Volume 63 Part 5

QUEENSLAND AGRICULTURAL JOURNAL

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NOVEMBER, 1946

Issued by Direction of
THE HONOURABLE H. H. COLLINS
MINISTER FOR AGRICULTURE AND STOCK

GOVERNMENT PRINTER, BRISBANE

Contents

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

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Event and Comment.

The Year in Agriculture.

IN his annual report to the Minister (Hon. H. H. Collins), the Under Secretary of the Department of Agriculture and Stock (Mr. R. P. M. Short) reviewed departmental achievements and general progress during the year ended 30th June last. In the course of a comprehensive commentary Mr. Short said:—

Departmental reorganization to provide for more extensive advisory and research services became effective during the year, which was one of substantial progress. Under the new divisional formation the ground was cleared for further advancement.

Regional experiment stations are in process of establishment in important agricultural centres. At the old-established station at Biloela activities are being extended further into the field of general agriculture, and it is planned to include facilities for work in animal husbandry, particularly dairying and pig raising. The departmental property at the Hermitage, near Warwick, has been reopened and there attention will be given to problems of wheat, grain sorghum, and maize production. Methods of soil conservation and pasture management will also be investigated. All these lines of inquiry should be of great value to farmers of the Darling Downs and neighbouring districts. Problems of dairying, piggery management, and lamb raising will likewise be studied at this station. At Nambour, a horticultural experiment station has been established, at which problems of fruit production are under investigation. In the Far North, the departmental property at Kairi, too, will become a centre for experimental work, particularly on maize, lucerne, and pastures. There attention will also be given to animal husbandry and other matters of especial interest to the farmers of the Atherton Tableland and contiguous districts.

Crops new to Queensland agriculture are under investigation. The Director of Agriculture is at present on a mission to the United States of America and Canada inquiring into various aspects of primary industry, giving special attention to soy bean varieties, their characteristics and cultivation. It is probable that as a result of this mission the soy bean will eventually become an important factor in our agricultural economy.

Work at the Bureau of Tropical Agriculture, South Johnstone, has continued along lines laid down in previous years, particular attention being given to grasses and legumes of potential importance to the dairying and pastoral industries. Plans have been prepared for resuming horticultural investigations at Kamerunga, near Cairns.

General agricultural experimental work was continued in consonance with the design discussed in the last annual report. It included a wide range of varietal trials, fertilizer experiments, and the laying out of observation plots in respect of tobacco, oats, grain sorghums, potatoes, cowpea, peanut, linseed, sunflowers, and other crops. A comprehensive series of cotton experiments was continued at the Biloela Regional Experiment Station. Departmental plant breeders concentrated on work in wheat, oats, cotton, and grain sorghum—the cereal section of the work being carried out at Kincora, Roma, and Biloela; the grain sorghum work at Biloela and Kingaroy; and the cotton work in the cotton-growing districts, as well as at Biloela.

Horticultural experimental and plant breeding operations also received attention in the course of the general research activities of the Department. Weed pest problems likewise were investigated. Other experimental work included investigations into transport and storage problems of fruit and vegetables.

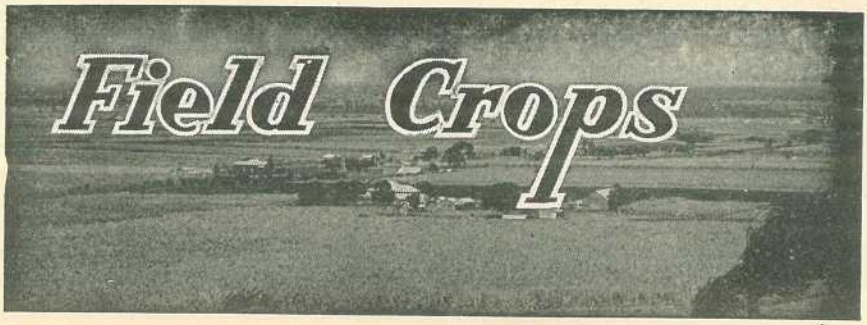
Entomological inquiries were directed largely to the possibilities of D.D.T. and other new insecticides for pest control. Plant pathological and botanical investigations proceeded more or less along the same lines as in the previous year and on somewhat the same scale.

Considerable attention also was given to soil surveys and to soil and water problems, including the causes and methods of prevention and control of erosion.

These and other developments are obviously of great value to the primary producers of Queensland, to whom results will become progressively available through a strengthened extension service.

Sugar production is estimated at 644,287 tons of 94 n.t. sugar. Based on this estimate, the 1945 production exceeded that of 1944 by less than 1,000 tons. The quantity of cane harvested was 4,551,982 tons. Consequently, 7·06 tons of cane were required to produce 1 ton of 94 n.t. sugar; this is only the third occasion in the past fifteen years on which more than 7 tons of cane have been required. The c.c.s. value of the cane was the second lowest recorded in this period, and this is obviously the main contributing factor.

Farmers are realizing more and more the benefits to be derived from the application of scientific methods, especially in respect of plant breeding and protection and the maintenance of soil fertility. The Department is collaborating with the producers in finding the answers to rural problems and the practical results already achieved have accelerated progress in primary industry and, consequently, added to the general prosperity of the State.



Grassland Development in Tropical Coastal Areas.

T. G. GRAHAM, Adviser in Agriculture.

THE wet tropical belt of North Queensland, bounded on the east by the sea and on the west by the Great Dividing Range, is a comparatively limited tract of country of varying width and extending some 150 miles from north to south. It is a highly productive area devoted for the most part to the production of sugar cane, tropical fruits, and timber, and to a very limited extent to dairying and cattle raising.

For very many years it was the practice to raise and fatten a few cattle on the coast, and some of these were grazed on introduced grasses such as Para grass, known to old residents as "marram" grass. About ten years ago, however, there was a marked quickening of interest in cattle fattening on the coast and the late Mr. Brice Henry imparted considerable impetus to the idea. He contended that store cattle could be obtained from the back country, brought to the coast, and topped off within the year to be sold at remunerative figures. Others have carried the project a stage further and today a number of graziers is actively interested; some hundreds of acres have been ploughed and planted to exotic grasses for cattle fattening on the far north coast.

Prior to the quickening of interest in fat cattle raising, it had been shown that dairying could be undertaken in favoured localities, but the expansion within recent years has been towards the range, where the areas are elevated and broken and, in some cases, extremely rough. Such areas normally call for the greatest skill in pasture management and, as they are subject to heavy tropical downpours, the difficulties and many disadvantages will be readily understood.

GRASSES.

Several exotic grasses were known to do well along the coast long before the increased interest in coastal fattening occurred, but it is only within recent years that attention has been given to them in an attempt to define their adaptability. As was to be expected in country carrying such dense tropical vegetation, introduced grasses have proved to be of most value, and among these Guinea, Para, and molasses grasses are of most importance.

Guinea Grass.*

The best cultivated grass for the tropics is unquestionably Guinea grass (Plate 103), a native of tropical Africa, of which three forms are at present under observation, namely, common Guinea grass, fine-stemmed Guinea grass, and purple top Guinea grass. Guinea grass grows luxuriantly in the wet season and withstands dry conditions better than most other grasses during the drier months of the year; it is thus suited to both wet and dry districts. It will stand heavy stocking and is remarkable for the manner in which it recovers after grazing. All varieties are erect and tufted and, if allowed to get out of control, grow quite tall and become stemmy. On the other hand, if properly managed, their habit of growth can be changed considerably

Plate 103.
A Guinea Grass Pasture.

and low dense tufts of leafy growth will result. The grass must be heavily grazed and then spelled until it becomes leafy again, and at no time should excessive growth be allowed to take place. During summer months, when the rate of growth is out of all proportion to the rate of stocking, if the herd numbers cannot be increased to cope with this condition, a mowing machine should be used where possible to remove the stems. On areas where mowing cannot be practised it is a good plan to burn the stubble annually, and a flame thrower will be found helpful in this respect. Guinea grass is inclined to fall away in phosphate content during the drier months of the year, but deficiency in the diet could be obviated by providing the stock with phosphate in the form of licks.

The seeding rate of reasonably fertile seed is 6 lb. per acre. Sometimes a mixture is used to give a quick cover, in which case the following seeding is recommended:—4 lb. Guinea grass and 3 lb. molasses grass per acre.

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* *Panicum maximum* vars. *typica*, *trichoglume* and *coloratum*.

Para Grass.*

Commonly known as "panicum," this grass is most useful in swamps, flats, and low-lying wet localities generally (Plate 104). A native of South America and Africa, it has now become established over most of the tropical world. It spreads by means of long runners which branch freely at the nodes, and though it is a rather coarse-growing grass, its large succulent leaves are relished by stock. During dry conditions, however, the protein content of the grass falls rapidly, and growth is appreciably slowed. Some care should be exercised in management of Para grass, since if grazed too closely weeds tend to make their

Plate 104.
A Para Grass Pasture.

appearance. The aim of the grazier should be to leave one foot of cover over the surface of the ground, except in very favoured localities, such as alluvial river flats, where a low dense cover can be maintained. The latter, however, is possible only under conditions of rotational grazing. Over the past five years the collection of seed has been developed and it is now possible to obtain excellent stands from seed, which should be sown at the rate of 4 lb. per acre.

Molasses Grass.†

Molasses grass is a straggling grass which, because of its rapid germination and subsequent growth, is most favoured for establishing pasture on newly cleared scrublands. particularly on hillsides and steep slopes. It forms a good ground cover and is able to cope with weeds and other troublesome growth. The great disadvantage of

* *Brachiaria purpurascens.*

† *Melinis minutiflora.*

Plate 105.
A Year-old Stand of Molasses Grass on a Scrub Burn.

molasses grass lies in the fact that it will take fire readily and, if the field is carrying considerable growth, the heat can be so intense as to wipe a stand right out, necessitating resowing (Plates 105 and 106). A good deal of care should be exercised in its management, since it is more sensitive to grazing than either Guinea or Para grasses. Molasses grass will not stand continuous grazing and it has come into disfavour in some quarters because of the erroneous belief that it will not remain as a permanent pasture species. Under rotational stocking it persists

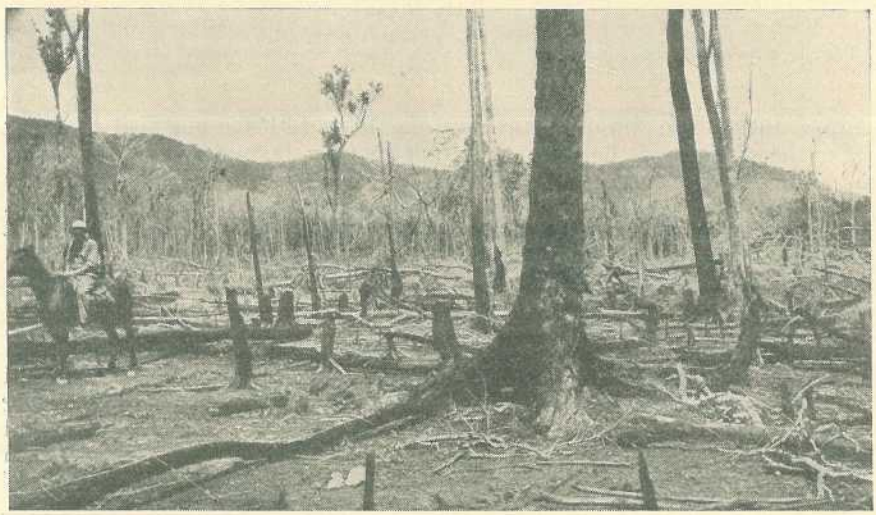

Plate 106.
Showing the Effect of a Fierce Burn on the Stand of Molasses Grass shown in Plate 105.

and can be relied on to provide a good quantity of feed; moreover, under this system of management, especially if intensified, the danger of fire is reduced to a minimum. Molasses grass maintains a reasonably high protein content throughout the year, but appears to be somewhat deficient in calcium. This being the case it is wise to supplement the pastures with licks designed to supply the deficiency.

The seeding rate of molasses grass sown alone is 4 to 5 lb. per acre.

LEGUMES.

The introduction of legumes into the pastures of North Queensland has occupied the attention of the Bureau of Tropical Agriculture since 1936. The importance of this work is apparent when the valuable part that legumes play in any pasture is realized. Having a relatively high protein content, legumes are capable of raising the protein level of a pasture, a particularly valuable feature when the nutritive value of the grasses is declining rapidly with the approach of maturity. Grass in itself is a balanced ration for stock when it is in the young stage and in active growth. Under average conditions on the coast such growth lasts for about nine months of the year if the pasture is handled properly. It is for the remaining three months of the year that a legume can be of great value in balancing the pasture. In addition to this, legumes enrich the soil in nitrogen by means of nodule-forming bacteria on their roots and thereby help to build up and maintain the fertility to a level suitable for the growth of desirable grasses.

Many legumes are pioneer plants, that is to say, they can be established on eroded or worn-out soils and will in time build up soil fertiiity to a level suitable for the growth of desirable grasses.

Differences in root penetration and in response to climatic factors often enable legumes to make growth during seasons when grasses are growing slowly; therefore, by a careful selection of legumes the grazing period of a pasture can be considerably prolonged.

Quite a number of legumes has been tried over the last ten years. Their place in a pasture, however, has not yet been worked out, but there is evidence to show that some of them can be successfully established in pastures. Brief descriptions of the more important legumes tested are dealt with here.

Puero.*

This plant is indigenous to the East Indies and is used extensively in the East as a cover crop for rubber. It is a vigorous perennial rambler, and though somewhat slow in the early stages of growth it begins to take charge after four months and can provide a complete ground cover in six months. Stock are very fond of this legume and will graze it bare if allowed free access to it. On this account there is danger of overstocking and the paddock should be spelled frequently to avoid this. At the present time puero seems to hold most promise for admixture with Para grass where the latter is growing in well-drained situations. The legume can easily be established from runners spaced 6 ft. x 12 ft., or from seed. Seed is difficult to obtain, for, while the plant bears a profusion of flowers, seed-setting is extremely light owing to the constant attack of the bean pod borer. Puero can be relied on after the first season to provide 10 tons of green material per acre per annum.

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* *Pueraria phaseoloides.*

Centro.*

Centro is a native of South America and has been developed within recent times mainly as a cover crop in tropical areas. It is a perennial twining plant which shows a marked tendency to climb, and forms a good cover over the surface of the ground in about four months from seeding. The legume is grazed by stock when they become accustomed to it. It is a heavy seeder, but considerable difficulty is experienced in harvesting, as the seed pods do not mature uniformly, and in addition the crop is hard to mow. It will regenerate itself quite freely and appears to do well with Guinea grass where the latter has been subjected to judicious management. Seeding at the rate of 4 lb. per acre is recommended.

Calopo.†

Calopo, a native of South America, is a quick-growing aggressive legume which was introduced into the East as a cover crop. It establishes itself well from seed either in a fallow or on newly burnt scrubland, and is capable of forming a dense cover over the surface of the ground in four months, completely choking out all weed growth. Calopo is a prolific seeder but is not as hardy as puero or centro, being affected by cold weather much more readily. So far stock have not shown a marked liking for the plant, but they have been observed to eat it during the drier months of the year. For rejuvenating worn-out lands calopo should prove very satisfactory. Owing to its vigorous nature it may not be suitable in a pasture mixture, but much depends on its palatability and the ability of the grazing animal to keep it in check. Grazing trials with this legume singly and in combination are in progress at the Bureau of Tropical Agriculture. Seeding at the rate of 3 lb. per acre is recommended.

Stylo.‡

An introduction from South America, this plant for a number of years was known as *Stylosanthes guianensis* or Brazilian lucerne, but is now commonly called stylo. It is a plant with a very wide range of adaptability: it has been grown successfully on a wide range of soil types and seems to thrive in dry as well as in extremely wet localities; it is tolerant of acid soils but not of swampy conditions. Stylo is an upright plant resembling lucerne somewhat in appearance, but if allowed to grow into large plants it becomes very woody. If large plants are cut back close to the ground the stand is thinned out considerably, as most of the plants fail to survive drastic defoliation, but if kept short it develops into a leafy plant and will last for many years. From its habit of growth, stylo would appear to have some promise in tropical pastures under careful management.

Divergence of opinion exists as to the palatability of stylo. At certain times of the year stock appear to take to it readily; at other times it is left ungrazed. It appears certain that when stock become accustomed to it they graze the plant quite readily and keep it in the short leafy stage.

Stylo develops a large quantity of seed which matures unevenly and while the seed-heads are still green. This presents harvesting difficulties but, under good conditions, the crop can be cut, cured and

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* *Centrosema pubescens.*

† *Calopogonium mucunoides.*

‡ *Stylosanthes gracilis.*

threshed to recover a fair percentage of seed. Where facilities are available, as much as 300 lb. of seed has been obtained from an acre by cutting and drying out on covers which collect the seed as it is shed. At the Bureau of Tropical Agriculture a yield of 110 lb. of seed per acre has been recovered by mechanical means. The plant can be readily established from seed in prepared seed-beds (fallows) or in pastures that are already established. Seeding at the rate of 2 lb. per acre is recommended.

Samoan Clover.*

This is a twining herbaceous plant from the Pacific Islands introduced into Queensland about fifteen years ago. It is palatable to stock, recovers quickly after stocking, and is a prolific seeder. The pale yellow flowers appear on upright stems, and each flower gives rise to a jointed pod which easily breaks at the joints. The pod is covered with a large number of minute hairs and readily sticks to the hair of animals; the plant is disseminated in this manner. Samoan clover makes its growth in areas of abundant rainfall under tropical conditions. It is being tried at the present time in combination with purple top Guinea grass and also with *Paspalum scrobiculatum* and gives promise of being one of the most useful legumes for the far north. Seeding at the rate of from 1 to 2 lb of seed per acre should be sufficient.

Desmodium heterophyllum.

A native of Mauritius, this legume is a perennial prostrate herb with trifoliate leaves and pale purple flowers. It forms a close sward and should prove useful in combination with prostrate grasses. Under natural growth and free from grazing and clipping, the plant grows upright into a diffuse leafy mass draping itself over a network of trailing stems. The plant is palatable to stock and will stand close grazing. Efforts are being made to study this legume in combination with various grasses. Unfortunately, it does not set seed readily and the pods are developed in the body of the foliage, making harvesting difficult. The pods are small and contain two or three medium-sized seeds. The plant spreads readily by means of runners which root freely at the nodes. Seeding at the rate of 3 lb. per acre is desirable.

Sarawak Bean.†

This legume, a native of the West Indies, was introduced into Queensland as a cover crop. It does well under partial shade but is a poor seeder. Small yellow flowers are produced on short racemes which are usually borne close to the ground, rendering harvesting difficult. The plant is a low, creeping, perennial herb of rather weak growth. It is slow in establishment but under most conditions will eventually suppress weeds. It prefers the lighter types of soils, though it does quite well on heavier lands. While it is a shallow-rooting, moisture-loving plant Sarawak bean can adapt itself to extremely dry conditions. Tests are under way to determine its palatability and also its permanence under stocking. Seeding at the rate of 3 lb. of seed per acre will be found sufficient.

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* *Desmodium scorpiurus.*

† *Dolichos hosei.*

PASTURE ESTABLISHMENT.

Tropical pastures need very careful handling in the initial stages of establishment if successful stands are to be obtained. A good deal of time and expense can be saved if sufficient attention is paid to detail.

The aim of every new settler should be to arrange that his scrub is "fallen" some months before the commencement of the wet season. July and August are considered the best months on the coast. An exceptionally heavy burn is not desirable; all that is necessary is to prevent regrowth by fire and, in the process, remove all rubbish and some of the timber. This should provide sufficient ash for a good seed-bed. An intense burn can do a considerable amount of harm by destroying organic matter. Further, land that has been subjected to intense heat bakes on the surface, rendering germination of young seeds difficult. Fierce burning also aids run-off by altering the soil structure.

No time should be lost in setting about sowing after a field has been burnt. It is necessary to ensure that the seed is planted before rain occurs, so that a good early germination is obtained, resulting in a quick cover which combats weed invasion and soil erosion. Only good quality seed should be used, for ideal planting conditions do not occur frequently and, if the greatest advantage is not taken of them, a field can be very seriously damaged The rate of seeding will depend on the species planted, but it should be sufficiently heavy to ensure that a good cover is afforded. It is better to seed too heavily than too lightly. The quantity of seed used is generally so small and the seed so light that it is often necessary to mix it with sawdust in order to be certain of a uniform distribution. Sawdust should not be mixed with the seed until broadcasting is about to take place, since poor germination sometimes follows if new sawdust has been mixed with the seed some days in advance of sowing.

A careful watch should be kept on germination and wherever bare patches occur these should be resown at once.

Under no circumstances should the pastures be grazed too early. It is imperative that grasses should become well established and form a dense cover before stock are allowed access to the paddocks. It is always wise to ensure that the first grazing is light, even though a good stand has been established. Where for some reason or other solid stands have not been established, it is advisable to allow grasses to go to seed in the first year of establishment to enable the stand to thicken. By periodically examining a young stand for the appearance of noxious weeds any undesirable growth can be checked before it becomes troublesome. At no stage should sucker growth be allowed to get the upper hand.

MANAGEMENT.

The aim of every stock owner is to have a continuous supply of nutritious feed and this can only be achieved by careful pasture management. It has been clearly demonstrated that controlled grazing is one of the most vital factors in pasture management and failure in this respect has been largely responsible for deterioration of pastures in many localities.

If stock are allowed free access to large paddocks they tend to graze the area selectively, concentrating on particular patches and allowing others to become rank and coarse. They also foul the pasture by excessive trampling and resting. Proper attention cannot be given to

a pasture if stock have access to it continuously. It often happens that bare patches need reseeding and this cannot be done while stock are roaming over the area; whereas, if the total area was effectively subdivided, individual paddocks could be closed until the desired improvements had been carried out

Grasses are ordinarily easier to maintain in a pasture than are legumes, because their growing buds are not exposed to the same extent as in legumes. Hard continuous grazing thus tends to eliminate the legumes and special care is often needed to maintain them. Occasional resting of the paddocks is necessary to allow the legumes to recover, build up plant food, and set seed. On the other hand, undergrazing sometimes encourages too tall a grass growth, the shading effect of which is harmful to low-growing legumes.

If the best is to be obtained from grazing land, therefore, the grazing must be controlled. Rotational grazing—or grazing the pasture when it has reached a suitable stage of growth and then resting for a fresh growth to appear—is the key to successful grazing management. When rotational grazing is put into practice the pasture is grazed short in a few days—ten days or less; it is then rested and then grazed again. The time which it takes to graze pasture bare depends on the number of stock and the rate of growth. The length of rest a field must be given depends on the rate of growth. In the flush from February to March, a fortnight's rest would be ample; at other times it may be a month or so. From the point of view of the pasture the rest is essential if the pasture is to be maintained in a sound condition and if the maximum amount of nutritious herbage is to be secured. From the point of view of the animal, rest periods of one month or longer are perfectly satisfactory.

When a field has been grazed down and cleared of stock, any grass which the animals have left should be mown with the mowing machine. This is particularly necessary with Guinea grass, which quickly becomes coarse and rank if not properly handled. During dry weather, however, the mowing machine must be used with care, for it is advisable to keep a good covering of grass to prevent the sun from baking the land, thus leading to slow recovery when rain falls.

Later in the season, as the grasses become more fibrous and stemmy with a lower feeding value, too much energy is expended by highly productive animals if they are forced to graze the pasture down. Therefore, the stock should be divided into two lots; the first pick of a pasture should be given to the most productive animals and the cleaning up done by the least productive animals—dry cows or store stock.

In spite of the difficulty sometimes encountered in establishing legumes and the care necessary to maintain them, their inclusion in a pasture mixture is regarded as a basic feature of sound grassland husbandry. It has been found that feeding animals on a legume-grass pasture is more profitable than feeding them cut feed.

It will be apparent from the above that, where suitable grass-legume combinations are secured, great care in management is necessary to maintain these associations in the desired ratio, otherwise the work will be doomed to failure.

Harvesting and Packing Lemons.

C. G. WILLIAMS, Horticulture Branch.

THE successful marketing of good-quality lemons depends to a large extent on the methods employed in harvesting, handling, and packing. Quality in lemons coupled with good appearance in case lots obtain better sales, and present a more attractive and satisfactory article to the public. With proper preparatory attention, undesirable features, such as thick and scaly skin, badly coloured, over-large, and poor juice content types, will be eliminated. Observance of the following points will do much to achieve this objective.

Picking Stage.

Lemons are best harvested at a stage known as silvering, which occurs between the change in colour of the skin from dark green to pale yellow. If the fruit is allowed to remain on the tree until is is fully coloured it may deteriorate in quality and become large and coarse.

The ideal size for market requirements is within the 2½-inch diameter range of packing counts.

Harvesting.

It is most important that the skin of the fruit be protected against injury and the resultant entry of mould infection, and to this end gloves should be worn during harvesting and subsequent handling operations. If gloves are not worn at least care should be taken to see that finger nails are kept short to avoid any damage to fruit. The lemons should be closely clipped from the tree with a suitable blunt-nosed type of secateur and placed in a clean, shallow box or basket.

The fruit should be removed carefully from the filled container into a larger box or tray and stacked in the shade under the tree for subsequent transportation to the packing shed.

Large picking bags should be avoided because the weight of fruit may cause skin damage, particularly to the bottom layers of fruit.

Grading and Preparation.

The lemons must be removed to the packing shed as soon as practicable after harvesting. To avoid unnecessary handling it is desirable to grade for size, colour, and quality, and reject diseased and imperfect specimens at the time when the lemons are removed from the harvesting container. Dirty fruit should be carefully washed and thoroughly dried. After grading, culling, and, if necessary, washing and drying, the fruit should be placed in shallow trays 3 feet long by 2 feet wide by 3 inches deep, stacked in a cool place in the shed, and sweated for a period of approximately ten days to remove moisture from the skin. It is essential that the trays be stacked in a manner which will allow good air circulation around the fruit. Following the sweating period the lemons may be cured and, if desirable, artificially coloured.

Curing.

Correctly cured lemons may be stored for a period of several months, provided they are handled carefully to avoid skin abrasions and the relative humidity is maintained at 85-90 per cent. One method of curing lemons involves wrapping each fruit in sulphite wrapping paper and storing loosely in shallow paper-lined trays stacked in a suitable place in the shed. At intervals of about ten days it is necessary to examine each fruit and reject all mouldy or unsatisfactory types, then rewrap and replace in the stack until curing is completed. In maintaining humidity at the required level a humidifier may be cheaply constructed by hanging a series of absorbent cloths from a frame above which is fixed a small perforated iron water pipe, allowing water to drip when required. The air in the shed may be circulated by means of a small fan.

Artificial Colouring.

Although lemons will change colour naturally at relatively high temperatures, more rapid and uniform colouring is obtained by treating the fruit with ethylene or acetylene gas at controlled temperatures. The fruit must be picked at the silver-green stage, as fruit picked before this stage will not develop a satisfactory colour after treatment. The rind may also be injured if the fruit is picked during damp weather. Temperature, humidity, and gas concentration must be carefully controlled; failure to do this commonly results in uneven and poor colouring, damage to the rind, and dropping of the buttons. The process is usually carried out in gas-tight rooms or under a canvas, tarpaulin, or wooden cover. The quantity of ethylene necessary for coloring depends on the type of fruit, but a concentration of one part of gas to 5,000 parts of air is sufficient for lemons placed in gas-tight rooms. A concentration of one part of gas to 2,000 parts of air is recommended for rooms which are not sufficiently gas-tight, but higher concentrations than this should be avoided as they have no further effect on colouring and may cause injury to the skin. Ethylene is supplied in cylinders with a measuring gauge attached, and the required concentration of gas is introduced into the centre of the room at floor level. While ethylene is recommended for colouring, acetylene can also be used. This latter gas is generated by treating carbide with water; 1 oz. of carbide generates sufficient gas for 75 cu. ft. of air space. In calculating the volume of air-space no account is taken of the space

occupied by the cases. The displacement of gas caused by the volume of case material does not make any appreciable difference in the result of the treatment. The required quantity of carbide is placed in a container and water is allowed to drip slowly on to it. If the water is added quickly large quantities of gas may be generated and may injure the rind.

The fruit should be spread on trays or in open field boxes stacked on a false floor and each tier separated to provide good air circulation throughout the stack. After the fruit has been placed in position the room is sealed and the required amount of gas is introduced. The room is ventilated every four hours by opening doors or vents or raising the cover. A fresh charge of gas is then introduced. Adequate ventilation is essential, especially in airtight rooms, in order to prevent the accumulation of carbon dioxide, which tends to retard the ripening and gives the fruit an unpleasant flavour. Forced air circulation is often necessary to avoid large temperature differences within the stack, which may cause uneven colouring. For this purpose fans should be installed in the ceiling near the centre of the room and directed towards the floor. It is important to obtain a high humidity during colouring, as low humidities retard colouring and cause an excessive loss of moisture from the fruit. In hot, dry weather it may be necessary to soak the picking cases in water and to raise the humidity of the room by injecting steam, sprinkling the fruit with water or hanging wet bags in the room.

The room may be constructed of timber, brick, concrete, or fibro, and insulated with sawdust, shavings or other suitable material. It can be made more gas-tight by lining with paper, but tarred paper is not recommended because it absorbs ethylene. Large doors should be constructed at opposite ends of the room to provide rapid and efficient ventilation. If sufficient doors cannot be provided then large ports should be built into the back wall or ceiling. The optimum temperature for colouring lemons is 65 deg. F., and in cooler months the rooms may have to be heated with electricity, steam, or a fuel burner. The heaters are placed in the centre of the room, and the temperature should be raised gradually. Thermostatic equipment can be used to control the temperature automatically.

During warm weather the fruit should be either picked in the morning or cooled down in the packing shed before it is placed in the colouring rooms.

Ethylene forms an explosive mixture in air concentrations greater than 3 per cent., and, although this concentration is very much greater than that recommended for colouring, care should be taken to keep naked lights away when the gas is being handled. Ethylene cylinders should be kept outside the colouring room and smoking should not be allowed in the immediate vicinity.

Packing.

Lemons are packed in the Australian dump case, the internal measurements of which are—18 inches long by $8\frac{3}{8}$ inches wide by $14\frac{1}{4}$ inches deep. The standard method of the diagonal count system of packing is easily applied in this case.

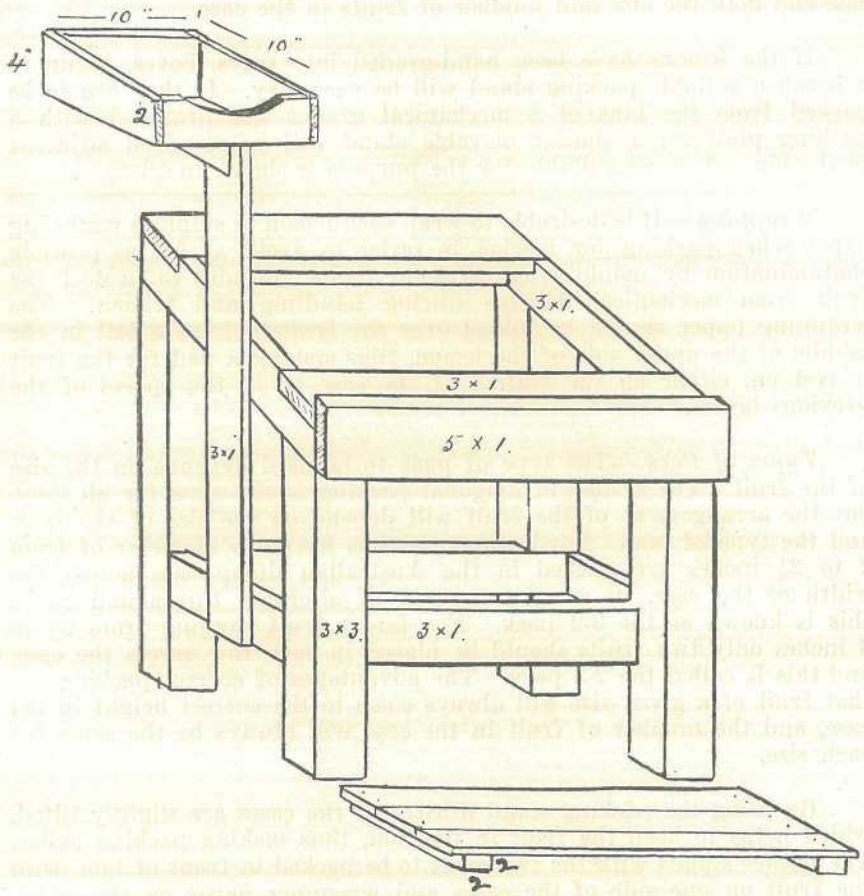


Plate 107.

PACKING STAND WITH WRAPPING PAPER HOLDER AND SPRING BOARD.

This stand is tilted and holds two cases. The tilt assists the packer by keeping the lemons in position. By packing two cases of different sizes (within a quarter-inch grade range) at the same time the operator is assisting himself in his sizing.

Sizing.—Before packing is attempted it is essential that the fruit be graded into the sizes applicable to standard counts, namely, 2 inches, 2½ inches, 2¾ inches, and 3 inches.

To determine the size, when a mechanical grader is not used, the fruit may be passed through grading rings or through a piece of three-ply in which holes of the specified sizes are cut. A lemon that will pass through a 2½-inch ring with the stalk up but will not pass through a 2¼-inch ring is classified in the 2¼-inch range. The principle in this method of grading is that a fruit that will pass through a ring of a certain diameter but will not pass through the next lower size ring will be classified according to the size of the ring retaining it.

Although fruit may be graded in eighths and sixteenths of an inch, for most practical purposes the grade size is stated in ¼-inch graduations. However, it is possible to get two or three different counts

within this ¼-inch range. It is therefore necessary to brand on the case-end both the size and number of fruits in the case.

If the lemons have been hand-graded into trays, boxes, or on to a bench a suitable packing stand will be necessary. If they are to be packed from the bins of a mechanical grader not provided with a packing platform a similar movable stand will be required adjacent to the bin. A stand suitable for the purpose is shown in Plate .

Wrapping.—It is desirable to wrap each lemon in sulphite wrapping paper when packing for market in order to avoid as far as possible contamination by mould from adjacent fruits and also to protect the fruit from mechanical damage during handling and transit. The wrapping paper should be folded over the fruit to form a tail in the middle of the under side of the lemon, thus making a pad for the fruit to rest on, either on the bottom of the case or in the spaces of the previous layer.

Types of Pack.—The type of pack to be used depends on the size of the fruit. The system of diagonal packing is the same for all sizes, but the arrangement of the fruit will depend on the size of the fruit and the type of case. For instance, lemons having a diameter of from 2 to 2¼ inches are packed in the Australian dump case across the width of the case, in an arrangement of alternate threes and twos; this is known as the 3-2 pack. For larger fruit ranging from 2½ to 3 inches only two fruits should be placed in each row across the case, and this is called the 2-2 pack. The advantages of correct packing are that fruit of a given size will always come to the correct height in the case, and the number of fruit in the case will always be the same for each size.

By using the packing stand illustrated the cases are slightly tilted, which helps to keep the fruit in position, thus making packing easier. The packer stands with the two cases to be packed in front of him, with the fruit on one side of the cases and wrapping paper on the other. A bench containing the fruit should be so constructed that it is tilted so that the fruit is always within easy reach of the packer.

3-2 Pack.—In the 3-2 pack the first layer (Plate 108) is started by placing a lemon in each corner of the case and one exactly midway between them facing end to end in the case, the stalks facing the packer and the nipples facing to the other end of the case. This forms a line of three lemons with two spaces or pockets between them. The pack is continued by placing two lemons in these spaces, which leaves two pockets between the two lemons. Then three lemons are placed in the next pockets and then alternately two and three until the layer is finished, except for the last line of fruit, which is reversed with the stalks facing the wood of the case-end furthest from the packer. To start the second layer (see Plate 110) place two lemons in the pockets formed by the first two lemons of the first layer, then two and three alternately facing as in the first layer, until all the pockets of the first layer are filled, again reversing the last line of fruit across the case. This process is repeated layer by layer until the case is filled. With the 3-2 type packs containing eight or nine layers are obtained (see Plate 112 and packing table).

3–2 Packs.
First Layers.

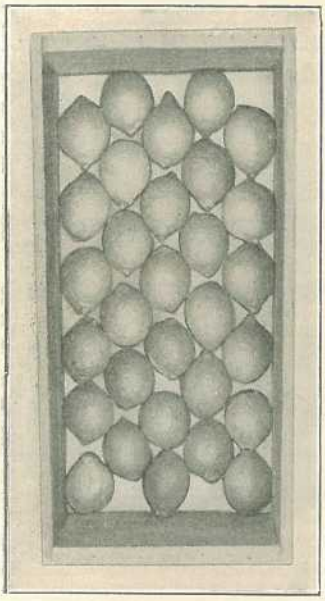


Plate 108.
3–2 Pack. 6 ×6 Layers. 9 Layers.

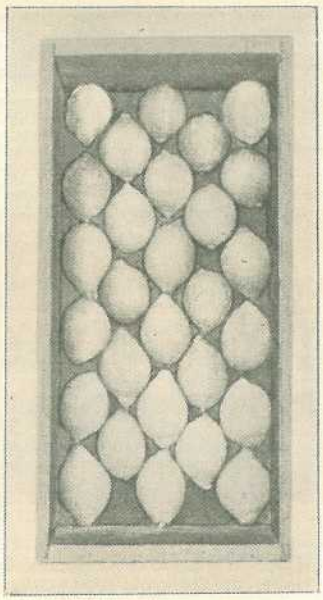


Plate 109.
3–2 Pack. 6 × 5 Layers. 9 Layers.

How to Start the Second Layers.

3–2 Pack.

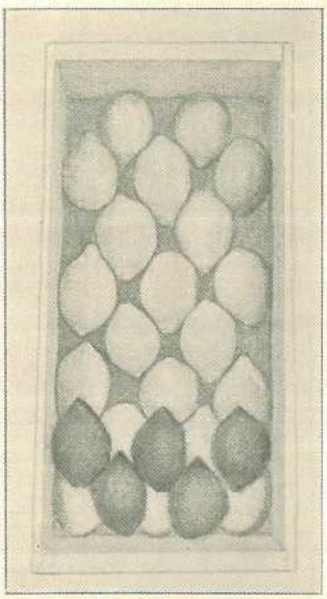


Plate 110.
Note how the lemons are placed on the pockets or spaces of the first layer, the second layer starting with two instead of three.

2–2 Pack.

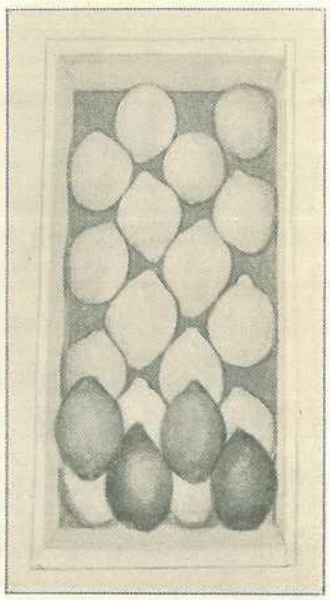


Plate 111.
Note how the first two lemons of the second layer are placed on the pockets of the first layer.

FINISHED CASES.

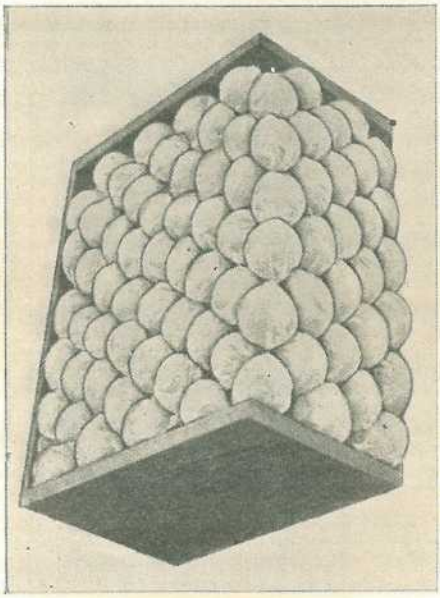


Plate 112.

3–2 Pack. 6 × 6 Layer. Total 270.
Lemons wrapped.

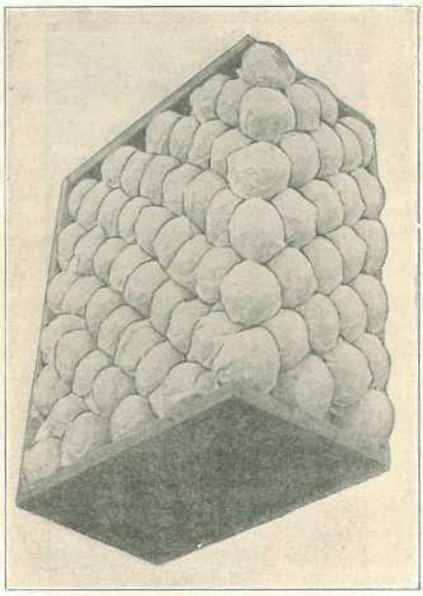


Plate 113.

3–2 Pack. 6 ×5 Layer. Total 248.
Lemons wrapped.

Note the alignment of fruit up and down, across, and diagonally in the case. No two lemons rest one upon the other.

HOW TO READ AND USE THE PACKING TABLE.

The Layer Count is obtained by counting two lines of fruit from end to end in the case, this layer count being 6 × 6.

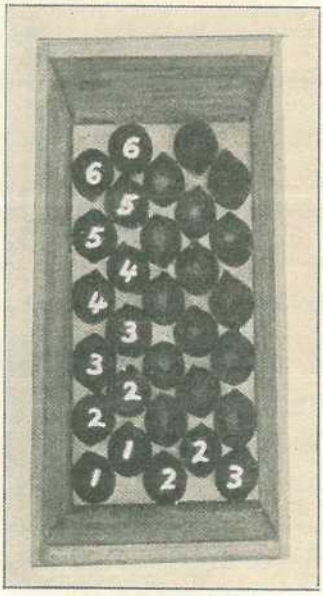


Plate 114.
3–2 PACK.

The Pack gets its name from the way the first five lemons are placed in the layer.

The Layer Count is obtained by counting two alternate lines of fruit from end to end in the case, this layer count being 4 × 4.

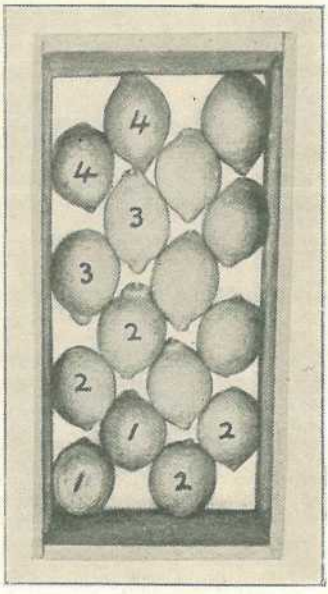


Plate 115.
2–2 PACK.

The Pack gets its name from the way the first four lemons are placed in the layer.

TABLE FOR PACKING IN THE AUSTRALIAN DUMP CASE.

(18 inches long x 8⅝ inches wide x 14¼ inches deep.)

Approximate Size.	Pack.	Layer Count.	Number of Layers.	Total or Count.
2 inches	3 - 2	6 × 6	9	270
	3 - 2	6 × 5	9	248
	3 - 2	5 × 5	9	225
2¼ „	3 - 2	5 × 4	9	203
	3 - 2	5 × 4	8	180
	3 - 2	4 × 4	8	160
2½ „	2 - 2	5 × 5	7	140
	2 - 2	5 × 4	7	126
2¾ „	2 - 2	4 × 4	7	112
	2 - 2	4 × 3	7	98
3 „	2 - 2	3 × 3	7	84

Special Note.—In the 180 and 203 count the same number of fruit is contained in each layer, but there is an extra layer in the case. This is brought about by the difference in the diameter of the fruit and the size of the pockets. Close attention to the directions in reference to the 3-2 pack will enable the packer to bring fruit to the correct height.

2-2 Pack—This pack is started by placing a lemon in the bottom left-hand corner of the case, and midway between this fruit and the right-hand side of the box a second lemon, leaving two pockets, one between the two fruits and the other between the second fruit and the right-hand side of the case. The next line of two lemons is placed in the pockets formed by the first two fruits, thus commencing the 2-2 pack (see Plates 116 and 117). This is then repeated, the lemons being placed facing as in the 3-2 pack until the layer is finished with all but the last line of fruit, which is reversed, with the stalks facing the wood of the case end furthest from the packer. The second layer is started by placing two lemons on the pockets formed by the first two fruits of the first layer (see Plate 111). The layer is continued by placing lemons on all the pockets of the first layer and reversing the last line of fruit as was done with the first layer. This procedure is repeated, layer by layer, until the case is filled. Two-two packs give seven layers of fruit (see packing table).

Bringing the Pack to the Correct Height in the Case.—Lemons should be packed 1 to 1½ inches above the top of the case, and eased gently into position before applying the lid. After nailing both lid and bottom of the case should show a bulge. Care should be taken that the bottom of the case is kept clear of the floor or nailing-down stand. This can be done by placing a block under one end of the case while easing the fruit into position and nailing.

After two or three layers have been packed the experienced packer can judge fairly well how high the fruit will come in the full pack. Faults in height may be corrected by making the pockets smaller by slightly increasing the size of the fruit used, thus keeping the fruit higher in the box to correct a pack which will come too low or, in the case of a pack that is coming high, to open the pockets by using slightly smaller fruit. Usually these faults are caused by a variation in sizing the fruit in subsequent layers after placing the first layer in position.

2–2 Pack. 7 Layers.
First Layers.

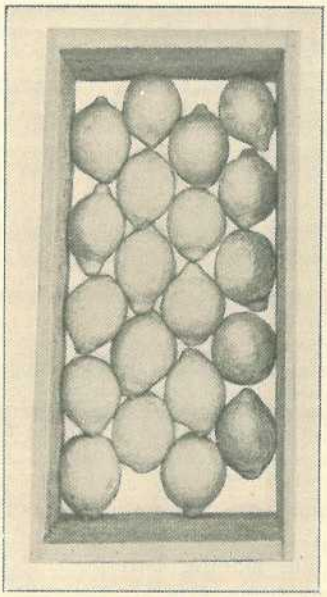


Plate 116.
2–2 Pack. 5 × 5 Layers. 7 Layers.

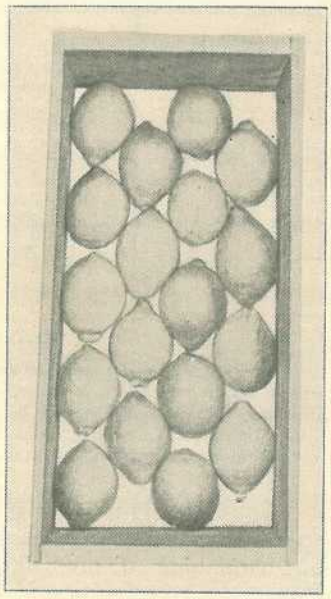


Plate 117.
2–2 Pack. 5 × 4 Layers. 7 Layers.

Finished Cases.

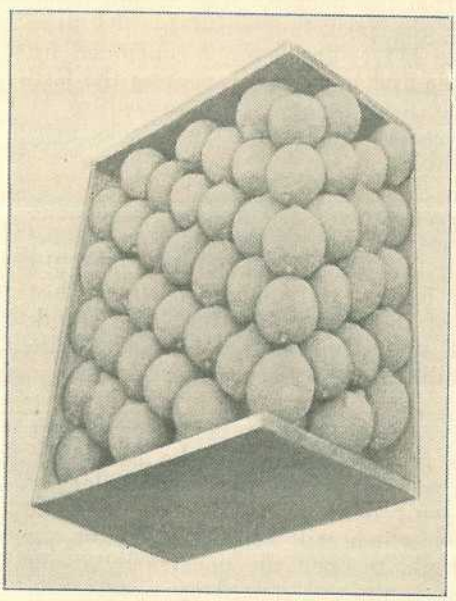


Plate 118.
2–2 Pack. 5 × 5 Layers. Total 140.

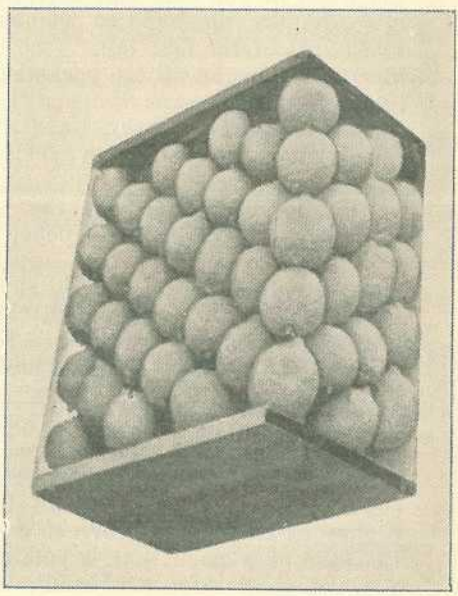


Plate 119.
2–2 Pack. 5 × 4 Layers. Total 126.

General Notes on Packing.

Packers should observe the following notes in packing:—

(1) Each fruit should be placed on its cheek facing end-to-end in the case.

(2) Reverse the last two or three lemons, as the case may be, in each layer.

(3) See that all fruit appears in straight lines from end to end in the case, across and diagonally.

(4) No two lemons must rest directly upon one another, but in the pockets of the layer beneath.

(5 The size of the pockets governs the height of the fruit in the case.

Stencilling and Labelling.

Growers may make their cases look more attractive by neat stencilling and attractive labels. Under the Fruit and Vegetables Act it is necessary for the packer to brand on the case his initials, name, and address legibly and durably within a space measuring not less than 5 inches long by 2 inches wide. The name of the variety of fruit and size and count should also be branded in letters of not less than ½ inch in length. Wiring is recommended in all cases, and a machine for this purpose can be obtained commercially.

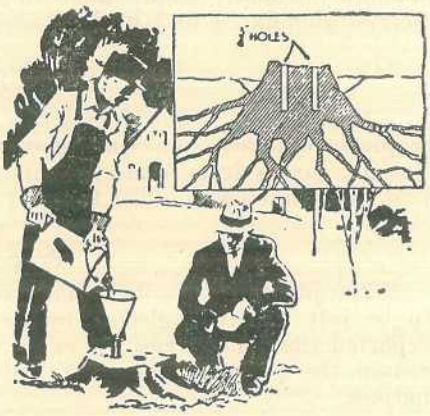
BURNING STUMPS.

One good suggestion for a method of treating stumps of recently felled trees in order to prevent them from sending up shoots is to apply kerosene to the stump, as shown here.

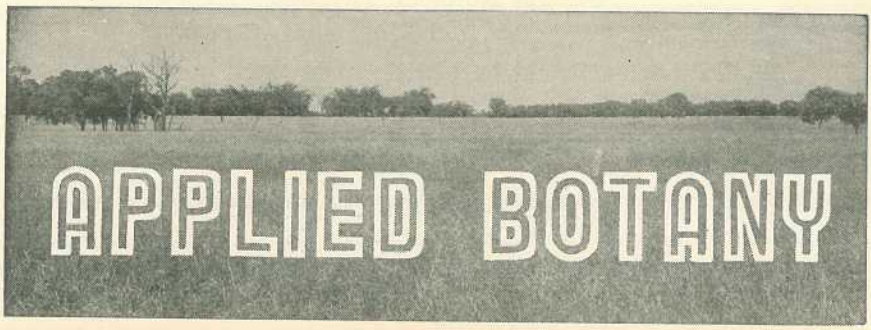
Some ¾ in. augur holes are bored downward through the top of the stump and kerosene poured in.

The effect of the kerosene is said to be to kill the roots, and at the same time to assist in burning the stump much earlier than is possible under other conditions.

One augur hole and one application is sufficient for a small stump up to 3 in. in diameter, but for larger stumps it is necessary to make several holes and to repeat the filling once or twice a week for a month, owing to the more extensive spread of the roots.



—From "Handy Farm and Home Devices and How to Make Them."
(J. V. Bartlett for War Blinded Association, Adelaide, S.A.), 1946.



The Devil's Fig.*

C. T. WHITE, Government Botanist.

THE devil's fig is a prickly weed that of late years has spread considerably over parts of coastal Queensland, and at the request of some northern Shire Councils it has been declared noxious throughout the State. The following account is therefore offered that Council officers and the farming and pastoral public generally might be acquainted with it, should it make its appearance in their areas.

Description.

A large scrambling shrub, the branchlets and foliage densely clothed with hairs, slightly rough to the touch on the upper and soft on the lower surface of the leaves, where the clothing of hairs is particularly dense. Stems armed with strong, stout, straight or slightly hooked prickles, a few more slender ones sometimes seen on the leaves. Leaves 3 to 6 in. long, 2 to 3 in. broad, the edge of the leaf irregularly lobed with broad shallow bays. Flowers white, about $\frac{1}{2}$ in. diameter, borne in clusters on short, stout stalks in the leaf axils or on the branches. Berries globular, $\frac{1}{2}$ to $\frac{3}{4}$ in. in diameter, yellow when ripe.

Distribution.

A native of tropical America, now a naturalized weed in most tropical countries. In Queensland it is essentially a weed of coastal "scrub" areas from Wide Bay northwards. It is never likely to be a pest in inland parts. The furthest inland record is Childers.

Properties.

The plant belongs to a dangerous family—Solanaceae—and seems to be left wholly neglected by stock. Fowls eat the berries. It is reported that the berries are eaten raw or cooked in Java, and for this reason the plant is protected and even sometimes cultivated by the natives.

Common Names.

Devil's fig seems to be the name almost universally used, though in some places it is known as "Dirran Curse," a name more correctly applied to a native and allied plant (*Solanum hamulosum*).

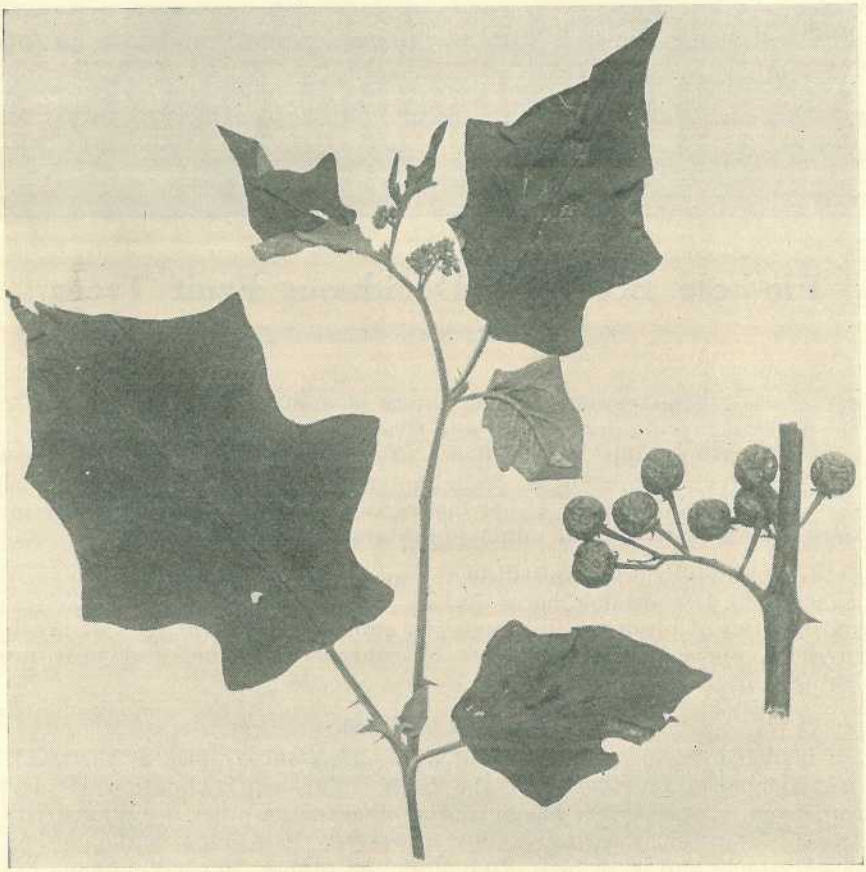


Plate 120.
THE DEVIL'S FIG.

Eradication.

No experiments have been carried out by the Department in the eradication of this weed. Isolated patches or individual plants are best grubbed out, or stems cut off with a brush hook and if large enough swabbed with an arsenical weedicide. Cutting and burning on larger areas is not likely to prove permanent. Spraying would aid but is not generally effective in preventing regrowth in strong growing plants of this type and, as the plant is essentially a weed of coastal pastures, there is a great danger of stock being poisoned by the sprayed weed or even the subsequent ash. A tractor-drawn triangular drag of flanged steel rails has been used with some success in the eradication of groundsel bush and a similar implement or a modification of the mallee roller might prove effective with the devil's fig.

* *Solanum torvum.*

PLANT PROTECTION

Pin-hole Borers in Deciduous Fruit Trees.

N. E. H. CALDWELL, Entomologist.

IN the last three years, pin-hole borers have attracted attention in the deciduous fruit orchards of the Granite Belt, where they appear to have been responsible for the death of a number of trees. The insect was not previously recorded from that area and its exact identity has not yet been determined. Other borers, of course, infest deciduous fruit trees, but they are of quite minor importance.

Apples and plums constitute the majority of the trees known to be attacked by the pin-hole borer and at least seven varieties of apple and six varieties of plum are involved. In addition, three varieties of peach, three of apricots, and one each of cherry, nectarine, and pear are included in the host list.

Effect on Tree.

Frequently, a certain amount of weeping takes place at the small, inconspicuous borer holes in the bark. This sap exudation is most copious on apples, but it has also been observed on other deciduous fruit trees. However, weeping is not necessarily associated with pin-hole borer attacks and is, in fact, often absent on plums. A certain amount of gumming may also occur, particularly in peaches. Subsequently, the foliage on one or more limbs may wilt and finally the tree itself dies. Such an unexpected collapse of the tree is often the first indication to the grower of pin-hole borer activity.

The acute symptoms shown by infested trees in most cases seem out of all proportion to the mechanical damage caused by the tunnelling beetles. It is therefore inferred that the insect is a vector or "carrier" of either a fungal or bacterial disease organism, a well-known habit of certain closely related species in other countries. This inference is supported by a pronounced brown to blackish internal staining of the wood above and below each borer hole.

Description, Life History, and Habits.

The adult borer is a Xyloborid beetle measuring slightly more than one-sixteenth of an inch in length and changing in colour with age from the light, creamy-brown of the young insect to the blackish-brown of older individuals. Entry into the tree is made by the adult insects through small pin-holes excavated in the bark and wood. These holes are usually concentrated in the trunk and lower portions of the main limbs, though they have been found up to 6 feet from the ground. The

small, more or less straight tunnels lead to irregular-shaped brood chambers or galleries which mostly run with, rather than against, the grain. They may be located at depths up to 1½ inches in the wood. The largest so far encountered covered an area of about one square inch and comprised three superimposed tiers separated from each other by a thin layer of wood.

In the brood chambers, the female beetles lay small, elongate-oval eggs, from which emerge the cream-coloured larvae or grubs. These feed, not on the plant tissue, but on a fungus growing on the walls of the brood chamber. Such feeding habits are common to this and some related borers and have given rise to the name of "ambrosia beetles." When full-grown, the larvae pupate within the brood chambers. Thus all stages of the insect may be associated together in the one gallery.

Attacks by insects of the pin-hole borer type are usually confined to dead, dying, or at best, sickly trees, but the pest species at Stanthorpe may have more destructive habits. Many of the infested trees were obviously not particularly robust before the attack took place. Nevertheless, some rank amongst the best in the orchards concerned and appear to be quite up to the average standard of vigour for the district.

Control.

Borer control in any type of tree presents many difficulties, but it is obviously sound practice to reduce sources of infestation wherever possible. For this reason, growers should remove and burn immediately all dead and dying limbs or trees in the orchard. These trees may harbour large numbers of pin-hole borers, and their destruction will lessen the risk of further attacks.

Measures designed to prevent infestation and also to eliminate borers from trees already attacked are being investigated.

ANSWERS.

Selections from the outward mail of the Government Botanist.

Hairy Indigo.

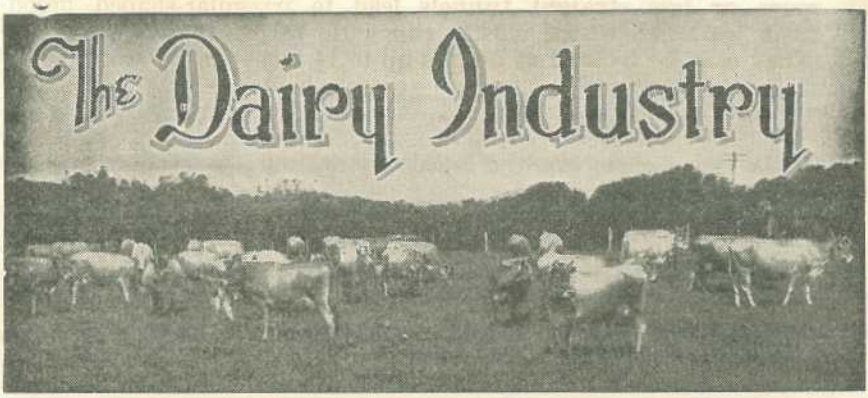
W.B. (Mundubbera)—

The specimen is the Hairy Indigo (*Indigofera hirsuta*). This plant is widely spread through coastal Queensland to India. It is not known to possess any harmful properties. It has been reported, particularly from the Rockhampton district, that stock, especially horses, have eaten it readily. It is sometimes seen as a weed of cultivation. It is not Groundsel Bush, and is nothing like so aggressive as that plant.

Goosefoot.

J.V.S. (Murgon)—

The specimen is *Chenopodium carinatum*, a species of Goosefoot. This plant would certainly give a strong flavour to milk and cream, but dairy stock have not been seen eating it in any quantity, if at all. The plant contains a prussic-acid-yielding glucoside, and has been known to cause the death of travelling sheep in New South Wales. It is a native plant, but is frequently seen as a weed of cultivation.



Observations on Dairy Production in New Zealand.

E. B. RICE, Director of Dairying.

(*Continued from page* 219, *October*, 1946.)

RESEARCH AND INVESTIGATION ON PRODUCTION AND ANIMAL HEALTH.

Research and investigations on various aspects of dairy production and the health of dairy cattle have been carried out by the Dominion Department of Agriculture, the Dairy Research Institute and the Herd Improvement Department of the Dairy Board. Notes on the nature of the projects being investigated at research institutes and on statistical and other investigations follow:—

Department of Agriculture.

The Department of Agriculture operates two research stations, which deal with the production and health of dairy stock. Ruakura Station (C. P. McMeekan, B.Sc. Ag., Ph.D., Director) is charged with the responsibility of studying dairy production problems; it consequently is only concerned with diseases in relation to dairy production and not specifically as veterinary problems. Wallaceville Station (I. Cunningham, B.Sc., Ph.D., B.V.Sc., Director) is primarily engaged on studies of the health of dairy stock.

Ruakura Research Station.

Ruakura is within one mile of Hamilton, the main town of the Waikato, the most intensive dairying area in New Zealand and possibly in the world. Among other stock, the station carries 500 head of dairy cattle including 300 milkers. The station does not confine its researches specifically to dairy production. The work of the station is organised into five main sections—Animal Nutrition, Animal Breeding, Animal Fertility, General Biology, Chemistry.

Animal Nutrition.

Most of the projects in this, as well as other sections, are of a long term nature.

Nutritional Studies of Pastures.

Primarily the nutritional investigations are designed to map the whole field of grass and pasture feeding of dairy stock. It is of fundamental importance to know, for instance, how much grass a cow is capable of eating, and how this and the nutritional value are affected by factors —such as species, stage of growth, and pasture management—under New Zealand conditions. An attempt is being made to determine the influence on the lifetime performance of dairy cattle of two major kinds of pasture nutrition as it exists in New Zealand, viz., a high, even level of nutrition typical of that existing on well managed, rotationally grazed pastures characteristic of progressive farmers, and an uneven (up and down) level of nutrition exemplified by most farms. For this investigation portion of the station has been set aside as two farms of approximately 60 acres each. One is subdivided into 3-acre paddocks and the other into paddocks each of 15 acres. The studies extend over the whole life of the dairy cow.

Nutrition of Calves.

There is a wide variation in the herd wastage on different farms and especially in the proportion of calves dropped to those which enter the herd at two years of age.

In conjuction with this investigation, it is proposed to study the effect of management from the pre-calving period to two years of age on the subsequent lifetime performance—production and disease incidence—of the animal.

The calves on the farm, which is subdivided into 15 acre paddocks, are reared in accordance with normal farm practice. They receive whole milk for the first month; then being gradually changed over to separated milk. Each calf gets up to 2½ gallons of skim milk daily, in two feeds. They are not rotated in the pasture paddocks.

The calves on the other farms are fed whole milk for four weeks, after which the changeover to separated milk is begun by replacing whole milk with separated milk at the rate of one pint for one pint until only separated milk is fed. Free access is also given to crushed oats, each calf getting up to 2 lb. daily. The calves are weaned at three and a-half to four months. As soon as they can eat pasture (at three weeks old) the calves are put in the pasture paddocks, being constantly rotated from paddock to paddock and spending not more than two days at a time in any one paddock.

Striking differences occur in the two groups of young stock. At weaning, the calves reared under the improved system have an average weight of 100 lb. in excess of the other group, at twelve months the difference is 130 to 150 lb., and at two years 170 lb.

Mortality in the former group is nil, as against up to 50 per cent. in the group less favourably managed. This group is treated every three weeks with phenothiazine to control parasites, while the first group does not require such treatment. Dr. McMeekan is of opinion that calves are the most selective grazers of all animals. If kept in one large paddock they will eat only short grass, refusing to touch the longer pastures. As the calves become undernourished despite the available grass, parasites then assume control. It has yet to be ascertained whether the difference noted in the two groups is of parasitic or nutritional origin.

At two years of age, each of the groups of calves is divided into two, one half of each group being moved on to the other farm, so that although there are two herds in practice, four separate treatment-groups are available for study on the animals attaining two years of age. From this age onwards the investigation falls within category (*a*).

Twenty-one sets of identical twin heifer calves have been obtained and will be used for research on nutrition, fertility, &c. A small dairy capable of handling 40 cows is now being established for this work. The animals will, for example, be all treated similarly one season and all, or part, switched over to different conditions in the succeeding seasons. The identical twins are usually similar in habits, keep together, and the same weight to within 1 lb. The use of twins diminishes the variable hereditary factors associated with the use of other stock in any studies on fertility and nutrition.

Animal Breeding.

Research in progress on the breeding of dairy cattle is also chiefly of a long-range character.

A number of theories of animal breeding propounded by statistical geneticists are being submitted to experimental test.

Ruakura is the station at which artificial insemination investigations are proceeding. This work is still in the experimental stages. Special problems arise in New Zealand because of the short breeding season of only about nine weeks' duration. Proven sires, or the sons of proven sires, obtained from farmers, are selected for artificial insemination work. It has been found necessary to keep the yearling sons of proven sires, because of the possibility of the semen of the mature bulls proving inactive. Incidentally the semen of each bull is always examined by certain laboratory tests to test its activity prior to distribution for inseminating farmers' herds. At present, five proven bulls and five yearling sons of proven sires, as supports, are employed on artificial insemination work. The bulls are rotated, each being used one day in five. Four to five bulls provide enough sperm for inseminating 1,000 to 1,400 cows, it being found that the short breeding season reduces the number of cows serviced per bull to about 300 to 400, in contrast with 1,000 in other countries where breeding extends throughout the year. Even 300 calves per bull a season is tenfold the number obtained by natural mating.

The uterine system of depositing the semen in the cow is more effective than the cervical method, but the first method must be performed by a trained man, whereas a layman can use the cervical method. The experience of Ruakura in the different methods has been uterine 71, cervical 51, natural 60, conceptions per 100 services.

No fee is charged co-operating farmers in the artificial insemination work, but they are obliged to keep certain records for the information of the research station and to sell all cull cows to the station.

In conjunction with the artificial insemination investigations, it is proposed to study the effect on a herd of consistently breeding by artificial insemination, using, of course, proven sires. Though the herd was well fed up till the establishment of the station two years ago, its average productivity was low. It has since been heavily culled. As nutrition was always satisfactory, any improvement must come from better breeding.

A slogan used in New Zealand is, "If production is below the district average, feed is the limiting factor."

Animal Fertility.

Failure of dairy cows to breed regularly seems to be a major problem in New Zealand. Farms were inspected on which as high a proportion as 30 per cent. of the cows failed to conceive in the previous breeding season.

As a first line of attack on this problem an attempt is being made with the co-operation of the veterinary clubs to map the relative incidence of different types of female sterility in New Zealand dairy cows. It is not known to what extent female sterility is the result of biological or physiological causes, respectively, and within each of these main groups, the various sub-groups. As a guide to research, it is hoped to get a sample of up to 5,000 dairy cows in an intensive dairying district, and to classify the causes of sterility.

Fertility in bulls is also being studied. For this investigation identical twin bulls are being used.

Biological Section.

In this section the investigations relating to dairying are:—

1. A method of diagnosing pregnancy in cows in the early stages.
2. A method of assaying hormones with the object of picking out calves which will develop into high-producing cows. The economic benefit to the industry of such a means of early identification of future productivity is obvious.
3. Blood grouping in dairy cattle.—There are 30 blood groups in dairy stock. This study aims at classifying the different groups with a view to ascertaining if any relationship exists between the respective blood groups and milk and butterfat production.
4. Milking machines.—Studies on milking machines and machine milking have been carried out. So far as mechanical aspects are concerned, special attention has been given to vacuum gauges and relief valves. Studies on machine milking have dealt with the rate of milking and non-stripping practices. Co-operative studies by the Dairy Board's consulting staff and Ruakara have been made on some phases of machine milking on numerous farms—e.g., machine milking in relation to mastitis.

Wallaceville Research Station.

This station, situated about 12 miles from Wellington, deals primarily with the health of the various classes of livestock. The Dairy Division has also been provided with accommodation for its laboratory, which performs routine and investigational work for the central and southern portion of its North Island activities.

The organisation of the station provides for subdivision of the work into five sections—diagnosis, biochemistry and toxicology, parasitology, bacteriology and pathology.

The diagnostic section operates as a laboratory service for field officers of the Division of Livestock and the co-operatively organised farmers' veterinary clubs. The other sections are engaged in research projects.

As most of the studies at Wallaceville are of a purely veterinary nature—such as bone diseases, ketosis diseases, mastitis and photosensitivity diseases—reference to them is not called for in this report. Because of its implications to Australia, brief reference will be made to the work in the use of Strain 19 vaccine for the control of contagious abortion in dairy cattle. It was the opinion of Dr. Cunningham and others that methods of keeping contagious abortion in check, or at any rate minimizing the disease to a degree which would render it no longer a serious economic factor, have been demonstrated. In a trial in one badly affected district in 1943, of 10,724 heifers vaccinated, only 3 per cent. aborted from all causes, compared with 22 per cent. of the 11,268 unvaccinated heifers. The average incidence of abortion in the whole Dominion in 1943 was estimated to be 12 per cent. In 1944 the number of heifers treated was 110,000, of which only 2·6 per cent. failed to carry a full-time calf. It was suggested that failure to breed in the vaccinated heifers may not have been caused by contagious abortion. The work has been extended this year to provide for the vaccination of 200,000 calves. The calves are vaccinated when four to eight months old.

Another investigation successfully completed dealt with copper deficiency in certain peat lands. The malady called "peat scours" caused acute scours, milk production was lowered and calves were unthrifty—in fact, previously calves could not be reared in some districts.

Top dressing of pastures with 5 lb. of bluestone annually has proved effective in ameliorating the copper deficiency in affected districts. Actually at the time of our visit trials were being conducted in using aeroplanes to distribute the copper salt on a mass scale in one area.

As already stated, cobalt deficiency in certain areas was another soil-mineral deficiency problem in one district successfully overcome.

Dairy Research Institute.

The Dairy Research Institute is situated in the Massey Agricultural College property, about four miles from Palmerston North, the main town of the Manawatu district. It is in the centre of an intensive dairying district. The institute is equipped with farm, factory and laboratories, and its work covers animal husbandry, dairy manufactures, dairy bacteriology and dairy chemistry. There are two dairy herds—Jersey and Friesian. The bulls kept are proven sires, as well as young bulls (sons of proven sires) which are being proven. As the New Zealand sire survey investigations have shown that the dam contributes only 15 per cent. towards the production standard of her progeny, while the proven sire is so prepotent in his breeding efficiency, Professor Riddet believes in keeping every calf sired by a proven bull, irrespective of its dam.

Informed opinion generally nowadays in New Zealand is placing all emphasis on the improvement of dairy stock via the proven sire or the son of a proven sire, in contrast with the old system of selecting a bull on the production records of his nearest female ancestors. Since the insistence on the use of proven sires, the productivity of the

Institute's herd has been confidently maintained and in fact is improving. Previously, even though highly priced, fashionably bred, but unproved, bulls were used, many disappointments were experienced.

The following investigations on dairy production problems are being pursued at the institute:—

Relation of Plane of Nutrition to Milk Production and Milk Composition.

The object of this investigation is to determine the influence of the plane of nutrition of dairy cows on (*a*) health; (*b*) production; (*c*) chemical composition of milk; (*d*) manufacturing quality of milk for butter and cheese.

Twenty cows were kept on a high nutritional plane and twenty on a low plane for a pre-calving period of 80 days. In this time the first group gained 55 lb. and the second lost 66 lb. in live weight. So at calving the average difference in weight of the cows in the two groups was over 100 lb. After calving the two lots of cows were grouped as one and given exactly the same pastures and other management. It was, in fact, difficult in the paddock to distinguish to which pre-calving treatment each cow had been subjected. The original groups had then been combined for three months.

The experiment had not proceeded long enough for any significant results to be apparent. However, the capacity of the dairy cow to recover from the effects of undernourishment is manifestly evident even from the present appearance of the cows which were in the low-plane group before calving.

Calf Feeding.

The value of calf meal as a supplement to separated milk for calves reared on good pasture was investigated. The calves were put into three groups, one lot receiving separated milk only, the second separated milk plus meal, and for the third lot meal was substituted for portion of the separated milk—½ lb. meal replaced its equivalent (4 lb.) of separated milk. All lots had access to good pasture, rotationally grazed. There was no significant difference in the growth rates in the different groups. The results may be interpreted as indicating (*a*) if separated milk is scarce its use can be economised by substituting meal for portion of the milk; or (*b*) there is no value in reducing the separated milk if it is plentiful. The key to the success of this calf-rearing trial on separated milk and pasture was, of course, the rotationally grazed pasture available to the calves.

Feeding of 10 per cent. v. 15 per cent. of Body Weight of Separated Milk to Calves.

The quantities of milk stated would correspond with average and good calf-rearing methods in New Zealand. So far as the work has gone, the advantage is in favour of the 15 per cent. group, but both lots are regarded as entirely satisfactory.

Variations in Solids-not-fat Content of Milk.

A decline in the solids-not-fat content of milk of the Institute herd occurs in December and January (normally a relatively dry period). This is of economic importance, inasmuch as milk for the liquid-milk

market may fail to reach the legal standard of composition, while cheese-making is adversely affected in regard to manufacturing methods, cheese yield and quality. It is desired to find if the lowering of the solids-not-fat is due to summer temperatures or the lower protein and higher fibre content of grass during the period stated. It was shown that on a low plane of nutrition the solids-not-fat content of milk tends to decline. The experiments are being further pursued with a view to ascertaining also the effect of temperature.

Milk Secretion.

Studies are now being undertaken on the hormonal control of lactation.

By the injection of hormones into an empty cow which had already been in milk for 14 months the animal was induced to continue to produce for another season and 400 lb. butterfat were yielded.

In another trial, milk secretion was initiated in a virgin heifer which yielded 160 lb. butterfat in the lactation period. This work is, however, not yet developed to a practical stage. It has been confined mainly to treating cows from which a season's production would have been missed through temporary or permanent sterility. Hormone studies are expected to add to the knowledge of milk secretion.

Use of Thyroprotein to Stimulate Milk Production.

Thyroprotein, prepared from casein and iodine, has been shown to increase the fat percentage and milk yield of the dairy cow; but is without effect on the solids-not-fat content. About 15 to 20 grams are fed daily. The cow's pulse rate also increases from 69 to 85 and the weight drops, but not markedly. Used in excess thyroprotein is definitely harmful. A cow has been treated for a season without ill-effect, but it is not yet known whether moderate use over an extended period will prove detrimental.

Daily v. Less Frequent Testing of Milk for Estimation of Butterfat Production.

The results obtained have indicated a mean variation of only 1 per cent. between the quantity of butterfat produced by daily weighing and fat testing of one day's milking per month. Clearly, then, the results obtained in the herd testing scheme, whereby a visit, one day monthly, is made by the recording officer, give a reasonably accurate estimation of the productivity of dairy cows.

HERD IMPROVEMENT DEPARTMENT, NEW ZEALAND DAIRY BOARD.

The inauguration of the herd improvement plan in 1938 enabled herd recording work to be intensified and detailed information for research and investigation into milk and butterfat production to be assembled. In the latter connection, the Herd Improvement Department has instituted the following investigations:—

Sire survey work to isolate the high breeding strains and encourage the retention of bulls whose daughters have displayed high productive qualities.

In making a survey the following conditions apply:—

(*a*) *All* tested daughters of the bull *must* be included.

(*b*) The average production of each daughter is calculated from all available normal lactations.

(*c*) At least 10 daughter-dam pairs are required for an "official" survey. (It is necessary for the stock to comply with the prescribed identification scheme.)

(*d*) (i.) A "preliminary" survey is issued on the basis of the first lactation for all daughters.

(ii.) An "intermediate" survey is issued when two lactations have been completed by at least eight daughters.

(iii.) A "final" survey is issued when three lactations have been completed by at least six daughters.

Sire surveys completed up to June, 1944, showed that of 1,833 bulls surveyed 26 per cent. left daughters with higher production than their dams, 28 per cent. maintained production, and 46 per cent. decreased production. The difficulty in ensuring an adequate supply of bulls capable of raising herd levels is thus indicated.

The sire survey work also has shown that, within a breed, there has been a general association between high average test and high butterfat production.

A method of sire survey called "the equal parent index," based on the theory that each parent contributes equally to the milk-producing ability of their offspring, is adopted in some countries. The New Zealand investigations have, however, shown that approximately 15 per cent. of the difference within surveys and within herds can be accounted for by inheritance from the female side (in one generation), while the proven sire has a prepotent influence on the productive capacity of his progeny. This is probably the outstanding discovery in all the herd improvement work.

Age Correction Factors.

For sire survey purposes, it becomes necessary to convert the yields of young cows to a mature equivalent. From an analysis of lifetime production records of 1,500 cows, the following factors have been derived for correcting two-year-old and three-year-old cows' productions to a mature basis:—

Age.	Formula to estimate mature butterfat equivalent.
2 years old	75 per cent. of actual production, plus 150 lb.
3 years old	70 per cent. of actual production, plus 140 lb.
4 years old	No allowance.

These correction factors differ entirely from those used in Australia and other countries, but the New Zealand statistics definitely showed that the previously-used correction factors were not valid.

Herd Wastage.

The collection of data on the causes of culling of cows has enabled the main factors to be classified in their order of importance. Reliable information on the extent of the various factors influencing cullings in dairy herds is of much value to departmental and consulting officers in their duties among farmers and to the farmers themselves by enabling them to take appropriate steps in the care of their herds to minimize, so far as practicable, the incidence of their chief causes of wastage.

The table hereunder shows wastage as a percentage of all cows totalling 155,508 in 2,901 herds over the period 1938-1943.

Cause.	Percentage.
Low production	5·63
Disease—	
Mastitis	3·72
Sterility and abortion	2·63
Tuberculosis	0·33
Calving troubles	0·20
Grass staggers, bloat, &c.	0·47
Deaths or sundry diseases	0·89
Total	8·24
Other causes	2·95
Total wastage	16·82

Effective Average Production.

A technical committee determined that the following principles should apply in ascertaining the effective average production:—

1. The total fat used for the calculation should be that supplied to dairy companies for manufacturing purposes (city milk supply herds are excluded).
2. The "effective" number of cows to be taken into consideration in arriving at the effective average production should be the appropriate weighted monthly average number of cows in milk or intended to be milked on properties during the season.

The method of approach to the problem of getting this information is that all suppliers are asked to supply on a fixed day (usually 15th January) the number of cows milked on that day. This is sent to the factory on a label tied to the milk or cream can.

Through the herd recording associations, detailed figures for the number of cows carried on a large number of properties and intended for milking from August to February, inclusive, are collected. This enables the fixing of the ratio between the number of cows in January and the average number which has to be carried from August to February, inclusive, in order to milk that number. It was found that a mean of 104·25 cows is carried from August to February for every 100 milked in January.

Having obtained (and 95 per cent. of farmers supplied the information) from all factories the total number of cows milked on 15th January, this number multiplied by the ratio 104·25 gives the "effective" number of cows carried by suppliers. The butterfat for each supplier for the year is supplied by the dairy factories. This divided by the supplier's "effective" number of cows gives the average production per cow.

The effective average productions in the different seasons were:—

1940-41.	1941-42.	1942-43.	1943-44.
232·7	216·6	207·2	205·1

Other investigational work pursued by the Herd Improvement Department through data collected by herd testers or consulting officers includes:—a mastitis survey, calf nutrition, general herd nutrition, sterility survey, fertility survey.

SIRE SURVEY WORK AND HERD IMPROVEMENT THROUGH BREEDING.

Summary of Conclusions and Recommendations.

Extracted from the Nineteenth Annual Report of the New Zealand Dairy Board.

Conclusions.

(1) Dairy farmers have based their methods of increasing the production per cow on—

(*a*) Provision of herd replacement by selection of daughters from higher producing dams.

(*b*) The use of pedigree herd sires from dams with butterfat backing considerably above the average of the herd that the bull is selected to head.

(*c*) The recording of herds in order to identify high and low producers and to enable—

(i.) elimination of low producers;

(ii.) rearing of replacement heifers from higher producing cows;

(iii.) Data to be obtained for sire surveys.

(2) In regard to herd improvement since 1920 it may be stated that—

(*a*) The rate of improvement in per cow production has gradually diminished over the past 20 years and is at present practically stationary.

(*b*) The observed improvement in production per cow in New Zealand since 1920 has been mainly due to improved feeding due to top-dressing, better pasture management, conservation of additional winter feed, and the like, with the associated increase in the length of lactation, and to the rapid change in breed composition of herds, rather than to selection and elimination of low producers.

(3) We have critically examined the data on the above points and are agreed that they are soundly based and fairly represent the position in the higher producing and presumably best-managed herds in the industry. The results of surveys are comparable with, and confirm, the results of similar work overseas. The reliability of the data is improved by the fact that, in many cases, it is based on a much larger number of records than similar overseas work.

(4) In respect of breeding and selection methods the data shows that the proven bull is all important because—

(*a*) In order to secure an improvement it is necessary that the 17 to 20 per cent. of animals culled each year for disease, low production or other cause should be replaced by animals of higher producing ability.

(*b*) The improvement possible on the basis of selection of replacements from the higher producing dams is very slow, due to—

(i.) Regression of daughters towards the mean.—On the average only 15 per cent. of the dam's advantage is passed on to the progeny.

(ii.) Heavy culling for disease necessitates saving approximately one-third of replacements from cows below the herd average.

(iii.) Rapid expansion in herd numbers by approximately 1,000,000 cows since 1920 has further limited the scope available for selection.

(iv.) Not more than 30 per cent. of cows have even been tested and therefore two-thirds of farmers do not know which are their highest producing cows.

(*c*) The farmer has therefore been reliant upon the herd sire as the chief means of ensuring that herd replacements will be of superior producing ability to the culls they replace.

(*d*) The 1,078 sire surveys conducted to date indicate that only one in three of the bulls surveyed has improved production in the herd in which he has been used, and the net result is that these bulls have been completely unable to improve production.

(*e*) Further, a considerable proportion of the bulls surveyed have been slaughtered before their breeding worth has been determined and are no longer available to the industry.

(5) We believe the present position has arisen because the grade herds in which these bulls have been used now approximate the same level of production as the pedigree stock from which herd sires are drawn.

(6) The difficulties confronting the pedigree breeders in attempting to raise production have been similar to those of the grade herd, but complicated by the pedigree breeders' dual allegiance to type and ancestry as well as performance and his reluctance to cull vigorously on a basis of performance.

(7) The facts set out above disclose a very disquieting position in the industry, and one which can be viewed with complacency by neither the industry nor the breed societies concerned.

Recommendations.

(1) With the object of rapidly raising the average production of pedigree stock we suggest the breed societies should consider—

(*a*) Encouraging by every possible means the use of proven sires in pedigree herds. The aim of the breed societies should be to have every pedigree calf sired by a proven bull.

(*b*) Selective registration on a basis of performance.

(*c*) As a necessary basis for constructive breeding every pedigree herd should be continuously recorded, but the owner should have the option of excluding any cow from the annual herd average by cancelling her registration.

(2) While every endeavour should be made to promote improvement in our pure-bred herds, we believe that more rapid improvement of grade herds can be secured by—

(*a*) The sire surveying of as large a proportion as possible of the sires in use in the industry while the sires are still living.

(*b*) The use of the best proven sires as widely as possible in grade and particularly in pedigree herds by the widespread use of artificial insemination.

(3) In order that as large a proportion of herd sires as possible may be available for survey, action should be taken to further encourage—

(i.) Continuous recording of as high a proportion of herds as possible in order to provide necessary production data.

(ii.) Individual identification of all heifer calves reared for dairying.

(iii.) Running of selected yearling bulls with heifers and the saving of sufficient heifer calves to obtain a reliable indication of the bulls' worth as early as possible.

(iv.) Retention of herd sires in the industry until such time as the merit of their progeny has been determined by sire survey.

(4) We have reviewed the methods employed in sire surveys and in this connection recommend—

(*a*) As from the present season the results of all official sire surveys be published irrespective of the results of the survey. For the 1943-44 season only it is recommended publication be withheld if any member makes written objection.

(*b*) As soon as conditions permit steps should be taken to publish the results of all official sire surveys in graphical or other convenient detailed form.

(*c*) In order to bring the methods of sire survey into line with our other recommendations, only the first 305 days' production in any lactation should be used in assessing dam or progeny records for sire survey purposes.

(*d*) Bulls eligible to sire merit heifer calves will be those bulls meeting the basis of qualifications for official proven sires. Such fact shall be indicated in the publication of officially surveyed sires.

(5) It is further recommended that as soon as conditions permit steps be taken to establish artificial insemination centres in the main dairying areas. It is hoped that experience gained at Ruakura during the present season will indicate suitable organisation and technique for such centres.

(6) It is considered that education and publicity are fundamental to the success of the scheme outlined above, and we therefore recommend that—

(*a*) The Board arrange for its technical officer to produce a bulletin (or bulletins) setting out the results of the herd improvement work conducted to date and the conclusions which may be drawn therefrom, such bulletin to be distributed as widely as possible.

(*b*) The Board should make the services of its technical officer and its consulting officers available for talks or lectures to groups of breeders, young farmers' clubs, &c., wherever this can be conveniently done. Films or film strips suitable for this purpose should be prepared.

(*c*) An endeavour should be made to have the judging of dairy stock at agricultural and pastoral shows placed on a sounder basis.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock, which qualified for entry into the advanced register of the A.I.S., Jersey and Guernsey Societies' herd books, production records for which have been compiled during the month of August, 1946 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
JUNIOR 3 YEARS (STANDARD 270 LB.)				
Rhodesview Royal Primrose 3rd	W. Gierke and Sons, Helidon	8,827·05	367·248	Blacklands Prospector
SENIOR 2 YEARS (STANDARD 250 LB.)				
Rhodesview Butterfly 4th	W. Gierke and Sons, Helidon	9,424·45	367·738	Alfa Vale Nigel
Rhodesview Biddy 29th	W. Gierke and Sons, Helidon	7,192·3	307·763	Alfa Vale Nigel
Rhodesview Queen	W. Gierke and Sons, Helidon	6,352·05	278·15	Alfa Vale Nigel
Sunnyside Empress 100th	R. Moore, Kingaroy	7,195·85	261·148	Sunnyside Father Christmas
JUNIOR 2 YEARS (STANDARD 230 LB.)				
Fairvale Laurel 3rd	H. L. and C. I. Bruggemann, Kulpi	6,614·55	299·226	Fairvale Reward
Rosehill Gem 6th	Protheroe Brothers, Lawnton	8,394·16	295·232	Dnalwon Felix
The Corals Silver 4th	A. H. Webster, Helidon	5,814·55	249·814	Blacklands Herdsman
Wandegong Countess 11th	H. G. Watson, Killarney	6,436·55	244·554	Blacklands Courageous 2nd
The Corals Petal 6th	A. H. Webster, Helidon	5,663·25	235·064	The Corals Victory
JERSEY.				
MATURE COW (STANDARD 350 LB.)				
Oxford Gracious	W. A. Berderow, Fairney View	6,742·09	400·681	Oxford Ajax
Navua Design's Samaritan	F. Z. Eager, Petrie	6,887·9	353·852	Design's Ruler
Oxford Pamist	Burton Brothers, Wanora	7,618·2	342·366	Oxford Golden Peer
JUNIOR 4 YEARS (STANDARD 310 LB.)				
Strathdean Deanna	S. H. Caldwell, Bell	6,852·45	450·134	Navua Ladoras Ruler
Westbrook Sylvia 15th	Farm Home for Boys, Westbrook	7,240·6	346·882	Orphanage Comet
SENIOR 3 YEARS (STANDARD 290 LB.)				
Hocknell Bravo Camilla	N. C. Webb, Beaudesert	7,229·6	432·231	Navua Victoire Lad
Westbrook Tulip 125th	Farm Home for Boys, Westbrook	6,170·55	347·665	Orphanage Comet
Elwyn Mayflower	E. T. Dunning, Woodford	6,579·3	326·517	Glenside Lone Star
JUNIOR 3 YEARS (STANDARD 270 LB.)				
Trecarne Jersey Lass 4th	J. J. Ahern, Conondale	7,996·46	420·347	Trecarne Some Duke
Westbrook Safety 33rd	Farm Home for Boys, Westbrook	7,077·85	302·684	Mornmoot Clementine's Valour
SENIOR 2 YEARS (STANDARD 250 LB.)				
Oxford Silver Maid 3rd	W. A. Berderow, Fairney View	6,348·3	355·402	Oxford Maid's Victor
Ashview Joybell	C. Huey, Sabine	6,224·15	310·919	Torquay Prince 2nd
Lermont Colleen 2nd	J. Schull and Sons, Oakey	4,802·35	260·485	Lermont Peer

JUNIOR 2 YEARS (STANDARD 230 LB.)

Kathleigh Pippin I	F. W. Kath, Dalby	7,749·6	434·945	Oxford Daffodil's Victor
Kathleigh Dehlia	F. W. Kath, Dalby	6,922·33	379·98	Oxford Daffodil's Victor
Oxford Feodora	Burton Brothers, Wanora	6,667·63	367·766	Oxford Maid's Victor
Romsey Flo	J. Wilton, Killarney	5,882·6	365·322	Oxford Pixie's Victor
Hocknell Bravo Joy	N. C. Webb, Beaudesert	5,219·65	312·106	Navua Victoire Lad
Trinity Candytuft's Choice	J. J. Ahern, Conondale	6,220·2	305·810	Trinity Crowning Effort
Lermont Locketette 2nd	J. Schull and Sons, Oakey	4,997·40	284·475	Selsey Samaris Hallmark
Woodview Flora	P. H. Schull, Oakey	4,241·75	262·760	Lermont Commander
Lermont Lottie	J. Schull and Sons, Oakey	4,785·7	258·654	Lermont Peer
Lermont Golden Lily	J. Schull and Sons, Oakey	4,524·15	248·309	Trinity Noble Effort
Inverlaw Rejoice (244 days)	A. Huth, Milbong	5,142·7	247·319	Trinity Exchange
Woodview Aileen	P. H. Schull, Oakey	4,267·15	236·237	Lermont Commander
Lermont Nora	J. Schull and Sons, Oakey	4,202·85	231·866	Selsey Samaris Hallmark
Wyalla Bonnie	C. Huey, Sabine	4,025·4	230·373	Trinity Noble Effort

GUERNSEY.

JUNIOR 2 YEARS (STANDARD 230 LB.)

Laureldale Liddy	W. A. K. Cooke, Maleny	6.569·2	367·506	Minnamurra Topsy's Sequel

Selection of the Boar and Sow.

E. L. MELVILLE, Adviser, Pig Branch.

THE foundation of a successful piggery is quality stock, well fed and well managed. This can only be attained in the first instance by careful selection of the breeding stock. Too many farmers in the past have been content to use any sort of sows and very often a boar of doubtful ancestry. This must reflect on the quality of our pig meats. The future outlook for pig raising points clearly to the demand for a more uniform type of pig and this can only be achieved by careful selection of breeding stock.

The choice of breed or breeds to select from is for the individual to make, but it would be unwise to purchase pigs of any but the most popular breeds. The more breeders of any one particular breed, the wider the range of selection will be.

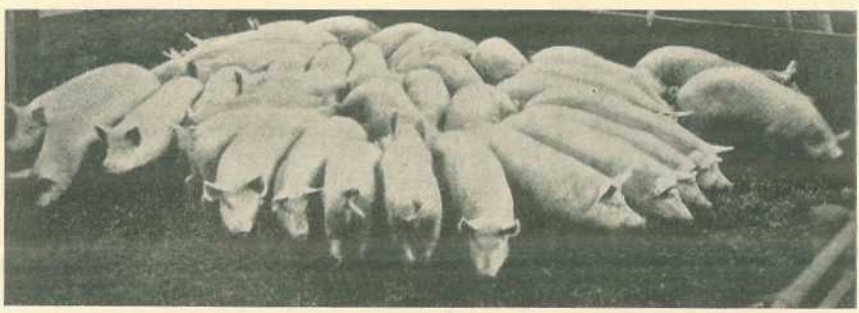


Plate 121.

UNIFORMITY OF TYPE IS REQUIRED BY THE TRADE AND IS AN INDICATION OF THE BREEDER'S SKILL AND MANAGEMENT.

Once the breed or breeds have been decided, the next step is to note those particular breeders who have consistently good records as regards type and prolificacy, and if possible favour the breeder who is making an effort to improve his type of stock by carcase appraisal.

The show ring is a guide to type, although one must not be guided by show awards entirely. Inquiries should be made as to the competition encountered when such prizes were gained. A long string of prizes and champion ribbons is of little use in assessing the value of a stud if there was little or no competition at the particular shows at which these awards were won.

Shows, and Royal Shows especially, have been with the help of competent judges the means of raising type over the years to a level equal to that of any country in the world.

The statement is often made that shows have done little to improve our standards, but how else has the improvement in our pigs been made? In the various carcase competitions held throughout Australia it will be found that the winners in every case claim ancestry to show stock. A competent show judge adjudicates with a definite plan of type in relation to commercial requirements.

While it is not necessary to purchase prize-winners, it will be found that certain families or strains within a breed have consistently good records of type and production and it is from these that selection should be made. A purchaser should always insist on seeing the parents of the animals it is proposed to buy, if at all possible, also any other progeny of the same breeding.

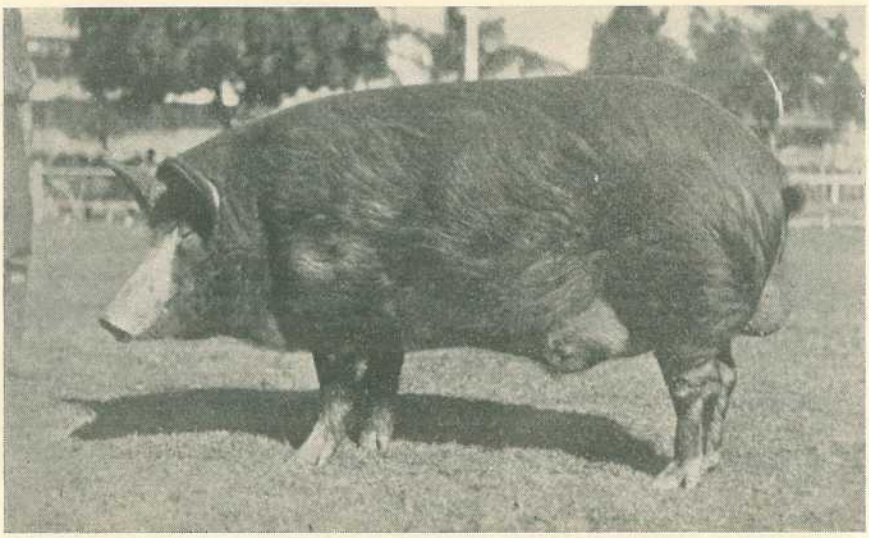


Plate 122.
MASCULINITY, CONSTITUTION, AND TYPE ARE ESSENTIAL IN A SIRE.

The age of the pig to buy depends upon the purchaser. Although the older the animal the more certain one can be of selecting the desired type, it is not good practice to select stock under the age of three or, preferably, six months.

The Boar.

The boar is a most important unit of the pig farm as he will be the sire of all the pigs that are bred on the farm, which during his lifetime may number over 1,000. The wisdom of purchasing only the best strains is clearly demonstrated when the sire's capacity to reproduce is realized.

In conformation, the boar should have a good head typical of his breed, wide between eyes and ears with a bright intelligent eye, jaws well formed, not overshot or undershot when viewed from the side, with a well-formed neck of medium length and running smoothly into the shoulders, which should be wide between the front legs and well filled out behind the shoulder and elbow; avoid the pig that cuts in badly

behind these points. The back should be straight or slightly arched, of good length without any dip over the loins, ribs well sprung, hams well formed and fleshed down to the hocks and tail set reasonably high. The underline should be even and carry well through towards a flank which should be well let down and thick. The teats should be well spaced and extending well forward towards the front legs; these should be at least 10 in number and, in the case of Large White, the standard of excellence requires 12 well-placed teats. (Teat placing in the boar is important, as it will greatly influence the number and placing of his daughters' udders.) The legs should be straight, of medium length, and set evenly into the four "corners" of the body. The pasterns should be strong and short, slightly sloping to firm compact feet; avoid any splaying or crossing of the feet. The skin should be fine and free from wrinkles and

Plate 123.

PROLIFICACY AND THE MATERNAL INSTINCT ARE NECESSARY IN THE BROOD SOW.

covered with an abundance of fine straight hair. When viewed from the front or back the general conformation of the animal should be level along the sides and into the shoulders and giving that "trim" appearance so necessary for commercial requirements.

In general appearance the boar should carry himself with a proud and free action, having visual evidence of his masculinity, character, and constitutional vigour.

Careful handling of the boar when young will do much towards keeping him docile. Bad tempered strains should be avoided, as rarely are they "good doers."

The Sow.

In the selection of foundation stock for the brood sow herd, whether they be pure bred or grade, uniformity of type and conformation is of paramount importance. Their ancestry, like that of the boar, should be of the best within the breed. They should show good body capacity, sound constitution, maternal characteristics, and come from a prolific family.

The sow's conformation is on similar lines to the boar, but whereas the boar may be built on more compact and robust lines, the sow needs to be the feminine version of this type. This may be described as being constructed on a more refined framework without any loss of constitution or vigour and the realisation that ample length and depth of body are essential for the accommodation of her unborn litter and eventually to rear a large litter of healthy pigs.

Young sows should be well fed and kept growing. Sows should not be mated until at least 8 months of age.

Points to remember:—

Select only from the popular breeds and strains of proven blood.
Masculine vigour in the boar.
Maternal characteristics in the sow.
Constitution, character, and commercial suitability.
Prolificacy and docility.
Well fed and housed, success should then be the reward.

TRUCKING PIGS TO FACTORIES.

In view of recent reports of pigs arriving dead or dying in railway trucks at the place of delivery, producers or their agents are strongly advised not to overload railway trucks and to give pigs every possible care and correct treatment before despatch.

It is always an advantage, when pigs have been topped up in enclosed pens, to give them the run of a grazing paddock for two or three days prior to despatch. This accustoms them to exercise and living on their feet, thus they will be better fitted to travel.

The chief causes of deaths in transit are:—

1. Exhaustion, contributed to by overfeeding or feeding too near to the time of loading on the farm, resulting in animals becoming travel sick which lowers resistance to further ailments, distress or accident. Pigs should not be fed on the morning of despatch, but allowed drinking water only.

2. Overloading of railway trucks and particularly the loading of pigs and calves in the same compartment. Under the *Pig Meats Acquisition Plan*, bacon pigs were then being accepted up to 200 lb. dressed weight and this resulted in an increase all round in the weight of pigs received at bacon factories and meatworks and in consequence necessitates a review of the number which should be accepted as proper loading for the various trucks used for this class of stock. It is suggested that loadings be limited as follows:—

F.P. truck—24 to 26 pigs;
L. truck—48 to 52 pigs (24 to 26 on each deck);
M.G.P. truck—80 to 86 pigs (40 to 43 on each deck).

Should extra heavy baconers be consigned the numbers need to be further reduced, also if choppers or backfatters are included the allowance should be on the basis of one chopper or backfatter being equal to two average baconers.

3. Overheating is another frequent cause of loss during transit. Pigs should not be allowed to become overheated and should always be loaded or unloaded by means of a well constructed loading race. If pigs must be marketed during very hot weather they should be delivered to the receiving yards early in the morning and vehicles used should be well covered so as to protect the animals from direct rays of the sun, but allowing for plenty of ventilation.

Sometimes pigs are required to be loaded into the railway trucks late the previous evening for early morning departure of trains. When this is necessary care should be taken to partition off all large or restless stock (old sows and stags) so as to prevent fighting and jostling,

It is wrong to attempt to load exhausted pigs into railway trucks, in the hope that they will recover during the journey, as such pigs rarely survive. However, if given prompt attention and allowed to remain in the resting yards, separated from other stock, they usually regain sufficient strength to ensure safe delivery.

ANIMAL HEALTH

The Tuberculin Test.

A. L. CLAY, Divisional Veterinary Officer.

TUBERCULIN is a digest or extract of tubercle bacilli. It does not contain any of the bacilli themselves and is quite incapable of causing tuberculosis. It was first prepared in 1890 by Robert Koch and at that time attracted as much attention for its possibilities as a cure for tuberculosis as for its use as a diagnostic agent. In the former role tuberculin has not proved a success, but as a diagnostic agent time has shown it to be of very great value. The tuberculin test was first used on cattle in 1891 and is now being used more than ever before, so that it can be seen the test is no mere passing phase of veterinary practice.

What is the Tuberculin Test ?

The test is one designed to determine the presence or absence of tuberculosis in the animal under test. This it does with a high degree of accuracy. It does not, however, give any indication of the extent of the disease in the animal, nor does it indicate whether the animal is shedding tubercle bacilli in its milk.

The test is carried out on the animal itself, not in the laboratory on a blood or milk sample. It consists essentially of the introduction of tuberculin into the animal's tissues and subsequent observation of the effects of such introduction.

How Does the Test "Work" ?

There is no entirely satisfactory explanation of how the test operates. Several different theories have been put forward at various times. Nowadays, it is generally conceded that the tuberculin reaction is allergic in nature; that is to say, the tuberculous animal is in a sensitive state or condition which can be demonstrated by exposing the animal either to contact with tubercle bacilli themselves or (as happens in the tuberculin test) to extracts of these organisms. Sensitivity is revealed, according to the type of test employed, by a rise in temperature, by a swelling at the site of inoculation of the tuberculin, or by a discharge from the eye.

How is the Test Usually Carried Out ?

The test is usually carried out in one or two ways, namely, the subcutaneous or temperature method and the intradermal (intracutaneous) or skin sensitivity method. A third method known as the ophthalmic or eye test method is seldom used nowadays.

Subcutaneous Method.

In this method temperatures of the animal under test are taken with an ordinary clinical thermometer both before and after the injection of tuberculin. Usually, two temperatures are taken before the tuberculin

is injected, one in the mid-afternoon and the other just before the time of injection. The two readings are averaged and the figure so obtained is spoken of as the pre-injection temperature.

The injection of tuberculin is usually made between 8 p.m. and 9 p.m. As the name of the method implies, the tuberculin is injected subcutaneously (hypodermically).

Temperatures taken after the injection are spoken of as post-injection temperatures and are taken at the 9th, 12th, 15th, and 18th hours after injection of the tuberculin. The result of the test is determined by comparisons of the pre-injection temperature and the post-injection temperatures.

Intradermal Method.

In this method tuberculin is placed in the skin itself. A mere drop of tuberculin suffices, but the injection is a precision one and requires skill. The site usually selected is one or other of the two folds of hairless skin to be found high up under the base of the tail. The injection is made in this position largely as a matter of convenience, there being no need to shave the skin beforehand. It could be made elsewhere and in fact in England is very often made in the skin over the sides of the neck.

Nowadays, with the improved types of tuberculin available it is customary to make only one injection. With the older types of tuberculin previously in use two injections were required, the second being made 48 hours after the first.

The injection site is examined for the presence of swelling 72 to 96 hours after the time of injection. This is called "reading" the test. Animals which exhibit swellings have given a positive reaction to the test, whilst those which do not are negative. The size of the swellings given by positive reactors varies widely but for the most part is something in between a bean seed and an almond nut. Large swellings do not necessarily indicate "bad cases" of the disease but simply high sensitivity to tuberculin.

Does Proximity to Calving Affect the Reliability of the Test?

With the subcutaneous test this question has some point, but not with the intradermal test. However it is not a question of the reliability of the test undergoing change so much as the cow near calving being an unsuitable subject for the test. The high temperatures which cows run as calving draws near make the interpretation of post-tuberculin injection temperatures difficult. As the intradermal test is not dependent on temperature but on skin sensitivity, on which calving has no effect, that test remains quite suitable even when calving is imminent.

Does Feeding Affect the Reliability of the Test?

Heavy feeding during the progress of the subcutaneous test may force temperatures up and thus render the interpretation of post tuberculin injection temperatures difficult, but again there is no question of any effect on the reliability of the test itself. With the intradermal (skin sensitivity test) feeding can be as heavy as may be without any effect whatsoever.

Does the Tuberculin Test Condemn any Healthy Animals?

Perhaps this is the question most frequently asked by persons having their first experience of the test. It requires to be considered in conjunction with the question,

Does the Test Pass any Animals which are Tuberculous ?

The answer to the second question is an unequivocal affirmative. It is nowadays well recognized that the old-standing advanced case of tuberculosis does on occasion fail to exhibit sensitivity to tuberculin. Fortunately such animals usually reveal themselves by their appearance, but in heavily infected herds it is necessary to be on the look-out for them.

The answer to the first question cannot be stated unequivocally. For one thing it is necessary to be quite clear on how we are going to determine whether an animal is tuberculous or what we expect to see when we carry out a post-mortem examination of a reactor to the test. On the average, cattle exhibit sensitivity to tuberculin about 30 days after they contract tuberculosis. Very little, if anything, in the way of disease can be seen post-mortem at this time, and in general a further 30 days (making 60 days from time of infection) has to elapse before evidence of tuberculosis can be detected with the naked eye with any degree of facility. Even then careful search of the carcase is often necessary as the lesion may be quite small. Often, when lesions are not visible to the naked eye, the presence of tubercle bacilli can nevertheless be proved by inoculating small laboratory animals with material obtained from glands from the tested animal.

It cannot be stressed too much that the routine inspection of cattle at abattoirs (to determine whether meat is suitable for use as food) cannot be expected to reveal all lesions of tuberculosis which are present. It has been shown repeatedly that an exhaustive search often revealed the presence of small lesions of tuberculosis which ordinary meat inspection methods did not detect. This is no reflection on the methods employed, as the detection of small isolated lesions of tuberculosis in the internal organs is not of any significance in relation to judgment on the suitability of the carcase meat for food.

It will be seen, therefore, that when an animal reacts to tuberculin we must not necessarily expect to be able to demonstrate the presence of disease in all cases. It is, notwithstanding, probable that in rare instances animals exhibit sensitivity to tuberculin for reasons other than that they are affected with bovine tuberculosis; but it can be stated, practically with certainty, that this happens far less commonly in Queensland than in many other countries.

Why are Repeated Tests Necessary ?

A single test only reveals those animals which are sensitive to tuberculin at the time of the test. It does not reveal those animals which are infected but have not yet developed sensitivity, nor does it take any account of those animals which may become infected by tubercle bacilli persisting in feed boxes and in pasture after the reactors to the test have been removed from the property. Where reactors are found at a first test of a herd it is very necessary to have repeat tests at intervals of about three months in order to eradicate the disease completely.

Conclusion.

Many farmers in Queensland are at present making their first acquaintance with tuberculin testing and it is hoped that this article will provide satisfactory answers to many of the questions which one is frequently asked in connection with the test. The test has been tried and proved in the hard school of experience over a period of nearly sixty years and stands to-day as one of the most reliable diagnostic tests in veterinary medicine.

REGISTERED HATCHERIES

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

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

REGISTERED HATCHERIES—*continued.*

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

REGISTERED HATCHERIES—*continued.*

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

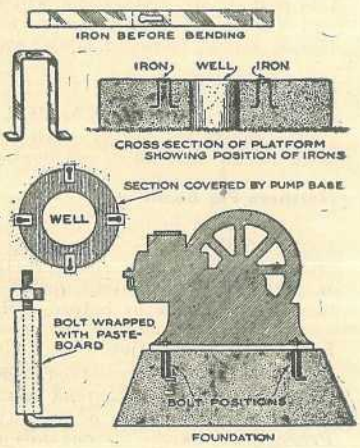
AFFIXING FARM MACHINERY TO CONCRETE BASES.

This makes removal for repairs, etc., easy, whilst two ways are shown for setting bolts into concrete foundations, the upper method being particularly adaptable to pumps.

Take 4 pieces of flat iron about 18 in. long and bend into U-shape, as shown. Drill holes large enough to permit entrance of bolthead in each piece, and from this hole cut a slot a trifle wider than the shank of the bolt and about 1⅛ in. long.

Suspend these U-pieces in the mould with slots pointing to the centre in such a position that the centre of the slots will be in line with the holes in the pump base. Make sure these are not moved out of alignment when concrete is placed.

As soon as concrete has set sufficiently to prevent flowing, the bolts are placed in position and worked back and forth in the slots to remove some of the cement and form a cavity for the bolt heads. The one difficulty in setting the bolts is to space them properly so as to enter the holes in the engine base.



For the other, take bolts or pieces of ½ in. rod about 12 in. long threaded on one end. Bend the other end 3 in. at right angles.

Suspend bolts from stationary wooden strips laid across form in a position corresponding to holes in engine bed. Before cement is poured in, wrap the shank of the bolts with heavy pasteboard or corrugated cardboard to make cylinders about 1 in. in diameter. After cement has hardened, these cylinders will still be soft from moisture absorbed and can be easily removed, leaving holes in the base that permit a fair range of movement of bolts.

—*From "Handy Farm and Home Devices and How to Make Them." (J. V. Bartlett for War Blinded Association, Adelaide, S.A.),* 1946

GENERAL NOTES

Staff Changes and Appointments.

The appointment of Mr. H. K. Lewcock, B.Sc. Agr., M.Sc., as Assistant Director of Marketing and Senior Marketing Officer in the Department of Agriculture and Stock has been confirmed.

Mr. G. D. Daly, Assistant Bacteriologist, will be transferred from the Animal Health Station, Oonoonba, to the Animal Health Station, Yeerongpilly.

Mr. O. St. J. Kent, B.Sc., A.A.C.I., Senior Dairy Technologist in the Division of Dairying, Department of Agriculture and Stock, has tendered his resignation on acceptance of an appointment as Chief Dairy Research Officer and Principal of the School of Dairy Technology, Department of Agriculture, Victoria.

Mr. L. E. Nichols, B.Sc.Agr., Dairy Technologist, Toowoomba, has been appointed Acting Assistant Director and Senior Dairy Technologist, Division of Dairying, Department of Agriculture and Stock.

Two growers' representatives on the Banana Industry Protection Board are appointed annually, and Messrs. W. A. H. Cheales (Gympie) and V. G. Tredwell (Currumbin) have been appointed as representatives on the Board until the 30th September, 1947. The Government representatives are Dr. W. A. T. Summerville (Director of Horticulture) (chairman), and Mr. J. H. Simmonds (Officer in Charge, Science Branch).

Special leave of absence has been granted to Mr. A. K. Sutherland, B.V.Sc. (Syd.), Government Veterinary Officer stationed at the Animal Health Station, Yeerongpilly, to enable him to accept a graduate assistantship at the College of Veterinary Science at Illinois, U.S.A., for a period of one year. At the expiration of this period, Mr. Sutherland will return to the Department of Agriculture and Stock, and the knowledge and experience in veterinary laboratory work gained in the U.S.A. should prove of considerable benefit to Queensland stockowners.

Milk Board.

Regulations under *The Milk Supply Act of* 1938 have been amended to provide that straight-out voting shall be employed in future elections of members of the Milk Board, instead of optional preferential voting as at present in force.

Northern Pig Board.

An Order in Council has been issued under *The Primary Producers' Organization and Marketing Acts* giving notice of intention to extend the operations of the Northern Pig Board for a further period of three years from 1st January, 1947. A petition for a poll to decide whether the Board's operations shall be continued may be lodged on or before 18th November.

Egg Board Boundaries.

A petition was received recently from egg producers requesting the issue of an Order in Council to extend the present boundaries of the Queensland Egg Board. Accordingly, a notice of intention to make such an Order in Council under *The Primary Producers' Organization and Marketing Acts* received the approval of the Executive Council. Growers of eggs in the area concerned may lodge a petition to decide whether the Order in Council shall be made, such petition to reach the Minister for Agriculture and Stock on or before 18th November.

If the proposed additional area is placed under the control of the Board, its territory will embrace the whole of the area under Commonwealth wartime control, with the exception of the shires of Eidsvold and Monto. The Commonwealth proposes to terminate its wartime control of eggs at the end of December.

Wild Life Preservation.

By an Order in Council under *The Fauna Protection Act of* 1937, the camping and water reserve R.11, on "Booralie," Bowen, the property of Mr. G. H. Kelsey, has been declared a sanctuary for the protection of fauna.

Drought Relief.

The Minister for Agriculture and Stock (Hon. H. H. Collins) has announced that cheques to the value of approximately £50,000 had been sent to dairy farmers who had suffered hardships, because of the dry conditions which prevailed in some dairying areas during the year 1944-45, and had applied for assistance. This money, which is an outright grant, was provided in equal proportions by the Commonwealth and this State.

Stock Food Standards—A Warning.

The Minister for Agriculture and Stock, Mr. H. H. Collins, stated recently that many complaints were being received by his Department from farmers in dry areas about the adulteration of hay and chaff sold to them. All people who are concerned with the growing, baling, chaffing, or sale of hay and chaff are warned that it is an offence under The Stock Foods Acts to sell any of these materials containing any substance harmful to animals or which has been added for the purpose of fraudulently increasing the weight; and such material may contain not more than 5 per cent. by weight of any foreign substance even if it is not harmful to animals.

Southern Cane Growers' Executive.

Following the closure of Eagleby sugar mill, near Beenleigh, an Order in Council has been issued under the *Primary Producers' Organization and Marketing Acts* providing for altered representation on the Southern District Cane Growers' Executive. Instead of one representative each of suppliers to the Eagleby and Rocky Point mills and three to the Moreton central mill on the Executive, there will now be two representatives of suppliers to Rocky Point mill and three to the Moreton mill. A further Order in Council alters the list of mill suppliers' committees appearing in subsection (4) of section 30 of the abovementioned Acts by deleting the name of Eagleby mill.

Proposed Central Queensland Egg Board.

The Executive Council has approved of the issue of a notice of intention to make an Order in Council under the *Primary Producers' Organization and Marketing Acts* constituting a Central Queensland Egg Board.

The proposed Marketing Board shall consist of four elected representatives of the producers of eggs and the Director of Marketing . Such representatives shall be elected triennially and shall hold office for three years. One representative shall be elected for each of the following districts:—

District No. 1.—The town of Gladstone and the shires of Monto, Miriam Vale and Calliope.

District No. 2.—The shires of Mount Morgan and Banana, the Theodore Irrigation Area, the shires of Bauhinia, Duaringa, Emerald and Peak Downs, and that portion of the shire of Belyando which is east of the Drummond Range.

District No. 3.—The city of Rockhampton and the shires of Fitzroy and Livingstone.

District No. 4.—The city of Mackay and the shires of Broadsound, Sarina, Mirani, Pioneer and Proserpine.

Tanning Hides and Skins.

The answers to many inquiries will be found in a new booklet entitled *Tanning Hides and Skins*, which is now available. Its contents include the preparation of white hide for leg ropes, information on the chrome leather process, the making of sheepskin mats and rugs, methods of tanning marsupial and other skins, waterproofing coats and home-made oilskins and tarpaulins and ways of preparing greenhide. This useful little handbook is published by the Farmers and Settlers Newspaper Proprietary, Sydney. Our copy is from Edwards, Dunlop & Co., Edward street, Brisbane, from whom copies may be obtained (price, 1s. 6d.; postage, 2d. extra).

Rural Topics

Another Big Shearing Tally.

M. Fisher of Augathella shore 315 ewes and lambs in 7 hours 45 minutes at Bunda Bunda Station, North-west Queensland, on October 2nd, using four combs and nine cutters. Probably he would have put up a record had he not lost 15 minutes. Fisher's tallies for eleven days, when rain stopped work, were 241, 261, 315, 236, 231, 259, 249, 217, 209, 249, and 217.—C. Frewen in the *Courier-Mail* (Brisbane).

Thus a *Courier-Mail* commentator:—

This report of the shearing tally of 315 sheep in 7 hours 45 minutes, put up by Mick Fisher, of Augathella, has set chins wagging among old-time shearers in Brisbane. They gave the palm to Jack Howe, whose name perpetuated the "Jackie Howe singlet." In eight hours, one day in October, 1892, he shore 321 sheep with blades at Alice Downs Station.

Although they had no definite records to back up their statements, they said Howe's record had been exceeded only once by a shearer in West Australia, who had tallied 326 in a day.

Among the mighty shearers of modern times—since the advent of the machine—they numbered Sandy Urquhart, who shore 310 in a day at Newstead Station, Ilfracombe. Tony Ogden had tallied 315 at Leichhardt Farms Station, near Aramac. Howe, Ogden, and Urquhart's records, they said, were more notable in that they gained them shearing full-wool sheep carrying fleece of at least 12 months' growth. These are the hardest sheep to shear.

George Pont, father of the A.W.U. district secretary of that name at Longreach, established a record in 1936, when, at the age of 68, he shore with hand blades enough stud rams to average him a wage of more than £4 a day. His average was produced at Terrick Terrick Station, near Blackall, after a run of several weeks, and meant that he tallied near the 200 mark.

Comparable with Pont's performance was that of Ted Dean, who, two years ago, averaged 200 a day in an extended run at Hereward Station in the Longreach district. He celebrated his 65th birthday at this shed, and on the day he became eligible to draw old-age pension he tallied 225 sheep.

[In his heyday, Ted Dean was one of the fastest shearers in Australia. An old Westerner, Bob Matthews, has supplied us with authenticated summaries (originals seen) of some of his daily tallies which include the following totals of 200 sheep and over]:—

Terrick Terrick Station, September, 1907—205, 202, 207, 204; October, 1907—218, 236, 274, 210, 226, 235, 201. Lorne Station, November, 1907—222, 216, 211, 211, 202. Mount Morris Station, December, 1907—204, 227, 218. Northampton Downs, April, 1908—203, 203; May, 1908—211. Cambridge Downs, June, 1908—210, 213,; July, 1908—210, 210, 238. Alice Downs, July, 1908—241, 209; August, 1908—274, 237, 223, 217, 261, 260, 283. Terrick Terrick, September, 1908—206, 210, 219, 227, 215, 213, 231, 214, 213, 238, 250, 222. Lorne, October, 1908—219, 229, 232, 225, 233; November, 1908—220, 206. Mount Morris, November, 1908—206, 206, 206; December, 1908—200.

Ted Dean's average for three sheds—Terrick Terrick, Lorne, and Mount Morris—in the 1907 season was 153; highest daily tally, 274. For the six sheds—Northampton Downs, Cambridge Downs, Alice Downs, Terrick Terrick, Lorne, and Mount Morries—in the 1908 season his average was 163; highest daily tally, 283; highest weekly tally, 221; days worked, including wet weather, 136.—Editor, Q.A.J.]

Bob Matthews (Hawthorne, Brisbane) writes: "Ted Dean's 283 in 1908 was the best tally cut since Jack Howe's day—321, when the average weight of the Australian fleece was only 3 lb. 8oz., bare bellies and clean points, compared with the 7 lb. fleece of 1908. Jack Howe, with blades; Ted Dean, machine. On the day Ted Dean shore 274 at Terrick Terrick (11th October, 1907) I had the assurance of the shed overseer and bookkeeper at the time (Messrs. Jobson and O'Reilly) that on one run he shore 7 sheep in 9 minutes."

Shearing Records of Yester-year.

Subjoined is a reprint of an interesting clipping from the *North Queensland Register* of about 28th October, 1908:—

"Mr. J. Leahy, General Secretary of the Machine Shearer's and Shed Employees' Union, writing in the *Pastoralists' Review* of the 15th instant, (15-10-1908) says:—

"In last month's issue, page 586, I noticed an article headed 'A wonderful Shearing Record,' the same being a record of portion of the sheep shorn at Murnpeowie Station, South Australia, by one of the teams of the Federal Sheep-Shearing Company, wherein it is claimed that, using Moffat-Virtue machines, this station put up a record for Australia. Such is not the case. The best average for a big team of shearers in Australia in the last sixteen years was put up at Alice Downs Station, Blackall, Queensland, this year by one of my teams using Wolseley machines.

"I have carefully noted the tallies of the Murnpeowie team and am herewith enclosing a copy of the tallies of the Alice Downs team for four days. You will note that there is a difference in the average of the two teams from drummer to ringer. The sheep at Alice Downs were shorn in a most satisfactory manner, the owner being greatly pleased with the way in which the sheep were put through, and on the completion of the shearing he complimented the overseer on the way he had conducted the shearing.

"You will also note that I am giving you the time worked each day, and if you wish to verify these tallies you can inspect the tally book, the tally sheet, and the ledger. I think after inspection you will agree that there is no comparison at all between the two teams. I am quite prepared to give you the results from the date of starting to the date of finishing, and I think that, on seeing the same, you would be greatly surprised.

"The daily tallies were:—

	10th August.	11th August.	12th August.	13th August.
W. F. Smith	126	140	136	128
C. Pugh	152	181	173	183
D. Patterson	169	196	204	190
Mart. Murphy ..	178	200	205	195
N. Brown	140	151	184	174
J. Phillips	143	161	170	172
W. H. Garvie	149	171	228	206
H. A. West	153	177	225	202
E. R. Webber	152	144	181	167
O. Harrison	204	240	239	248
H. A. Marsh	209	238	234	256
D. O'Malley	182	208	212	206
J. Matthews	127	135	152	152
R. Matthews	267	111	138	147
W. Spence	140	164	165	163
Mick Murphy	174	213	207	207
G. Bennett	183	—	—	—
E. R. White	174	225	219	226
W. Patterson	155	167	165	168
E. Broomfield	156	177	167	153
T. Case	136	148	148	150
Joe O'Malley	138	145	133	102
E. Harrison	164	205	193	218
J. Boyland	176	200	201	217
C. Maude	188	225	214	224
E. Dean	217	261	260	283
H. Lane	180	213	217	233
E. L. Fern	187	197	201	213
Totals	4,719	5,003	5,171	5,183

The number of shearers employed was—for one day, 28; for the following three days, 27. Allowing twenty-eight men for each day, the average works out at 184¾ per man. The average of my ringer (E. Dean) is 255 as against 241 cut by Day.

"The time worked and the average per man per day were:—

	hrs.	mins	Average.
10th August	8	20	168
11th August	8	25	185
12th August	8	25	191
18th August	8	25	191"

GADGETS AND WRINKLES

A USEFUL SMOTHER FOR GRASS FIRES.

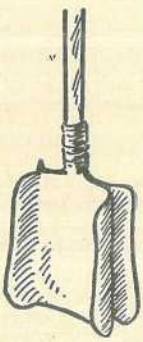
This is another quite useful idea for extinguishing a grass fire as it has been used with success by one farmer, and in districts where grass fires are likely, it is well worth while keeping a few old tyres handy for use as suggested, as grass fires can be fairly quickly extinguished by dragging the tyres over the grass as shown here.

The tyre is wired to the end of a light pole and it is pulled over the burning grass as indicated.

It is quite effective and there is very little danger of the rubber igniting, if the tyre is moved fairly rapidly, which would of course also be better in order to put the fire out.

A USEFUL FIRE BEATER.

This handy tool or "fire flap" is a most useful one for extinguishing grass fires. It is far more efficient than the usual twig as it does not spread the sparks but stifles the flames, and the rubber does not catch fire.



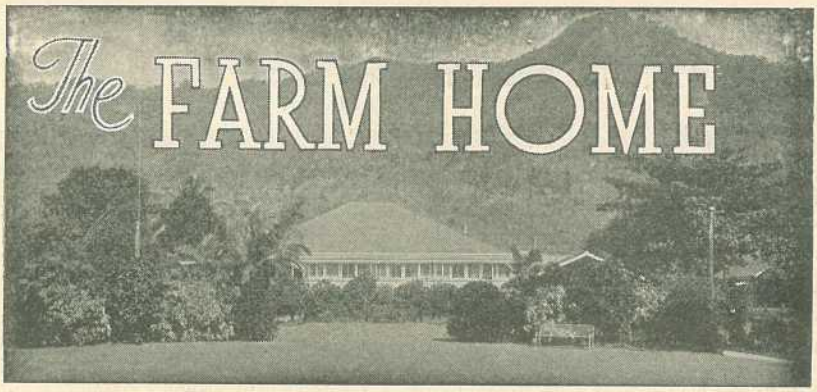
As seen in the sketch, two rubber flaps are cut from old 6 in. motor inner tubes; each flap should be, if possible, 14 to 15 in. square, with an extra length in the middle of each flap of about 3 in. wide and 4 in. long.

The flaps are laid one on top of the other, the extra centre bit is folded round a wooden handle of 4 to 5 ft. in length. Broomsticks might be used but a little longer handle is preferable.

The centre piece of the flaps are firmly nailed to the handle then bound with wire and the wire is then covered by rubber binding.

One user of this type of fire-flap has used them periodically for several years with much success. It might therefore be advisable for any who live in fire danger areas to make several of these in their spare time to have handy in case of need.

The items on this page have been extracted from "Handy Farm and Home Devices and How to Make Them," a recent notable work by J. V. Bartlett, published in Adelaide on behalf of the War Blinded Association.



Care of Mother and Child.

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

"THE BABY WHO CRIES TOO MUCH."

ONE of the more common problems a mother has to deal with is her baby's crying. This often worries a mother with a first baby because she has not learnt all the reason why babies cry and when she has just arrived home from hospital with her very new baby and he starts to yell lustily she is upset and anxious.

The first thing mothers have to realize is that all young babies cry at times because it is their only way of expressing themselves, but if a baby cries unduly there may be something wrong and the cause must be sought.

Do not imagine that every time a bay cries he is hungry—if he is fed at regular intervals, is gaining sufficient weight, he is not likely to cry from hunger except perhaps just when his feed is due. But if he is not gaining enough weight he may be hungry, and the sister at the welfare centre will arrange some test feeds for him.

There are lots of other causes for crying besides hunger. Baby may be thirsty in hot weather in which case a drink of boiled water will put a stop to his crying, or he may be uncomfortable from tight or wet clothing, or he may be dressed too warmly or not warmly enough, or he may be sleepy or overtired. The mother should be on the look-out for these causes and correct them if they occur. Babies seem to cry a little more when they are first home from hospital, perhaps because the surroundings are strange and the mother may not handle a babe quite as securely and expertly as the nurses. But this problem should soon be overcome as long as the mother does not worry about it. If she loves her baby and is interested in doing the right thing she will quickly learn to keep calm and to handle the baby firmly.

When the baby's napkin has been changed and it is seen that he is comfortable and there is nothing wrong with him, he should then be left alone.

He must not be picked up constantly, rocked, or walked, to make him stop crying, or he will become a spoilt little tyrant in no time. An occasional good cry will not hurt the baby or cause a rupture, as mothers are sometimes told by misguided neighbours.

Nevertheless, there is nothing more upsetting to parents than a constantly crying baby, and a mother needs someone who is very experienced in the care of babies to turn to when her baby appears to be crying too much.

If she has tried all the usual measures without success, she should see her doctor or take her baby along to her welfare centre, and have the matter thoroughly investigated.

Any further information may be obtained by communicating personally with the *Maternal & Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

Dishes from Cold Meat.

Hot Pot.

Take any left-over cold meat, cut small or mince, put in a piedish with 1 or 2 sliced onions, and carrot if liked. Pour over 3 tablespoons flour mixed with about 1½ cups or more of water and 2 or 3 tablespoons tomato sauce and hot sauce. Put lid on dish and bake two hours or longer. Serve hot, with mashed potatoes.

Making Cold Corned Beef Tasty.

Cut the beef in rather thick slices, dip in batter and fry in the usual way. Serve with apple sauce. Use a good nut of butter to two good-sized apples and no water; if the meat is very salty, sweeten the sauce.

Beef Mould.

Take 1 lb. cold roast beef and 2 oz. bacon and ham and mince them. Fry 1 chopped onion in a little butter and add minced meat to pan. Heat well, adding 1 gill of stock or gravy, 4 oz. breadcrumbs, 1 tablespoon of chopped parsley, a pinch or two of dried herbs, 1 beaten egg and a seasoning of salt and pepper. Butter a mould, which should be sprinkled with breadcrumbs before adding mixture. Bake same, covered with a greased paper, for three-quarters of an hour.

Curry.

Required: 1 lb. of any kind of cold meat, ½ pint of stock made from the bones, 1 level tablespoon of curry powder, 1 dessertspoon of chutney, 2 small onions, 2 medium-sized cooking apples, 1 oz. of dripping, salt. Peel and core the apples, peel the onions, and chop rather small. Melt the fat in a pan, put in the onions, the meat and apples, cut in cubes, sprinkle with the curry powder and a little salt, and fry until they are nicely browned. Add the stock, stir for a few minutes, then turn the whole into a casserole with the chutney, and cook gently in a moderate oven for 1½ hours.

Meat in Sauce.

Peel and fry one or two onions, cut in quarters, and when just coloured sprinkle in 1 oz. of flour. Let it all cook a minute or so before adding a cup of stock—either meat or vegetable—or failing that, meat extract and water, a pinch of powdered herbs, a little vinegar, a seasoning of salt and pepper, and two tomatoes. Let it all boil gently till the vegetables are quite tender, then pass through a gravy strainer. Trim some slices of cold meat, lay them in the sauce, and heat up gently. When half done, add a little pickle. Serve with mashed potatoes.

Meat Patties.

Scraps of cold meat, 1 teaspoon minced onion, 1 teaspoon minced parsley, cold mashed potatoes, 1 tablespoon of gravy, ½ oz. butter. Mince the meat very finely and mix with the rest of the ingredients except the butter and potatoes. Put into well-greased patty tins, cover with mashed potatoes dotted with small lumps of butter, and bake until brown.

Scotch Collops.

Mince the meat with a little fat. To ½ lb. minced meat, allow ½ teacup breadcrumbs, ½ cup stock, 1 onion, 1 dessertspoon dripping, a few drops of sauce or ketchup, pepper, salt, and a dash of grated nutmeg. Melt the dripping in a pan, and when it is smoking hot put in the minced meat and the onion finely chopped. Pound these with a wooden spoon until the meat is nicely browned. Pour in the stock or add a meat cube dissolved in a little water. Season, put on the lid and simmer slowly for half an hour. Then add the breadcrumbs, which will absorb any liquid fat, and cook a few minutes longer. Garnish with small pieces of toast and serve with baked tomatoes.

Carne Pie.

A quarter of a pound boiled macaroni, 1 breakfastcup of minced cooked meat, ½ lb. tomatoes peeled and sliced, 1 teacup of brown breadcrumbs, 1 onion, 1 oz. butter, pepper and salt. Arrange the macaroni, tomato, meat, onion and seasoning in layers in a well-greased piedish, placing the breadcrumbs and dabs of butter on top. Bake from half to three-quarters of an hour.

Kentish Steak.

Put cold roast beef or mutton through mincer with celery and some parsley. To 3 cups of meat add 1 cup of breadcrumbs, 3 dessertspoons softened dripping, a small onion (minced), pepper and salt. Sprinkle with flour, mix all ingredients with beaten egg and bake about 20 minutes, basting two or three times with hot vinegar and dripping. Spread a layer of crumbs and one beaten egg over the top, return to oven to brown, and serve with potato chips and peas.

Vegetables on the Menu.

Vegetable Charlotte.

Two eggs, 1 cup stock, 1 tablespoon butter, seasoning, breadcrumbs, 3 tablespoons grated cheese, 4 cups mashed cooked vegetables (carrots, potatoes, beans, peas and onion). Mix stock and vegetables smoothly, add beaten egg yolks, cheese and seasoning. Whip egg whites stiffly, fold into mixture, pour into fireproof dish and cover with crumbs. Dot with butter and bake 40 minutes in moderate oven.

Potatoes in White Sauce.

Potatoes browned in the oven in a white sauce are excellent with fish. For two very large potatoes, make ½ pint of sauce. Cut the potatoes in dice and put them in a buttered baking dish with layers of the sauce. Scatter with breadcrumbs and brown in the oven or under the grill. Make the white sauce by blending a tablespoon of margarine and flour, add half a cupful of milk, stir until smooth, and season with salt and pepper.

Baked Carrots.

Three cups grated carrots, 3 tablespoons butter, salt and pepper. Place grated raw carrots in baking dish with tight cover. Bake in a moderate (350 deg. F.) oven for half an hour. Just before serving sprinkle with salt and pepper and dot with butter. Carrots baked in this way have an extraordinarily rich, sweet flavour. A sprinkling of ginger may be added to carrots before putting in oven for added flavour. Whole carrots, firm and of fair size, may be baked carefully in the oven, and they offer a similarly sweet flavour. Wash and clean carrots and bake in skin. When cooked, cut in half lengthwise and add butter and seasonings.

Cooking Dried Peas.

Dried peas, when nicely mashed, are tempting in appearance, as their soft green colour contrasts so well with whatever they are served. For instance, a dish of cutlets piled against a mound of mashed potatoes, with little heaps of mashed peas, arranged as a border, and a touch or two of thick tomato sauce, not only makes a nice scheme of colour for a one-dish course, but is as good as it looks. Sausages can be substituted for the cutlets. To cook the peas they should be soaked over-night with a little bi-carbonate of soda, then well boiled, passed through a coarse sieve, and mashed with butter and milk (or bacon fat), and seasoned to taste.

Beetroot Mould.

Ingredients: 2 dessertspoons (½ oz. gelatine, 2 average-sized beets (cooked), 1 cup (½ pint) hot water, ¾ cup vinegar, pepper, salt, sugar to taste.

Method: Peel and slice beetroot. Dissolve gelatine in hot water. Add sugar, salt, pepper and vinegar. Leave to thicken slightly, then pour over the beetroot. Serve garnished with shredded lettuce and slices of tomato. Serve with mayonnaise dressing. If liked, more vinegar and less water in proportion may be used in this recipe. If setting in an ice-chest or refrigerator, use less gelatine—1¾ dessertspoons.

Pumpkin Fritters.

Take one teacup mashed (boiled) pumpkin made into a stiff batter with flour; add one teaspoon baking powder, a pinch of salt; a pinch of ground cinnamon, half a teacup sugar, 2 well-beaten eggs, and sufficient milk to make batter the consistency of dropscones. Have a frying-pan ready with hot fat, then drop batter by tablespoon into frying-pan. Fry a nice brown. When done serve hot, and sprinkle sugar and ground cinnamon over them.

Cauliflower Fritters.

Break off the sprays of a cooked cauliflower, season each with salt and pepper, dip in frying batter, and fry in deep fat. Drain well and serve piled on a hot dish. Garnish with fried parsley.

Cabbage with Sour Sauce.

Take one small head cabbage, 2 tablespoons sugar, 3 or 4 tablespoons vinegar, 2 tablespoons butter, 1 cup thick cream, 1 egg. Cut cabbage into eighths, then soak in cold water. Boil in salted water for 20 minutes. Put the butter into a saucepan with the vinegar, mix and add sugar. Stir constantly over the fire until it reaches boiling point, then stir in the egg, well beaten, also cream. Heat well over fire, then pour sauce over the cabbage and serve.

QUEENSLAND WEATHER FOR OCTOBER.

Aggregate district rainfalls were below normal throughout the State, though scattered thunderstorms of variable amounts fell in the south-eastern districts, mainly between the 6th/7th, 16th, and 26th to 28th. These storms were reasonably well distributed in the eastern fringe of the Downs and the Moreton-Sub-division, which showed the smallest rainfall deficiencies of 35 per cent. and 16 per cent. respectively. Most of the useful rain benefit of September was also confined to these restricted areas, and the recurring scattered storms of October should maintain the previous recovery. In the Port Curtis Section, 27 per cent. below normal, approximately a quarter of the stations reported over 2 to 2½-inch totals, but further seasonal storms are urgently required to rehabilitate most of that district. In the Central Coast East, Central Highlands, Atherton Plateau, and Upper Carpentaria there were isolated storms, but for the *seventh successive month* many districts throughout the State, apart from the south-easern corner, reported either no rain or a few points. The exceptionally dry weather along the tropical coast areas was reflected in a rather unusual record of winter and spring bush fires north to the Peninsula. Apart from the previously mentioned improved farming prospects in limited areas in the south-eastern corner, rising seasonal temperatures are now contributing to the already protracted harsh seasonal conditions. All the main pastoral districts, inland and coastal, need a series of seasonal November storms to start and maintain growth and provide surface water.

Pressure.—Inland trough and southern low-pressure distribution was advancing through South Australia on the 3rd. The through and associated cold front produced the convergence thunderstorms in the south-east 5th/7th, but general movement was too rapid for inland rains. Another marked inland trough on the 13th commenced its eastward movement, followed by a vigorous cold southerly front. Local thunderstorms conditions extended along a line from the north-west of the State to the Warrego on the 14th, but again rapid movement detracted from rain production, and by the 15th the new continental high was bringing moderate south-easterly coastal weather. A moderate northerly circulation persisted on the Central and South Coast preceding these trough movements, the last of which brought the South Coast storms of the 26th/27th. Although pressure distribution showed the seasonal influence of lower pressure shallow dip formations in Northern Australia, the absence of an inflow of tropical air from the north and north-west was an unfavourable factor for rain production.

Temperature.—Average maximum temperatures mostly approximated 1 to 3 degrees below normal up to 5.6 degrees at Stanthorpe, where the average minimum readings were also 8.5 degrees below normal.

Local frosts occurred on the Downs 1st/3rd, 17th/18th, 25th/27th; Stanthorpe seven nights (29 degrees/25 degrees on 27th).

A few daily maximum readings over 100 degrees at western stations; Boulia 102 degrees (13th). Considerable haze at times 2nd to 4th and 5th, and in western and tropical sections 6th/7th; also 13th/15th, 17th/18th, 21st/22nd; latter periods accompanied by squally northerly winds with west to south-west change.

Brisbane.—Pressure 9 $+\frac{3}{2}$ 30.050 (normal 30.038). Temperatures.—Mean maximum, 76.4 degrees (normal, 75.5 degrees); mean minimum, 58.2 degrees (normal, 60.1 degrees); mean temperature, 67.3 degrees (normal, 69.7 degrees); lowest since October, 1939. Highest daily, 86.0 degrees (2nd and 29th); lowest daily, 48.8 (17th). Rain—251 points, 7 days (average, 259 points on 9 days).

Rain position is summarised below:—

Division.	Normal Mean.	Mean Oct. 1946.	Departure from Normal.	Progressive Totals, May to end of October.	
				Normal.	1946.
	Points.	Points.	Per cent.	Points.	Points.
Peninsula North	45	19	58 below	315	202
Peninsula South	70	1	99 „	220	12
Lower Carpentaria	52	2	96 „	188	5
Upper Carpentaria	76	18	76 „	320	19
North Coast Barron	133	35	74 „	958	438
North Coast Herbert	178	29	83 „	1398	347
Central Coast East	129	53	59 „	787	128
Central Coast West	77	0	100 „	473	18
Central Highlands	146	36	75 „	734	113
Central Lowlands	98	8	91 „	497	25
Upper Western	60	2	97 „	264	4
Lower Western	71	0	100 „	340	3
South Coast Port Curtis	208	151	27 „	1099	370
South Coast Moreton	274	231	16 „	1522	668
Darling Downs East	223	146	35 „	1041	604
Darling Downs West	165	19	88 „	800	314
Maranoa	161	34	79 „	812	173
Warrego	110	12	89 „	626	126
Far South-west	86	0	100 „	458	38

Commonwealth of Australia Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

OCTOBER RAINFALL.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of years' records.	Oct., 1945.	Oct., 1946.		Oct.	No. of years' records.	Oct., 1945.	Oct., 1946.
North Coast.	In.		In.	In.	*South Coast—cont'd.*	In.		In.	In.
Atherton	0·90	42	1·23	1·26	Gatton College ..	2·06	44	5·54	..
Cairns	2·06	61	0·74	0·12	Gayndah	2·37	72	3·07	1·78
Cardwell	1·95	71	1·90	0·63	Gympie	2·73	73	2·70	2·62
Cooktown	1·00	67	0·56	Nil	Kilkivan	2·68	62	1·31	2·01
Herberton	0·93	57	1·08	0·93	Maryborough ..	2·73	72	2·04	1·23
Ingham	1·80	51	2·82	0·38	Nambour	3·23	47	3·89	3·46
Innisfail	3·12	62	5·30	0·37	Nanango	2·19	61	1·93	1·80
Mossman	2·59	19	3·58	0·69	Rockhampton ..	1·78	72	2·34	1·80
Townsville	1·25	72	0·85	0·06	Woodford	2·53	55	1·56	3·51
Central Coast.					*Darling Downs.*				
Ayr	0·87	56	1·84	0·06	Dalby	2·01	73	0·61	0·32
Bowen	0·97	72	1·11	0·09	Emu Vale	2·18	47	0·95	1·75
Charters Towers ..	0·71	61	2·70	Nil	Jimbour	1·88	64	1·45	0·55
Mackay	1·76	72	5·10	0·38	Miles	2·00	58	0·40	0·61
Proserpine	1·53	40	3·39	0·31	Stanthorpe	2·50	70	1·18	2·11
St. Lawrence ..	1·76	72	3·99	0·33	Toowoomba	2·54	71	1·74	2·17
					Warwick	2·32	78	0·59	2·02
South Coast.					*Maranoa.*				
Biggenden	2·49	44	4·48	2·28	Roma	1·73	69	0·76	0·87
Bundaberg	2·07	60	1·99	2·13	St. George	1·29	62	0·35	0·09
Brisbane Bureau ..	2·59	94	2·73	2·51					
Caboolture	2·73	67	3·27	3·28	*Central Highlands.*				
Childers	2·71	48	3·03	1·25	Clermont	1·28	72	2·45	0·23
Crohamhurst	3·38	50	2·67	5·33	Springsure	1·62	74	4·08	0·07
Esk	2·60	56	1·62	1·92					

CLIMATOLOGICAL TABLE FOR OCTOBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric pressure at 9 a.m. Mean	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	84	66	87	16	57	3	17	3
Herberton	..	80	55	88	6, 7	41	1	93	4
Townsville	..	84	66	94	4	56	18	6	1
Rockhampton	30·07	84	60	92	24	50	18	180	4
Brisbane	30·10	76	58	86	2, 29	49	17	251	7
Darling Downs.									
Dalby	..	81	52	90	13	38	17	32	3
Stanthorpe	..	73	45	84	12	29	27	211	6
Toowoomba	..	73	47	83	23	37	1, 27	217	5
Mid-Interior.									
Georgetown	29·98	95	62	98	31	52	6, 7	Nil	..
Longreach	30·05	88	61	100	14	49	1, 17	22	1
Mitchell	30·02	85	48	93	5, 12, 13, 14	35	1, 2	8	1
Western.									
Burketown	..	93	65	100	25	53	20	Nil	..
Boulia	29·97	90	58	102	13	48	17	Nil	..
Thargomindah	30·05	85	54	99	12, 21	44	4	Nil	..

A. S. RICHARDS, Divisional Meteorologist.

Commonwealth of Australia,
Meteorological Bureau, Brisbane.

ASTRONOMICAL DATA FOR QUEENSLAND.

DECEMBER.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Day.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	4.45	6.28	Cairns	51	6	Longreach	44	26
6	4.46	6.32	Charleville ..	30	24	Quilpie	33	37
11	4.47	6.35	Cloncurry	65	35	Rockhampton ..	19	1
16	4.49	6.38	Cunnamulla ..	27	32	Roma	19	15
21	4.51	6.41	Dirranbandi ..	16	22	Townsville ..	42	8
26	4.54	6.43	Emerald	28	11	Winton	52	29
31	4.56	6.46	Hughenden ..	49	21	Warwick	2	6

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Day.	Rise.	Set.
	a.m.	
1	10.43	..
		a.m.
2	11.40	12.15
	p.m.	
3	12.38	12.49
4	1.37	1.22
5	2.39	1.57
6	3.44	2.33
7	4.53	3.13
8	6.04	3.58
9	7.16	4.50
10	8.24	5.50
11	9.25	6.55
12	10.18	8.04
13	11.04	9.11
14	11.42	10.16
15	..	11.16
	a.m.	p.m.
16	12.17	12.14
17	12.49	1.09
18	1.19	2.03
19	1.50	2.57
20	2.22	3.51
21	2.56	4.46
22	3.34	5.40
23	4.16	6.34
24	5.02	7.25
25	5.52	8.13
26	6.45	8.58
27	7.41	9.38
28	8.37	10.15
29	9.33	10.50
30	10.29	11.22
31	11.26	11.55

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

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

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Day.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	25	14	42	29	17	4	49	33
6	14	23	30	39	5	14	34	44
11	11	29	26	44	0	20	28	52
16	16	20	32	37	8	11	36	42
21	26	12	42	27	17	2	49	30
26	29	11	44	26	19	1	52	29
31	20	19	36	35	11	10	42	40

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS)

Day.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	45	14	61	41	45	26	37	14
3	34	20	54	44	38	29	29	18
5	23	31	46	51	31	36	21	26
7	13	42	39	59	24	44	13	35
9	5	50	35	63	20	49	6	42
11	6	52	36	65	20	50	7	44
13	13	47	39	62	24	47	13	39
15	22	38	46	56	30	41	20	33
17	28	27	50	48	34	33	24	23
19	37	17	55	43	40	27	31	17
21	46	9	61	37	46	23	37	10
23	52	4	66	34	50	20	43	6
25	53	4	67	34	50	20	44	6
27	50	9	64	37	48	23	41	10
29	42	18	58	43	43	28	35	17
31	31	29	52	50	36	35	26	25

Phases of the Moon.—First Quarter, December 2nd, 7.47 a.m.; Full Moon, December 9th, 3.52 a.m.; Last Quarter, December 15th, 8.57 p.m.; New Moon, December 23rd, 11.06 p.m.; First Quarter, December 31st, 10.23 p.m.

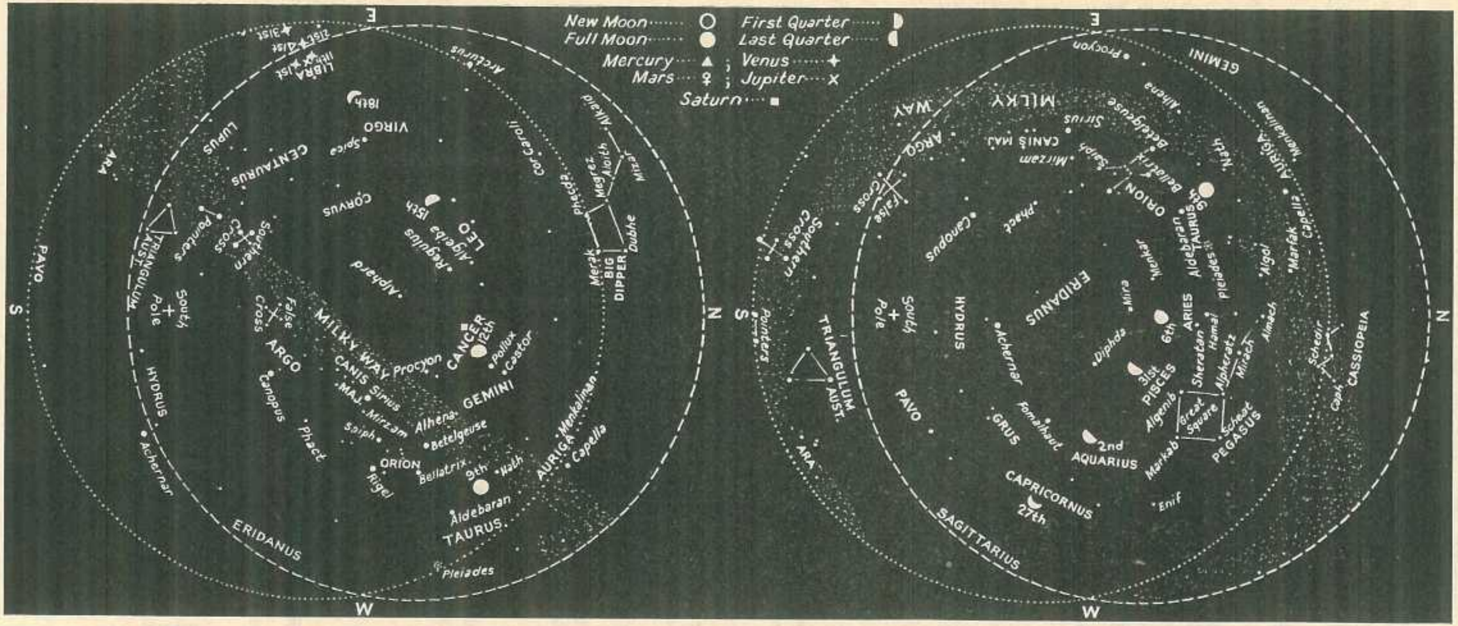
On December 22nd, at 9 p.m., Eastern Australian Standard Time, the Sun will reach its maximum declination south (Southern Solstice). It will then rise and set about 25 degrees south of true east and true west respectively.

On December 4th, 17th, and 30th the Moon will rise and set very close to true east and true west respectively.

Total Eclipse of Moon, December 9th.—At 1.12 a.m., Eastern Australian Standard Time, the Moon will enter the penumbra and at 2.10 a.m. the umbra of the earth's shadow will begin to creep across the disc of the Moon. Totality will begin at 3.19 a.m. and last until 4.17 a.m. Seen from the eastern districts of Queensland, the Moon will set partly eclipsed, but viewed from the far western districts the Moon will have passed out of the umbra before setting.

Mercury.—At the beginning of the month in Libra, will rise about 1 hour before the Sun, and on December 9th will reach greatest elongation west, when it will rise over 1 hour before the Sun. At the end of the month in Sagittarius it will rise 1 hour before sunrise.

Venus.—Will rise about 1 hour before the Sun at the beginning of the month, and will reach greatest brilliancy on December 23rd, when it will rise between 2.30 a.m. and 3.30 a.m. At the end of the month in the constellation of Libra it will rise between 2.15 a.m. and 3.15 a.m.



Mars.—Too close in line with the Sun for observation.

Jupiter.—At the beginning of December, with Mercury and Venus may be seen low in the east during morning twilight, when it will rise between 3.15 a.m. and 4.15 a.m. At the end of the month in the constellation of Libra it will rise between 1.45 a.m. and 2.45 a.m.

Saturn.—In the constellation of Cancer, will rise between 10.30 p.m. and 11.30 p.m. at the beginning of the month and between 8.30 p.m. and 9.30 p.m. at the end of the month.

Star Charts.—The chart on the right is for 8.15 p.m. in the south-east corner of Queensland to 9.15 p.m. along the Northern Territory border on the 15th December. (For every degree of longitude we go west time increases 4 minutes.) The chart on the left is for 7 hours later. On each chart the dashed circle is the horizon at Cape York and the dotted circle is the horizon along the New South Wales border. When facing north hold "N" at the bottom; when facing south hold "S" at the bottom and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the Moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.