Prenzlau, Lowood |
| Jungle's Pride | Aged | Black | S.B. and R.B. | E. L. Risdale, Balfe's Creek |
| Lustre's Choice | 3 | Bay | L.C. | E. Ford, Pomona |
| Macsturgeon | 5 | Bay | L.T. and C. | M. Marnane, Atherton |
| Major | 3 | Brown | L.T. and C. | E. J. Fry, Peeramon |
| Marble Intent | 4 | Blue Grey | S.B. and Thoro | T. Comerford, Finch-Hatton |
| Maxie | 4 | Roan | L.T. and C. | C. Brownson, Slogan Downs, Charters Towers |
| Noble Kerr | 3 | Black | L.T. and C. | J. S. Schmidt, Mount Sylvia, Gatton |
| Nugget | 5 | Bay | L.T. and C. | Berryman Bros., Home Hill |
| Piper II. | 5 | Chestnut | Unicrypt. and L.T. and C. | E. H. McGregor, Waroolaba, Radford |
| Pride of Springsure | 4 | Bay | S. B. | H. E. Carey, Yangan |
| Prince | 3 | Bay | L.T. and C. | J. K. Nielson, Upper Clifton |
| Prince | Aged | Bay | S.B. | J. R. Colvin, Keepit, Manilla, N.S.W. |
| Prince | Aged | Brown | L.T. and C. | G. E. Bishop, Toorbul |
| Punch | 5 | Bay | L.T. and C. | R. Norris, Airedale, Ayr |
| Punch | 4 | Brown | L.T. and C. | Lyons and Son, Box 118, Giru |
| Punch | 6 | Bay | L.T. and C. | J. C. Randell, Carmila |
| Royal Pride | 3 | Bay | L.T. and C. | J. B. Pennell, Kalbar |
| Royal Reserve | Aged | Bay | L.T. and C. | B. D. J. Clark, Yarra Farm, Sarina |
| Shady Glen | Aged | Grey | L.T. and C. | T. P. Smith, Post Office, Mareeba |
| Unnamed | 3 | Bay | L.T. and C. | F. Lee Hong, Yungaburra |
| Unnamed | 3 | Light Bay | L.T. and C. | A. Marks, Atherton |
| Unnamed | 6 | Bay | L.T. and C. | Estate J. S. Love, Valley of Lagoons, Ingham |
| Unnamed | Aged | Bay | S.B. | S. E. Hobbs, Victoria Estate, Ingham |
| Unnamed | Aged | Bay | L.T. and C. | Hally Bros., Pittsworth |

# PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the advanced register of the herd books of the Australian Illawarra Shorthorn Society and the Jersey Cattle Society, production charts for which were compiled during the month of October, 1938 (273 days unless otherwise stated).

| Name of Cow. | Owner. | Milk Production. | Butter Fat. | Sire. |
|---|---|---|---|---|
| | | Lb. | Lb. | |
| **AUSTRALIAN ILLAWARRA SHORTHORNS.** | | | | |
| *Mature Cow (Standard 350 lb.)* | | | | |
| Folkestone Myrtle | N. Bidstrup, Ehlma, Warra | 12,908·78 | 474·734 | Dinkum of Thorndale |
| Sunnyside Mabel 10th | P. Moore, Wooroolin | 9,417·4 | 380·095 | Countess Lord of Cosey Camp |
| *Junior, 3 Years (Standard 270 lb.)* | | | | |
| Rhodesview Strawberry 4th | W. Gierke and Sons, Helidon | 9,117·39 | 303·3 | Blacklands Prospector |
| *Senior, 2 Years (Standard 250 lb.)* | | | | |
| Sunnyview Rosette 2nd | N. L. Siemon, Beaudesert | 10,097·54 | 390·859 | Burradale Byron |
| **JERSEY.** | | | | |
| *Mature Cow, (Standard 350 lb.)* | | | | |
| Glenview Successor | F. P. Fowler and Son, Glenview, Coalstoun Lakes | 7,495·8 | 378·172 | Trinity Officer |
| *Senior, 4 Years (Standard 330 lb.)* | | | | |
| Pineview Brighteyes | J. Hunter and Sons, Borallon | 6,510·99 | 361·583 | Oxford Jeweller |
| *Junior, 4 Years (Standard 310 lb.)* | | | | |
| Strathblane Palatines Dahlia | W. and C. E. Tudor, Branch Creek, Gayndah | 7,432·5 | 390·511 | Gunawah Prometheus |
| *Junior, 3 Years (Standard 270 lb.)* | | | | |
| Woodlands Fashion | D. R. Hutton, Bellgarth Cunningham | 7,383·07 | 382·793 | Kenmore Victor |
| Foxteth Fairy | W. C. Dunn, Wolvi, Gympie | 5,015·1 | 310·635 | Trinity Knight |
| Carnation Princess Victoria | D. R. Hutton, Bellgarth, Cunningham | 5,177·5 | 298·783 | Vinchelez Golden Victory |
| *Junior, 2 Years (Standard 230 lb.)* | | | | |
| Glenview Flower | J. Hunter and Sons, Borallon | 6,187·38 | 320·469 | Pineview Reliance |
| Glenmoore Some Fern | L. J. Comisky, Warra | 4,544·92 | 264·831 | Some King of Glenmoore |
| Westwood Lustre | E. J. and H. G. Johnson, Beaudesert | 4,640·35 | 261·586 | Westwood Royal Hero |
| Carnation Bonny Etty | G. Harley, Childers | 4,753·42 | 258·393 | Carnation Golden Charmer |
| Glenview Sunny Girl | F. P. Fowler and Son, Glenview, Coalstoun Lakes | 5,455·2 | 252·847 | Trinity Governor's Hope |
| Glenmoore Noble's Hope | L. J. Comisky, Warra | 4,911·92 | 248·431 | Kelvinside Noble Golden Prince |

# General Notes

**Staff Changes and Appointments.**

Messrs. A. L. Clay and K. M. Grant, Government Veterinary Surgeons, have been transferred from Atherton to the Animal Health Station, Oonoonba, Townsville, and from the Animal Health Station, Oonoonba to Atherton, respectively.

Constable P. H. Barnett (Windorah) has been appointed also an inspector under the Slaughtering Act.

Mr. H. H. R. Walker (Camp Hill) has been appointed an inspector under the Stock, Slaughtering and Dairy Produce Acts, Department of Agriculture and Stock, and will be stationed at the Oxley Bacon Factory.

Mr. D. A. Bacon, inspector under the Dairy Produce, Stock, and Slaughtering Acts, will be transferred from Oxley to Mareeba.

Mr. R. M. K. Snell, instructor in cheese making, Toowoomba, will be transferred to Brisbane.

Mr. A. C. P. Nurcombe, cotton grader, will be transferred from the Glenmore Ginnery, Rockhampton, to Brisbane.

Mr. C. D. O'Brien, Police Magistrate, has been appointed also chairman of the Bingera, Fairymead, Gin Gin, Millaquin, and Qunaba Local Sugar Cane Prices Boards and an agent of the Central Board.

Mr. E. Raff, Amity Point, Stradbroke Island, has been appointed an honorary protector under the Fauna Protection Act.

Constable M. Flynn, Barcaldine, has been appointed also an inspector under the Slaughtering Act.

Constable J. T. Doherty, Eumundi, has been appointed also an inspector under the Slaughtering Act.

Mr. C. R. Tummon, Slaughtering, Stock, and Dairy Inspector, has been transferred from the Doboy Bacon Factory to the Oxley Factory.

Mr. P. Round, Inspector of Stock, Pittsworth, has been appointed also an inspector under the Brands Acts.

Mr. S. W. Masters, Victoria Point, has been appointed an honorary protector under the Fauna Protection Act and an honorary ranger under the Native Plants Protection Act.

**Wild Life Preservation.**

Appointments made under "*The Fauna Protection Act of* 1937" and "*The Native Plants Protection Act of* 1930" include those of Messrs. C. T. Campbell (Mayne Junction), G. A. Lennard (Balmoral), and O. Lacy (Amity Point), who have been appointed honorary protectors and rangers.

An Order in Council issued to-day under the Fauna Protection Act, declares an area embracing the air base and pilot station, Karumba, to be a sanctuary for the protection of fauna.

An Order in Council has been issued under the Fauna Protection Act declaring portion of the Obi Obi Creek and surrounding lands near Maleny to be a sanctuary for the protection of fauna. Messrs. W. H. R. Burnett, W. M. Dunlop, J. A. Grigor, and A. C. Dickson, of Maleny, have been appointed honorary protectors for the sanctuary.

**Grade Standards for Plums.**

The Regulation under the Fruit and Vegetables Acts embodying the existing grade standards for plums has been rescinded, and a new Regulation, covering new grades has been issued in lieu thereof. The plum grades at present permit the marketing of practically all sizes of plums, but the new grades prescribe a minimum, in the case of certain varieties of plums which have been set out in two tables, of one and three-eighths inches and one and a-half inches in diameter.

**Stock Foods Regulations.**

Amendments of the Regulations in force under the Stock Foods Acts have been approved, and these include the issue of a revised list of stock foods, the foreign ingredients contained therein, and the proportion or amount of such foreign ingredients allowed.

The preparation of certain stock foods is also described.

**Mossman Mill Assessment.**

An Order in Council has been issued under the Regulation of Sugar Cane Prices Acts providing that the total assessment which the Minister may make and levy on every ton of sugar-cane received at the Mossman sugar mill during the 1938-39 season shall be one penny farthing (1¼d.) per ton. Assessment at the rate of one penny per ton has already been levied on all sugar mills throughout the State. The additional amount, in the case of Mossman, is required to cover expenditure on surveys necessitated by alterations in assignments decided upon by the Central Sugar Cane Prices Board.

**Plywood and Veneer Board Levy.**

Regulations under the Primary Producers' Organisation and Marketing Acts empower the Plywood and Veneer Board to make a levy on suppliers of plywood and veneer at the rate of three pence per hundred feet face measurement, to be used for administrative expenses of the board. These Regulations have been amended to provide that the levy shall be at a rate not exceeding threepence per hundred feet face measurment as the board may from time to time determine.

**Wheat Board.**

Result of the voting in State Wheat Board Election:—

J. G. Todd, Goomburra, 1,556 votes; A. C. V. Bligh, Condamine Plains, 1,438 votes; W. J. Brimblecombe, Pirrinuan, 1,389 votes; T. W. McIntyre, Yarranlea, 1,299 votes; A. C. Kreig, Brookstead, 1,204 votes; A. J. Booth, Junabee, 1,188 votes; W. Milne, jnr., Cambooya, 1,188 votes; R. Hembrow, Wallumbilla, 909 votes; F. F. Neumann, Hodgson, 817 votes; R. Swan, Wallumbilla, 258 votes.

The new members will be appointed for a term of three years.

**Egg Board.**

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts giving notice of intention to extend the operations of the Egg Board for the period from 1st January, 1939, to 31st December, 1944.

A further Order in Council has been issued amending the constitution of the Egg Board to provide that persons entitled to vote at elections or referenda in connection with the Board, in addition to having grown the commodity for the nine months preceding the date of the election or referendum, shall also have regularly supplied their produce to the Board.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts exempting certain growers of eggs from the provisions of Section 15 of such Acts.

Section 15 of the abovementioned Acts provides that all the commodity shall be delivered to a marketing board or its authorised agents for sale by the board on behalf of the growers. The commodity board may, in certain cases as may be prescribed or approved by the Minister, exempt certain growers of the commodity, or sales, from the operation of the Section.

The Regulations issued set out specifically what is required of a grower of eggs who seeks and is granted exemption from the obligations imposed by Section 15 to deliver his product to the Egg Board or its authorised agents. The Board is empowered to grant exemption, on terms and conditions prescribed, in respect of—

(1) Sales of eggs for hatching purposes;
(2) Such small growers as the Board thinks fit;
(3) Sales direct to local consumers or retail vendors;
(4) Any other transactions as may be approved by the Minister.

Such exemptions, however, may be limited to the person or persons named and to localities.

The Regulations also are designed to tighten the control of the board over the sale of eggs and to facilitate the collection of levies and equalisation deductions from growers exempted as above.

An Order in Council has been issued under "*The Primary Producers' Organisation and Marketing Acts*, 1926 to 1935," providing that growers of eggs who, during any period from the 1st January, 1934, to the 31st December, 1938, marketed eggs in accordance with the Acts, shall have recorded to their credit in the books of the Queensland Egg Board, evidence of their interest in the Egg Board's general reserve fund of £20,000.

The Board is required, as soon as convenient after the 1st January, 1939, to cause a tentative calculation to be made of the sums to be credited to growers, and immediately thereafter by a notice inserted in a newspaper published in Brisbane give notice of its intention to credit the sum of £20,000 to the growers abovementioned. The Board shall also give notice to each grower at his last known place of address of this intention. These notices will indicate a date, three months later, before which growers who wish to participate in the crediting of the reserve funds must lodge their claim with the Board.

Credit is to be made to each person concerned in the proportion which the total of the sums paid and payable to each such grower for eggs marked by him within the period 1st January, 1934, to 31st December, 1938, bears to the total sum paid and payable to all growers for eggs marketed in accordance with the Acts during that period.

After the amount has been credited amongst growers in the manner indicated, each grower concerned shall be issued with a certificate, non-negotiable and non-transferable, except in special circumstances, showing the amount standing to his name in the books of the Board.

The amount credited in the books and shown on the certificate will not constitute debt owing by the Board, nor will it be a charge over the assets of the Board. It will, however, be used as a basis for calculations in relation to the revolving building fund of the Board.

The reserve fund of £20,000 is maintained by the Board as a set-off against an overdraft with the Commonwealth Bank loaned on account of the Egg Board's building, storage plant, and machinery, &c., at Makerston street, Brisbane, for the maintenance, insurance, depreciation, &c., of which provision is to be made by the Board out of its income.

The Order in Council provides also that growers shall be credited, in future, in like manner, for their interest in the annual payment of £2,000 to the bank in reduction of the Board's building account overdraft, but so that—

(*a*) Sums provided for depreciation although paid to the Commonwealth Bank in reduction of the Board's building account overdraft shall not be reckoned as part of the said sum to be credited to growers;

(*b*) The sum to be credited to growers in any year shall not be greater than a sum which if added to all sums previously credited to growers would equal the net surplus of the assets over all the liabilities of the Board whether actual or contingent upon the thirty-first day of December preceding.

After the Board's building account overdraft with the Commonwealth Bank has been entirely repaid, the Board shall continue to set aside each year the sum of £2,000, or such other sum as may from time to time be determined by the Board with the approval of the Minister, and thereupon the fund shall commence to revolve. Such sum shall be applied in payment of the earliest amounts credited to growers in the books of the Board.

In the meantime the Board shall pay interest to growers upon the sums standing to their credit, at a rate to be fixed by the Board from time to time but not exceeding 2½ per cent. per annum.

**Field Rat Destruction.**

An Order in Council has been issued under "*The Sugar Experiment Stations Acts, 1900 to 1938,*" declaring that Section 7A of such Acts shall be amended to provide for the disposal or refund of any surplus funds remaining after the proper disbursements of moneys raised by way of special assessment. The Order in Council further declares that the surplus funds representing the unexpended portion of a levy made under section 7A of the Sugar Experiment Stations Acts in respect of the Victoria and Macknade Sugar Mills for the purpose of rat destruction shall be paid to the Victoria and Macknade Cane Pests Board.

**Queensland's Population.**

The official estimate of Queensland's population for the 30th June, 1938, exceeded the figure of 1,000,000 for the first time. This figure, however, includes a considerable seasonal tourist population, and the figure of true resident population passed the million mark about the end of July so far as can be estimated. At 30th June, 1938, population was estimated to be 1,003,172 persons. The number of males was 525,117 and females 478,055.

# Answers to Correspondents

## BOTANY.

*Replies selected from the outgoing mail of the Queensland Botanist, Mr. C. T. White, F.L.S.*

### Plants from the Bell District Named.

V.R.C. (Cooranga North, via Bell)—

1. Cape spinach or prickly jack, *Emex australias*, also called bull head burr, a name applied, however, to other burrs in Queensland. A native of South Africa, but now widely spread as a weed in different parts of Australia. It is more abundant in the southern States than in Queensland, although it is quite a bad weed here and there. The name spinach is applied to it because the leaves have sometimes been used as a substitute for ordinary spinach.
2. Crane's bill or crow foot, *Erodium cygnorum*, a wellknown fodder of the Darling Downs. It is not the best, however, of the crow foot species.
3. Hen bit or dead nettle, *Lamium amplexicaule*, a plant closely allied to the stagger weed or mint weed, and, like it, causes staggers or shivers in working or travelling stock. Ordinary paddock or resting stock, however, feed on the plant with impunity.
4. A variety of pepper cress or mustard weed, *Lepidium fasciculatum*, widely eaten by stock, but taints milk rather badly.
5. The common vervain, *Verbena officinalis*, a very common weed on the Downs.
6. Lamb's tongue or plantain, *Plantago varia*, generally regarded as quite a good fodder, particularly for sheep.
7. Knot grass, *Polygonum aviculare*, a common European plant now widely spread as a weed in most temperate countries. The long tailing stems are rather fibrous, and are reputed to cause impaction in stock. We have never seen it eaten here in sufficient quantities to cause trouble.
8. A dock, *Rumex* sp.
9. See answer to D.S. (No. 7).
10. Yellow daisy, *Senecio lautus*. We have no particulars on the properties of this plant.
1. A variety of "everlasting," *Helipterum polyphyllum*.
12. New Zealand spinach, *Tetragonia expansa*, this plant is sometimes cultivated as a substitute for English spinach. It is reputed to be quite a good sheep fodder.
13. *Vittadinia australis*, sometimes called native daisy. Many of these native daisies are regarded as quite good fodders for stock.
15. *Cotula australia*, a weed prevalent on the Downs sometimes called native carrot. It does not, however, belong to the true carrot family, but we have several other plants which do, and to which the local name applies more correctly.
16. *Zinnia parviflora*, a native of tropical America now a very common naturalised weed on the Darling Downs. It is not known to possess any particular properties.

### Scarlet Pimpernel.

W.S.G. (Barmundu, via Gladstone)—

The specimen is the Cape weed (*Cryptostemma calendulacea*). It is very common in some of the southern States, and covers acres and acres of ground. It has been established in Queensland for some years past, but never seems to spread here to the same extent it does in Victoria and South Australia. We have heard it spoken of in other States as a moderately good fodder, but we cannot say we have seen stock eat it here, at least to any extent. It is not known to possess any poisonous or harmful properties at any stage of its growth.

**Western Plants Named.**

E.M.B. (Jundah)—

1. The small reed—*Arundinella nepalensis.* This grass has a very wide distribution in Queensland from the coast to the interior. On the coast it grows mostly on forested hillsides and, generally, has a poor reputation as a fodder. Very often in the West these plants seem to become more palatable and this is evidently the case with the present species.
2. *Triraphis bromoides.*
3. *Triodia Basedowii.*
   Two very interesting grasses neither of which was previously recorded for Queensland, although we think Mr. Blake, the Walter and Eliza Hall Fellow at the University of Queensland, who has been studying western plants, has collected both of them.
4. *Ipomoea reptans.* We were very glad to get seeds of this plant.
5. *Acacia coriacea.* It was interesting to know you call this an oak. It is really a wattle, although very much like an oak in appearance.
6. Whitewood—*Atalaya hemiglauca.* We suppose you know that it has been accused in North Queensland of causing "walkabout" in horses. Its effect in the West on horses is probably familiar to you. Prominent veterinarians have told us that the "shivers" or "staggers" produced by this plant in the Central West is a form of the same trouble as "walkabout." In the more southern parts of the State and in New South Wales it seems quite harmless and an excellent fodder.

The grass you sent down some time ago as a winter fodder is a species of *Neurachne.* We think an undescribed species. Mr. Blake informs us that he has collected the same grass about Windorah.

**Grasses and Clovers on the Eungella Range.**

G.J.G.H. (Dalrymple Heights, via Mackay)—

There is no reason why paspalum and white clover should not be established on the Eungella Range although we did not see any good stands of it when we were there.

The average sowing of good paspalum seed would be 10 lb. an acre. The *Queensland Agricultural Journal* for September, 1937, contained an article by Mr. C. W. Winders on the establishment of paspalum, Rhodes, and Kikuyu pastures based on departmental experiences over a number of years.

In planting Rhodes grass 5 or 6 lb. of best quality seed to the acre is generally considered to be sufficient. It varies considerably in germination, so, perhaps a heavier sowing may be advisable. If you submit a representative sample to the department you will be advised as to the percentage of germination and rate of sowing.

Kikuyu is planted from cuttings which you may obtain locally. A cutting should consist of two or three joints, but can be less if desired, and placed about 3 feet apart.

We have placed the grasses in our order of preference, but this is purely individual opinion. The grass should not be planted near cultivation.

White Dutch clover, this is a perennial. One or 2 lb of seed to the acre may be included in the mixture and can be sown at the same time as paspalum or in the autumn.

Cluster clover, burr trefoil, and the English trefoil or black medic are annual clovers or trefoils that should do well on the Eungella Range and may act as a mother crop to the perennial white Dutch.

**Darnel.**

N.A.M'C. (Ubobo, via Gladstone)—

The specimen is Darnel or Drake (*Lolium temultenum*), a grass belonging to the same genus as rye grass. Darnel, in its young stages, is said to be quite suitable as a food for stock, but the grain is reputedly poisonous. It is not quite certain whether this poisonous principle is actually contained in the grain itself, or is due, in part at least, to a fungus commonly associated with it. In Europe, the plant is a common weed of grain fields and is said to have caused trouble when ground with wheat, rye, and other grains. Although the plant is moderately common in Australia, we have never heard of its causing trouble in any way.

**Milky Bean. Scrub Wattle. Kurrajong.**

J.A.T. (Julatten)—

1. *Alstonia villosa.* One of several trees in North Queensland known as milky pine or milky bean. We have no information on the fodder value of this tree.
2. Scrub wattle, *Acacia circinnata.* The leaves of several wattles are used in times of drought for fodder. We have no information about the present one, but the mature leaves would probably be very fibrous and have a constipating effect.

Of scrub trees used for fodder, the best are the Scrub Kurrajong or Brown Kurrajong (*Commersonia echinata*), a tree that comes up as secondary growth. It has rather large leaves, and in the stump or young stage, green underneath and the adult trees whitish, numerous white flowers followed by seed capsules covered by soft bristles. The tree frequently known as sarsaparilla, red ash, or silver leaf is another. This comes up often on cleared country following burns on the Atherton Tableland, Eungella Range, and other scrub areas. It is one of the best of the fodder trees.

**Cape Spinach.**

S.C. (Warwick)—

The specimen is the Cape Spinach—*Emex australis*—a native of South Africa now spread widely as a weed in many parts of Australia. In South Australia it is commonly called "saucy jack" or "prickly jack"; it also is called "bull head burr," although this name is applied to a number of burr pests in Queensland. The plant is not known to possess any poisonous or harmful properties, and the young leaves have been used as a substitute for ordinary spinach. It is, however, a very serious pest when it gets a hold in a locality. It has been established in Queensland for some years, but does not seem to spread here to the same extent as in the Southern States.

**Plants from the Boonah District Named.**

I.S. (Allandale, via Boonah)—

1. Plume grass—*Dichelachne crinita.*
2. *Chloris divaricata.* The Chloris family of grasses contains Rhodes grass and a number of native species. The native ones are commonly called windmill grasses.
3. Blue grass—*Dicanthium sericeum.*
4. Crow-foot—*Eleusine indica.* This grass is widely spread over the warmer countries of the world. Like sorghum it contains a prussic acid, yielding glucoside. Very few losses, however, occur from it in Australia.
5. Tussock grass—*Poa australis.*
6. Early spring grass—*Eriochloa* sp. Various species of Eriochloa are familiarly known as early spring grass. This name is not particularly appropriate as they are no earlier than several other grasses which come up with the spring rains.
7. *Paspalidium distans,* a native paspalidium grass which is generally regarded as a good fodder.

Paspalum is a native of South America.

**Indian Laburnum. Siris Tree.**

W.A.B. (Cloncurry)—

1. Indian Laburnum, *Cassia fistula,* a native of India, but now widely cultivated in many tropical and subtropical countries. It is one of the Cassias grown in Honolulu under the name of golden shower. It is commonly called cascara bean or cascara tree in North Queensland, and the sweetish pulp surrounding the seeds is eaten as a milk and safe laxative. It has really no connection with the true cascara of commerce, which is the product of a tree of the family Rhamnaceæ. The Indian laburnum belongs to the same genus as several shrubs which produce the senna leaves of commerce.
2. The Siris tree, *Albitzia lebbek,* a native of India, but now widely spread either naturalised or as a cultivated tree throughout the tropical and subtropical parts of the world. It is very extensively planted in North Queensland as the commonly called acacia. It is not a member of the genus acacia, although it is very closely allied to it. The genus acacia includes the Australian wattles.

# Rural Topics

### Achievement its Own Reward, What!

Farmers, like poets and philosophers, are supposed to get so much fun out of doing the things they want to do that they can go on living on the joy of achievement—or, perhaps, like a ghost, on fresh air. All very beautiful in theory, but like love on intermittent relief, rather apt to fade out in actual experience. Of course, one must have "the right spirit" for both farming and matrimony, but in our modern, matter of fact, and mechanical age the "spirit," no matter how willing, is not enough. Certain fundamentals of successful husbandry—men, money, machinery, and markets—must not be overlooked.

British Commonwealth co-operation as visualised by the Empire Producers' Conference in Sydney may be an indication that the "Promised Land" of sane economy is not so very far away after all.

### Soft Fat in Bacon Pigs.

The fat laid down by bacon pigs bears some relation to the fat in the diet.

Liquid fats are termed oils, and when these form an appreciable part of the pig's diet soft, oily carcases result.

Seeds with a high oil content—e.g., peanuts—should not be fed. Those with medium oil content—e.g., seed cakes and meals (linseed meal, cotton seed meal, &c.)—should be fed in moderation and discontinued at least one month prior to slaughter.

Low oil content seed cakes and meals (solvent extracted) may be fed with safety.

### Unsung, but not Forgotten!

There are modest, industrious, kindly men and women in every community who lead such exemplary lives that they have to die to get more than a personal mention in their home-town newspapers. Just goodness—for some inexplicable reason—isn't news!

Mayhap there's something perverse about that, but this is a perverse world. Even editors are perverse. We may moralise and philosophise in our odd moments, but primarily we have the instincts of the lowest cub reporter—we are newsivorous. The unusual is our food and drink—our respite from the monotony of daily chores. The unusual is news!

But to-day we doff our hats to all whose names have not appeared in our pages during the year just ended. They are, perhaps, our best citizens! They are the men and women who rear children without appearing in the juvenile court; the workers who disappoint us by failing to go on strike; the churchmen who never go wrong; . . . . the solid, homespun citizenry who work hard, suffer much, pay their taxes, meet their obligations and still have faith in their home town and their homeland.

They may be unsung, but they're not forgotten. In Heaven, we know, they'll get front-page mention. Here's to our rank and file citizenry!—*The Citrograph* (California).

### The Live Stock Market Outlook.

The Queensland Meat Industry Board strikes a note of optimism in a report on the outlook of the industry, and in which it is stated that there is plenty of room for expansion in the production of beef, pork, and lamb. The fact that problems associated with the industry are being studied scientifically encourages the belief that the outlook for the future is substantially sound.

### Market Rivals?

That Australia is likely to prove New Zealand's most hefty rival on the primary produce market was the view expresed at the last meeting of the Wellington branch of the Economic Society by a well-known New Zealand agricultural science worker who had just returned from a tour abroad. In a summary of his travel impressions, he said that Australia is marketing the same kind of primary products as New Zealand, and is gradually overcoming the problems that had restricted her efforts in the past. "For a long time Australia has been wool and wheat-minded, but now is going in extensively for fat lambs," he said. From what he had been told at Smithfield, Australian fat lambs are excellent in quality. More efficient farming on more efficient acres is the winning policy.

# Orchard Notes

## JANUARY.

### THE COASTAL DISTRICTS.

ALL orchards and plantations should be carrying a good cover crop which will help to check erosion during the wet season and maintain the soil in good physical condition when cut and turned under.

Pineapple plantations should be kept well worked.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Care is advised in handling and marketing of all kinds of fruit.

Grapes are in full season, and in order that they may be sold to advantage they should be very carefully handled, graded, and packed, as their value depends on the condition in which they reach the market. Well-coloured, mature fruit, with the bloom on and without blemish, always sells well.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe. A maturity standard for grapes is now in force, and immature grapes are liable to condemnation.

Bananas for the inter-State trade should be well filled but showing no sign of ripening. The fruit should be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and despatched without delay.

### THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

JANUARY is a busy month in the Granite Belt, and orchardists will be fully occupied gathering, packing, and marketing the crop of midseason fruits.

Much of the fruit may not carry far beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central District; and, if they are carefully selected and properly graded and packed, they should carry as far as Cairns.

Points to remember:—

The fruit should be fully developed, but yet quite firm when gathered.

It should be handled carefully. Bruised fruit is spoilt fruit.

Only one-sized fruit, of an even degree of ripeness and colour, should be packed in a case.

The fruit should be so packed that it will not shift, for if it is packed loosely it will be so bruised when it reaches its destination that it will be of litle value. At the same time, it must not be packed so tightly as to crush the fruit.

### GREEN MANURING OF CITRUS TREES.

A green manuring experiment extending over thirteen years at the Commonwealth Research Station at Griffith, New South Wales, has shown that the growth of a winter green manure crop (tick beans) increased the growth and yield of trees compared with trees kept clean cultivated. The growth of a summer green manure crop (cowpeas) at first decreased the growth and yield of the trees because of the competition of the cowpeas for soil moisture during the summer; after about ten years, however, the trees on the cowpea plots caught up to those on the clean cultivated plots.

# Farm Notes

## JANUARY.

THE heaviest rains of the year normally occur during the January-March period, and, weather conditions permitting, the main field activity for the month will be the preparation of land for autumn and winter crops, together with the scarifying and chipping required for existing row crops.

In all districts where wheat, barley, canary seed, and oats have been harvested, ploughing should be continued in order to conserve moisture for the succeeding crop, and to eradicate troublesome summer weeds.

Early ploughing permits the accumulation of subsoil moisture, which is invaluable in promoting the growth of winter cereals at a time when seasonal rainfall is often deficient. The practice of early ploughing is recommended, especially to dairymen outside the wheat areas who normally sow oats, barley, and wheat for green feed.

Land intended for the February potato planting will now be in an advanced stage of preparation. The selection of whole seed from disease-free crops is recommended for autumn planting, as losses may occur from rotting if hot, wet conditions prevail after the planting of cut sets. Very small whole potatoes, less than 2 inches in diameter, are not likely to give the same results as more robust potatoes.

Succession sowings of summer fodder crops—such as sorghum (saccaline, white African, and imphee), Sudan grass, white panicum, Japanese millet, and cowpea may be continued where land is available. Maize sowing may also be completed in districts where early frosts are not the usual experience, but preference should be given to early-maturing or mid-season varieties.

Full advantage should be taken of the opportunity to arrange for the adequate conservation of fodder during the summar growing season, when the production of bulky, green crops presents no great difficulty.

Well-grown crops of maize and the sweet sorghums cut at the right stage of growth and before full maturity will make excellent sileage which can be economically conserved in pit, trench, stack, or overhead silo. Surplus green grass, and many other green crops, will also make satisfactory sileage for winter feed, and as a reserve for dry periods. Many dairymen prefer to rely on a continuity of green fodder crops throughout the year, but provision also should be made for conservation, for if pastures are scarce because of dry conditions, crop growth is then also at a minimum.

January is usually a favourable month for the sowing of paspalum, Rhodes, and other summer grasses in districts suitable for their growth. Recently burnt scrub land or thoroughly cultivated areas provide a good seed-bed, given sufficient moisture, but care should be taken to ensure that the germination standard of the seed is sufficiently high, as a good cover and rapid early growth is the principal factor in keeping weeds and undergrowth in check.

All harvesting machinery should be placed under cover. Repairs and adjustments may be regarded as wet-day jobs.

## THE NEED FOR A PLANNED ECONOMY.

Over and over again it has been prophesied that the world would one day become unable to feed its people. In fact, some prophets have actually gone so far as to fix the year of universal famine. About forty years ago the present year, 1938, was selected by one then accepted authority as the year when the world might not be producing enough to feed its population. The real position is that unless we increase consumption by properly feeding those who are under-nourished we are over-producing many agricultural commodities.

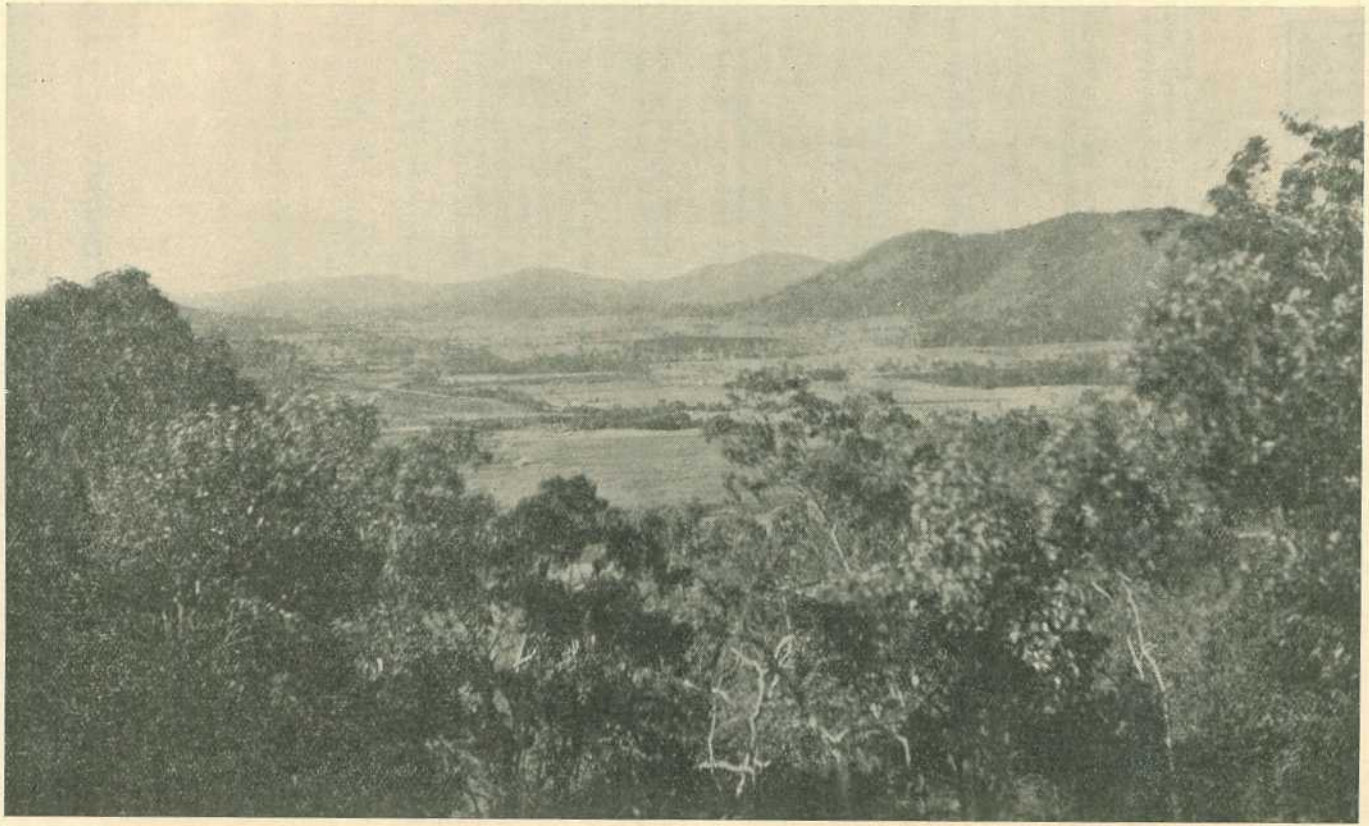
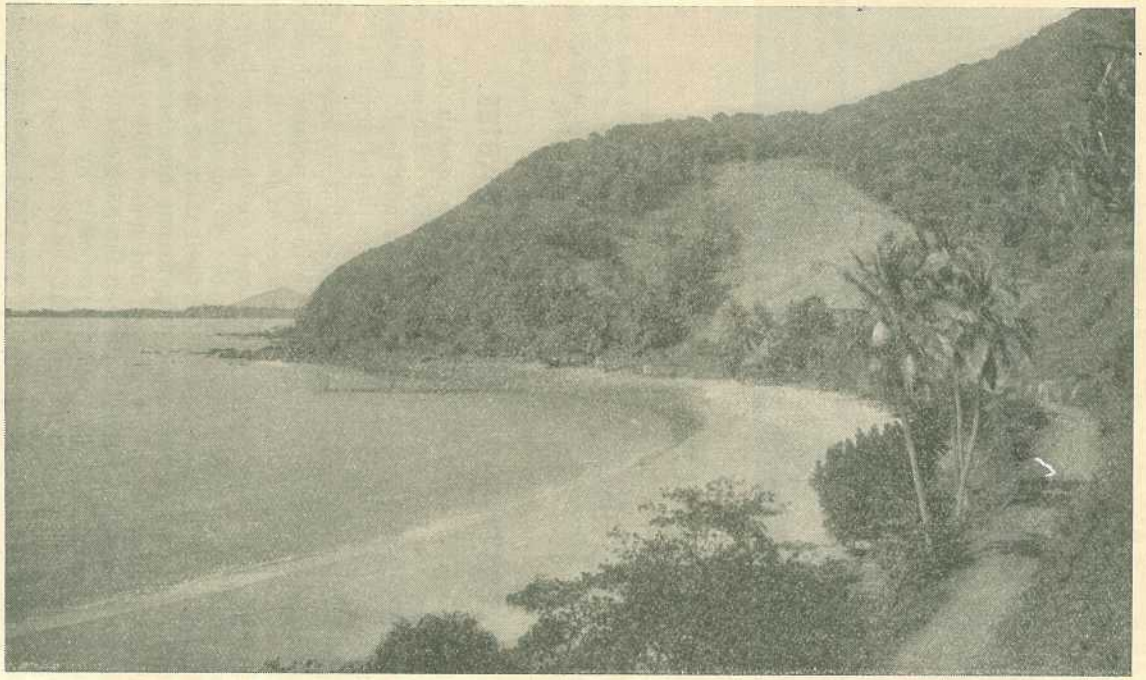


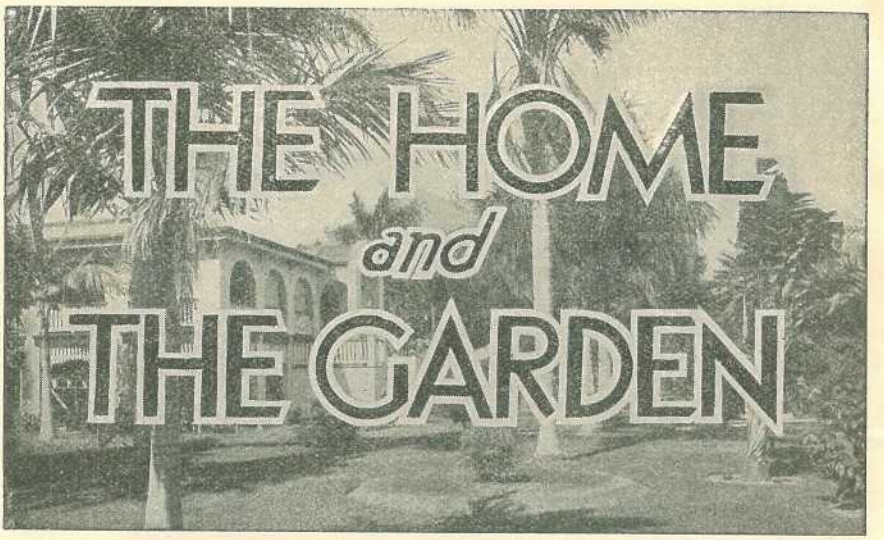
Plate 235.
Fertile farming lands in the Sarina Valley, Mackay District, Queensland.



[*Photo.: J. Lunn, Lands Department.*

Plate 236.

Where the mountains come down to the sea. A scene on a coastal road near Innisfail, North Queensland.




# Our Babies.

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

## OVERSTIMULATING OUR BABIES.

A MOTHER writes:—"My baby is just one month old, entirely breast fed, and is gaining weight steadily. He seems content and sleeps nearly all the morning after his bath and feed. Is there any objection to my taking him for a motor run in the afternoons?"

We informed the mother that we considered it unwise to take him for outings in the motor car. A quiet ride in his perambulator would be better. In these days there is a danger of overstimulating our babies. This happens especially in the case of the first baby. The baby is exhibited to everyone who visits the home and to others met outside. The proud father may be more at fault than the mother. There is a temptation to handle him too much, to pat his cheeks, to chuck him under the chin, to snap the fingers and make those noises which fathers excel in making. This behaviour on the part of the parents and attendants continues until the infant responds by laughing or by making impulsive movements which delight the onlookers.

Children who are stimulated in this way tend to become restless, irritable, and discontented. If the child is naturally highly strung his digestion may be upset and his nutrition may suffer seriously. Many babies who have been recently fed regurgitate their food as the result of being excited or carelessly handled by mothers or nurses. A child may be sat up gently immediately after or in the middle of a feed to enable him to "bring up wind," but once this is done he should be placed in his cradle and not be jogged up and down, rocked, or fondled.

Quite often the digestion of a baby has been upset and vomiting has been induced by the mother or nurse thoughtlessly swinging him to and fro with his face downwards and his body across her knees, rocking him side to side and patting him on the back.

### Mothering.

We do not believe that infants should be allowed to lie passively unnoticed in their cots. The bad effects of this treatment are noticed in children who have been confined to bed in a hospital for a long time suffering from a chronic form of illness. The only occasions on which these children may be disturbed are when the nurses require to administer treatment, much of which the infants resent actively or passively. Such infants may develop a condition of limpness, inertion, boredom, and lethargy in which they cease to exhibit any interest in their food or surroundings. They cease to possess the desire or will to live. The mothering of these infants may be the turning point in their recovery. Sick children require to be mothered.

Mothering comprises an attitude of unobtrusive friendship, good will and love on the part of the mother, nurse, or attendant towards the child. In response to this the child loses his fear of his surroundings, gains confidence, and feels that all is well. A smile, or a kindly softly-spoken word when a mother is passing the child's cot as he lies awake, makes all the difference to him. After the morning's bath, feed, and sleep he may be taken out of his cot or placed in a position near where the mother is working.

The midday meal over, preparation is made for his afternoon outing. If possible, let this outing be made in restful surroundings, away from the noise and bustle of traffic. Avoid taking your baby into crowds. On returning home, put him down to rest quietly after his evening meal.

It is well if the mother, however busy her life, is able to carry out the various activities associated with the care of her baby in a calm, quiet, and deliberate manner, free from fuss and excitement.

## COMMON FAULTS IN CHILD FEEDING.

*(Contributed by the Queensland Nutrition Council.)*

One year of good feeding before the child is five years old, is worth more than ten years of good feeding after the child has reached adult age.

Many mothers, if they were asked if their children were fed properly, would insist that they got the best of everything, and yet if one went carefully into the children's daily life habits, one would find many faults.

Now let us discuss shortly the common faults which one finds in childhood feeding. The three commonest causes of malnutrition in children are, firstly—The diet is insufficient in amount. Secondly—The wrong kinds of foods are eaten, and thirdly—Bad food habits.

Let us take those in order. Firstly—There is insufficient food eaten. Now the essence of childhood is activity, every movement the body makes, every little bit of work the body does requires nourishment.

and this can come from but two sources—the food that is eaten, or from the body itself. If the food that is eaten and made use of is not sufficient for those needs, the body sacrifices itself to make good the deficiency. Now one of the commonest causes of the child not having enough to eat is a poor breakfast. Studies have shown that many children have no breakfast at all, or else a more scanty apology for a breakfast such as tea and toast, and toast made from white bread at that. It is amongst the very poor people that this serious situation is most common. The custom in poorer homes is to have only one real meal a day; that is at night, when father comes home from work. In the meantime, the children get along as best they can with snacks of bread and jam and cups of tea. In the worst cases, the mothers go out to work as well, and leave the children in bed to get up and eat what they can find before they scramble off to school.

Poverty is not the only cause of this sad state of affairs, because the no-breakfast habit is quite common amongst all groups of the community, and in many cases it is due, not to lack of food, but the child's failure to eat it.

Now why is it that children suffer from lack of appetite in the morning? In some cases it is purely a bad habit, but there are other causes as well. For instances, a bad taste in the mouth in the morning can be caused by diseased teeth, tonsils, adenoids, or the coated tongue that results from constipation; this bad taste may often account for a lack of desire for food. An indigestible evening meal, or a stuffy bedroom which leaves a child listless and far from refreshed in the morning may also result in a child's being disinclined to eat. Or perhaps it is because the child gets up too late. The interval between getting out of bed and breakfast is, at any rate for the city child, usually far too short for an appetite to develop. Children in the country who are up for an hour or so before breakfast, helping with the daily duties of the farm, rarely fail to develop a normal appetite at breakfast time. Amongst older children, especially girls of school age, going without breakfast often becomes a fad which rapidly spreads over a whole school, and is no doubt responsible for much of the physical weakness and inefficiency at this period.

Perhaps the commonest cause of no breakfast is the feeling of hurry, which possesses most children in the morning. Because of a late bedtime the night before, the child gets up late and must hurry to get to school in time. Breakfast must be eaten straight away, and hurriedly, if at all. He has no desire for food, he is coaxed or forced by his mother to eat "a little something"—a mouthful of porridge, a cake, a cup of tea, or toast made from white bread—and off he rushes to school He has robbed his body of one-fourth to one-third of the day's needed nourishment, and the chances are not very great that he can make up for it in the middle of the day. On the contrary, he is likely to become over-hungry and over-tired, and may eat even less than if he had had a proper breakfast.

Few people realise that starting the day without breakfast, or with only tea and toast, can be a cause of complaints such as headaches, indigestion, and constipation. Much inefficiency in school may be due to poor breakfasts.

So from breakfast we pass to lunch time. Children who come home to lunch either because of the fear of being late for school, or because of their desire to get back to play, will, if allowed, only eat enough to stay the most insistent hunger pangs, or bolt whatever mothers think they should have before they hurry back to school.

Children who live too far from school to go home must carry lunches, or buy the lunches at school. Many children are given a penny or threepence to buy their lunch. If you are passing the school tuck shop around lunch time it will be interesting to note just what the children really do buy—saveloys, ice cream, chocolate-sticks, white bread sandwiches, or other odds and ends picked up at random to be eaten as they dash off to continue their play. At one school where the scholars all come from well-to-do and comfortable homes, a lunch survey of 200 children showed that only 14 per cent. had lunches which were adequate in quantity and quality of food, but the lunches of over half of them were plainly too small in amount, and were otherwise lacking in the essentials of a child's diet.

Given a free choice, children without training naturally select the foods which they regard as luxuries. One boy's lunch for several weeks of the year, consisted of ice cream, a saveloy, and a stick of chocolate. Most of the children were given money enough to buy a good lunch if it had been suitably spent, but they purchased too many expensive foods or saved their lunch money to buy sweets after school.

Among school children, both breakfast and lunches are likely to be skipped, and this is specially unfortunate as it means that a child goes from dinner one night until the same time the next day without any real meal. It is unwise, even if it were possible, for a child to eat almost his whole day's requirements at one meal at night.

Growing children have a tremendously high need for the right foods—milk, fruit, vegetables, meat, potatoes, cheese, butter, eggs, and wholemeal or wheat germ bread are what the child needs for proper nutrition and development. Many mothers blame rapid growth for the thinness of their children, but more often than not it is due to insufficient nourishment Much of the food that is served to the child is so unattractive, and unpalatable, that no one would eat it unless driven to do so by extreme pangs of hunger. This is possibly a relatively unimportant factor in this diet problem of childhood, but it does certainly exist.

Then we come to the factor of the wrong choice of food, and here the outstanding fault in Queensland is too little milk. Milk is the only dependable source of lime which is needed in large amounts for the growth and development of the teeth and bones. The idea to be aimed at is somewhere about a quart of milk for the growing child every day, and one pint of milk a day has long been accepted as the absolute irreduceable minimum which should be considered.

In a study made of young children at school, it was found that only 20 per cent. were getting as much as a pint of milk a day, and over half were having no milk at all to drink.

Few mothers realise the importance of milk to a growing child, and even in farm homes, where milk is plentiful, no effort is made by the mother to see that the child drinks it regularly. In poorer homes the

mother thinks that she cannot afford milk, and when the child is old enough to eat solid foods she leaves out the milk and replaces it with tea because it is cheaper. In the more comfortable type of home the child is given so many highly flavoured and heavily sweetened foods, that the child refuses the milk because it has such a bland, mild flavour. It is usually a safe guess that when a child refuses milk and other plain foods, the diet is unbalanced in other ways.

The next commonest feeding fault is the giving of too few vegetables. The scanty use of vegetables is very widespread amongst poorly nurished children. Vegetables are not quite as indispensable in the diet of children as is milk, but it is very difficult to plan a perfect diet for childhood if vegetables and fruits are excluded. Many children dislike vegetables, but this dislike is largely due to the failure on the part of the parents of beginning early to teach the children to like them, and of gradually accustoming them to the special flavours which vegetables impart to the daily food.

The third commonest fault in daily food habits is that of taking too many sweet foods. Too much concentrated sweet foods are accepted by all nutrition workers as a cause of faulty nourishment. The most serious effect of sweet foods is that of lessening or destroying the appetite for milk, vegetables, and other important foods, and of crowding them out of the diet. When the child's appetite is dulled by sweets, there is not, as a rule, a desire for the mild bland foods like milk and vegetables, so that foods, to make an appeal, must be highly flavoured and highly sweetened.

When sweet foods push the milk and vegetables out of the diet, along with the milk and vegetables go a great part of the proteins, lime, iron, and other minerals and vitamins which are so essential for growth. The loss on but one day will probably not be a serious matter, but if it is repeated day after day, with breakfast, luncheon, and dinner robbed in this way (as it is with many children) the effect cannot be anything but disastrous.

## IN THE FARM KITCHEN.

### SALADS FOR EVERY DAY.

IT is quite wrong to suppose that salad made with raw or cooked vegetables should be used only in summer. The nutritional needs of the body are just as important in winter as in summer, and much of the so-called spring sickness of the older days was probably due to the custom, quite a wrong one, of not using fresh salad vegetables and fruit during the winter months. Salads of fresh vegetables and fruit therefore hold a high place among foods if one wishes to achieve a balanced diet.

Now, there are two classes of salads, those made with raw and those made with cooked vegetables. First of all there are a few secrets in the preparation of raw vegetable salads which are provided by the cookery expert of the Queensland Nutrition Council. Lettuce, of course, frequently forms the foundation of raw vegetable salads, other vegetables used are tomato, cucumber, radish, celery, grated beetroot, grated raw carrot, and even raw grated white turnips, or shredded raw cabbage. These salads are served on individual lettuce leaves with cream or salad dressing. Some people like to rub the salad bowl with a piece of cut garlic or onion in order to impart flavour to the salad. Onions are a very delightful addition to salads, but you must remember the old joke about the onion which said that while onions built one up physically, they drag one down socially. Finely chopped meat

like lamb, ham, tongue, chicken, cold cooked fish, salmon, prawns, or crab may be added to raw vegetable salads. Lettuce once it has lost its crispness is, of course, not as good as fresh lettuce but if you cannot get fresh crisp lettuce you can improve the appearance of the lettuce when it has become somewhat limp by soaking it in as cold a water as possible without salt. By this means, the leaves will become a little more crisp. After washing, all lettuce leaves must be dried thoroughly with a clean cloth.

So much for the raw vegetable salads. Now the cooked vegetable salads are made from cooked cold vegetables such as potatoes, peas, beans, carrots, cauliflower, turnips, or parsnips. Boiled lima beans or haricot beans or french beans are very nice when served on a lettuce leaf with french dressing. The point about cooked vegetable salad is that the vegetables should be cut into small uniform squares and arranged carefully in a salad bowl, a glass dish, or on lettuce leaves. Cooked beetroot may be served alone with its vinegar.

In the preparation of chicken salad, take the remains of a cold fowl and mince it rather coarsely, heap this minced fowl into a small mound built on to some finely cut or shredded lettuce, and covered neatly with some well cooked green peas or grated raw carrot. Over the top of everything pour some plain salad dressing.

Cabbage salad is another suggestion. For this you require a cup of firm white cabbage, finely shredded, a large apple, 3 sticks of celery, salad dressing, pepper and salt, a little finely shredded lettuce. Half a pineapple may be used instead of the apple and lettuce. First wash and dry, and finely shred the cabbage. Cut the apple and celery into dice or grate the pineapple, and season with a little pepper and salt. Arrange in layers in small individual glass dishes or plates, sprinkle each layer with a pinch of pepper, salt and sugar, put a little finely shredded lettuce on the top and serve with salad dressing.

Now for a beetroot or tomato salad. For this you will require 3 beetroots, or 3 tomatoes, ½ cup of vinegar, ½ cup of water, 2 cloves, 12 peppercorns, a small piece of mace, 1 teaspoon of salt and a dessertspoon of sugar. Put the vinegar, the cloves, the mace, the salt, the sugar, and the pepper corns in an enamel saucepan and bring it to the boil and simmer for three minutes. Stand on one side until cold, then peel and slice the beetroot and arrange daintily in a glass dish, pour the cold spiced vinegar through a strainer over the beetroot and tomatoes. Now for some rather more ambitious salads—asparagus salad. For this you will require 1 tin of asparagus, lettuce leaves, salad dressing, slices of hard-boiled egg and parsley. Drain the asparagus free from its liquid and place the stalks in an ice chest for an hour. Lay six stalks on a lettuce leaf and cover the tips carefully with a good salad dressing just before serving. Place a very thin half slice of egg on each side and touch with a little piece of parsley. Several stalks of asparagus may be placed through a thin ring of tomato or lemon free from pulp.

Here is another suggestion, a grapefruit salad. Take 4 grapefruit shells, 1 oz. of chopped walnuts, 1 large apple or a small pineapple, grated carrot, 4 stalks of white celery, 1 teaspoonful of lemon juice, some nice lettuce leaves, and a good salad dressing. First of all peel the apple and cut it into small dice, grate the carrot and mix with the lemon juice, shred the celery very finely, add the walnut and mix the ingredients lightly together. Fill the grapefruit shells and serve on a dish on either shredded lettuce or young lettuce leaves, and over it all pour salad dressing. This may also be served on a slice of pineapple, lay it on a crisp lettuce leaf with a teaspoon of whipped savoury cream on the top.

Potatoes are very valuable in the daily diet. The League of Nations Nutrition Committee reported that the use of potatoes as a basic food should be increased, and it could with advantage replace much of the white flour, bread and cakes in the diet. Now if you cut a raw potato across with a sharp knife and look at the surface, you will see three distinct layers. There is, firstly, the thin outer skin, secondly a broader layer inside the skin, and thirdly the flesh of the potato which makes up the rest of its bulk. The importance of recognising these three layers lies in the fact that they differ considerably in chemical composition. The part of the potato just under the skin is considerably richer in mineral matter and proteins than the flesh, and in peeling it off with the rind these valuable ingredients are lost. So if you wish to get the best value from potatoes boil them in their jackets, even though they be peeled before serving. Actually the peel itself, if clean and well scrubbed before being boiled has no particular disadvantage; indeed, it

forms a convenient source of roughage in the diet. Undoubtedly, an enormous amount of waste takes place in nearly every home in the potato peelings that are thrown out. So when making potato salad, boil your potatoes in their jackets and peel and slice them when cold.

Another suggestion for a valuable food that can be built into a salad is cheese. Now cheese deserves a far more prominent place in the diet throughout the year. Cheese is one of the most economical ways of taking milk. The Australian eats only half the amount of cheese that the Britisher does, and even the British eat much less of this valuable food than they should. Of the high nutritive value of cheese there can be no doubt, and it is just what one would expect when one remembers that 1 lb. of cheddar cheese represents the total protein, and most of the fat in a gallon of milk. So mix some thin slices of diced squares of cheese into your salads, and it will enrich the flavour and nutritive value. You can make quite a tasty salad out of small dices of cheese with finely chopped raw apple mixed with it. Now, it will be said that the apple will go brown, but not if you know the secret, and that is to pour some lemon juice over the apple as soon as it is chopped up. That will prevent the apple from going brown.

Many of these suggestions for salads can be used for the preparation of savouries. The highly coloured fancy sweet cakes for party purposes are now out of date. In their place are seen savouries which have a much higher nutritional value. They stimulate the appetite instead of destroying it, as the sweet cakes do. When the Queensland Nutrition Council had its annual meeting early this year a savoury supper was served to show what could be done. An extensive variety of thin slices of tomato, sprigs of parsley, prawns, asparagus tips, a few shreds of lettuce, squares of cheese, minced cold chicken were built on to thin crisp slices of fried potatoes.

## PRESERVATION OF BIRD LIFE—A PLEA.

At this time of the year, when birds are nesting, an earnest appeal is made to all to become interested actively in the preservation of wild bird life. The value of birds in our rural economy is incalculable. It has been well said that the service that birds render in protecting forest trees "is more nearly indispensable to man than any other benefit they confer on him. Were the natural enemies of forest insects annihilated, every tree would be threatened with destruction, and man would be powerless to prevent the calamity. He might make shift to save some orchard or shade trees; he might find means to raise some garden crops; but the protection of all the trees would be beyond his powers. Yet this herculean task ordinarily is accomplished as a matter of course by birds and other insectivorous creatures without trouble or expense to man."

During the grasshopper plague last year, many thousands of starlings were to be seen feeding on the insects, but starlings were not alone in their assault on the common enemy. Every insectivorous bird fed to satiety on the hoppers. The indiscriminate shooting of bush birds has, therefore, nothing to commend it from any point of view.

Fortunately, very few native birds are not protected legally, but even the despised crow is a friendly ally in the continuous war against insect pests. Crows eat grasshoppers and it takes a lot of hoppers to fill the craw of a crow. The crow also is energetic scavenger. It eats carrion and maggots. From maggots come blowflies, and the loss to Australian woolgrowers caused by blowfly infestation runs into millions of pounds annually.

# FLEA INFESTATION.

With the coming of warmer weather, reports are reaching the Department of the infestation of dwellings, gardens, and other places by fleas. There are three species of fleas which may be responsible, namely, the cat flea, the dog flea, or the "human" flea. Usually the species prevalent in the cities is either the cat or dog flea, whilst at the seaside, the "human" flea, or sand flea as it is sometimes called, is often rife.

Fleas become a nuisance only when conditions are suitable for them to breed. The female flea, which is much larger than the male, lays eggs which drop off into the ground and hatch into maggots. The maggot feeds on certain substances in the dust and eventually become a pupa. From this pupa the adult flea, in time, emerges and immediately searches for a host on which to feed. When conditions are warm and dry with a good accumulation of dust, fleas breed rapidly.

Control of fleas is not difficult, and if properly carried out, the nuisance will rapidly disappear. Such measures include:—

(1) Dogs and cats should receive a thorough dusting with a good pyrethrum or derris dust. The dust should be worked down to the skin. In a few minutes the fleas will crawl out of the coat and fall off. The animal should be stood on a sheet of paper while being dusted. After all the fleas have fallen off on to the paper it should be rolled up and burnt.

In the case of dogs, a wash in soapy water to give a good lather will kill all the fleas. This is not as effective as dusting, as the derris or pyrethrum prevents reinfestation for some time after application.

(2) Where the infestations involve outhouses, underneath the house, &c., all litter should first of all be cleaned up and burnt. The ground should then be thoroughly soaked with water and kept wet for about two weeks. This will kill the maggots and pupæ in the soil.

(3) Where dwellings are infested it would be desirable—

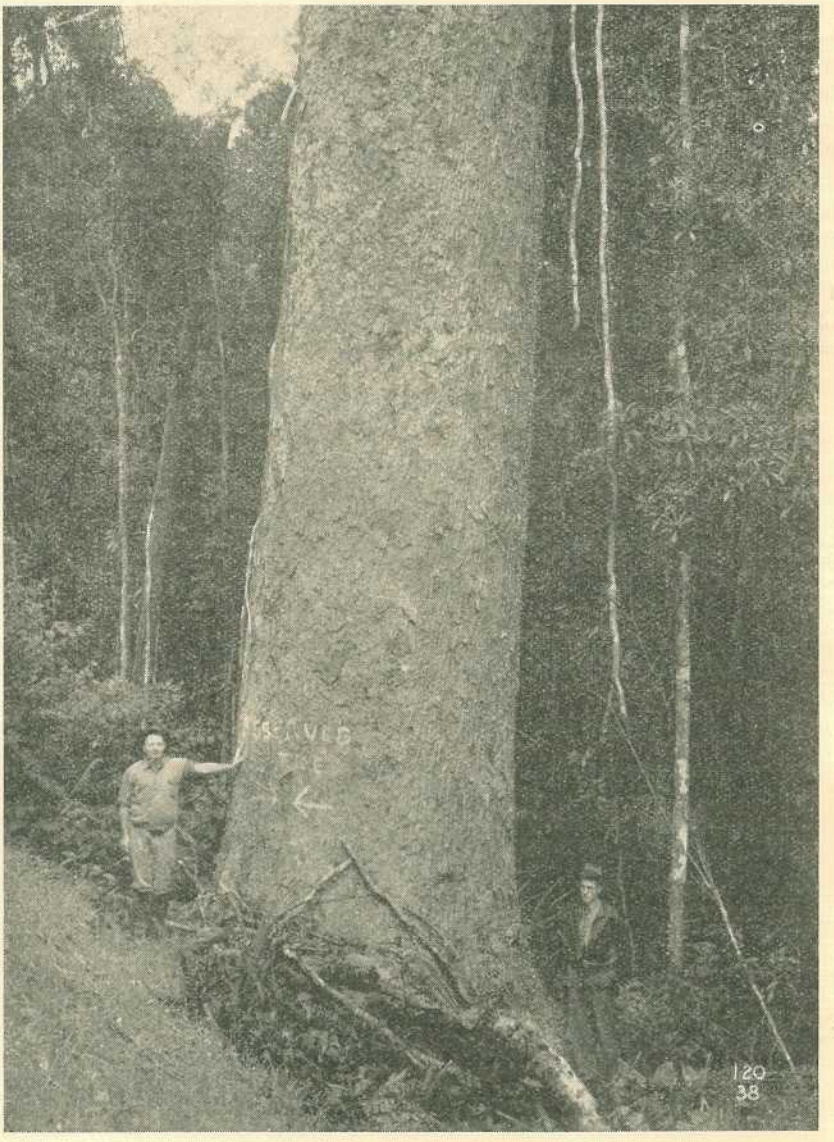
(*a*) To take all rugs outside the house, shake well, and hang in the sun for a day.

(*b*) If a vacuum cleaner is available, go thoroughly over all floors and furniture. Burn the dust.

(*c*) Spray thoroughly with a good spray, forcing the spray into all cracks and crevices. Where there is little risk of fire, petrol may be used for this purpose.

(*d*) After cleaning the house, sprinkle naphthalene under the rugs, &c.

More than one treatment may be necessary where houses are very badly infested.



[*Photo.: J. Lunn, Lands Department.*

Plate 237.

A Rain Forest Giant, Dunbulla, North Queensland.

# RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1938 AND 1937, FOR COMPARISON.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Oct. | No. of years' records. | Oct., 1938. | Oct., 1937. | | Oct. | No. of years' records. | Oct., 1938. | Oct., 1937. |
| *North Coast.* | In. | | In. | In. | *South Coast—contd.* | In. | | In. | In. |
| Atherton .. .. | 0·92 | 37 | 1·77 | 0·21 | Gatton College .. | 2·05 | 39 | .. | 5·37 |
| Cairns .. .. | 2·10 | 56 | 4·30 | 0·03 | Gayndah .. .. | 2·41 | 67 | 3·10 | 3·69 |
| Cardwell .. .. | 2·02 | 66 | 1·38 | 0·06 | Gympie .. .. | 2·73 | 68 | 3·12 | 4·93 |
| Cooktown .. | 1·03 | 62 | 1·38 | 0·75 | Kilkivan .. .. | 2·65 | 59 | 4·50 | 4·80 |
| Herberton .. | 0·97 | 52 | 1·10 | 0·14 | Maryborough .. | 2·74 | 67 | 4·25 | 1·81 |
| Ingham .. .. | 1·86 | 46 | 1·97 | 0·02 | Nambour .. .. | 3·21 | 42 | 4·18 | 8·76 |
| Innisfail .. .. | 3·22 | 57 | 5·31 | 0·55 | Nanango .. .. | 2·25 | 56 | 2·96 | 2·47 |
| Mossman Mill .. | 2·91 | 25 | 3·49 | 0·18 | Rockhampton .. | 1·78 | 67 | 3·36 | 2·27 |
| Townsville .. | 1·31 | 67 | 0·75 | 0·09 | Woodford .. | 2·63 | 51 | 1·91 | 7·32 |
| *Central Coast.* | | | | | *Central Highlands.* | | | | |
| Ayr .. .. | 0·91 | 51 | 1·37 | 0·22 | Clermont .. | 1·30 | 67 | 1·80 | 0·32 |
| Bowen .. .. | 1·01 | 67 | 0·92 | 1·13 | Gindie .. .. | 1·37 | 39 | .. | 1·38 |
| Charters Towers .. | 0·72 | 56 | 1·77 | 0·67 | Springsure .. | 1·64 | 69 | 2·65 | 1·06 |
| Mackay P.O. .. | 1·72 | 67 | 2·43 | 2·29 | *Darling Downs.* | | | | |
| Mackay Sugar Experiment Station | 1·47 | 41 | .. | 1·54 | Dalby .. .. | 2·06 | 68 | 2·42 | 3·41 |
| Proserpine .. | 1·62 | 35 | 1·85 | 2·05 | Emu Vale .. | 2·18 | 42 | 2·79 | 2·89 |
| St. Lawrence .. | 1·80 | 67 | 1·41 | 3·63 | Hermitage .. | 1·88 | 32 | .. | 2·39 |
| *South Coast.* | | | | | Jimbour .. .. | 1·87 | 50 | 2·72 | 1·50 |
| | | | | | Miles .. .. | 2·02 | 53 | 4·14 | 2·11 |
| Biggenden .. | 2·46 | 39 | 2·35 | 4·52 | Stanthorpe .. | 2·52 | 65 | 2·15 | 1·72 |
| Bundaberg .. | 2·12 | 55 | 2·99 | 3·64 | Toowoomba .. | 2·58 | 66 | 3·06 | 4·70 |
| Brisbane .. .. | 2·55 | 86 | 3·45 | 3·59 | Warwick .. .. | 2·31 | 73 | 4·26 | 3·81 |
| Caboolture .. | 2·59 | 51 | 4·61 | 7·16 | *Maranoa.* | | | | |
| Childers .. .. | 2·76 | 43 | 2·66 | 5·46 | | | | | |
| Crohamhurst .. | 3·31 | 45 | 6·85 | 5·06 | Bungeworgorai .. | 1·47 | 24 | 0·72 | 0·74 |
| Esk .. .. | 2·64 | 51 | 2·60 | 10·13 | Roma .. .. | 1·74 | 64 | 1·85 | 0·96 |

A. S. RICHARDS, Divisional Meteorologist.

# CLIMATOLOGICAL TABLE—OCTOBER, 1938.

COMPILED FROM TELEGRAPHIC REPORTS.

| Districts and Stations. | Mean Atmospheric Pressure, at 9 a.m. | Shade Temperature. | | | | | | Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | | Means. | | Extremes. | | | | Total. | Wet Days. |
| | | Max. | Min. | Max. | Date. | Min. | Date. | | |
| *Coastal.* | In. | Deg. | Deg. | Deg. | | Deg. | | Points. | |
| Cooktown .. .. | 29·96 | 85 | 71 | 88 | 25 | 62 | 7 | 138 | 5 |
| Herberton .. .. | .. | 79 | 60 | 85 | 10, 14, 24, 25, 26 | 51 | 16 | 110 | 6 |
| Rockhampton .. .. | 30·07 | 84 | 64 | 92 | 27 | 58 | 21 | 336 | 6 |
| Brisbane .. .. | 30·12 | 79 | 61 | 86 | 26 | 56 | 19 | 345 | 8 |
| *Darling Downs.* | | | | | | | | | |
| Dalby .. .. .. | 30·08 | 84 | 58 | 91 | 2 | 49 | 17 | 242 | 8 |
| Stanthorpe .. .. | .. | 76 | 50 | 84 | 20, 22 | 39 | 18 | 215 | 8 |
| Toowoomba .. .. | .. | 77 | 55 | 86 | 21 | 46 | 19 | 306 | 8 |
| *Mid-Interior.* | | | | | | | | | |
| Georgetown .. .. | 29·95 | 96 | 66 | 102 | 28 | 57 | 25 | 2 | 1 |
| Longreach .. .. | 29·97 | 94 | 63 | 104 | 30 | 50 | 15 | 16 | 1 |
| Mitchell .. .. | 30·02 | 88 | 60 | 96 | 9 | 50 | 19 | 131 | 5 |
| *Western.* | | | | | | | | | |
| Burketown .. .. | 29·94 | 93 | 70 | 100 | 27 | 63 | 25 | 243 | 1 |
| Boulia .. .. .. | 29·88 | 94 | 64 | 107 | 29 | 50 | 11 | 101 | 2 |
| Thargomindah .. | 29·96 | 91 | 64 | 100 | 4, 20 22, 29 | 51 | 24 | 23 | 3 |

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

### AT WARWICK.

| | December, 1938. | | January, 1939. | | Dec., 1938. | Jan., 1939. |
|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | p.m. |
| 1 | 4·49 | 6·31 | 5·0 | 6·50 | 12·25 | 1·56 |
| 2 | 4·49 | 6·32 | 5·1 | 6·50 | 1·21 | 2·55 |
| | | | | | p.m. | |
| 3 | 4·49 | 6·33 | 5·1 | 6·50 | 2·16 | 4·2 |
| 4 | 4·50 | 6·34 | 5·2 | 6·51 | 3·15 | 5·4 |
| 5 | 4·50 | 6·35 | 5·3 | 6·51 | 4·17 | 6·4 |
| 6 | 4·50 | 6·36 | 5·3 | 6·51 | 5·17 | 7·0 |
| 7 | 4·50 | 6·37 | 5·4 | 6·51 | 6·24 | 7·52 |
| 8 | 4·50 | 6·38 | 5·5 | 6·52 | 7·27 | 8·29 |
| 9 | 4·51 | 6·38 | 5·5 | 6·52 | 0·23 | 9·22 |
| 0 | 4·51 | 6·39 | 5·6 | 6·52 | 9·16 | 10·3 |
| 11 | 4·51 | 6·39 | 5·7 | 6·52 | 10·4 | 10·42 |
| 12 | 4·51 | 6·40 | 5·8 | 6·51 | 10·45 | 11·21 |
| 13 | 4·52 | 6·40 | 5·9 | 6·51 | 11·26 | .. |
| | | | | | a.m. | a.m. |
| 14 | 4·52 | 6·41 | 5·10 | 6·51 | .. | 12·2 |
| 15 | 4·52 | 6·41 | 5·11 | 6·51 | 12·4 | 12·44 |
| 16 | 4·52 | 6·42 | 5·12 | 6·50 | 12·44 | 1·28 |
| 17 | 4·53 | 6·42 | 5·13 | 6·50 | 1·22 | 2·14 |
| 18 | 4·53 | 6·43 | 5·13 | 6·50 | 2·1 | 3·3 |
| 19 | 4·53 | 6·43 | 5·14 | 6·50 | 2·44 | 3·55 |
| 20 | 4·54 | 6·44 | 5·15 | 6·49 | 3·30 | 4·48 |
| 21 | 4·54 | 6·44 | 5·16 | 6·49 | 4·17 | 5·38 |
| 22 | 4·55 | 6·45 | 5·17 | 6·49 | 5·7 | 6·39 |
| 23 | 4·55 | 6 45 | 5·18 | 6 49 | 5·59 | 7·22 |
| 24 | 4·56 | 6·46 | 5·19 | 6·48 | 6·25 | 8·12 |
| 25 | 4·56 | 6·46 | 5·19 | 6·48 | 7·43 | 9·8 |
| 26 | 4·57 | 6·47 | 5·20 | 6·48 | 8·31 | 9·56 |
| 27 | 4·58 | 6·48 | 5·21 | 6·47 | 9·26 | 10·52 |
| 28 | 4·58 | 6·48 | 5·22 | 6·47 | 10·18 | 11·46 |
| 29 | 4·59 | 6·49 | 5·22 | 6·47 | 11·10 | .. |
| | | | | | | p.m. |
| 30 | 4·59 | 6·49 | 5·23 | 6·46 | 12·4 | 12·44 |
| 31 | 5·0 | 6·50 | 5·24 | 6·46 | 1·0 | 1·56 |

### Phases of the Moon, Occultations, &c.

| | | | |
|---|---|---|---|
| 7th Dec. | ○ Full Moon | 8 22 | p.m. |
| 14th „ | ☾ Last Quarter | 11 16 | a.m. |
| 22nd „ | ● New Moon | 4 06 | a.m. |
| 30th „ | ☽ First Quarter | 8 53 | a.m. |

Perigee, 9th December, at 11.0 a.m.
Apogee, 25th December, at 5.0 a.m.

When Venus rises as a morning star on the 26th it will again reach its utmost luminosity, shining with even greater brilliance than it did in the middle of October. Since it was in line between the Earth and Sun, 20th November, and invisible, corresponding to "new Moon," it again appears in crescent shape with telescope, still in the part of its orbit nearest the Earth.

On the 27th at 10 a.m. Jupiter will be 6 degrees south of the Moon, but before they set the Moon will overtake the planet and they will disappear about the same time.

At 9 p.m. on the 30th Saturn will be 6 degrees south of the Moon at first quarter, as they are nearing the western horizon.

Between the 22nd and 25th of this month, when no moonlight interferes, Saturn should be in a good position to observe, with telescope, its wonderful ring-system which is opening out; a fascinating sight, so entirely different from anything else in our solar system.

Mercury rises at 6.10 a.m., 1 hour 21 minutes after the Sun, and sets at 8.8 p.m., 1 hour 37 minutes after it; on the 15th it rises at 4.50 a.m., 2 minutes after the Sun, and sets at 6.31 p.m., 10 minutes after it.

Venus rises at 3.46 a.m., 1 hour 3 minutes before the Sun, on the 1st, and sets at 5.16 a.m., 1 hour 15 minutes before it. On the 15th it rises at 2.21 a.m., 2 hours 31 minutes before the Sun and sets at 4.10 p.m., 2 hours 31 minutes before it.

Mars rises at 2.10 a.m., and sets at 3.4 p.m. on the 1st; on the 15th it rises at 1.51 a.m. and sets at 2.48 p.m.

Jupiter rises at 10.32 a.m.. and sets at 11.42 p.m. on the 1st.; on the 15th it rises at 9.47 a.m. and sets at 10.52 p.m.

Saturn rises at 2.13 p.m. on the 1st and sets at 2.9 a.m. on the 2nd.; on the 15th it rises at 1.6 p.m. and sets at 1.3 a.m. on the 16th.

On Christmas-eve at about 9.30 our evening sky is again most luminous with the great northern and southern constellations, in and near the silvery light of the Milky Way.

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|---|---|---|---|
| 3rd Jan. | ○ Full Moon | 7 30 | a.m. |
| 12th „ | ☾ Last Quarter | 11 10 | p.m. |
| 20th „ | ● New Moon | 11 27 | p.m. |
| 29th „ | ☽ First Quarter | 1 0 | a.m. |

Perigee, 6th January, at 9 p.m.
Apogee, 30th January, at 11 p.m.

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

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

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