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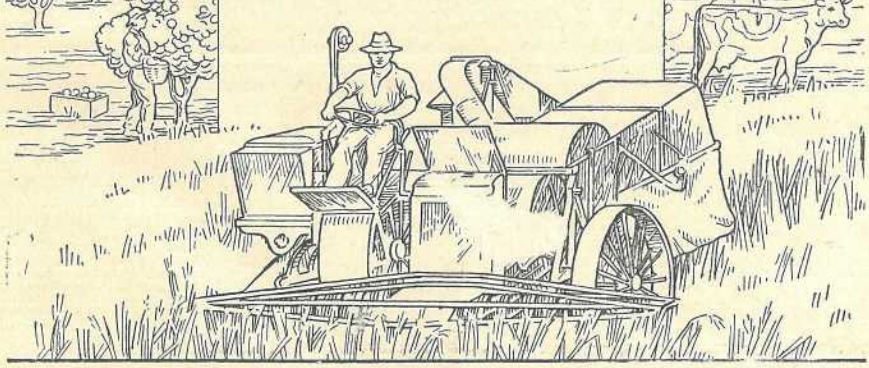

JANUARY TO JUNE, 1939

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QUEENSLAND AGRICULTURAL JOURNAL

Vol. LI. 1 JANUARY, 1939 Part 1

Event and Comment

The Year's Progress—A Review and a Prophecy.

REVIEWING 1938 as a year of progress in Queensland, the Premier, Hon. W. Forgan Smith, LL.D., said that production in all branches of industry reached the highest figures and the volume of employment was greater than at any other period in the history of the State.

The estimated national income of Queensland had risen from £94,978,000 in 1935-36 to £106,600,000 in 1937-38.

Estimates for 1937-38 were not yet complete in respect of the gross value of production, but on the preliminary figures it was anticipated that it would be about £61,000,000, as compared with £59,826,511 in 1936-37 and £54,301,016 in 1935-36.

The growth of employment was best indicated in the returns showing the contributors to the unemployment insurance fund. All persons of eighteen and over working under State awards must contribute to this fund. For the three months ended 31st October, 1938, there were 29,500 more contributors than during the same months in 1929, and 52,500 more than during the same period in 1931.

The latest returns from the Treasury indicate that the financial position of the State is highly satisfactory. Revenue for the six months ended 31st December, 1938, showed an increase of £689,035 over the corresponding period of the last financial year, the total receipts for

the half-year being £8,298,945. The excess of expenditure over receipts was £884,784, compared with £1,250,720 at 31st December, 1937—an improvement of £365,936.

"Thus there is ground," added the Premier, "for the most confident outlook for Queensland in the year ahead."

Continuing, he said that in the last session of Parliament important legislation had been passed for the more effective development of the State by orderly planning and co-ordination.

Three complementary measures—the Rural Development Act, the State Development and Public Works Organisation Act, and the Income (State Development) Tax Act—empowered the Government to give effect to its policy. A cardinal principle of that policy was to increase opportunities for full-time employment at award rates for the greatest possible number.

The Government was aware that it could not accept the responsibility of finding full-time employment for all, but it was conscious of the importance of leading the way, and, by making the best use of available resources, of stimulating general employment.

The first step was to plan for the progressive abolition of intermittent relief work. A thorough survey was made before a line of action was defined. Everybody knew that the system of relief was uneconomic, and, while it offered a temporary escape from the worst effects of unemployment, it was a hopeless substitute for real work.

The survey convinced the Government that intermittent relief work had to go, and the Government proceeded to end it. At the outset there was a great deal of criticism—most of it ill-informed—of the new scheme, but results have proved its soundness.

"It is gratifying to me," remarked the Premier, "to be able to say that the conclusions formed from the survey of the position have been more than justified by subsequent events."

He went on to say that while employment figures had been steadily rising since 1932, the additional impetus given by the Government's drive since 19th September, 1938, added 3,067 to the number to the end of the year. By the end of March of this year 4,071 men, hitherto on intermittent relief work, will have been given direct employment. Of the number of unemployed called up to 31st December, 1938, 1,342 had already found work. It was estimated that for every 1,000 men given direct employment 610 others were indirectly employed. Therefore, as a result of this scheme, more than 8,500 men will have obtained full-time work by the end of March next.

He called particular attention to this full-time work restoration scheme, because so much hinged on its success. There could be no gainsaying the beneficial economic effect on the State of the re-employment of so many workers who had previously lived precariously by intermittent relief work. Private industry was stimulated by the increased purchasing power of those workers; a demand was created for materials and equipment; systematic work of a permanent character was done under competent supervision; and the national assets were increased. But above all was the effect on the workers themselves. Thousands who had previously felt the pinch of want, mitigated only to a small extent by relief pay, were now enjoying good regular food,

living under healthy conditions in road and forestry camps, regaining their physical powers, and rejoicing in the knowledge that, at last, they were doing men's jobs.

In the promotion of this employment drive local authorities and private employers could play a big part, and he believed they would when they appreciated what it meant in the welfare of all.

An important factor in the development of the State was the provision of first-class roads. In this Queensland had done excellent work. In the North roads must stand up to the most trying conditions; yet gradually all-weather roads were reaching out. In other parts of the State the work was going steadily on. With the inauguration of the full-time work plan, road construction was pushed ahead vigorously, and by the end of 1938 5,700 men were employed by the Main Roads Commission, apart from 1,025 engaged by the Public Estate Improvement Branch.

The importance of this work from the point of view of national defence was obvious. The more first-class roads there were, the more mobile would be the defence force.

What of the future? The Premier believed that, provided our national life was not disturbed by circumstances beyond our control, we should go forward steadily with the development of our rich heritage, and build a healthy, happy, and self-reliant community.

Development of the Dairy Industry.

IN the course of a survey of rural progress in the State, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, placed especial emphasis on the remarkable development of the dairy industry. He said that possibly more research and investigation had been undertaken on behalf of the dairying industry than for any other branch of agriculture.

First came the holding. It must be capable of carrying a herd, possess a good, clean water supply, and preferably have sufficient arable land to allow for the growing of fodder crops.

Reliance had to be placed almost exclusively on introduced pastures. The grasses of prime importance were paspalum and Rhodes grass, but other grasses were being added rapidly to dairy-land pastures.

At Gatton Agricultural College the Plants Introduction Division of the Council for Scientific and Industrial Research was trying out many new grasses, some of which would ultimately become standard in dairying areas.

In the far North, Para, Guinea, and molasses grasses were benefiting pastures immensely.

Further south, the State had been divided into a number of research and experimental areas, and a progressive grass policy was in process of establishment.

He feared, however, that the importance of this work was not yet fully understood, nor was our dependence on grass yet fully realised. The combined soil and climatic factors in the State had their counterpart in no other dairying country in the world; so it was necessary to open up new furrows in the field of pasture research.

The Minister's New Year Message

THE sun is about to set on the old year. Fears, alarms, and anxieties were closely linked to the days that have departed. One result of these dire things has been a weakening of the world's purchasing power and, at times, a sharp decline in the prices obtained for agricultural produce. It is evident that peace and stability go hand in hand; that wars and rumours of war destroy confidence; that for our continued progress peace is essential.

Many agricultural industries enter the New Year under the smile of a kindly Providence, and my earnest wish is that the New Year will bring that harmony and understanding upon which peace is based.

Given these, I feel sure we shall march forward to our destiny without dismay, prepared as ever to face and overcome difficulty and even disaster.

I thank the members of the agricultural community for the assistance they have given me during the past year. I feel that you, as producers, realise more and more that the Department of Agriculture and Stock is your Department, staffed and controlled to give you service.

Every one of our numerous officers is anxious to serve the cause of Agriculture, and I assure the Primary Producers of our State that it will be our constant endeavour to do those things, cultural, economic, and in the wide field of research, that will add to the security of our people.

My officers join with me in wishing you all a Bright and Prosperous 1939.

Frank. W. Bulcock

22nd December, 1938.

Grape Vine Diseases in Queensland.

R. B. MORWOOD, M.Sc., Research Officer.

THE grape vine is subject to the attacks of a large number of plant diseases of which the three most important in this State are downy mildew, powdery mildew, and anthracnose. These are the principal diseases in most grape-growing countries, except that in America black rot, which, fortunately, is not present in Queensland is even more serious than any of them. In addition, the vine is subject to a number of other maladies which, while not comparing with those mentioned in importance, may become quite serious under some circumstances. These include fruit rot, berry shrivel, dead-arm, autumn leaf spot, coulure, red leaf, and court noué. In this article brief descriptions are given of the three principal diseases to enable vignerons to recognise them and understand their methods of spread. This is followed by a combined account of their distribution and control, after which the other diseases are discussed.

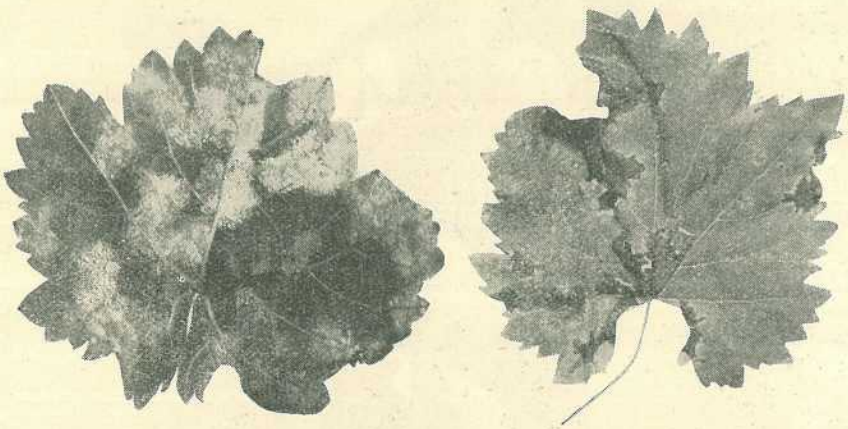


Plate 1.

DOWNY MILDEW OF THE GRAPE.—*Left.*—The fruitifications of the fungus on the lower surface of the leaf. *Right.*—A later stage, as seen from the upper surface after the spots have dried out.

DESCRIPTION OF THE THREE PRINCIPAL DISEASES.

Downy Mildew.

The first sign of this disease is a light spotting on the leaves which may spread to occupy the greater part of the leaf area. In dry weather the spots turn brown, and heavily affected leaves shrivel. Under moist conditions a white mildew develops on them, particularly on the under surface of the leaves. (Plate 1.) When shoots are attacked before the leaves have fully developed, they become stunted and contorted. Affected fruit develop large blotches of a somewhat oily appearance with a dark margin and fall readily.

Downy mildew is caused by the fungus *Plasmopara viticola*, which grows inside the affected plant parts, only appearing on the surface to produce spores. The spores and their supporting threads constitute the white mildew which can be seen on diseased leaves in damp weather. The disease is spread during the growing season by the blowing of the spores to fresh leaves, where, in the presence of moisture, they

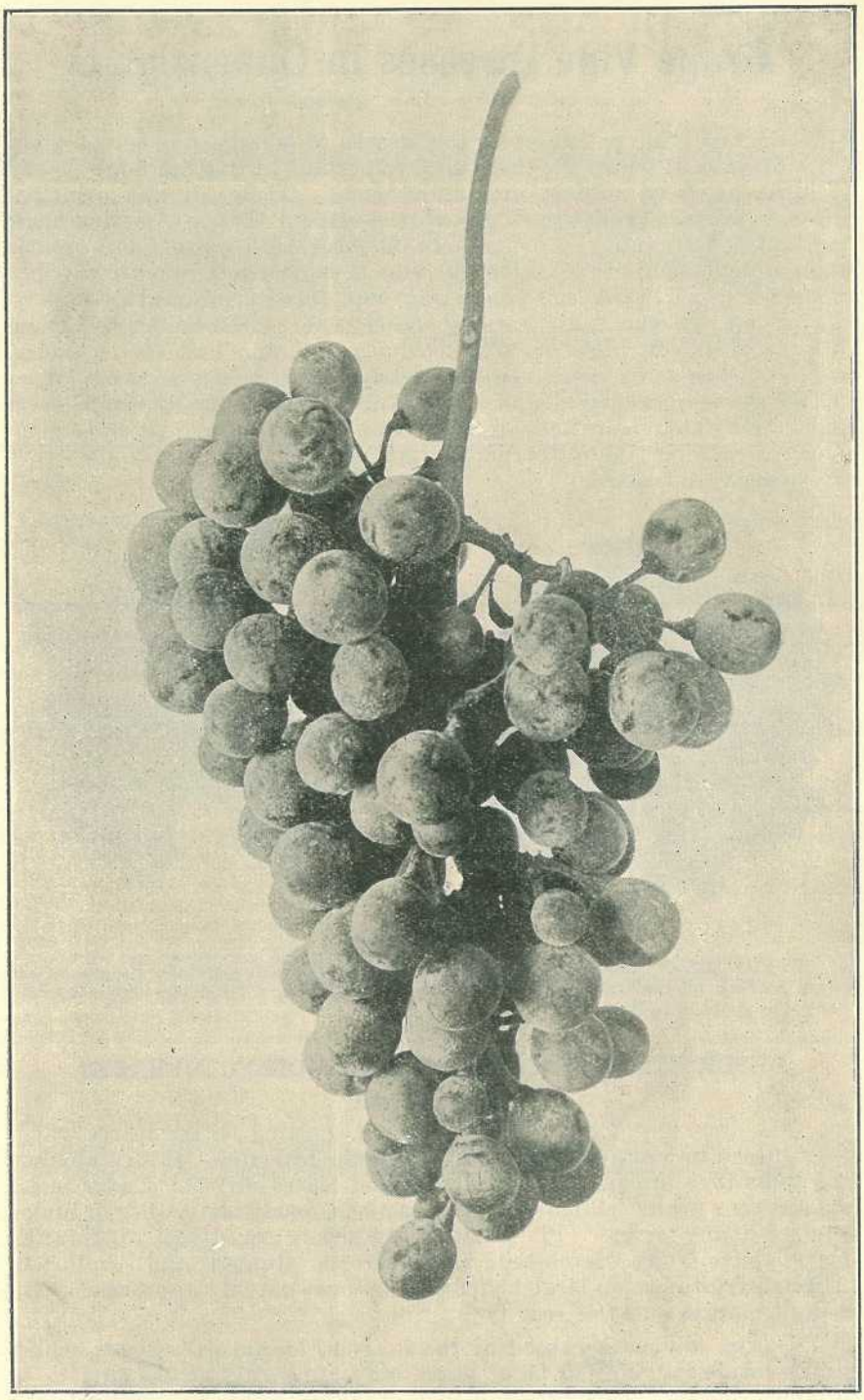


Plate 2.
Powdery mildew.

germinate and grow down into the underlying tissues. In the autumn another type of spore is formed internally, and this has a thick wall which survives the winter and initiates infection in the following spring.

All varieties of grape are susceptible to downy mildew, but the vinifera group, which is almost exclusively used in Queensland for commercial purposes, is more subject to attack than are American varieties. Stock effects on susceptibility have been recorded, but this is probably due to an alteration of vigour—the parasite finding more congenial conditions on a vigorously growing vine.

Powdery Mildew.

The principal symptom of powdery mildew is the presence of the actual parasitic fungus as a mildew on the surface of foliage or bunches. (Plate 2.) The mildew is distinguished from that due to downy mildew by its grey colour and by the difference indicated by their respective names, that is, the downy nature of the one and the powdery appearance of the other. Contortion of the foliage, stunting, hardening and skin cracking of the berries can result from powdery mildew infection.

The disease is caused by the fungus *Uncinula necator*, which grows on the surface of the vine, sending in short projections to derive nourishment from the underlying tissues. Summer spores blown about by the wind serve for the rapid dissemination of the disease. As with downy mildew, a second spore stage occurs for the overwintering of the fungus. However, in many countries, including Queensland, this other spore stage is rare, and overwintering probably occurs by means of fungous threads or summer spores protected within the bud scales of the vine.

Anthracnose.

Anthracnose is readily distinguished by the presence of numerous black spots on leaves, stems, and fruit. (Plate 3.) Infection takes place on young tissues, and the spots enlarge as the leaves and other parts expand. On the stems they eventually become deep cankers. Anthracnose reduces crop yields indirectly due to curtailment of leaf area, and malformation of canes and directly due to spotting of berries and dropping of fruit. The fruit falls following infections on the fruit stalks which frequently become completely girdled.

The disease is due to the fungus *Elsinoe ampelina*, an internal parasite. Spores are borne on the surface of the lesions, but are less conspicuous than those of the last two diseases discussed. The fungus survives the winter in the cankers. Varieties of grapes vary greatly in their susceptibility to anthracnose. American varieties are resistant, as are also Gros Coleman and Royal Ascot of the vinifera grapes. The majority of other varieties in common cultivation in Queensland are liable to the disease to a greater or lesser extent.

DISTRIBUTION OF THE PRINCIPAL DISEASES.

Of the three main grape-growing districts, the East Moreton, Stanthorpe, and Maranoa, the coastal areas of the East Moreton are most severely affected by disease. In these regions downy mildew finds the damp conditions so favourable to its development that it would frequently defoliate commercial varieties of grape if unchecked. Even in spite of the energetic adoption of control measures, in particularly wet seasons it causes considerable losses. Anthracnose and powdery mildew are of lesser importance on the coast, but further inland they occur more frequently than downy mildew. Powdery mildew thrives in comparatively dry conditions unless the vines are adequately sprayed or dusted.

Anthracnose is, of course, only serious on susceptible varieties, and fails to develop even on these in a dry spring. In the Stanthorpe district, with its elevated situation and medium though variable rainfall, conditions are frequently suitable for the development of all three diseases, but as a rule they are readily kept under control by adequate attention to spraying and dusting.

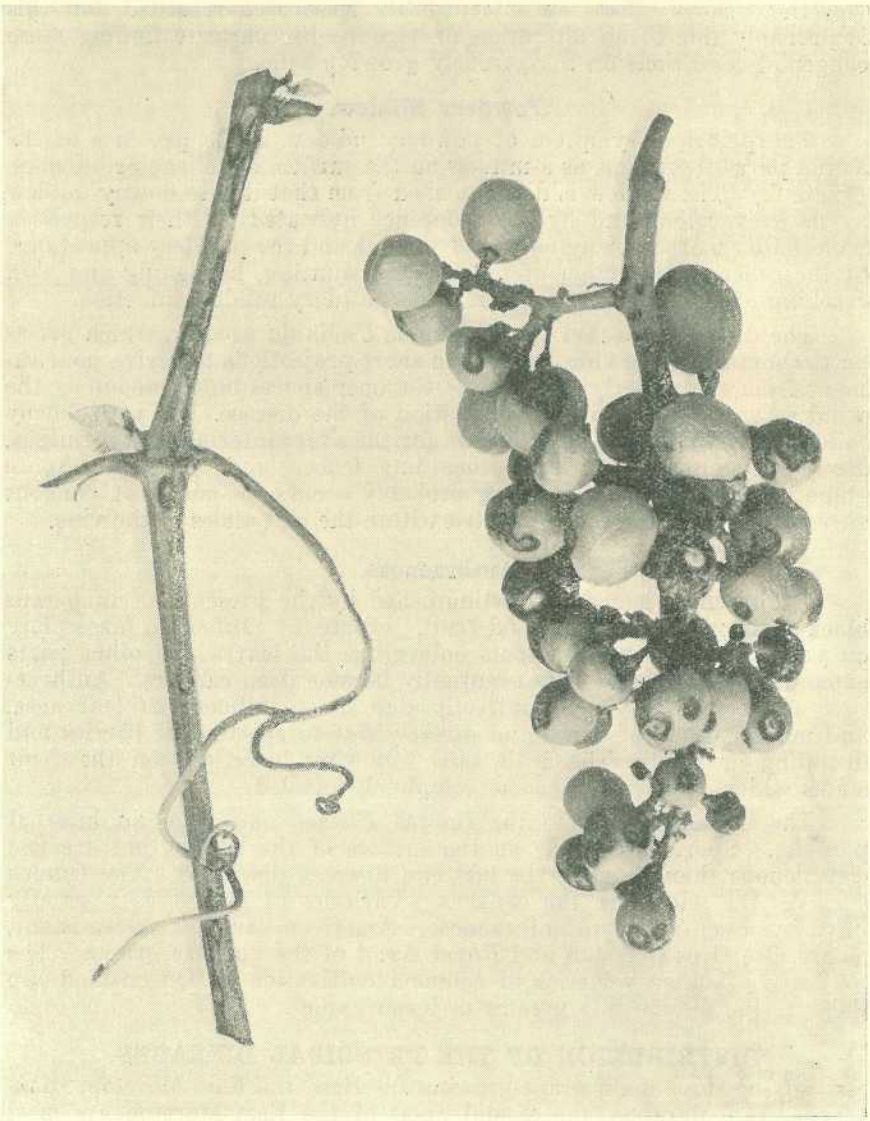


Plate 3.
Grape anthracnose.

CONTROL OF THE PRINCIPAL DISEASES.

An important factor in disease control on deciduous plants, including vines, is the thorough cleaning up during the off season.

Prior to budburst all prunings, fallen leaves, and mummied fruit should be burnt or well buried in order to minimise sources of infection for the following season.

This should be supplemented by a spray programme. For varieties which are subject to anthracnose this should commence with an application of 6-4-40 Bordeaux at budburst. With other varieties it will not be necessary to spray till the new shoots are 6 to 8 inches long, when an application will be necessary for the prevention of downy mildew. The Bordeaux mixture forms a coating on the plant which prevents the germination and entry of the fungus spores, and the first application should be repeated to cover new growth as it appears and to renew the coating on the older portions as it weathers off. The interval between sprays and the number required vary with the district and the season, the more frequent applications being needed when conditions are moist. Three to five applications at intervals of two to three weeks are usually required at Stanthorpe to control downy mildew, whereas in the wetter districts it is frequently necessary to spray every ten to twelve days. In the Maranoa, spraying is generally unnecessary during the growing season. Bordeaux mixture at a 4-4-40 strength is recommended for all sprays later than budburst.

Spraying while the grapes are in flower should be avoided, but, where spraying is required, an application should be made as soon as the berries have set. This is particularly important for the prevention of anthracnose on the bunch in varieties subject to this disease. Spraying should cease in good time before the berries ripen, in order to avoid undesirable residues at the time of marketing.

Notes on the preparation of Bordeaux mixture and of Burgundy mixture, which may be substituted if desired, are given later. If a ready mixed Bordeaux powder is used in the preparation of the spray, then it should be made up to a strength equivalent to that of the Bordeaux mixture recommended. For example, 8 lb. of a prepared powder containing 12·5 per cent. copper should be used in 40 gallons of water to be equivalent to a 4-4-40 mixture. The percentage of active constituent will be found on the label of containers of prepared powders.

The copper sprays will not control powdery mildew, and for this disease sulphur has to be used. The sulphur may be applied as a dust, or colloidal sulphur may be added to Bordeaux mixture at the rate of 1¼ lb. or ¾ pint to 40 gallons. Colloidal sulphur should be thoroughly stirred before being weighed or measured out. Sulphuring should commence with the warmer weather when the vines have made considerable growth. Three to five applications may be needed, according to the severity of the diseases in the district. Contrary to spraying, sulphur dusting of the vine while in bloom is harmless; in fact, it may assist in the setting of some varieties. Sulphur is most effective when applied on a warm day, but if used during a heat wave some burning of the vine may result.

A little spray burn may be apparent on the leaves after the use of Bordeaux mixture. While this is to be regretted, as any reduction of leaf area will ultimately react to the detriment of the crop, no immediate loss is evident. Spray burn can best be avoided by correct mixing of the spray and adequate attention to the efficiency of spray outfit. Large or jagged apertures in the spray nozzle, or low pressures at the pump, result in spray injury. Spray forced through a small, round

Plate 4.
Bitter rot following downy mildew.

aperture at high pressure breaks up into minute droplets. Enlargement of the aperture or lowering of the pressure results in larger drops, which are more likely to injure tender foliage. The spray nozzle should not be held too close to the vine.

DISEASES OF MINOR IMPORTANCE.

Fruit Rot.

Grape berries, particularly those on vines on which spraying has been neglected, are liable to the development of rot when ripening. The rots may be caused by one or more of a number of different fungi, of which *Botrytis cinerea* and *Melanconium fuligineum* appear to be the most common. They are, however, largely influenced by predisposing factors, such as the presence of other diseases, wet weather during the ripening period, or injuries, either mechanical or due to insects.

Grey mould rot is the name given to the rot caused by *B. cinerea*, which is recognised by the conspicuous mould which often involves whole bunches. It develops only when prolonged wet periods are experienced while the berries are ripening. This disease has also been termed "noble rot," as the inclusion of a percentage of affected berries in a vintage is considered to improve the flavour of the resultant wine.

Berries affected with bitter rot (Plate 4) caused by the fungus *M. fuligineum* are darker than normal and covered with minute black specks. This rot commonly follows an attack of downy mildew and completes the damage done by that disease.

The control of fruit rots is rendered difficult by the necessity for avoiding any adverse effect on the appearance of the ripening berries or undesirable residues on them. A non-staining spray is desirable and ammoniacal copper carbonate has been recommended for this purpose. This spray leaves no appreciable residue, but the ammonia is liable to cause a certain amount of injury, and a weak Burgundy mixture (1-1½-40) is considered to be the best spray to use when fruit rots are feared. Frequently an attack comes on during a period of wet weather when it is not possible to spray and losses are unavoidable. Arranging the planting of vineyards so that varieties ripening at different periods are included not only spreads the work of marketing over a longer period, but also lessens the risk of heavy loss from ripe rot. The loss due to a spell of bad weather during the ripening period of only one variety will not be felt so severely as if the whole vineyard were affected.

Berry Shrivel.

Grapes, like many other fruits, suffer during a spell of hot weather or drying winds. The leaves withdraw water from the fruit when the roots fail to keep up with the heavy demand. Shortage of moisture in the soil hastens this effect. If more than a little moisture is so withdrawn, permanent injury is done to the fruit. In the grape this takes the form of a berry shrivel. Berry shrivel is often noticed after a return to normal conditions when the vines have otherwise completely recovered from the moisture deficiency and the cause of the trouble is not obvious. Nevertheless, the temporary heavy demand for moisture made by the leaves has been the cause of the trouble. When irrigation is available the water supply should be maintained at a high level during hot, dry weather, and where irrigation is absent cultural practices should be such that all possible moisture is conserved. In the

drier districts vines should be widely spaced so that the roots have a greater area of soil to call upon for moisture supplies. Topping, or the removal of portions of the foliage, may lower the demand of the vine for water, but care must be exercised to avoid exposing the fruit with the risk of sunburn. Topping should not be carried out excessively or without good reason, as any reduction of leaf area of the vine tends to lower the provision of food reserves for future crops and an adverse effect on yield will eventually occur.

Dead Arm.

This disease has occasionally occurred on a few vines in Queensland. It is caused by the fungus *Cryptosporella viticola*—a wound parasite which enters injuries or large pruning cuts and develops in the vine. Portions of the vine beyond the point of injury become unthrifty and finally die. Affected portions should be cut away well below visible infection and the cut treated with tar.

Autumn Leaf Spot.

Spots differing from those caused by downy mildew in their more regular shape and smaller size are liable to develop in vine leaves late in the season. They are due to the fungus *Cercospora viticola*. Although the reduction of effective leaf area and the possibility of premature defoliation must have some adverse effect on the yield of the following season's crop, it is usually not sufficiently serious to warrant the adoption of expensive control measures. If desired, Bordeaux mixture may be used after the fruit is picked.

Coulure.

"Coulure" is the name given to the non-setting of fruit which is prevalent in a number of varieties. Affected bunches may produce no fruit or may be represented by a stage intermediate between this condition and the normal. Individual berries may be shed or may be represented by small seedless fruit. Bunches carrying a number of fully developed berries together with numerous undersized ones are commonly referred to as "hens and chickens." Such bunches even when not a total loss are difficult to pack and market attractively. (Plate 5.)

Coulure is generally attributed to failure of effective pollination and a number of physiological factors may be involved. Extremes of weather conditions, either cold and damp or very hot and dry, are favourable to the development of the trouble in some varieties. In other instances it may result from the failure of pollen to reach the stigma when artificial pollination should assist fruit-setting. Some success may attend lightly drawing the hand over bunches when in flower. It is claimed that sulphuring the vines when in flower has a beneficial effect, and this may be due to the disturbance and distribution of the pollen.

Red Leaf.

The vine is subject to physiological disorders which result in the production of red, brown, and autumn tints in the leaf, frequently in a definite pattern. A number of names have been applied to this disease or group of diseases, including Californian vine disease and brunnisure, as well as red leaf. Physiological diseases are due to unfavourable environmental factors, but the nature of the particular factor or factors

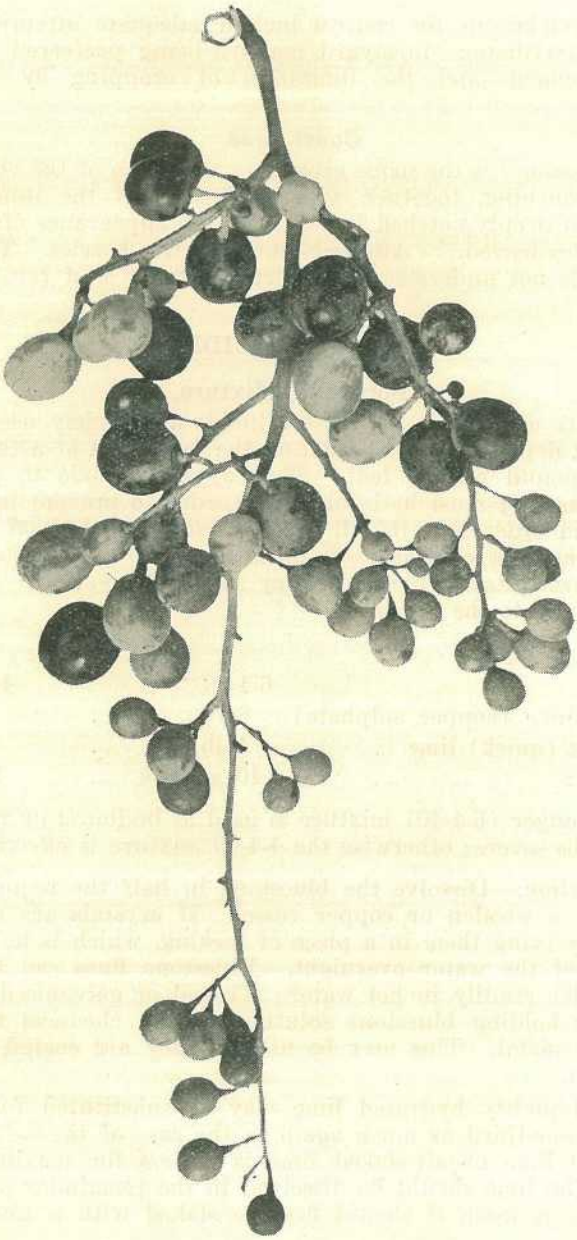


Plate 5.
Coulure of the grape.

concerned is frequently rather obscure. In the case of red leaf of the vine they are not well understood, but one factor which appears to be frequently associated is overbearing in the previous season.

Recommendations for control include adequate attention to cultivation and fertilizing—farmyard manure being preferred for general soil improvement—and the limitation of cropping by appropriate pruning.

Court-noué.

"Court-noué" is the name given to a condition of the vine in which excessive branching, together with shortening of the internodes and production of deeply-notched leaves, gives the appearance often referred to as "parsley-leaved." Affected vines set few berries. The cause of the malady is not understood but, fortunately, it is of rare occurrence.

THE FUNGICIDES.

Bordeaux Mixture.

Bordeaux mixture is the most valuable and widely used spray for the vine. It depends for its action on the formation of a thin film of a copper compound on the leaf. The copper is toxic to germinating fungus spores, but must be insoluble in order to prevent injury to the plant, and in order that it will not be readily washed off. The ideal in the preparation of Bordeaux mixture is the production of a fine gelatinous precipitate which will stay in suspension, will spread well, and will adhere to the foliage.

Formulæ—

	6-4-40.	4-4-40.
Bluestone (copper sulphate)	6 lb.	4 lb.
Burnt (quick) lime	4 lb.	4 lb.
Water	40 gallons	40 gallons

The stronger (6-4-40) mixture is used at budburst or when disease is likely to be severe; otherwise the 4-4-40 mixture is effective.

Preparation.—Dissolve the bluestone in half the required amount of water in a wooden or copper vessel. If crystals are used, this is best done by tying them in a piece of sacking, which is left suspended in the top of the water overnight. Bluestone fines can be obtained, which dissolve readily in hot water. Tinned or galvanised iron is not suitable for holding bluestone solution, as the chemical rapidly eats through the metal. Tins may be used if they are coated inside with melted pitch.

A good-quality hydrated lime may be substituted for the burnt lime, using one-third as much again in the case of the 6-4-40 formula. Agricultural lime or air-slaked lime is useless for making Bordeaux mixture. The lime should be dissolved in the remainder of the water. If quicklime is used, it should first be slaked with a small quantity of water.

The two solutions, bluestone and lime, are poured simultaneously through a strainer into a third container or the spraying vessel and the mixture stirred well for a few minutes. This method gives a fine gelatinous precipitate which does not readily settle out. If necessary, one solution can be poured directly into the other, provided the latter

is kept well stirred during the process. Concentrated solutions should not be mixed before dilution, as the resultant precipitate tends to be of a granular formation and its spreading and adhesive properties are poor. For the same reason, the two solutions should be quite cold before mixing. Bordeaux mixture should be used as soon as possible after preparation, as it loses its gelatinous nature after several hours' standing and settles out in granular form.

Testing.—It sometimes happens that the lime used is of poor quality, and the resultant mixture may then contain an excess of bluestone. This must be avoided, as the soluble copper salt is able to cause injury to the plant sprayed. An excess may be tested for by applying litmus paper or phenolphthalein paper (obtainable from a chemist) to the layer of clear liquid on the top of the spray. With a correctly prepared mixture, the litmus paper is then coloured blue or the phenolphthalein paper red; otherwise more lime must be added. A rough test is given by allowing a clean knife-blade or bright iron nail to remain in the mixture for a few minutes. If on removal this shows a brown coating of copper, more lime is required.

Stock Solutions.—It is sometimes found convenient to make up a stock solution of bluestone and lime. Fifty lb. of bluestone is dissolved in 50 gallons of water in a wooden vessel. In another vessel 50 lb. of quicklime is slaked and water added to make up to 50 gallons. The solutions will keep well if protected from evaporation. One gallon of each will contain 1 lb. of bluestone or lime respectively, on which basis the necessary dilution before mixing for the preparation of any quantity of spray can be readily calculated.

Burgundy Mixture.

This spray has the same active constituent as Bordeaux, but differs in the replacement of lime by soda.

Formulæ—

	6-8-40.	4-5½-40.	1-1½-40.
Bluestone	6 lb.	4 lb.	1 lb.
Washing soda	8 lb.	5½ lb.	1½ lb.
Water	40 gall.	40 gall.	40 gall.

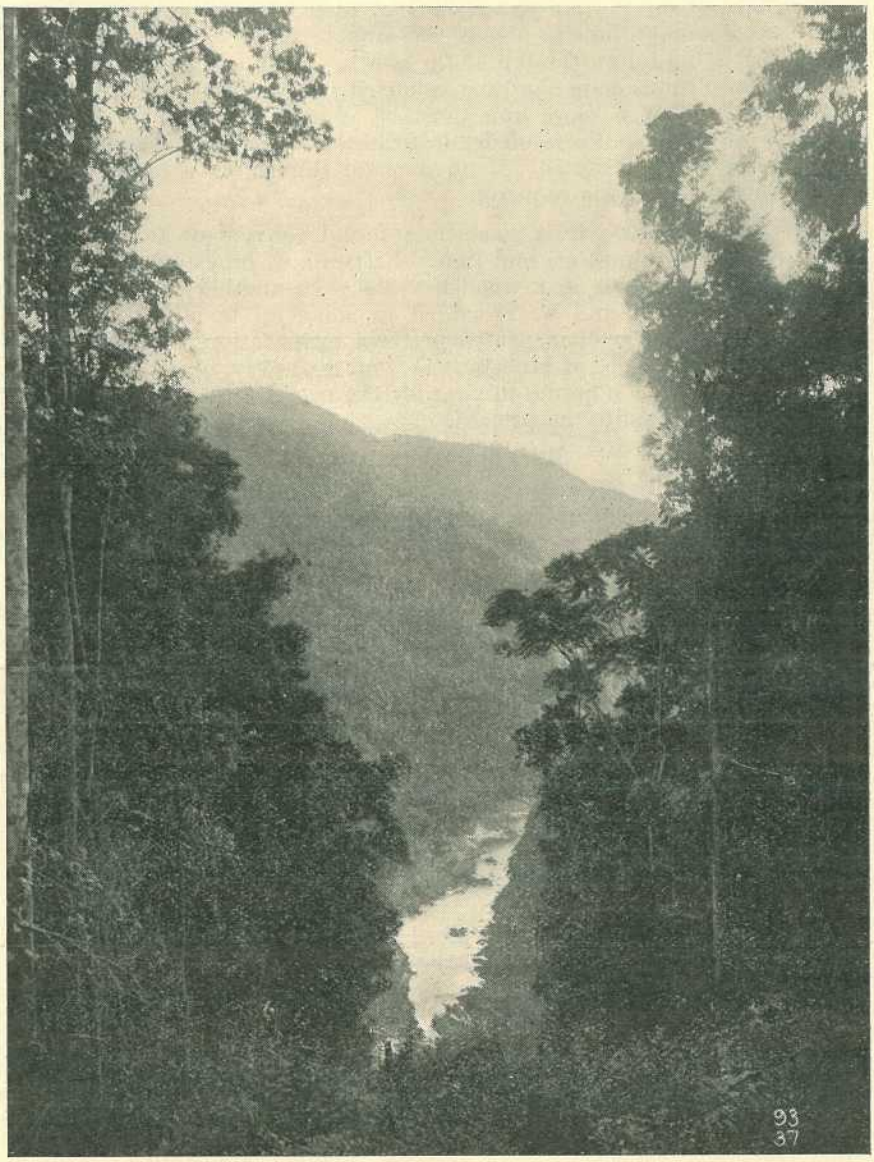
The 6-8-40 and the 4-5½-40 strengths are used in place of Bordeaux mixtures containing the same amounts of bluestone. The 1-1½-40 is a weak mixture for late application, when it is used on account of the small amount of residue it leaves on the fruit.

Preparation.—The preparation is essentially the same as in the case of Bordeaux, except for the substitution of washing soda for lime. Fresh crystals of washing soda should be used. If the crystals are left for some time exposed to the air, they give off water of crystallisation and crumble to a powder. The powdered material should not be used, as it contains more actual soda to the pound, and the quantity required cannot be accurately gauged.

Concluding Remarks.

The number and severity of the diseases discussed in these notes will doubtless leave the impression that grape-growing is a hazardous occupation. When grapes are grown in a haphazard manner this is so, but the careful grower maintains his vineyard in a practically disease-free condition, except in very adverse weather conditions. This is attained by careful planning of the vineyard, followed by due attention

to all details of culture, pruning, and fertilizing, supplemented by orchard sanitation and an adequate spray programme. In the section on control measures is given general information on spray programmes, but for the exact requirements of any particular location local experience is of great importance. The grower would be well advised to err on the side of a little excess spraying rather than too little, the additional expenditure being regarded as an insurance against conditions favourable to disease.



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

Plate 6.

IN THE BEAUTIFUL WEST PALMERSTON JUNGLE LANDS, NORTH QUEENSLAND.—The view down the gorge from Crawford's Lookout.

Hoya australis (Wax flower)—a Native Plant Poisonous to Stock.

By JOHN LEGG, D.V.Sc., Senior Veterinary Officer, Animal Health Station, Yeerongpilly, and C. T. WHITE, Government Botanist.

Contribution No. 4 from the Poison Plants Committee, Department of Agriculture and Stock, Brisbane, established as a result of a grant from the Australian Wool Board for the purpose of conducting investigations with plants suspected of being poisonous to stock.

HOYA australis is a fleshy climber; a milk-like sap runs freely when the plant is cut. The leaves are opposite, usually shiny above and pale beneath. When growing in exposed places where soil is scarce, as on rock faces, it may be dwarfed and bush-like with thicker leaves.

The leaves are blunt at the top and oblong in outline, 3 or 4 inches long and up to 2 inches wide, and borne on a short stalk up to ¾ of an inch in length. Flowers are in "umbels" in the axils of the leaves and radiate out from the top in a fleshy peduncle. They are sweetly scented and on a short stalk about ½-1 inch long. Seedpods are generally in pans mostly and 4-5 inches long. When ripe they burst down one side and free the seeds. Each seed has a tuft of fine silky hairs.

The plant is widely spread in Queensland and Northern New South Wales, and is also found in the islands of the South Pacific. It grows mainly in the drier rain forests, and extends some distance inland from the coast. A common situation is on the side and tops of hills among the rocks, in such places as the Glass House Mountains.

It is generally known as "Hoya" or "Wax Flower," the latter, however, is a common name for many native plants.

Poisonous Properties.

The plant has been accused of poisoning stock, mainly cattle, though poisoning of sheep has also been suspected on more than one occasion. Bailey (this Journal, 1915, p. 345) states that some specimens from Nanango were tested at Yeerongpilly on four guinea pigs, two of which developed symptoms of paralysis, one dying on the third, the other on the four day.

Experiments on Sheep.*

Minced fresh leaves were force fed to two sheep in varying amounts of approximately 2-3 lb. over a period of two days. Both sheep died. Another sheep was drenched with the watery extract obtained by washing minced leaves in water overnight and then pressing out the residue. This sheep also died.

The main symptoms noticed were at first a listless appearance and a staggering gait. One animal was noticed to be kneeling frequently, a symptom said to be common in cattle when poisoned naturally. Once the animal assumed the recumbent position, it soon stretched out on its

* A full report of the tests on sheep will appear in the Australian Veterinary Journal.

Plate 7.

HOYA AUSTRALIS.—A plant generally known as "Hoya" or "Wax Flower." The latter, however, is a common name for many native plants.

side with limbs extended. "Pirouetting" of the eyes was also noticed. The position became aggravated after a few hours and the animal was destroyed.

Post-mortem showed nothing beyond a slight congestion of the alimentary tract.

Conclusions.

1. *Hoya australis* is a poisonous plant for sheep.

2. Small amounts, as low as a lb., will cause death in a little over twenty-four hours.

3. A peculiar kneeling position was noticed in one animal. Extension of the limbs and "pirouetting" of the eyes were also noticed.

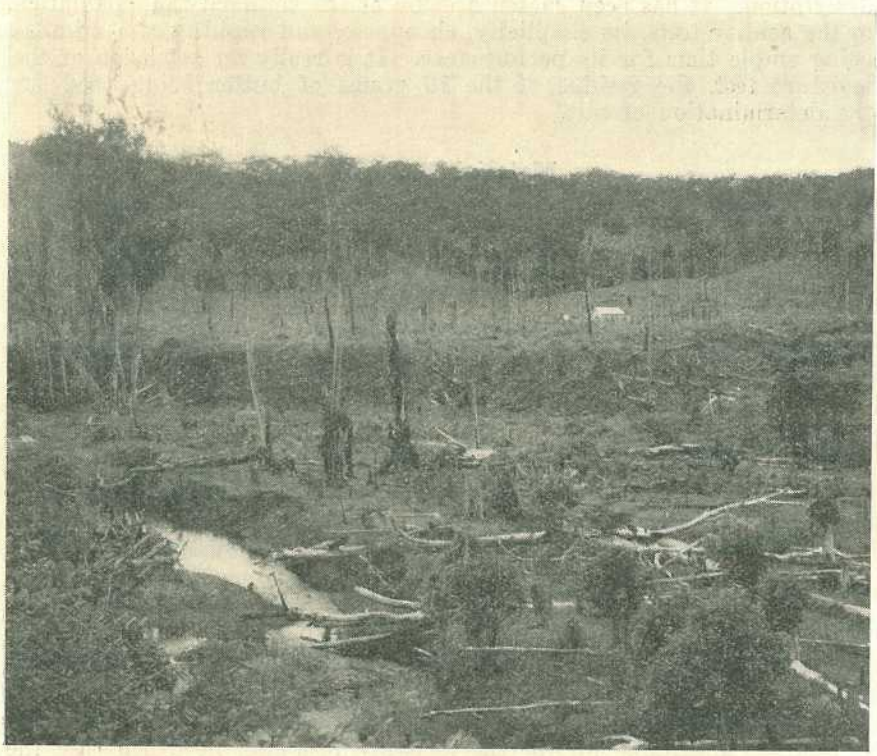


Plate 8.

A FARM IN THE MAKING.—A well-grassed clearing in the rain forest country, near Granadilla, North Queensland. This land is typical of the newly-settled areas on the northern tropical coast.

The Determination of Salt in Butter.

L. A. BURGESS, A.A.C.I., Dairy Technologist.

IN a previous article[1] the importance of maintaining an even percentage of salt in butter was emphasized. It was also pointed out that partial standardization of composition was attainable by the intelligent use of accurate moisture and salt tests. The performance of both tests is considered very important, particularly in those factories which, for various reasons, do not employ a technical officer or participate in a technical service. It is only by such means that satisfactory methods are evolved.

The conditions necessary for accurate moisture tests with various types of balances have already been discussed,[2] and a plan of a small laboratory suitable for a large number of chemical and bacterial tests was included. A modern butter factory without such facilities may be likened to a police force without detectives. It remains to describe a suitable method for the determination of the percentage of salt, and the manner in which the tests can be utilized.

One method only, of the many available, has been selected for description. It has been chosen because of the similarity in calculation to the acidity tests, its simplicity, cheapness, and rapidity, ten minutes being ample time for its performance. It is really an extension of the moisture test, the residue of the 10 grams of butter being used for the determination of salt.

Material Required.

A balance on which exactly 10 grams of butter are weighed for the moisture test is essential. The additional materials required are:—

(1) *Glass Stirring Rods.*—These should be 4 to 5 inches long and three-sixteenths of an inch in diameter. The ends should be smoothed and rounded in a flame.

(2) *Measuring Cylinder.*—100 ml. graduated in 1 ml. divisions.

(3) *Pipette.*—Either a 25 ml., 20 ml., or 17·6 ml. pipette may be uesd.

(4) *Burette.*—This may be either of 25 ml. or 50 ml. capacity graduated in 0·1 ml. divisions. It must have a glass stopcock.

(5) *White Titration Vessel.*—A shallow porcelain dish holding about 100 ml., or a shallow white china cup may be used.

(6) *Mixing Vessel.*—This is used to mix the residue from the moisture test with a measured volume of distilled or rain water. A malted milk mixer or shaker is quite suitable, but a wide-mouthed bottle with a cork, rubber or glass stopper will also serve. A clever mechanic should be able to construct a suitable lid for the moisture test cup, in which case the mixing may be performed therein.

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[1] Q.A.J., July, 1938, Vol. L., Part 1, page 10.

[2] Q.A.J., July, 1938, Vol. L., Part 1, page 13.

(7) $\frac{N}{23{\cdot}4}$ *Silver Nitrate Solution.*—1 ml. of this solution is equivalent to 0·0025 gram of sodium chloride (salt) and it should therefore be obtained from a reliable chemical supply house or prepared by an experienced analyst. It should be supplied in a brown glass-stoppered bottle and should be kept away from light. The solution should not be allowed to remain in the burette after use, as light causes silver to be precipitated and weakens the solution.

(8) *Potassium Chromate—Solution* (10 per cent.).—This is the indicator solution. Its strength is not very important but it must be prepared with distilled or rain water.

(9) *Distilled (or Rain) Water.*—Natural waters contain salt in varying amounts and should not be used.

Procedure.

Weigh out 10 grams of butter and perform the moisture test. Warm a quantity of the distilled or rain water to a temperature of about 120 deg. Fahr.

In the measuring cylinder, measure out the quantity of warm water shown below.

If a 17·6 ml. pipette is to be used— 70 ml. of water.
If a 20 ml. pipette is to be used— 80 ml. of water.
If a 25 ml. pipette is to be used—100 ml. of water.

(It should be noted that the volume of water required is four times the capacity of the pipette.)

Add about a quarter of the measured volume of water to the residue of the 10 grams of butter in the moisture test cup and stir thoroughly with a glass rod.

Pour the liquid into the mixing vessel.

Add a further 20 to 25 ml. of the water to the cup and stir again.

Pour this liquid also into the mixing vessel.

Repeat the addition of water to the moisture test cup, stirring and pouring into the mixing vessel until all the water has been used and all the remains of the butter have been transferred, but in no case use more than the quantity of water originally measured out. The water must be warm enough to keep the fat in a melted condition. If a close-fitting lid for the moisture test cup is available, the whole of the water may be added direct to the butter residue and the mixing performed at once in the cup.

Mix the liquid in the mixing vessel by vigorous shaking or stirring with a plunger. It is essential that the mixing be vigorous as the fatty coating on the solid material must be destroyed in order that the water may dissolve the salt.

Allow to stand undisturbed for 2 to 5 minutes so that the fat may rise to the surface.

Insert the tip of the pipette below the fat layer and fill from the lower water layer by suction. Adjust the bottom of the meniscus to the graduation mark on the pipette and allow the contents of the pipette to run into the titration vessel.

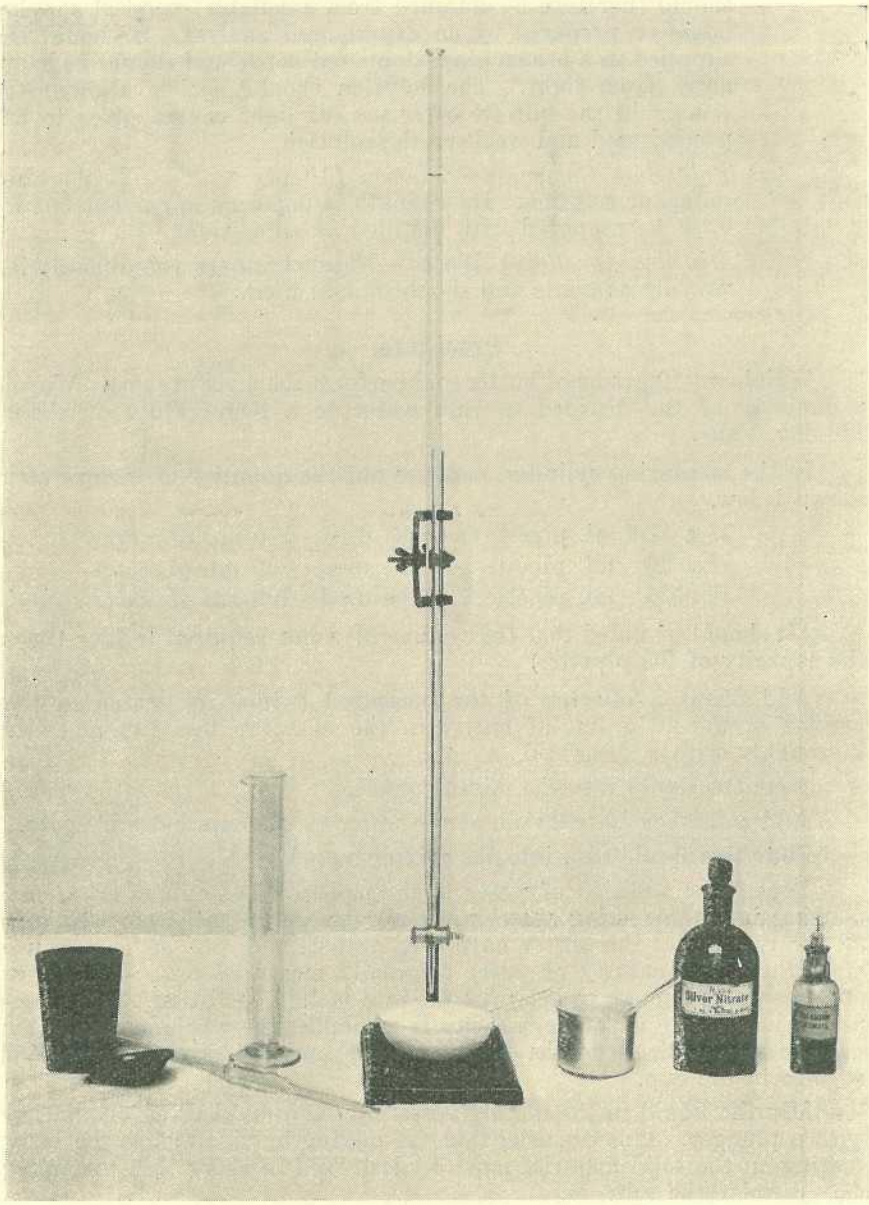


Plate 9.
Apparatus for salt test.

Add four to six drops of potassium chromate solution to the liquid in the titration vessel.

From the burette allow the silver nitrate solution to run into the titration vessel and stir with a glass rod. The formation of a red colour marks the end of the titration.

To obtain the percentage, read off the number of millilitres of the silver nitrate solution used and divide by ten.

Example.—A titration of 14·2 ml. shows the salt to be 1·42 per cent.

Theory of the Test.

During the titration a white precipitate of silver chloride is first formed by interaction of the salt and silver nitrate.

$$NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$$

Sodium Chloride + Silver Nitrate forms Silver Chloride + Sodium Nitrate

As soon as all the sodium chloride has reacted in this way, the excess silver nitrate reacts with the potassium chromate forming silver chromate (which is an intense red colour), and potassium nitrate. The formation of red silver chromate thus serves to mark the end of the titration.

Applications.

(1) *Butter Standardization.*—The four constituents of butter which are determined in routine analyses are water, salt, curd, and fat. The water and salt having been determined, and an assumption made for the curd, the fat may be determined by difference. The curd percentage of butter differs from factory to factory, but is reasonably constant for each factory as neutralizing, pasteurising, churning, &c., are usually carried out in the same manner each day. The average percentages range from 0·5 to 1·0 per cent., the average being about 0·8 per cent. A factory knowing its average to be 0·6 per cent. can safely make that assumption, but if the factory average is unknown, the State average of 0·8 per cent. may be assumed. By subtracting the sum of the percentages of water, salt, and curd from 100, a reasonably accurate figure for the fat percentage is obtained. It should be especially noted that inaccurate moisture and salt tests will lead to inaccurate figures for the fat percentage.

Examples:—

	Average for 1 week.
Water	= 15·3 per cent.
Salt	= 1·1 per cent.
Curd (assumed) ..	= 0·8 per cent.
	17·2 per cent.
Fat	= 100—17·2 = 82·8 per cent.

This shows that 82·8 lb. of fat are being used to manufacture 100 lb. of butter. By modifying the factory methods, it may be found that the average composition at a later date is—

Water	.. ..	=	15·6 per cent.
Salt	.. ..	=	1·4 per cent.
Curd (assumed)	..	=	0·8 per cent.
			17·8 per cent.
Fat	.. .. ..	=	100 — 17·8 = 82·2 per cent.

In this case only 82·2 lb. of fat are being used to make 100 lb. of butter. The percentage increase in manufacture is determined by simple proportion as follows:—

82·8 lb. of fat used to make 100 lb. of butter.

82·8 lb. of fat now makes $\frac{100 \times 82{\cdot}8}{82{\cdot}2} = 100{\cdot}73$ lb. butter.

Increase in manufacture = 0·73 per cent.

On a production of 1,000 tons of butter per year, the increased production of 0·73 per cent. means that an extra 7·3 tons of butter would be made, the value of which would be £876 at 120s. cwt.

(2) *Estimating Salt Losses.*—The value of the salt lost during the working of butter receives little consideration in a large number of factories because they are ignorant of how much of the salt is actually incorporated in the butter. This can be determined as shown in the following example:—

23 boxes (1,288 lb.) of butter were obtained from a churn.
22 lb. of salt were added.

The butter contained 0·31 per cent. of salt.

100 lb. of butter contain 0.31 lb. of salt.

1,288 lb. of butter contain $\frac{0{\cdot}3 \times 1{,}288}{100} = 4{\cdot}0$ lb. of salt.

Salt lost = 22—4 = 18 lb.

The following are actual figures obtained at a Queensland factory, and the complete figures for the day (six churns) were:—

Churn No.	1.	2.	3.	4.	5.	6.	All.
Butter obtained .. boxes	23	24	20	20	21	19	127 boxes
Salt added .. pounds	22	22	22	20	20	20	126 lb.
Salt .. .. percentage	0·3	0·5	0·7	0·8	0·7	0·7	0·62% Average
Salt incorporated pounds	4	6¾	8	9	8¼	7½	43½ lb.
Salt lost	18	15¼	14	11	11¾	12½	82½ lb.

The figures show that nearly two-thirds of the salt was being lost. Salting was being carried out at the rate of 40 lb. per ton, but only 13¾ lb. was being incorporated. The annual production was about 1,200 tons of butter and the annual loss of salt amounted to 31,500 lb. or over 14 tons, the value of which is by no means small.

For comparison the figures from a factory participating in the Butter Standardization Service are given. Regular salt tests are being performed at this factory and intelligent use has been made of them.

	Nov., 1937.	Nov., 1938.
Salt added per ton of butter	= 57 lb.	37 lb.
Salt incorporated per ton of butter ..	= 25 lb.	32 lb.
Salt lost per ton of butter	= 32 lb.	5 lb.
Salt lost per 1,000 tons .. .. .. (Annual production.)	= 14½ tons	2 tons
Percentage of salt in butter	= 1·12 per cent.	1·43 per cent.

Not only has this factory reduced the quantity of salt required per year from 58,000 lb. to 37,000 lb., but the quantity of salt incorporated has risen from 25,000 lb. to 32,000 lb. The monetary value of these altered conditions is—

	£
Value of 20,000 lb. of salt saved (approx.)	100
Value of 7,000 lb. extra salt incorporated and sold as butter at 120s. cwt.	750
Total	£850

These illustrations serve to show how accurate moisture and salt tests may be applied by intelligent factory officials, and also serve to show the important part which butter standardization plays in the dairy industry.

OVERSTOCKING GRAZING LANDS—SOME EVILS.

Stocking capacity is a point in the management of pastoral lands which is often neglected. It should be accepted as a truth that two well-fed sheep will give a greater monetary return than three half-fed animals and more than four half-starved sheep. The return from properly nourished sheep would be probably even higher were their greater resistance to internal parasites taken into consideration. Some of the evils of overstocking—altogether apart from total losses—are loss in wool per head, as the result of unthrifty growth; a possible break in the staple; poor lambings; a distinct loss on those animals which should be turned off as fats; and last, but not least, the erosion of country, of which overstocking is an important cause.

From the point of view of returns alone, it will be found that over a period of years a property stocked well within its carrying capacity will average far better returns than one where overstocking is the policy of the management.

Some graziers put forward the argument that, taking lean years into consideration, they have to stock to over-capacity to make ends meet. This policy is, however, considered to be wrong, especially when returns are averaged over a number of years.

Rejection of the First-Drawn Milk.

M. J. GRIFFITHS, B.Sc., Dairy Bacteriologist (Dairy Branch).

DAIRY farmers' troubles in regard to milk and cream quality usually begin in the cowbail at milking time. It is an unfortunate fact that bacteria of the types most harmful to keeping quality are always to be found in and around the milking shed. They may find their way into milk from many sources—the cow's coat and udder, dried dust and manure, the milker's hands if he neglects to wash them, or the milk utensils.

An additional source of contamination, which is often overlooked, is the small quantity of milk always present, even immediately after milking, within the narrow canal leading from the udder to the outlet of each teat. Here, bacteria entering from outside through the teat opening as soon as the cow lies down, and finding nourishment and a suitable medium and temperature for growth, may multiply and become established in enormous numbers in a few hours. Especially in the case of older cows, where the udder muscles have become slack, the bacteria can penetrate very easily into the teat canal through the enlarged opening.

The first operation, therefore, in clean milk production is the thorough washing of the outside of the cow's udder and teats, and the second is the removal of this first-drawn or "foremilk" so that it does not add large numbers of bacteria to the milk. Two or three streams of milk drawn off into a separate vessel before starting milking into the pail (or before affixing the machine) will be sufficient to wash the teat canal free, or almost free, of contaminating organisms.

The following figures, which are the results of experiments carried out to show the relative average numbers of bacteria found in the first, middle, and last-drawn portions of milk from a herd of twelve cows, show clearly the advantage of rejecting the first streams of milk, as well as of grooming the cows and keeping the surroundings clean:—

—	Foremilk.	Middle.	Last Drawn.
Cows not prepared and shed neglected	26,450 per c.c.	5,880 per c.c.	9,250 per c.c.
Cows groomed, shed neglected ..	13,720 per c.c.	2,430 per c.c.	3,130 per c.c.
Cows neglected, shed cleaned ..	13,360 per c.c.	2,200 per c.c.	1,550 per c.c.
Cows and shed cleaned	6,420 per c.c.	1,220 per c.c.	1,720 per c.c.

(Ref. Grant Lockhead, Dept. of Agric., Dominion of Canada.)

The work of many investigators shows that almost invariably the foremilk is the most heavily contaminated portion, though results and opinions vary as to the distribution of bacteria throughout the remainder.

It used to be thought that cleanly-produced milk must be almost sterile and that all bacteria found in it were from outside sources, but with the advance of dairy science it has been proved that the natural

"count" of milk varies enormously according to the individual cow, and that milk as it comes from the udder is rarely, if ever, completely free from bacteria. Some representative results are given below:—

—	Foremilk.	Middle.	Strippings.
Harding and Wilson (average of 5 cows over 6 days)	458 per c.c.	187 per c.c.	274 per c.c.
Orla-Jensen (one cow)	16,000 per c.c.	480 per c.c.	360 per c.c.
Copeland and Olsen (8 cows) ..	5,989 per c.c.	557 per c.c.	415 per c.c.

One American worker (Stocking), quoted by Hammer, tested the different streams of milk to find out the extent of the heavy preliminary contamination, with the following results:—

Trial Number.	Streams 1 and 2.	5 and 6.	9 and 10.	13 and 14.	Strippings.
1	1,940 per c.c.	550 per c.c.	250 per c.c.	275 per c.c.	216 per c.c.
2	25,200 per c.c.	5,391 per c.c.	285 per c.c.	218 per c.c.	101 per c.c.
3	5,491 per c.c.	2,096 per c.c.	430 per c.c.	820 per c.c.	141 per c.c.
4	7,941 per c.c.	1,350 per c.c.	125 per c.c.	216 per c.c.	156 per c.c.

These figures show the substantial decrease, even in very clean milk, after four streams have been removed. The reduction in count obtained by discarding the first three streams of milk from each teat has been found to amount to about 4 per cent. of the whole milking. (Ref. Hammer, "Dairy Bacteriology.") This quantity does not at first appear to be very significant, but a consideration of the types of bacteria present will show its importance. In the foremilk are mainly soil and water organisms and coliform types which are injurious to milk, whilst the flora of the middle and last-drawn portions of milk consists of inert udder types which are natural inhabitants of the normal healthy udder and are not undesirable in milk or harmful to its quality. For the production of clean milk to be used for human consumption, rejection of the first-drawn milk is obviously of assistance in maintaining a high standard of purity and good keeping quality; but in the case of milk production for butter or cheese making also, the practice has more advantages than disadvantages.

The most important reason why *every* farmer should make a practice of removing the foremilk regularly morning and evening is that it enables him to notice anything abnormal in the appearance of the milk. Signs of mastitis usually show up in the form of tiny clots or strings in the first-drawn milk, which, if observed, may mean the early detection of the disease in animals having one or more affected quarters. Special care may then be taken to milk these infected cows last; their milk can be isolated from the rest, and the spread of the disease can be arrested. Neglect or ignorance of mastitis infection, however, in its early stages may have serious and far-reaching effects on the individual cow, on the bulk milk, and on other animals in the herd.

A word of caution is necessary as to the method of removing this first-drawn milk. Under no circumstances must it be withdrawn on to the floor of the milking shed, for this is one of the surest ways of spreading any infection that may be present. Apart from this, decomposition will take place, with accompanying bad smells and attraction of flies.

Plate 10.
Method of Removing the Foremilk.

On many modern milk-producing farms in England a "strip-cup" is used, consisting of a small vessel fitted with a black-enamelled lid, over which each stream of milk passes before flowing through a hole into the cup below. This makes it possible to see at a single glance if any quarter is yielding stringy or abnormal-looking foremilk, and with such a system in use at each milking a case of mastitis cannot become advanced without the knowledge of the milker. Any ordinary small pail or billycan will, of course, serve the purpose, but it should be kept for this only and washed and scalded daily.

The foremilk will not amount to a great quantity except in the case of a large herd, but if it is free from any signs of disease it can be used for calf or pig feeding. It is advisable to pasteurize or bring it up to boiling point and cool before using. If it contains milk from several diseased cows, it is advisable to dispose of it, after adding some

disinfectant, by emptying *well* away from the cowbails and water supply. The pail should then be washed, scalded thoroughly, and rinsed with disinfectant.

It is well known that the highest percentage of butterfat in milk is found to be contained in the strippings, and that the first-drawn milk is the poorest portion, showing the lowest butterfat and the highest water percentage. Average analyses of the milk of seven cows, made by Eckles, showed only 10·67 per cent. of milk solids to be present in the foremilk, compared with 14·86 in the strippings, the difference consisting almost entirely of fat. Thus thorough stripping of every cow (done gently and not by downward jerking of the udder) will bring its own reward in the form of increased butterfat yield and stimulation of secretion by the milk glands; whilst the loss in butterfat occasioned by removing the first few streams of milk is negligible, and the slight reduction in the quantity is more than offset by the improvement in keeping quality of the bulk milk.

DAIRY CATTLE—PURE-BRED OR GRADES?

The question is often asked: Which is the more profitable—pure-bred or grade dairy cattle? The difference in value of pure-bred and high-grade dairy cattle lies in the higher selling price of the pure-bred. Dairy farms which are so equipped that they can handle the record work effectively will find more profit in pure-bred than in grade cattle. There is a steady market for high-quality pure-bred cattle at prices which net good returns to the breeder. Whether pure-bred stock will show the best results with any particular dairy farmer depends, however, on his keeping authentic records and also on his ability as a salesman. Pure-bred cattle which a breeder is unable to sell are no more valuable to him than an equal number of good grades.

A herd of carefully selected grade cows will produce as heavily as the average pure-bred herd, for the reason that they can be culled more closely, as their lower value does not encourage keeping an animal which is not a profitable producer. There is always a good demand for the female offspring at payable prices. Any person going in for dairying for the purpose of producing milk or cream, and not with the idea of gaining a large part of his income from the sale of stock, may do quite as well with grades as with pure-breds.

As in most things, success with dairy cattle depends on the individual farmer himself, and whether grade or pure-bred cattle are more desirable can be settled only when the particular conditions surrounding the individual case are considered.

It is sometimes stated that grade cows are better than pure-bred animals. This is not so, but it is true that some grades are better than some pure-bred stock.

One very important fact to remember, however, is that the herd sire should always be a pure-bred. Unfortunately, this is not sufficiently understood by some Queensland dairy farmers, and this accounts to a very large extent for the poor type of dairy cattle one sometimes sees when travelling through the country.

Some Notes on the Springsure and Clermont Districts, July, 1938.

S. L. EVERIST, B.Sc., Assistant to Research Officer.

THE observations contained in this report were made during a visit to Springsure and Clermont in July, 1938. The primary object of the visit was to add to the existing fund of knowledge of the natural grasslands and to study the behaviour of the Mitchell grasses. In addition, observations were made on soil erosion, weeds and poisonous plants, and on the effects of ringbarking.

GENERAL NOTES.

At the time of the visit the country generally was in fairly good condition. Although in many places summer rain was rather scanty, good general rains fell in May and June, and these, followed by an unusually mild winter, produced a good body of herbage such as Carrot (*Daucus brachiatus*), Yellow Daisy (*Senecio lautus*), Bluebell (*Wahlenbergia gracilis*), Lamb's Tongue (*Plantago varia*), Bindy-eye (*Calotis hispidula*), Daisy Burr (*Calotis lappulacea*), Mustard Weed or Pepper Cress (*Lepidium saggitulatum*), and Fat Hen (*Chenopodium album*), and in some places Yellow Buttons (*Helichrysum ramosissimum*), Saltweed (*Atriplex Muelleri*), Crowfoot (*Erodium cygnorum*), Potato Weed (*Solanum esuriale*), various species of *Sida* and *Abutilon* and *Malvastrum spicatum*.

The black soil downs carry many different grasses, and at present grassland in the area under consideration appears to be rather unstable as regards its composition. In many places White Spear Grass (*Aristida leptopoda*) has assumed dominance, but this is a particular problem dealt with in greater detail later. Blue Grass (*Dichanthium sericeum*) is not so plentiful as it was some years ago, while grasses like White Spear Grass, Mitchell Grasses, particularly Hoop or Weeping Mitchell Grass (*Astrebla elymoides*), Yabila Grass (*Panicum queenslandicum*), Barley Grass or Wild Millet (*Panicum decompositum*), and Feather Top (*Aristida latifolia*) appear to be on the increase. At the time of the visit practically all the grasses had green leaves and young shoots. Numerous seedlings of White Spear Grass and some Weeping Mitchell Grass seedlings were also seen. This is unusual, but is almost certainly due to the very warm winter.

On the basalt tablelands and some of the red rocky ridges the principal grass is Desert Blue Grass (*Bothriochloa Ewartiana*), also known as Desert Mitchell and Tableland Mitchell. Its reputation as a fodder is fairly good, particularly for large stock. This grass was also shooting freely, particularly where it had been kept short by grazing or judicious burning (Plates 13 and 14).

Burning of grassland is commonly practised in the Springsure and Clermont districts, but there is some difference of opinion as to the merits and demerits of the practice. If allowed to grow unchecked, some of these grasslands reach a stage where the ground cover becomes almost complete. The grasses are tussocky in nature, but the stems spread so as to touch and intersect each other. At this stage the grass is 2 feet or more in height, with a large amount of dry material, such as dead stalks and leaves (Plate 11). In this condition it is difficult

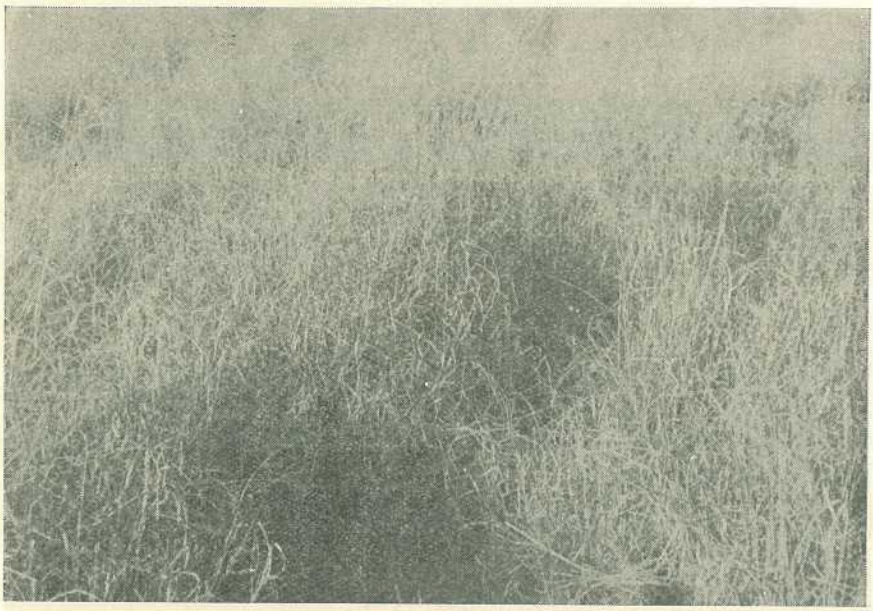


Plate 11.

ORION DOWNS: EAST OF SPRINGSURE.—Part of black soil downs showing thick stand of White Spear Grass (*Aristida leptopoda*), with one plant each of Feather Top (*Aristida latifolia*) and Yabila Grass (*Panicum queenslandicum*). Grass not burnt and useless for stock.

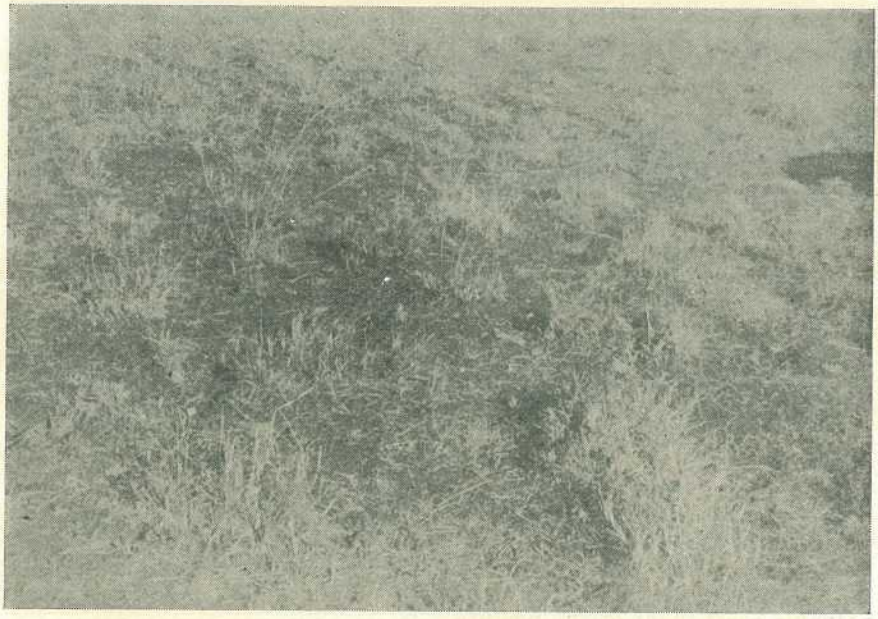


Plate 12.

ORION DOWNS: EAST OF SPRINGSURE.—Adjacent part of same paddock which has been burnt. Mostly White Spear Grass, with some Hoop or Weeping Mitchell (*Astrebla elymoides*), Feather Top, and seedlings of Yellow Drumsticks (*Craspedia chrysantha*). The Mitchell Grass has been heavily grazed.

to persuade sheep to enter the stand of grass, let alone eat it. Cases are know where sheep have died of starvation under such conditions and the rest of the flock has been saved only by hand feeding.

Under such conditions some means of reducing the density of the stand is essential if the country is to be utilised for grazing. Fire seems to be the best means of doing this (Plate 12) on large paddocks or rough country. For the small selector, mowing of suitable country may be more advisable as better control of storm rains would be obtained and there is less chance of the stalk destroying the more attractive grasses if grazing is allowed during the early stages of regrowth. Burning must be done with great care and at the proper time. Most people interviewed were of the opinion that it is best to burn in fairly

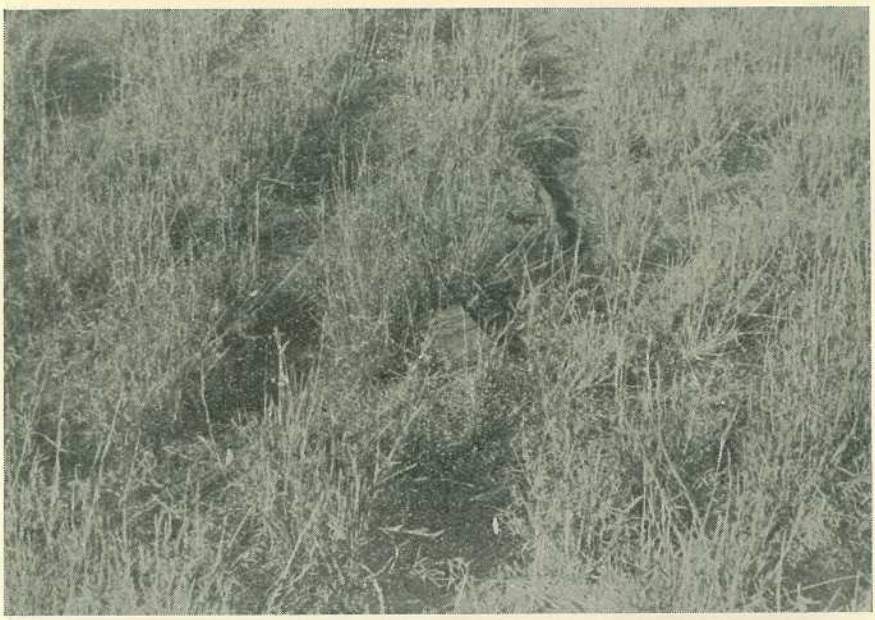


Plate 13.

BUCKLAND PLAINS: WEST OF SPRINGSURE.—Desert Blue Grass (*Bothriochloa Ewartiana*) on basalt tableland. Unburnt grass showing amount of dry stalk. Notebook near centre measures 5 inches by 6¼ inches.

narrow strips immediately after heavy rain when the ground is thoroughly wet. If that is done immediate growth results, and sheep will do well on the young growth of most of the grasses, with the possible exception of White Spear Grass, which seems to be unpalatable at all stages.

However, burning in a dry time or regular burning of the same area year after year will cause rapid deterioration. The coarser, less palatable grasses, such as White Spear Grass and Yabila Grass, take possession or else the ground remains bare and grows very little. A very hot burn, too, destroys many herb seeds and herbage is a very valuable constituent of the pasture.

Another important question is the effect of burning on soil moisture. In one instance holes were dug in adjacent burnt and unburnt areas, similar in soil, slope, and drainage. On the burnt area the soil was appreciably moist to a depth of 10 inches, on the unburnt area the

moisture penetrated to a depth of 12 inches. This indicates that important differences may be the result of fire, particularly a very hot fire.

Much still remains to be done on the effect to burning on native grassland.

PROBLEMS OF THE SPRINGSURE DISTRICT.

At the present time the Springsure district presents four major problems to sheepmen, viz., dingoes, White Spear Grass, soil erosion, and Mint Weed. Dingoes, however, are outside the writer's sphere of activity.

The White Spear Grass Problem.

White Spear Grass or White Seed (*Aristida leptopoda*) at present appears to be troublesome only on the open black soil downs and alluvial flats, though there is some evidence that it is spreading to the slopes

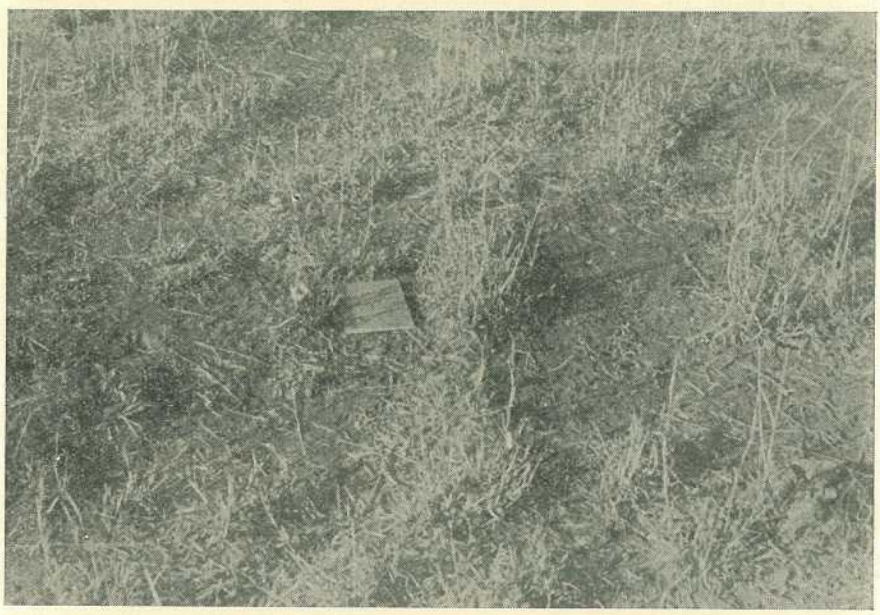


Plate 14.

Part of same paddock burnt December, 1937, showing green shoots on Desert Blue Grass. Grazed.

and tops of the low basalt tablelands. The grass is native to Queensland, but according to some local residents, first made its presence felt in 1914-15, following severe droughts. From that time on it has gradually become more serious until to-day it is a major menace to sheep raising in the district. As a matter of fact, one large holding has reverted to cattle because sheep could no longer be raised successfully on the Spear Grass.

During the course of the writer's visit a good deal of attention was paid to the plant. The grass itself is a densely tufted perennial, very like the Mitchell Grasses in habit, and possessing the same power of resistance to drought. The rootstock is composed of short, much-branched rhizomes, clothed in hard scales and bearing numerous buds. The buds, too, are wrapped in layer upon layer of hard, brown scales which protect the young shoots from dessication by drought. These

buds are produced at from ½ to 1 inch below the surface of the soil. The leaves are long, narrow, and taper to a fine point. They are frequently produced in tufts some distance above the ground and give the plant a very characteristic appearance. They are fairly hard, and appear to be unpalatable to stock, even when quite green. The seed head is a slender, spreading panicle, each branch of which bears two spikelets or "seeds" near the end. These "seeds" each have three bristles or awns on the top and a sharp, hairy point at the base.

The grass is a pest in two ways:—

1. It is aggressive in its growth and unpalatable to stock, therefore the more palatable grasses are grazed, leaving the unpalatable White Spear Grass to take possession of the country. It is also spread rapidly by wind.

2. The seeds themselves are dangerous to sheep. They are capable of penetrating the wool, skin, and even the flesh. Sometimes they also enter the eyes and render sheep blind. The seeds are not quite so bad in these respects as those of the Black Spear Grass or Bunch Spear Grass (*Heteropogon contortus*), but this latter grass has the saving grace of being very palatable and nutritious in its early stages.

Reasons for Infestation by White Spear Grass.

Many theories have been advanced by graziers to account for the spread of the grass. The principal ones are:—

1. *Overstocking with Sheep.*—A visit to properties grazed solely by cattle and horses showed that the grass is just as dense there as on adjoining sheep properties. Sheep, then, are evidently not primarily responsible for infestation, though they may be a contributing factor. Nevertheless, overstocking with any class of stock will encourage the grass since the more palatable grasses are eaten out, leaving the unrelished ones to seed and eventually become dominant. The presence of White Spear Grass is not necessarily evidence of overstocking, since lightly stocked properties are also infested with it.

2. *Burning.*—Again, places which have never been burnt show as heavy a growth of White Spear as those which have been burnt. However, it is believed that regular burning or burning at the wrong time would encourage the grass. It is fairly resistant to fire, and, since the young growth resulting from a burn is less palatable than the good grasses, selective grazing would encourage the White Spear Grass.

3. *Drought.*—Drought appears to be an important factor in the very rapid spread of this grass. When a serious drought occurs the ground becomes bare. White Spear Grass germinates readily and rapidly and is also carried easily by wind. If, therefore, climatic conditions following the breaking of a drought should favour the germination of White Spear Grass, selective grazing of other grasses such as Blue Grass (*Dichanthium sericeum*) which would germinate under the same conditions, would result in a preponderance of White Spear Grass.

4. *Soil Erosion.*—One individual interviewed by the writer suggested a theory which might repay investigation. His theory is this: Prior to the droughts at the beginning of this century, the downs soils were loose and very rough on the surface. Blue Grass flourished. During the droughts much of this rough surface soil was swept away by wind, and when the droughts broke in a deluge, as they usually did, more of it was washed away. The top soil contained most of the Blue Grass seeds, whereas White Spear Grass seeds were blown in from the east during and after the droughts. Blue Grass, too, did

not grow so readily on the harder surface left after the dry times and White Spear Grass flourished. He believes that the White Spear is gradually building up the texture of the surface soil to its original state, and that there is a possibility that the grass will eventually become less aggressive. It is possible, of course, that the occurrence of White Spear Grass is simply a stage in a natural succession and it may eventually give way to other grasses. Time alone will tell.

5. *Wind.*—Wind is a very important factor in the dispersal of White Spear Grass. The whole inflorescence breaks off readily and can be blown for considerable distances. The seeds have been observed piled up against houses, woolsheds, and fences. One resident of the Springsure district suggested that the grass may have come in from the Comet River country with the prevailing north-east and south-east winds. He bases his statement on the fact that the eastern properties were the first in the district to be affected and that along belts of timber and fences the inflorescences are piled up against the eastern side. If possible, a good plan is to leave a belt of standing timber on the eastern side of open downs areas.

Control of White Spear Grass.

The control of this grass appears to be difficult and constitutes a serious problem. Stocking with cattle has been suggested, but appears to be of no value in view of the fact that some cattle country is as heavily infested as that grazed by sheep. Burning only serves to increase the spread of the grass as outlined above. The result of spelling has not been observed, and it would be interesting to see what effect the removal of animals would have on the grass.

Some control appears to be possible by the use of Hoop or Weeping Mitchell Grass (*Astrebla elymoides*). Where this grass has become established it appears to be gradually ousting the White Spear Grass. Unfortunately, in the Springsure district Weeping Mitchell Grass is not relished by sheep except when very young. In some places occasional burning is practised. The burn must take place after heavy rain when the ground is thoroughly wet, otherwise little or no growth results and the grass eventually dies out. If, following a burn, the grass is kept fairly well grazed, sheep appear to do quite well on it. If allowed to grow big and coarse, sheep will not even enter the area it occupies.

Curly Mitchell Grass (*Astrebla lappacea*), which is much more palatable than the Weeping Mitchell, is growing only in isolated patches in the Springsure district, despite the fact that on some properties it has been extensively sown. It appears to do best on soils such as alluvials which are rather lighter in texture than the heavy black soils of the open downs. Stock are extremely fond of the grass.

The above observations were all made in the course of a visit of about a week's duration. In such a brief space of time no definite conclusions could be reached and much still remains to be done on this serious problem.

The Soil Erosion Problem.

So far as the writer's observations go, soil erosion is more serious in the Springsure district than in most other districts in Western Queensland. A number of different soil types are affected, and erosion is due principally to water.

Plate 15.

SOUTH OF SPRINGSURE.—Erosion gully in old alluvium between two rocky hills. Trees are Silver-leafed Ironbark (*Eucalyptus melanophloia*). Shrubs are Budda or Sandalwood (*Eremophila mitchellii*). Gully about 6 feet deep.

Plate 16.

CALANDOON ROAD: SOUTH OF SPRINGSURE.—Erosion gully across black soil road; stones mark position of invert in road. Trees are Coolabah (*Eucalyptus coolabah*). Shows ease with which black soil erodes when water is allowed to flow in definite channel.

1. *Black Soil.*—The most striking evidence of erosion in the district is afforded by the deep gullying of the black soil and the consequent silting up of creeks. Due to its position at the northern end of the Carnarvon Ranges, much of the Springsure district is particularly liable to be eroded by water. Large quantities of water flow from the hills, often at considerable speed.

Gullying and sheet erosion have always taken place to some extent and the material has been largely redeposited in the rich alluvial flats along most of the creeks. In some places fairly well-defined alluvial fans are recognisable. However, observations over the last two years indicate that gully erosion is increasing rapidly. The black soil is easily washed away by water, and if, through drought or severe grazing, the surface becomes bare, nothing is left to hold the loose surface soil. Gullies are particularly serious near steep hills, and are most noticeable south of Springsure, towards the Carnarvon Ranges (Plate 16). In many cases the gullies have cut right through the soil to the underlying basalt.

The possible relationship of soil erosion to the spread of White Spear Grass has already been discussed.

2. *Ringbarked Country.*—Several types of country are commonly ringbarked in the Springsure district. The stony ridges which carry a mixed tree flora of Box (*Eucalyptus populifolia*), Wilga (*Geijera parviflora*), Bottle Tree (*Sterculia rupestris*), Bonewood (*Macropteranthes Leichhardtii*), Holly (*Heterodendron diversifolium*), Boonaree (*Heterodendron oleæfolium*), Quinine Bush (*Alstonia constricta*), Budda or Sandalwood (*Eremophila mitchellii*), Emu Apple (*Owenia acidula*), and other trees with a fairly dense undergrowth of Currant Bush (*Carissa ovata*), appear to be fairly stable, due to the great number of large stones embedded in the surface soil. The proportion of edible trees is fairly large so that a good deal of standing timber is left even after the useless ones have been ringbarked. Brigalow (*Acacia harpophylla*) scrubs also appear to be fairly stable since most of them have the typical soil pockets known as gilgais which serve to hold the water and prevent excessive run off.

The soil types most threatened by erosion are the red soils sometimes found along creeks and the red sandy soil ridges which adjoin the poor, white sandstones hills east of Springsure.

When the timber is removed, the red soil creek flats tend to form claypans. At one place near Springsure a striking example of erosion of this type was studied. Along one bank of the creek is a narrow strip of timbered country. The strip is situated along the western edge of an area of open downs and is an old alluvial flat. The principal trees and shrubs are Silver-leafed Ironbark (*Eucalyptus melanophloia*) and Budda or Sandalwood (*Eremophila Mitchellii*) with a thin but fairly stable ground cover consisting principally of Slender Wire Grass (*Aristida gracilipes*), Wire Grass (*Aristida ramosa*), Bindyeye (*Calotis hispidula*), Feather Top (*Aristida latifolia*), Minute Grass (*Tripogon loliiformis*), Small Burr Grass (*Tragus biflorus*), Spider Grass (*Chloris acicularis*), Tall Chloris (*Chloris ventricosa*), Small Blue Grass (*Dichanthium affine*), Bunch Spear or Black Spear Grass (*Heteropogon contortus*), *Eragrostis falcata*, and Cotton Bush (*Kochia tomentosa*) (Plate 17). Some of these are present only as isolated plants. For example, there is not sufficient Black Spear Grass to cause trouble with sheep. This strip of country is particularly valuable, especially when

Plate 17.

ORION DOWNS: EAST OF SPRINGSURE.—Red alluvium with Silver-leafed Ironbark (*Eucalyptus melanophloia*) and Budda or Sandalwood (*Eremophila Mitchellii*), and ground vegetation of Wire Grass (*Aristida ramosa*), Small Blue Grass (*Dichanthium affine*), Small Burr Grass (*Tragus biflorus*), Bindyeye (*Calotis hispidula*), Minute Grass (*Tripogon loliiformis*).

Plate 18.

Same place as Plate 17. Open patch showing erosion gullies, also smooth surface on left due to sheet erosion.

Plate 19.

Same class of country as Plate 17, showing effect of clearing. Light-coloured patches are bare ground, darker patches sandy areas carrying Minute Grass, Bindyeye, Bluebell (*Wahlenbergia gracilis*) and Young Galvanised Burr (*Bassia Birchii*). Note how log has held the soil. Timbered country in background represents original condition of this area.

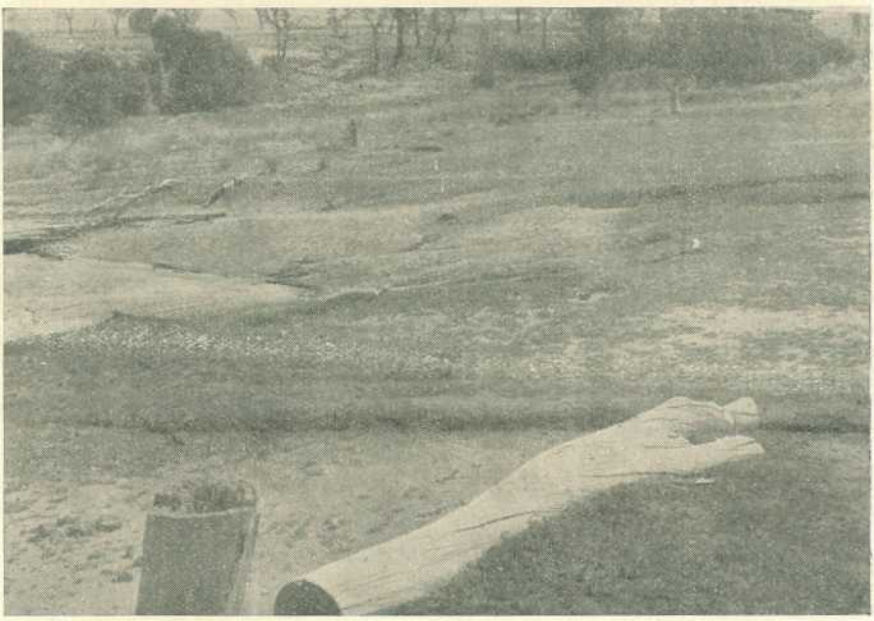


Plate 20.

Same as above. Same log in foreground, showing gullying of creek banks opposite cleared area.

lambing ewes are in the paddock, because the ewes get into it and escape the White Spear Grass on the downs country. In addition, the trees provide good shade.

In some places the timber has died, most probably through drought, and in these places sheet and gully erosion have commenced (Plate 18). They do not extend for any distance into the living timber.

The strip extends into an adjoining paddock, portion of which was cleared to provide wind for a mill. Where the timber has been removed the surface is mostly hard and smooth like a typical claypan with occasional patches of looser soil growing some Minute Grass, Bindyeye, Bluebell (*Wahlenbergia gracilis*), and Galvanised Burr (*Bassia Birchii*) (Plate 19). The surface is from 1 to 2 inches lower than that of the adjacent paddock where the timber was left standing. The bare area described above was formerly thickly infested with Galvanised Burr, but this was all removed. This year there is a good deal of young growth.

Evidence of the difference in run off is provided by the creek bank itself. Between the old alluvium and the present creek bed is a terrace about 20 to 30 feet wide and about 6 to 10 feet below the level of the timbered strip. Opposite the uncleared area this terrace and the banks remain intact, opposite the cleared area both terrace and bank are deeply gullied (Plate 20).

East of Springsure adjoining the ranges is a type of forest developed on a red soil. The surface readily breaks up into a fine sand and this soil is very susceptible to erosion by both wind and water.

The forest consists of a heterogeneous mixture of Belah (*Casuarina lepidophloia*), Box (*Eucalyptus populifolia*), Cypress Pine (*Callitris glauca*), and Silver-leafed Ironbark (*Eucalyptus melanopholia*), with a lower story of Budda or Sandalwood (*Eremophila Mitchellii*), and scattered Quinine Berry (*Petalostigma quadriloculare*). In its natural state the forest is practically a closed formation, and ground vegetation is negligible.

When the Belah, Box, and Ironbark are ringbarked, a dense cover of ground vegetation appears. This consists chiefly of Black Spear Grass (*Heteropogon contortus*), Tall Chloris (*Chloris ventricosa*), Wire Grass (*Aristida ramosa*), Purple Daisy (*Brachycome* sp.), Flinders Flea (*Stachytarphæta*), *Brachiaria piligera*, and *Rhagodia linifolia* (a saltweed). In some areas where the undergrowth was rung in addition to the larger trees, wind and water have removed a good deal of the surface soil and have either polished the surface or produced gullies. In any case the stand of herbage and grasses has been much reduced. In the open spaces, too, Currant Bush (*Carissa ovata*) is spreading rapidly. In the areas east of the Dividing Range Currant Bush does not appear to be grazed to any extent, and it is capable of forming a barrier almost impenetrable to sheep, cattle, and sometimes horses.

The Mint Weed Problem.

Mint Weed or Wild Sage (*Salvia reflexa*) appears likely to become a very serious pest in the Springsure district. Apart from the fact that it spreads rapidly and renders much land practically useless, Mint Weed is poisonous, and constitutes a potential danger to travelling stock. Paddock stock rarely, if ever, eat the plant, or if they do, they do not

get sufficient to cause trouble. However, empty sheep, particularly those unloaded from trucks and then driven, are very susceptible to plant poisoning. Losses among such sheep have already occurred.

Mint Weed is an annual and appears to flourish on bare areas, particularly after winter rains. It seeds very freely and the seeds appears to germinate very readily. The plant is easily removed by chipping, but such large areas are now infested that its removal by this means would be very costly.

PROBLEMS OF THE CLERMONT DISTRICT.

The Clermont district appears to be less threatened than the Springsure area although White Spear Grass is troublesome in places. Mint Weed does not seem to have reached the district as yet. Soil erosion is less active than in the Springsure district, though some of the black soil downs are gullied.

Plant Poisoning.

One of the principal problems in the Clermont district is loss by plant poisoning. The writer was informed that many sheep are lost each year from this cause, particularly after winter rains. A number of plants may be responsible. During his visit the writer saw plants of Thorn Apple (*Datura Leichhardtii*), Darling Pea (*Swainsona galegifolia*), Caustic Creeper (*Euphorbia Drummondii*), Ellangowan Poison Bush (*Myoporum deserti*), Fuchsia Bush (*Eremophila maculata*), Prickly Poppy or Mexican Poppy (*Argemone mexicana*), and the so-called Red Poppy or Red Bottlebrush (*Pimelea hæmatostachya*). Each of these plants has been either proved or is suspected of poisoning stock at different times.

Paddocks on one property where newly introduced rams are consistently lost were examined and found to contain fair quantities of Darling Pea and Red Poppy. In addition, one of the paddocks contained Ellangowan Poison Bush and Prickly Poppy. Caustic Creeper is said to be frequently present although none was seen at the time of the visit.

On another property where sheep are lost fair quantities of Darling Pea and Red Poppy were present in the paddock concerned.

Grass Problems.

A grass which threatens to become a pest in some parts of the Clermont district is Yabila Grass (*Panicum queenslandicum*), also known as Star Grass, Umbrella Grass, Windmill Grass or Blow-away Grass, names loosely applied in Western Queensland to grasses having a spreading seed head which breaks off at the base and blows away. The name Yabila Grass is worthy of note. So far as is known, this is the first time the name has been put on record. The name was given to the writer by Mr. Gillespie of Orion Downs in the Springsure district, who assured him that it is a genuine native name.

Yabila Grass is a densely tufted perennial growing to a height of about 2 feet or sometimes more. It grows vigorously and seeds freely, and appears to be fairly drought resistant. Stock generally avoid it, except when very young. In many places it has nearly replaced the Blue Grass. It is not so serious a pest as White Spear Grass because the seed is not at all dangerous to sheep. However, it is worthy of notice as a potential danger to the pasture on account of its vigour and unpalatability. Burning appears to favour the spread of this grass.

CONCLUSION.

In addition to the above data much information was collected on the behaviour of the native grass species, particularly the Mitchell Grasses. This has been added to the information already collected in other parts of Western Queensland.

In conclusion, the writer wishes to express his sincere gratitude to the many people who, sometimes at considerable inconvenience to themselves, co-operated in the course of this survey of the two districts.

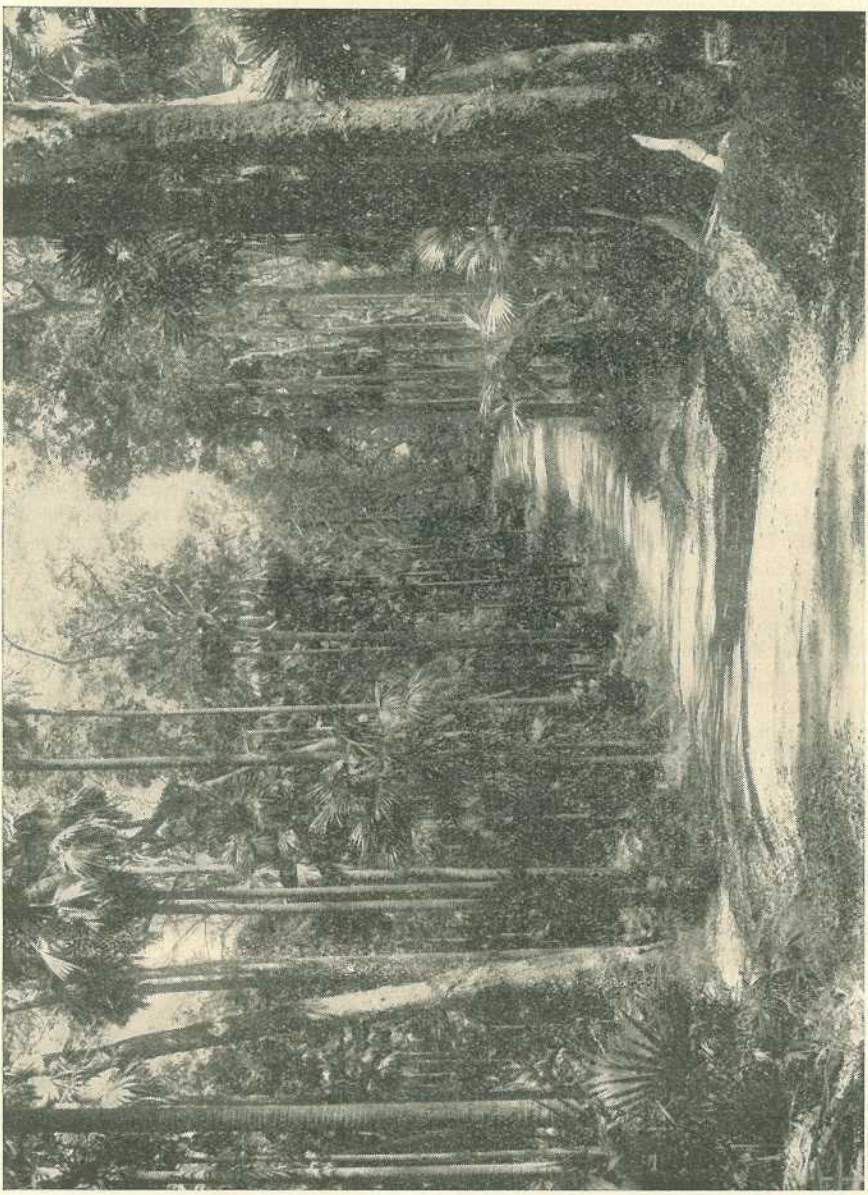


Plate 21.
A Road through the Rain Forest on the Eungella Range, near Mackay, Queensland.

Pig Raising.

By OFFICERS OF THE PIG RAISING BRANCH.

THE pig industry of Queensland provides an important part of the State's rural wealth, the total value of the annual production in recent years, after processing for fresh and frozen pork and cured bacon and ham, has approached £2,000,000. The true value of the industry is only visualised, however, when it is realised that so far, pig raising is conducted primarily for the purpose of disposing of by-products of other industries, particularly milk by-products from the butter and cheese industries, which have limited values in other directions, but can be economically converted into good quality pork.

The existence of the pig industry depends upon suitable food supplies, and in Queensland, although the pig industry is spread over a large area, the far northern and the most southern bacon factories being more than 1,000 miles apart, a relatively small part of the State is devoted to pig raising. Pig raising is confined to the dairying and agricultural areas along the coast, and at present approximately 85 per cent. of the pig population of the State is within a 200 miles radius of Brisbane.

The annual pig crop during recent years has been around half a million pigs slaughtered for pork and bacon within the State, and the number is increasing, although the annual crop fluctuates according to seasonal conditions which affect the food supply.

There is scope for greatly increased production of pigs, but any increase is dependent upon further food supplies, which could be provided by increased cultivation of fodder crops for pigs and increased milk production, which in turn is dependent upon improved pasture management, increased production of fodder crops for dairy cattle, and the conservation of fodder and water to smooth out the seasonal fluctuations in the production of milk.

Even with the present milk supply more pork could be produced by the use of greater quantities of fodder crops, and by distributing the available milk to larger numbers of pigs, or by substituting meat-meal for milk as the protein-rich part of the diet.

Climatic and soil conditions in Queensland's agricultural areas are very suitable for the production of numerous crops which provide good pig food. The long grazing seasons and moderate temperatures are conducive to profitable pig production.

MARKETS AND MARKETING.

Before commencing to produce an article for sale it is wise to ascertain if there is likely to be a market for that article; it is therefore in order to deal with existing markets and their present requirements, but it is necessary to realise that market requirements change with time, and producers must be prepared to make any alterations necessary in their commodity to meet changing consumer requirements; this is particularly important when there is competition among producers to supply a crowded market.

Australians are not big pork eaters in comparison with people of other countries; in fact, we eat less pig meats per head of population than most nations.

Queensland produced in recent years approximately one-fourth of the total pigs slaughtered in the Commonwealth. As Queensland's human population is only about one-seventh of the Commonwealth total this State has a larger surplus of pig meats than any other. This surplus is disposed of partly in the form of cured bacon and ham sold to the other States, some cured bacon and ham is exported to the East and to the islands of the Pacific, but the increasing surplus is being exported to the United Kingdom in the form of frozen porker and baconer carcases and pieces. Queensland is now supplying approximately one-half of the total frozen pig meat export to the United Kingdom from Australia.

The United Kingdom is the worlds largest importer of pig products, and Australia looks to this market as the logical outlet for its surplus pork. During the past seven years there has been a rapid increase in this trade with the United Kingdom until it has now reached a stage where the prices paid for pigs in Australia are largely influenced by the United Kingdom market. Since this effect has become more evident there has been greater stability of prices for pigs in Australia than was previously experienced. This stability gives the producer greater confidence in the pig industry, and is therefore conducive to increased production

The policy of the United Kingdom Government is to foster home production of pig meats and to give preference to Empire imports over foreign imports. Also it has legislated for the control of the home pig industry so that prices of bacon may be regulated, and the whole industry stabilised; Australia therefore does not contemplate restricted markets until pig production in Australia has reached a much greater volume than at present.

The local, interstate, and overseas markets provide for the disposal of good quality pigs of both porker and baconer weights, but when it is realised that the United Kingdom is the most obvious channel for marketing the increasing quantities of pig meats which are being produced in Queensland, special consideration should be given to the following resolution of the Australian Meat Board, published in November, 1937:—

> "That the board considers that the best way to export pig meats from Australia to the United Kingdom is in the form of frozen baconer carcases and pieces suitable for the manufacture into bacon and hams, and recommends accordingly to producers."

A study of pig prices in Queensland over a number of years indicates a seasonal trend of prices which reach their peak in the Spring and then fall rapidly until they reach their lowest in the Autumn; this is the result of the pig industry's reliance on milk, the production of which fluctuates with the seasons. In 1929 and for a few years previous, prices averaged about 7d. per lb. dressed weight for prime baconers on Queensland railways. Then, with the fall in world values for practically all primary products there was a sharp decline in pig values in the years 1931, 1932, and 1933. Since 1933 pig prices have increased to an average of around 5½d. per lb.

Most districts in Queensland where pig raising is well established are well provided with marketing facilities. Large bacon factories or meatworks are established at Brisbane, Toowoomba, Warwick, Maryborough, Gladstone, Rockhampton, and Mareeba. Each of these establishments treats pigs for local requirements, and most of them engage in the treatment of pigs for export. In most districts there are also smaller butchering establishments which treat pigs for local requirements.

Some of the organisations treating pigs arrange regular truckings either weekly or fortnightly from country railway centres, when pigs are sold either "over the scales," before trucking, on an estimated dressed weight basis, or on consignment to the works, when they are paid for after slaughter on their actual dressed weight.

Auction sales of pigs are conducted at Brisbane and several other large marketing centres, while practically all operators are prepared to accept pigs "on consignment" at the works direct from growers.

Prime baconer and porker pigs are readily saleable, but unfinished or excessively fat pigs are usually sold at a discount. Mature sows which are not in pig, but in prime condition, are classed as backfatters and find a good market; stags and rough quality pigs are not in very keen demand on most markets. Weaners and store pigs are traded fairly extensively at the larger auction markets, and also privately between producers. The demand for these two classes of pigs is irregular, fluctuating with the seasons and the food supply. Most successful pig raisers prefer to breed and then finish their own pigs, rather than purchase stores, because of the risk of introducing disease, and because store pigs are usually too expensive when in demand.

All pigs slaughtered for sale are submitted to inspection by Government meat inspectors, whose duty it is to satisfy themselves by examination, that each carcase is free from disease, and is fit for human consumption, any diseased carcase or part thereof being condemned. Pigs slaughtered for export from Australia are inspected by Commonwealth meat inspectors, who also grade carcases; any carcase not complying with export standards is rejected, though not necessarily condemned. Export standards are severe, and many carcases are rejected because of some slight blemish which could have been avoided by more care being exercised in growing and marketing those pigs. With the growth of the export trade the problem of disposing of rejected carcases will become more acute, and it is therefore necessary for producers and those handling pigs in transit to exercise greater care in order to avoid what could become a burden on the pig industry.

For the purpose of identification of ownership so that the seller of the pigs may be made to bear any loss of condemnations, and be credited with the gradings of his pig carcases, it is required by the Pig Industry Act of 1933 and Regulations thereunder that every pig offered for sale, and every pig consigned to a slaughtering establishment, must bear a mark of identification. Pigs consigned to works or factories are mostly branded with the body tattoo, which is an efficient brand for identifying carcases, but is not always visible on live pigs; therefore, in cases where it is desired to identify the pigs immediately before as well as after slaughter, the fire brand is resorted to, as ear-marking and ear-tagging have not proved wholly satisfactory.

The difference between the price per lb. which the producer receives for his pigs, and the price he pays the storekeeper for a lb. of bacon is thought by some producers to be too great; it should, however, be realised that the price paid to the producer does not usually include freight to the works, and when pigs are delivered to the works by the producer an allowance is made for the freight. Further, a lb. of dressed pork does not make a lb. of bacon. The following is an account of what happens to a prime, unfasted pig weighing 200 lb. alive at a country railway yard. Weight is lost in the form of shrinkage and emptying of the digestive tract during transit to the works, and whilst resting at the works; then at slaughter the blood, hair, and viscera are lost, and the resultant carcase with head, feet, and flare still on, weighs approximately 145 lb. after cooling. In the process of bacon curing the head, feet, flare, backbone, and trimmings are removed, and drying occurs, resulting in approximately 110 lb. of cured bacon and hams being produced, which is 55 per cent. of the live weight of the pig.

The yield of carcase and the yield of cured meat vary considerably, and are not so high with light pigs as with heavy pigs, and are influenced also by the condition and conformation of the pigs, the amount of food they are carrying when first weighed alive, and the time elapsing before slaughter.

ACCOMMODATION AND EQUIPMENT.

In providing accommodation for his pigs, the farmer must consider the health and comfort of his stock, and plan to prevent disease as far as practicable; he must also consider his system of feeding and management, and bear in mind the class of pigs required by the pork and bacon trades.

During recent years the general demand has changed towards leaner meat, and pig-raisers are now endeavouring to produce pork and bacon pigs which have an abundance of lean meat and a minimum of fat; this, of course, necessitates a change of methods in breeding, feeding, and management.

Health in pigs is dependent on sound husbandry, one of the more important features of which is the provision of good accommodation. Investigations into disease in pigs have shown that certain rules in sanitation regarding pig accommodation will, if carried out, control most of the serious troubles which occur in pigs, particularly infestation by internal parasites.

Bearing in mind the most important feature of pig accommodation —namely, sanitation—there can be only two clearly defined systems of keeping pigs which are completely satisfactory; one is the grazing system, wherein pigs are kept on fresh pasture or crop land which is either rested, or cultivated and grazed in rotation; the other is the intensive system, in which the pigs are kept on impervious floors, such as concrete, which are properly drained and regularly cleaned. In both of these systems the object should be to keep the pigs on clean ground, or on a clean floor, for a good deal of the infection to which pigs are subject lurks on the ground or floor of pig pens which are not rested, or properly cleansed. In grazing pig paddocks in rotation the youngest pigs should be kept on the cleanest ground, as they are usually the more susceptible to infection.

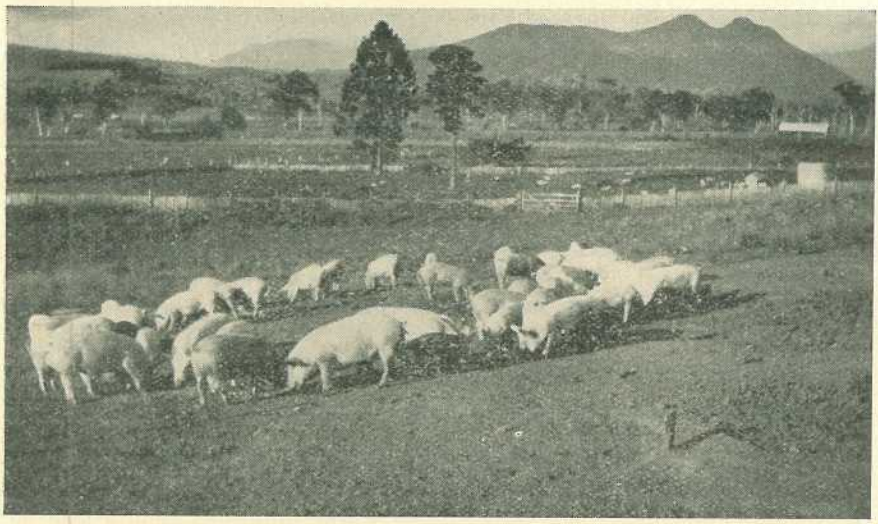


Plate 22.
A scene on a Queensland Pig Farm where pigs are grazed on lucerne and paspalum.

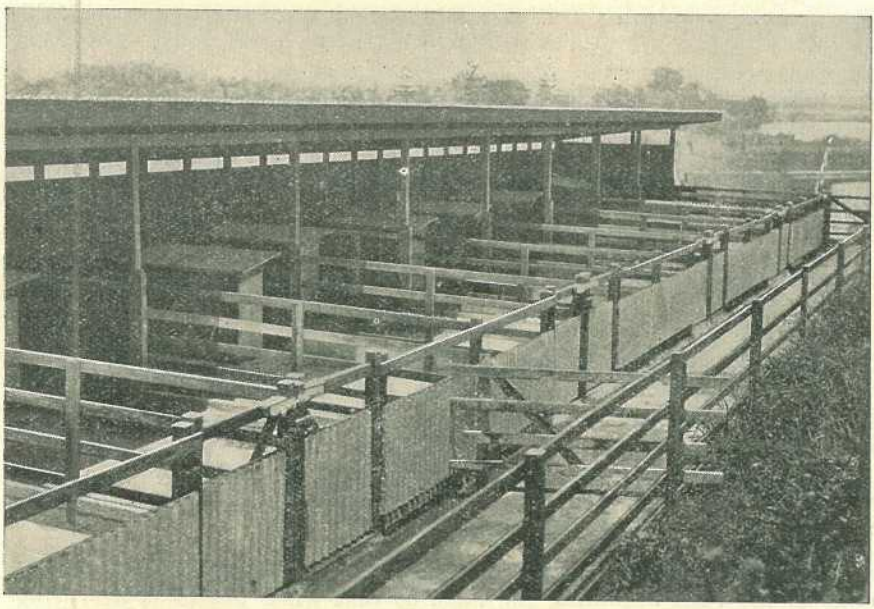


Plate 23.
Intensive Pig Pens of similar design to the drawings shown in Plate 50.

Where there is a sufficient area of good grazing land or cultivation land the grazing system has many advantages, and should be adopted, either entirely, or in combination with the intensive system. If sufficient paddocks can be cropped for the pigs to do the harvesting, the paddocks being ploughed a couple of times each year, infection will be kept at a minimum; the pigs will receive benefit from the exercise gained in grazing or harvesting their own food; a good deal of labour is saved in the harvesting of the crop, and the fertility of the land benefits.

On grazing land where cultivation is not practicable it is necessary to have sufficient paddocks of ample area to keep them always well grassed, and to enable the resting of the paddocks at frequent intervals. Pig paddocks should not be over-stocked so that they become bare, unless they can be cultivated or rested for several months. Even if pigs are paddocked as suggested, the ground near the troughs and sheds will become "pig sick" after a time, and so it is most desirable that such equipment should be movable. Sheds of convenient size should be provided in the paddocks to shelter the pigs from the extremes of the weather, and these sheds should be built on skids to allow of their easy transport about the paddock, or from one paddock to another. Food troughs and platforms, self-feeders, and water fountains should also be mounted on skids for easy transport.

With movable equipment and sufficient paddocks, there is no necessity for cleaning up with broom and shovel, and where pigs are kept on the grazing system the whole piggery is found to be free of noxious odours, which are usually associated with small pen piggeries; these features make pig-raising a much more congenial undertaking when the grazing system is adopted.

When the intensive system of pig-raising is adopted, impervious floors, and good drains are essential; a good supply of water and the necessary labour are also required to clean the pens daily. Intensive pens are necessarily small, and a portion of each pen is roofed to provide the pigs with shelter from the extremes of the weather. (See plan of intensive pig pens.)

In selecting a site for intensive pig pens, consideration should be given to the aspect, so as to provide shelter from the prevailing winds, and to make the best use of the early morning sun as a disinfectant and deodoriser inside the sheds; thus a north-easterly aspect will usually be found the most suitable.

A SUGGESTED LAYOUT.

The model piggery shown in Plate 24 suggests a layout which has proved very satisfactory where suitable cultivation or grazing land is available. This plan gives scope for cultivation and rotational grazing of paddocks with a view to providing a maximum of pasture for the pigs, and control of disease and parasites. The land in the centre of the runs, with a loading race at one end, and two movable hurdles, provides ample facilities for drafting pigs.

The usual fencing might be replaced by movable hurdles at the ends of the runs adjoining the lane, so that when paddocks are being cultivated implements may work right to the end of the run, for it is this portion around the troughs which becomes most fouled.

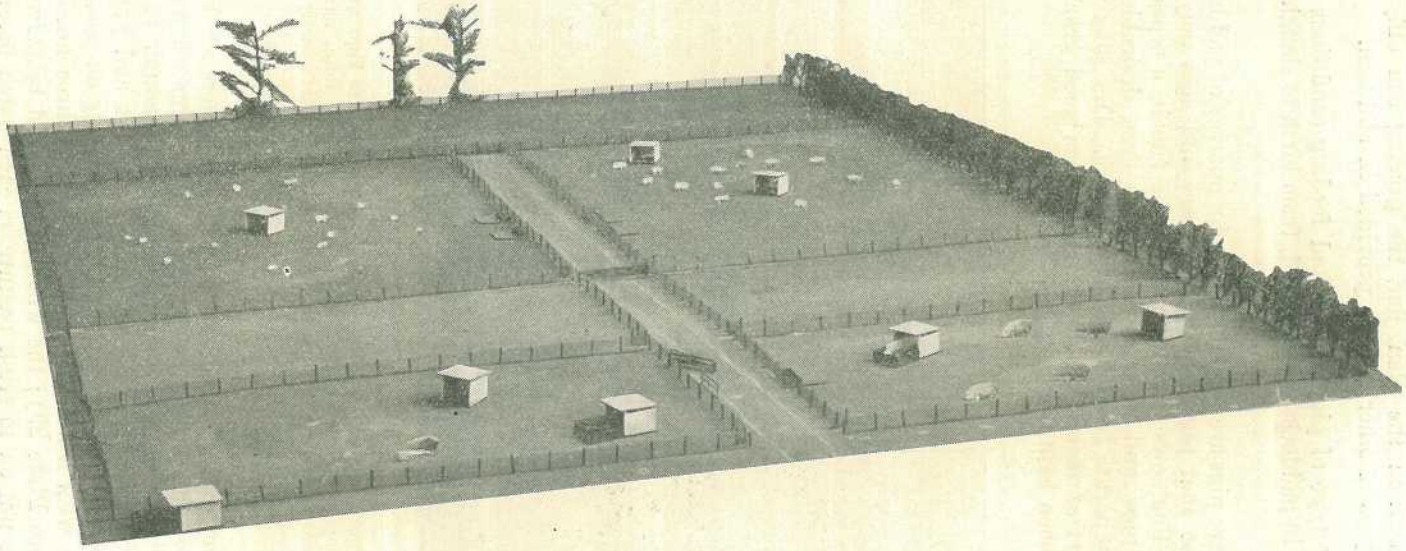


Plate 24.

MODEL PADDOCK PIGGERY FOR SIX SOWS, ONE BOAR, AND YOUNG STOCK.—The area is three acres, containing four small paddocks and three large ones, which allow for rotational grazing and resting or cultivation of the runs. The dry sows and the boar are kept in one paddock, sows with litters in another, and the younger litters in a temporary pen. The growing pigs are in two groups. No fattening pen is provided, as pigs bred to the right type finish well in paddocks.

The sheds are on skids and the troughs are built on platforms, which also rest on skids for easy transport.

The hurdles and loading race in the lane provide for easy handling of pigs, while the quarantine pen outside the main piggery is a safeguard for the control of disease.

It is not suggested that the pigs will obtain all their food from the 3 acres of grazing shown in the plan, and the grazing can only be expected to carry the pigs if other food is provided in addition.

Where the correct type of pig is bred, and feeding conditions are good, pigs may be kept in paddocks as suggested, from birth to slaughter, with excellent results.

On every farm where pigs are bred and reared a number of paddocks or pens is necessary, so that pigs of various classes and ages may be kept separately. Breeding sows when dry should be run in a separate enclosure from other pigs, and in some cases it is even desirable to run the forward sows separate from the backward sows. Dry sows will secure the greatest part of their food requirement from good grazing, and give best results when kept out in the open.

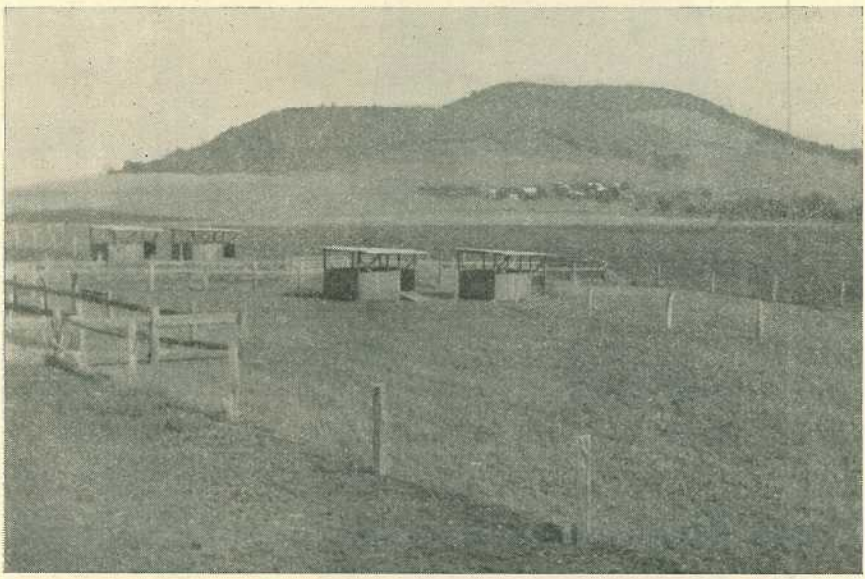


Plate 25.

W. F. Kajewski's Piggery, Glencoe, Darling Downs, where pigs are kept under grazing conditions, and movable sheds are provided for them. The long, narrow paddocks are cropped regularly, and the system has been working satisfactorily for some years.

The best results are obtained when sows with young litters are kept in individual enclosures, and as it is rather difficult on large piggeries to give each sow and litter a separate paddock large enough to be cultivated, the intensive pen is often resorted to for sows and young litters; however, the sows and litters may be kept separately on pasture by providing each one with a hut, to which are affixed three hurdles, making a small run (see Plate 29); the whole unit should be movable so that the pigs can be put on to fresh pasture as each patch becomes fouled.

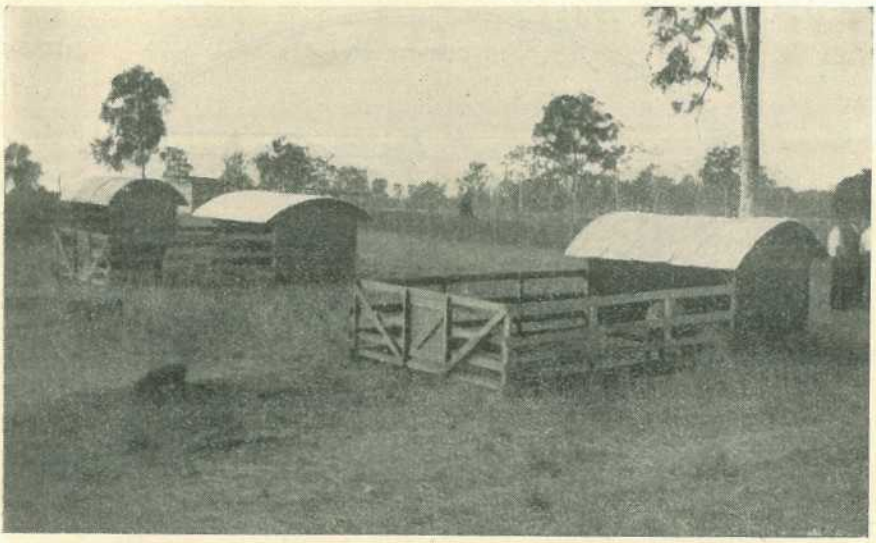


Plate 26.
Movable Pig Pens on W. Dawson's Farm, Woolooga.

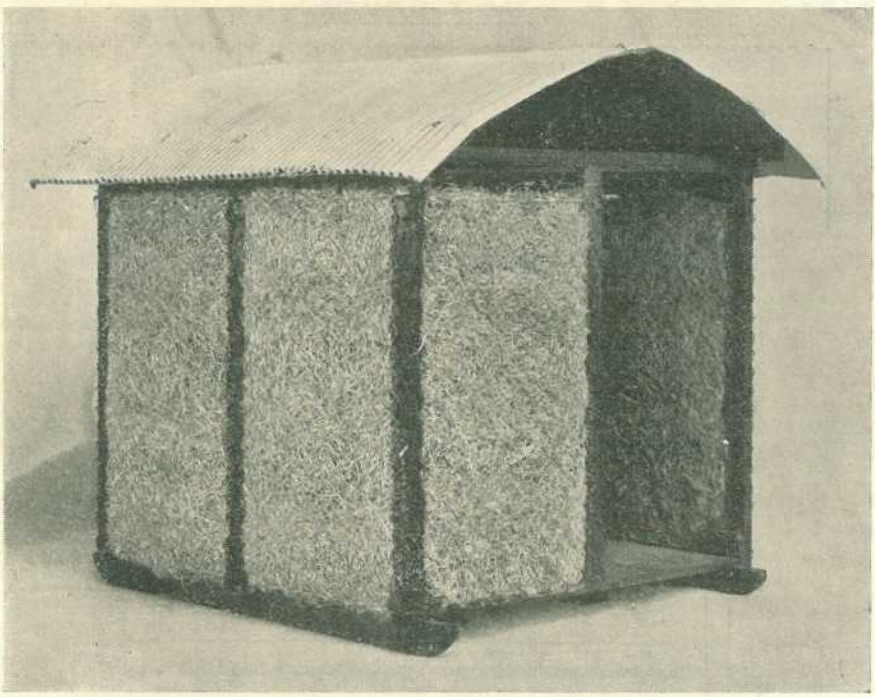
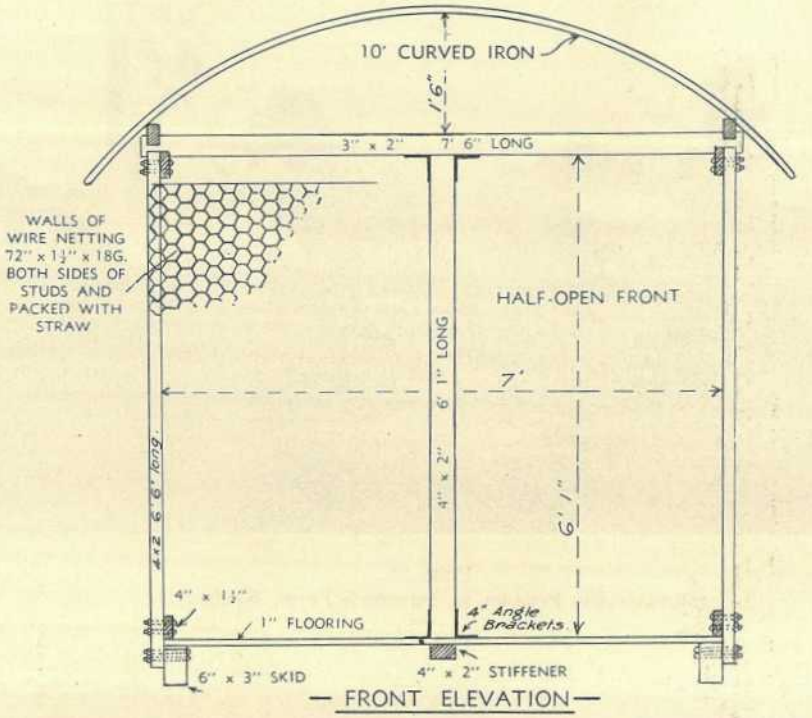
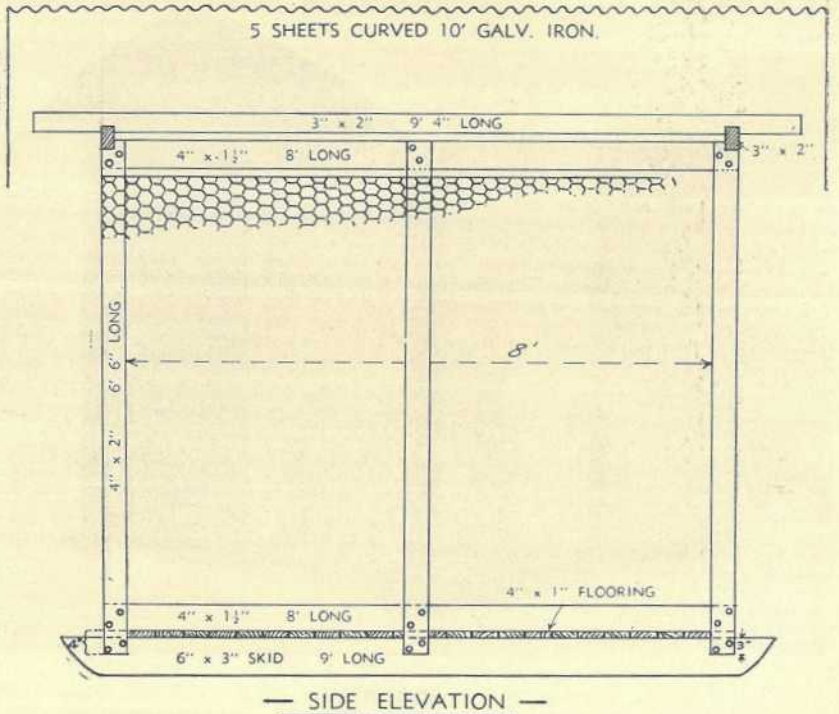


Plate 27.
Movable Shelter Shed with straw walls, as described in Plate 28.

MOVABLE SHELTER SHED FOR PIGS



— FRONT ELEVATION —



— SIDE ELEVATION —

Plate 28.

MOVABLE SHELTER SHED.

The shed illustrated in Plates 27 and 28 is suggested for use in pig paddocks. Being built on skids the shed is capable of being moved about the piggery for convenience, and to maintain good sanitation.

Its floor space, 8 feet x 7 feet, makes it suitable for a sow and litter, about five dry sows, or twelve growing pigs. The height allows a man to enter freely, and provides for coolness in hot weather, thus obviating the need for shade in other forms.

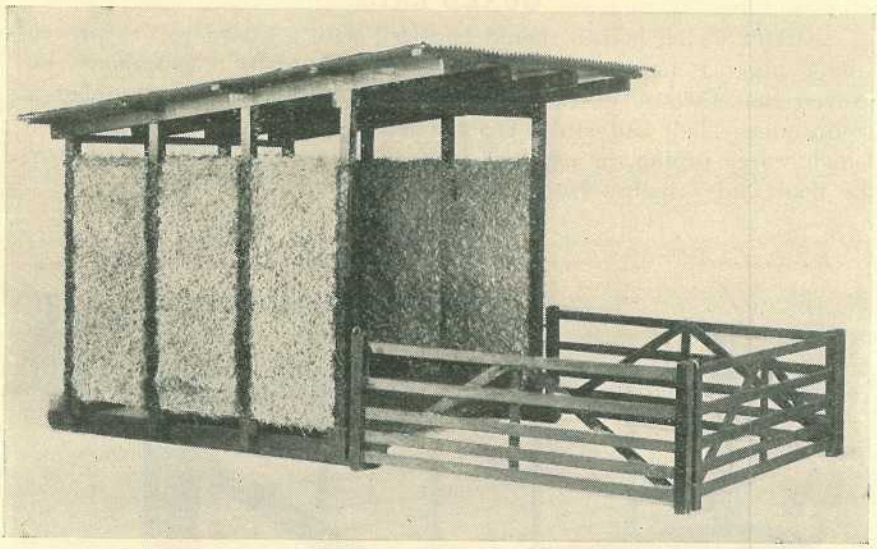


Plate 29.

When it is necessary to segregate the boar, or a sow with a young litter, or a few pigs being finished for market, the movable shed in the paddock can still be used by attaching hurdles as illustrated here, making a temporary pen.

The two features of this shed which should appeal to farmers are its ease of construction and low cost.

In building, the 4-inch by 1-inch flooring is laid across the 6-inch by 3-inch runners, each 9 feet long, and the 4-inch by 2-inch stiffener is placed along under the centre of the floor. The two sides are then made by bolting two 4-inch by 1½-inch by 8 feet plates across three studs 4 inches by 2 inches by 6 feet 6 inches, placing the bottom plate 4 inches from the end of the studs. The sides are then bolted to the skids as shown in drawings. Two pieces of 3 inches by 2 inches by 7 feet 6 inches are then fixed across the back and front as top plates, and checked on to the sides as shown. Centre studs 4 inches by 2 inches by 6 feet 1 inch are then placed in position at front and back

of the shed, reaching from floor to top plates, and these are fixed using 4-inch angle brackets. A rafter 3 inches by 2 inches x 9 feet 4 inches is then set along each side and checked into position as shown, to carry the iron.

Wire netting 1½-inch mesh, 18 gauge, and 6 feet high is then fixed to the inside and outside of the studs, covering all the walls, except half the front, which is left open. Straw is then rammed tightly between the wire before it is nailed up at the top. This walling material provides good insulation against weather, is inexpensive, and keeps the shed light for moving. The roof consists of five sheets of 10-feet curved iron.

GUARD RAIL.

All farrowing houses should be fitted with a guard rail to prevent young pigs from being crushed against the walls. Experience has proved that the use of this rail has saved an appreciable number of young pigs. This rail can be constructed of 3-inch by 2-inch hardwood, 1-inch water piping, or saplings. It should be placed 9 inches above the floor and 7 inches from the walls.

FENCING.

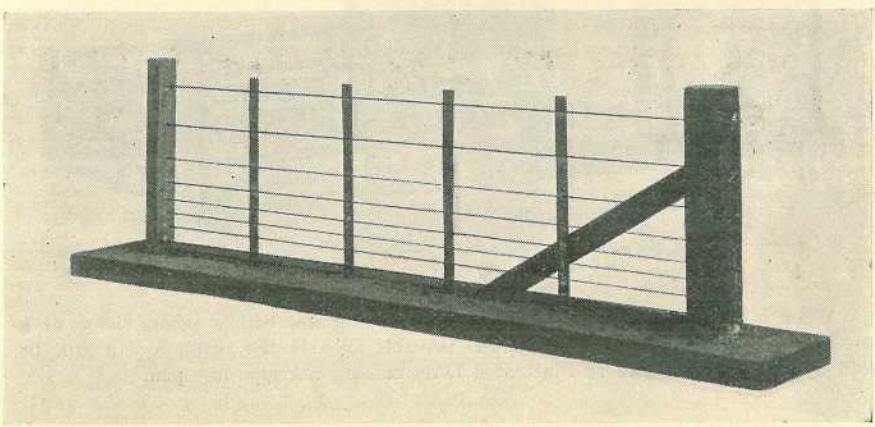


Plate 30.

This type of fencing will hold pigs over three weeks old, provided it is kept well strained. It is less expensive than comparable woven wire fences, and has the advantages of being easily repaired and strained by roller strainers at the end of each line.

The panel illustrated is 11 feet, the wires are spaced from the ground:—1 inch, 2 inches, 3 inches, 3 inches, 3 inches, 4 inches, 5 inches, 7 inches, 8 inches; the bottom wire is barbed and the others plain. The wooden droppers are stapled to the wires.

The "Electric Fence" has given satisfaction where tried, and has the advantage of saving a considerable amount of posts and wire where a large amount of fencing is to be erected. Where pigs are to be kept on the grazing system the "electric fence" is worthy of consideration.

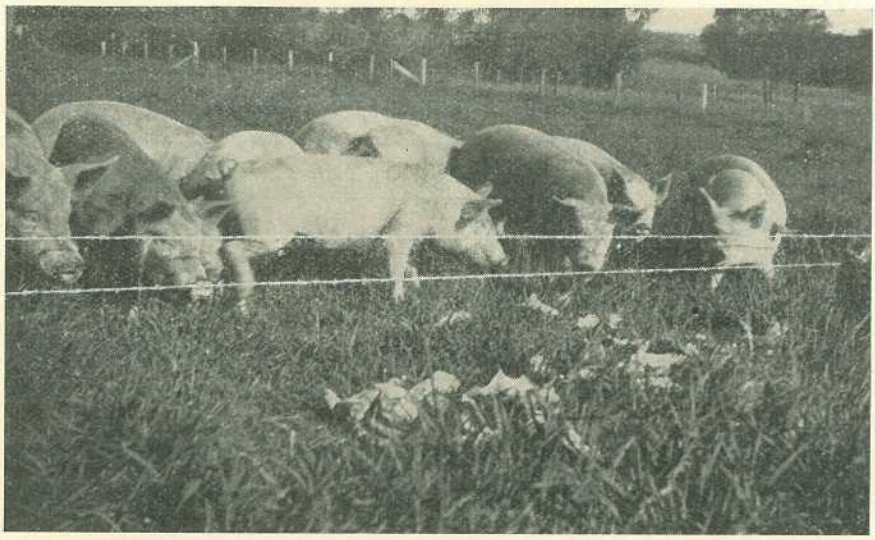


Plate 31.
The two low-hung wires of this electric fence effectively hold small pigs in check on Mr. F. N. Walker's farm, Belmont, Queensland.

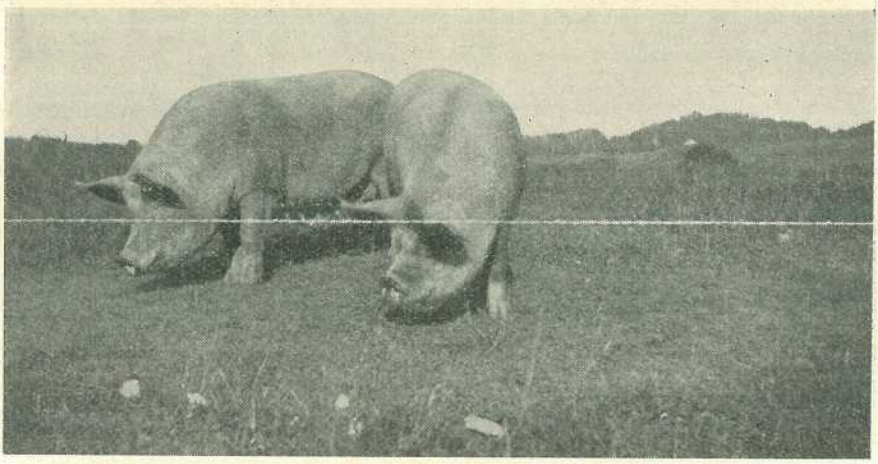


Plate 32.
Only one electrified wire is required for larger stock.

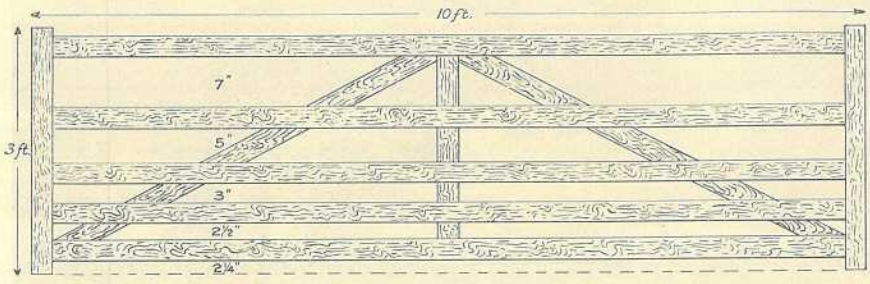


Plate 33.

Hurdle suitable for temporary penning; 3-in. by 1-in. battens are morticed into 3-in. by 3-in. end pieces.

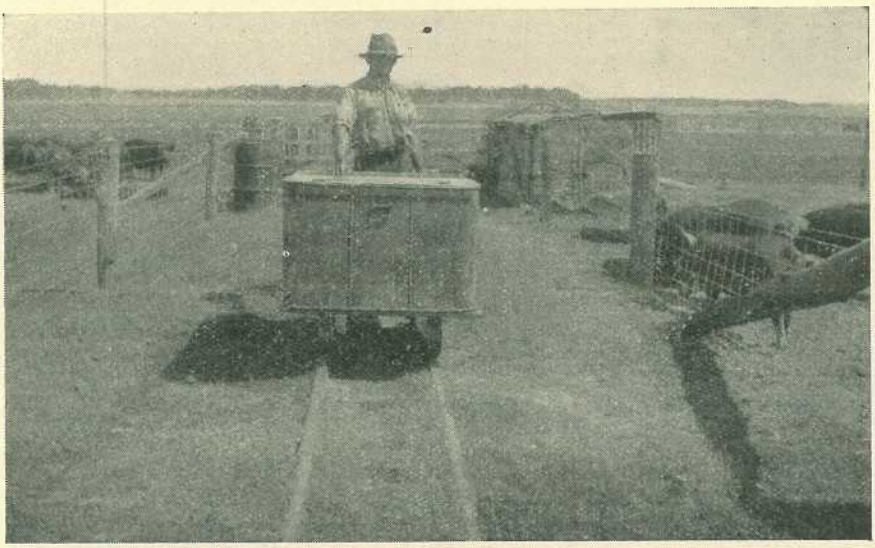


Plate 34.

Trolley on wooden rails used for conveying separated milk from the dairy to pigs, on Mr. E. J. Reeve's property, Balgowan, Darling Downs.

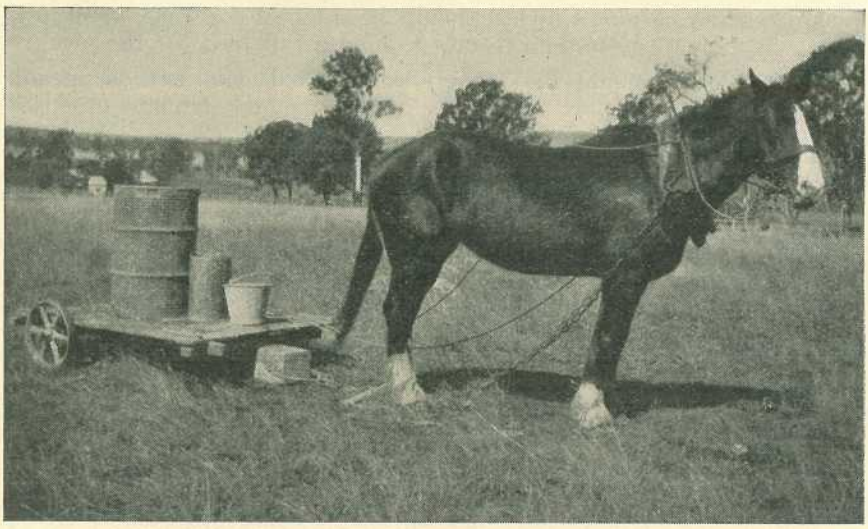


Plate 35.
A Good Feeding Outfit in Use on a Lowood Farm (Q.).

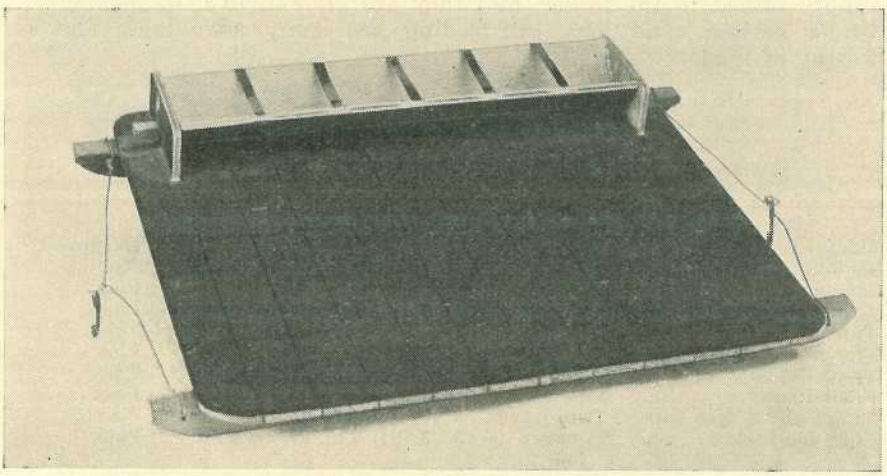


Plate 36.
Wooden trough on a movable floor, suitable for paddock use.

TROUGHS.

The piggery should be equipped with troughs of sufficient capacity to feed the pigs without undue scrambling or fighting at feeding time. An average space of 10 inches should be allowed for each adult pig. The trough should have the capacity to hold a full feed for the pigs.

Pig troughs should be strongly constructed, and have a smooth surface free from corners or cracks. Where portable troughs are used in a grazing piggery they should be of a size which allows of their being easily hauled on to clean ground. (See Plate 36.)

AUTOMATIC WATERER.

Plate 38 illustrates a watering device suitable for paddock use. A 40-gallon drum is set into a trough 6 inches deep, and the whole is fixed on to a slide. The drum has a ½-inch plug hole 1½ inches from its bottom, and a larger plug hole for filling at its top. The lower hole allows the water to flow out to a sufficient height to allow of the pigs drinking from the trough; and to fill the drum the bottom hole is plugged and the top hole opened.

SELF-FEEDERS.

Self-feeding of pigs is as yet little practised in Australia, because pigs are kept chiefly to utilise by-products, such as separated milk, which are not readily adaptable to self-feeding; but when the price ratio of grain and pork is such as to make the pig a profitable means of disposing of grain, pig-raising must be considered from a somewhat different viewpoint.

The grain-grower who keeps pigs but has no milk foods can make good use of his grain by feeding it in combination with such foods as lucerne chaff and meatmeal, both of which are substitutes for separated milk in the pig's ration. Such feeds as these are adaptable to dry-feeding through a self-feeder, whereby the pigs have several days' food supply placed in the feeder, and they are allowed to help themselves. Under certain conditions, self-feeding has many advantages and is worthy of trial.

ONE-WAY SELF-FEEDERS FOR PIGS—MATERIALS REQUIRED. (See Plate 37.)

Members.	Number.	Length.	Size.	Material.
		Ft. in.		
Skids	Three	1 6	4 in. x 2 in.	Hardwood
Trough	One	4 0	6 in. x 2 in.	Pine
Trough	One	3 10½	12 in. x 2 in.	Pine
Trough	One	3 10½	4 in. x 2 in.	Pine
Trough	One	3 10½	8 in. x ¾ in.	Pine
Trough	One	3 10½	4 in. x ¾ in.	Pine
Front Panels	Five	3 10½	6 in. x ¾ in. T. & G.	Pine
Front Panels	Two	2 3	3 in. x 2 in.	Pine
Sliding and hinged flaps	Two	3 10½	4 in. x 3 in.	Pine
Ends and back	Twenty-four	3 3	6 in. x ¾ in. T. & G.	Pine
Ends and back	One	7 0	6 in. x ¾ in.	Pine
Top	Ten	2 4	6 in. x ¾ in. T. & G.	Pine
Top	Two	5 0	6 in. x ¾ in.	Pine

Hardware—Three 1-inch by ¼-inch iron straps.
Six 3-inch strap hinges.
Two 3-inch by ½-inch bolts with thumb nuts.
Nails, &c.

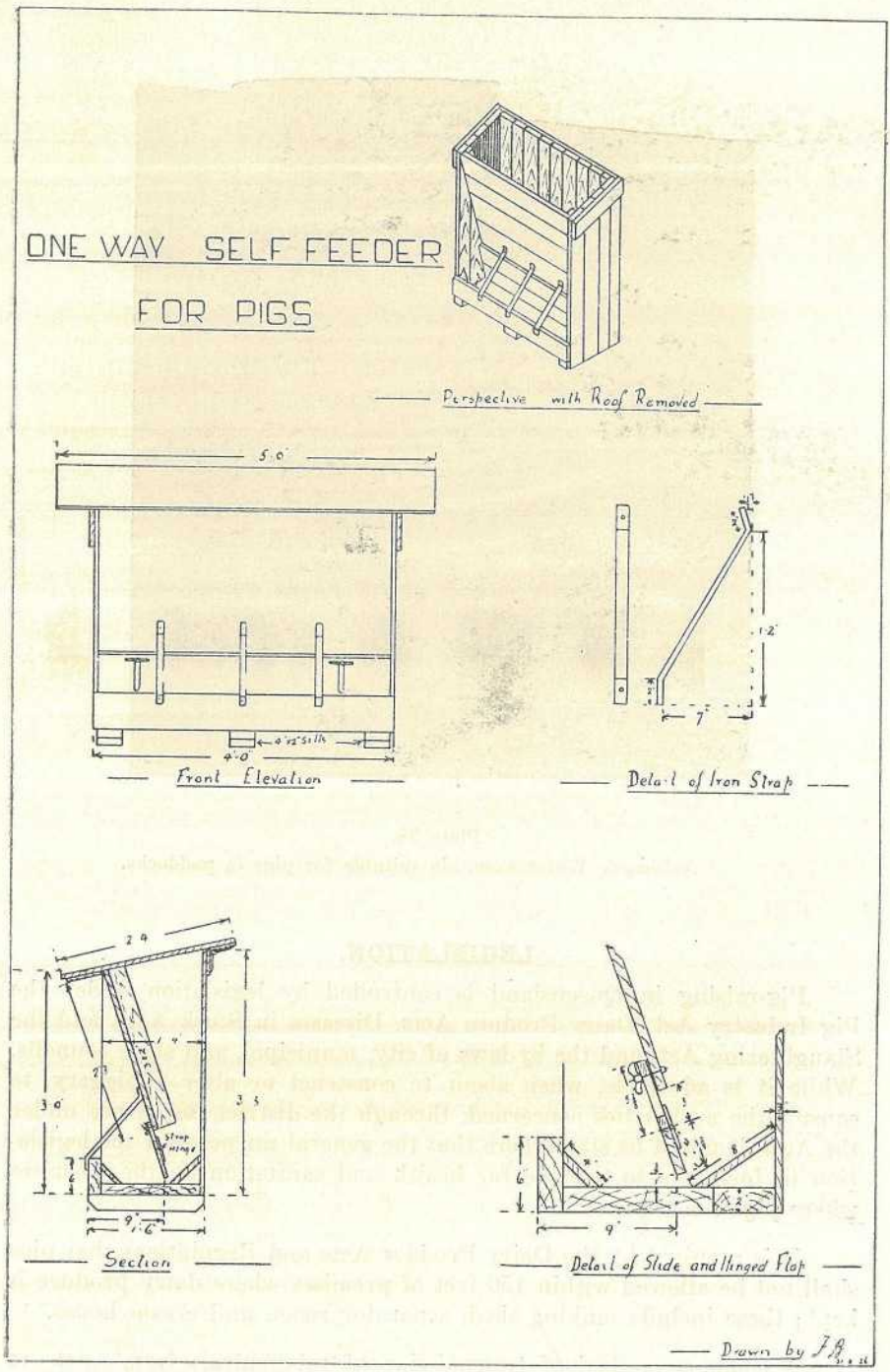


Plate 37.

Illustrating a type of self-feeder which has given satisfactory results in practice, and is large enough to feed twelve pigs.

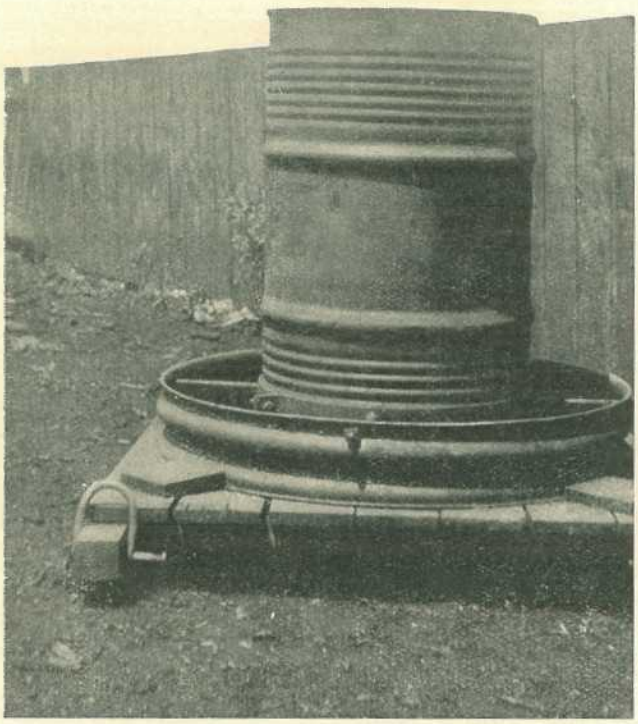


Plate 38.
Automatic Water Fountain suitable for pigs in paddocks.

LEGISLATION.

Pig-raising in Queensland is controlled by legislation under the Pig Industry Act, Dairy Produce Acts, Diseases in Stock Acts, and the Slaughtering Act, and the by-laws of city, municipal, and shire councils. While it is advisable, when about to construct or alter a piggery, to consult the authorities concerned, through the district inspectors under the Acts, it might be stated here that the general purposes of the legislation in force are to provide for health and sanitation on the premises where pigs are kept.

It is required by the Dairy Produce Acts and Regulations that pigs shall not be allowed within 150 feet of premises where dairy produce is kept; these include milking shed, separator room, and cream house.

A common method of transmission of tuberculosis from cattle to pigs is through the pigs having access to the dung of infected cattle; all pigs should therefore be kept out of cow paddocks and yards.

QUARANTINE PEN.

It is advisable to provide a quarantine pen some distance from other pens, where newly introduced pigs and sick pigs could be placed, and kept under observation. This is an important safeguard against disease.

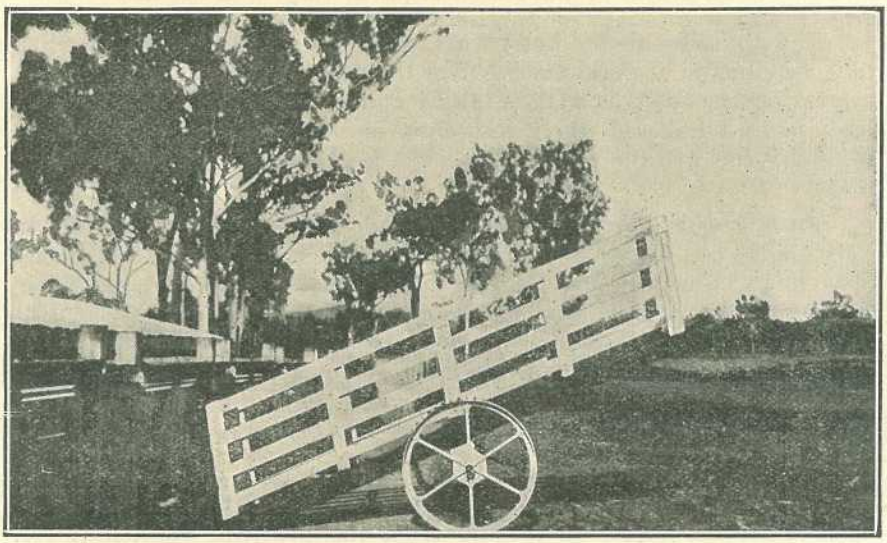


Plate 39.
A Useful Portable Loading Race.

FEEDING.

The ability of pigs to make economical gains in weight is determined by their breeding, management, and feeding. Well-bred, thrifty pigs that are well cared for, and kept in good health, will make the best use of the available foods. There are very few foods which pigs will not relish, provided they are wholesome. Decomposed foods should not be used. The pig's digestive tract is not designed for the consumption of large quantities of bulky foods; therefore, while a little roughage is desirable, concentrates should predominate in the ration.

In most circumstances, full feeding either by hand or self-feeder, is a wise practice, and, provided the animal receives a complete and balanced ration, and the necessary exercise, and is bred to the right type, it will produce a desirable carcase at the required weight; but if small-type pigs are being fed to bacon weights, limited feeding must be practised. While the nature and composition of a pig's food affects the proportion of fat and lean in the carcase, the inherited conformation, and the environment, are also important factors.

Up to the present, pigs have been kept in Australia chiefly to utilise by-products from other industries, more particularly the by-products of

the dairy industry, and when such foods are available cheaply, they form the basis of pig-feeding rations. While pig-raising is dependent on other industries for food supplies, the selection of foods and the selection and preparation of rations will depend almost entirely on the availability of by-products; but when pig-raising is undertaken as a special business, then provision of a food supply is a different matter, and the selection of foods to be grown or purchased requires very keen attention.

The pig-raiser should know what quantity of food his pigs are using to make a pound of pork, and whether the value of that pork is sufficient to pay for the food, as well as labour and other charges. When foods have to be purchased, their cost must be considered as well as their feeding value, and their suitability when used in combination with other foods.

Food is usually given to animals with the object of producing growth, work, milk, &c., but before any of these can be produced the animal body must be maintained, i.e., the body heat must be kept up, waste tissue must be replaced, and the necessary energy for the movement of body muscles must be supplied. Approximately half the food given to a young pig is used for maintenance before any growth can be expected; this explains why the quicker the animal is grown, the less the amount of food used for maintenance.

The growth of young animals is dependent on a supply of food in excess of a maintenance allowance, and with pigs, this is perhaps the most important object in feeding from the practical viewpoint, for, having produced the young pigs, the farmer's object is to grow them rapidly and as economically as possible.

In mature breeding stock, food is used not only for maintenance, but for the production of young. After the birth of the young, the sow has to secrete milk to feed them for a couple of months. This means an extra call on her body, which must be supplied with the necessary food. Protein-rich foods are essential for the production of muscle and milk, and carbonaceous foods and fats are used for the production of fat, heat, and energy in the animal body.

The laying on of fat is nature's way of storing up a reserve of energy and heat in the animal body, and animals at any stage, if supplied with sufficient food, will store fat in the body. There is, however, a greater tendency to store fat when the animal is past the early growing stage. The fat is stored in layers between the skin and the muscle, in the internal cavities of the body, and intermingled within the muscle fibres.

QUANTITY OF FOOD TO GIVE.

The growth, appetite, and condition of the pigs are the feeder's best guide in determining quantities of food to use, but for convenience in calculation the following may be taken as approximate requirements to produce rapid growth in pigs:—

Live Weight of Pigs.	Minimum Daily Allowance per Pig of Protein-rich Foods. OR		Daily Allowance per Pig of Grain or its Equivalent.
	Separated Milk or Buttermilk.	Meat Meal, etc.	
	Gallons.	Lb.	Lb.
20 lb.	½	¼	½
40 lb.	¾	½	1
60 lb.	¾	½	2
80 lb.	¾	½	3
100 lb.	¾	½	4
120 lb.	¾	½	5
140 lb.	¾	½	5½
160 lb.	¾	½	6
180 lb.	¾	½	6½
200 lb.	¾	½	7
Brood Sows (Dry)	¾	½	5–6
Brood Sows with litters over 2 weeks old ..	1½	1	10–12

When a minimum of three-quarter gallon of separated milk or butter milk daily per pig is available, there should be no necessity to use meat meal or similar protein-rich foods, excepting in the case of sows with litters, which require one and a-half gallons of milk.

When other foods are used to replace some or all of the grain allowance, it may be estimated approximately that 1 lb. of grain equals—

4 lb. Sweet potatoes.
4 lb. English potatoes.
5 lb. Arrowroot.
6 lb. Pumpkins.
8 lb. Mangolds.
5-10 lb. Green pasture or forage crops.
1 gal. Separated milk or butter milk (undiluted).
2 gal. Whey.

When pigs are receiving large quantities of protein-rich forage, such as lucerne, cowpeas, or field peas, the minimum requirement of protein-rich food such as milk or meat meal will be less than that shown in the table above. It should be remembered in using bulky foods to replace grain, that pigs have a limited capacity for such foods and better results are usually obtained by feeding at least some of the ration as grain. This applies more to young pigs than to brood sows.

Good pigs which are full fed should gain an average of 1 lb. live weight daily from 20 to 100 lb., and require an average of 3½ lb. of grain equivalent to make that 1 lb. gain. From 100 to 200 lb. the average daily live weight gain should be approximately 1½ lb. with a food requirement of approximately 4½ lb. grain equivalent for each 1 lb. gain.

The most important point to watch in pig feeding is the condition of the stock, for the pork and bacon trades require pigs in a finished, fleshy condition, but not too thin or too fat. It is known that pigs require variety in their rations, that at least a portion of their food should be concentrates, that they require both nitrogenous and carbonaceous foods, and that many other factors must be considered in the selection of pig foods.

PREPARATION OF FEEDING STUFFS.

Any benefit to be derived from the preparation of a food will depend on its character and condition, and on the animal. With most foods cooking is unnecessary for pigs, exceptions being offal and English potatoes, also milk products which are suspected of carrying the tubercle bacillus. In cold weather pigs prefer warm food and drink, and this should be attended to where practicable, as it will increase the palatability and help to maintain the body heat, portion of which would otherwise be absorbed in heating up the cold food in the digestive tract. While it is usually wise to force pigs to chew their foods, the small grains are more digestible when they are ground, crushed, or rolled, and even maize, which may be well chewed and digested at times, is often improved by grinding. On the other hand, pigs, if accustomed to the method of feeding and full fed, will make economical use of maize either on the cob or as whole shelled grain.

American experiments have shown a saving in food consumption resulting from the grinding of the small grains, such as wheat and sorghum, as compared with the same grains fed whole through a self-feeder, the saving being approximately 4 per cent. in the case of sorghum grain and 6 per cent. in the case of wheat.

When the small, hard grains cannot be crushed, ground, or rolled, they should be softened by soaking or boiling. Lucerne chaff or hay is sometimes steamed or soaked to increase its palatability for pigs, although after pigs become accustomed to these foods they make good use of them in a dry condition.

In the following notes the more common pig foods have been grouped as follows:—(1) Grains and mill offals; (2) protein-rich concentrates; (3) dairy by-products; (4) pasture and forage crops; (5) root crops; and (6) miscellaneous foods. The notes are intended to assist pig-raisers in determining the value of each food when used in combination with other foods.

Maize.

Maize is a carbonaceous (that is fat and energy producing) concentrate. It should always be fed to pigs in combination with protein-rich foods, such as milk, meatmeal, and lucerne. The improper use of maize in unbalanced rations has earned for it a reputation for producing a soft and fat carcase, but it has been amply demonstrated that, when used in complete and balanced rations, maize is one of the best pork producing foods, and its use can be continued with confidence, provided its shortcomings are understood.

The quantity of maize used in pig feeding is usually governed by its market value and the price of pork. Approximately 5 to 6 lb. of maize (or its equivalent, as it is not wise to feed maize alone), will produce 1 lb. of dressed pork in good young pigs, or each bushel of maize should return 10 lb. of pork. This knowledge enables the pig-raiser to calculate the value of maize as grain and as pork. When maize is worth 2s. 6d. per bushel as grain and dressed pork is worth 5d. per lb. each bushel of maize should be worth 5d. x 10=4s. 2d. as pork. In such a case it would pay the pig-raiser to feed all the available maize to good pigs, with just sufficient protein-rich foods to balance the ration. When the value of a bushel of maize is more than the value of 10 lb. of dressed pork, maize should be used as sparingly as possible, and some cheaper carbonaceous food used in its place where practicable.

Wheat.

In feeding value, wheat closely resembles maize, and it is nearly as palatable as maize. The quality of meat produced from wheat is very satisfactory. Wheat is less frequently used for stock feeding on account of its high average value for human food. Being a small, hard grain, wheat gives much better results if ground before being fed to pigs.

Barley.

Barley is another of the useful grains for the pig's diet; although slightly below the feeding value of maize and wheat, it is palatable and has a reputation for producing an excellent quality meat. Barley requires grinding before being fed to pigs.

Sorghum.

Grain sorghums are a much neglected pig food, ranking only a little behind maize in feeding value. The hardiness of this crop and its ability to produce grain when maize would fail, deserve the consideration of the pig farmer. Like the other small grains, sorghum grain should be ground before being fed to pigs to get the greatest feeding value, but as the grain can be fed on the heads or even from the standing crop, preparation by grinding will probably not be favoured by most farmers.

Pollard.

Pollard, which is a by-product from the milling of wheat, has its place on the pig farm, being very palatable, and usually available at a price to make it worth feeding to pigs.

Bran.

Another mill offal, is not such a good food for young pigs as pollard, its fibre content being higher, and its fat and carbohydrates being lower than those of pollard. Bran, however, is a laxative and, for this reason, it has its use for brood sows about farrowing time, and a bran mash is often given to pigs which are in ill-health, and need some food which will stimulate the bowels.

(2) PROTEIN-RICH CONCENTRATES.

Meat Meal.

Meat meal, which is sold under various trade names, is a by-product from meatworks and abattoirs of great value to the Australian pig farmer. It is a nitrogenous concentrate containing a very high percentage of digestible protein, and can be put to excellent use in balancing some of the common carbonaceous and bulky foods.

The Australian pig-raiser relies to a great extent upon separated milk for his supply of protein-rich food to balance the grains, &c. In consequence of our climatic conditions, however, the supply of milk products is very irregular, and in most years there is a period when the supply is too low to maintain a full supply of pigs. It is on occasions such as these, that meat meal can be put to good use as a substitute for milk products, thus keeping up a regular supply of pigs throughout the year.

Pigs can be satisfactorily grown on grain and meat meal without the use of milk when each pig receives ½ lb. of meat meal daily from weaning to baconer stage, and as much grain as it requires, which will be about 4 lb. for each 100 lb. live weight. Feeding the fixed amount of meat meal right through and just increasing the grain, automatically balances the ration as required.

When pigs have access to protein-rich pastures such as lucerne, the meat meal allowance may be reduced to ¼ lb. daily.

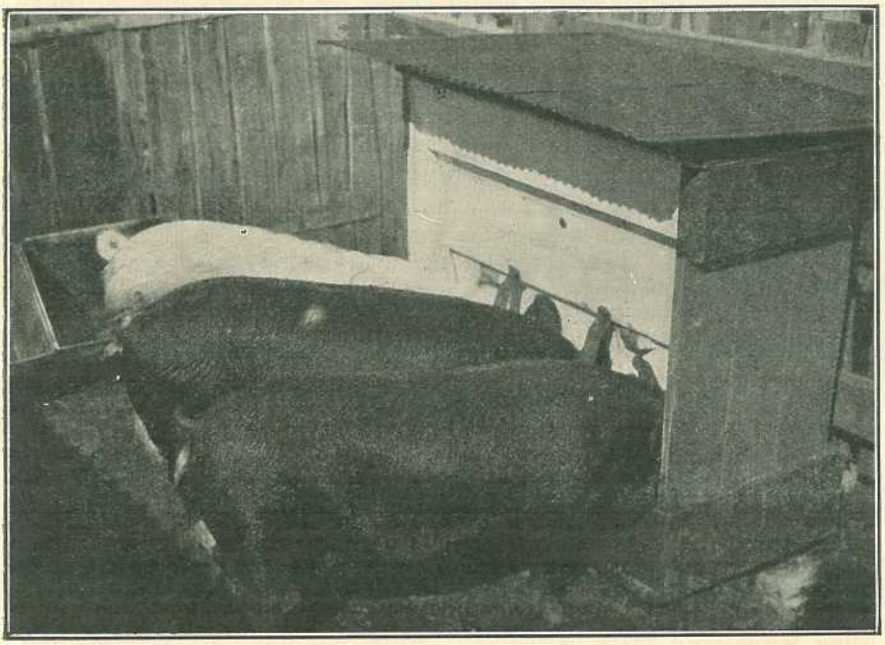


Plate 40.

Baconers grown on the self-feeder in which was placed a mixture containing 80 lb. maize meal, 10 lb. lucerne chaff, and 10 lb. meatmeal. The pigs were also given unlimited supplies of water to drink.

Meat meal may be fed either wet or dry. When fed wet, care should be taken so that there is no residue in the trough to putrify and become offensive in odour, and dangerous to the pig. It is a palatable food, and is relished by both young and old pigs.

Experiments have demonstrated that for balancing grains a supplementary mixture of two parts of meat meal, one part of linseed meal, and one part of lucerne chaff or meal by weight, is superior to meat meal alone.

Linseed Oil Meal.

Linseed Oil Meal is a protein-rich concentrate which can be used in a similar manner to meat meal. It contains less protein, but nevertheless it is a highly nutritious food and has a laxative action on the animal. When used as the only protein-rich supplement to grain, linseed meal does not give such good results as when it is used in combination with supplements such as separated milk, buttermilk, or meat meal. On account of its laxative action the addition of linseed

meal to the ration of sows at farrowing time is a wise practice., The fairly high percentage of oil in this food makes it suitable for feeding to stock which are being prepared for show, as it gives them a glossy coat. Oily foods should be fed with care, as their excessive use tends to produce a soft, oily carcase.

Cotton Seed Meal.

This by-product of the cotton seed is a protein-rich concentrate. The use of cotton seed meal for pig-feeding has been limited because in some cases it has been found to produce poisoning when fed in a fairly large proportion, over a lengthy period; however, recent experiments, both here and in other countries, indicate that at least half the protein supplement of a ration may consist of cotton seed meal provided it is fed in conjunction with meat and bone meal.

(3) DAIRY BY-PRODUCTS.

Separated Milk

Although strictly speaking a protein-rich supplement for foods such as grains, separated milk is used in Australia very often as the basis of the ration, or as the whole ration, and to a large extent the supply of baconers and porkers is dependent on the supply of separated milk.

Separated milk contains no fibre, but about 90 per cent. of water. It is one of the most palatable and nutritious foods for pigs and is unsurpassed as a protein-rich supplement, being even a little superior to meat meal as a sole supplement to grain. Pigs of all ages relish separated milk, and being rich in minerals, it is particularly valuable for growing pigs and breeding stock. Being produced on most farms where pigs are raised, separated milk will be the cheapest protein-rich food for pigs.

If young pigs received a minimum of three-quarters of a gallon of separated milk per head daily from weaning to baconer stage, they will be receiving sufficient protein from the milk to balance all the grain they can eat. By feeding a constant amount of milk—three-quarters of a gallon daily—and increasing the grain as the pig grows, a fairly satisfactory balance is maintained in the ration. When just sufficient separated milk is used to balance the ration, the greatest value is being gained from the milk, and the feeding of greater quantities results in a loss of nitrogen from the protein of the milk (only the non-nitrogenous portion of the protein being used to make fat); but there are occasions when milk is available more cheaply than carbonaceous foods, and then it may be more economical to use larger quantities of separated milk.

Separated milk may be fed fresh or soured. When it is held in vats to sour and thicken, care should be taken not to allow it to putrify by holding in filthy containers, or by holding for too long a period. The ultimate gain from using soured milk is very small, if any, and if the milk is fed fresh after the froth has been removed, quite satisfactory results will be obtained. If large amounts of froth form in the pig trough, the pigs may suffer from a form of digestive disorder (wind), which may end disastrously.

Milk, besides being an excellent food for animals, is an excellent medium for the growth of bacteria, hence care should be taken to have the milk free of disease-producing organisms. Milk and its products

which come from a cow suffering from tuberculosis, are a source of infection in pigs which receive this milk in a raw state. The milk from one tubercular cow may infect all the milk with which it is mixed, and so pigs drinking any of this milk in an uncooked state would be liable to infection.

Unless milk products come from cows that are certified as tubercle-free by a competent person, there may be a risk of tuberculosis being transmitted from a tuberculous cow to the pigs drinking the milk. It is well known that the tubercle germ is destroyed if held at a temperature of 155 deg. Fahr. for twenty minutes or at 180 deg. Fahr. for five minutes. Therefore, all doubtful milk should be heated to these temperatures as a safeguard against the infection of pigs. Heating milk to these temperatures is a fairly difficult problem on the average farm, but there are heating appliances manufactured for this purpose, and some farmers are using same with satisfaction.

Buttermilk.

Buttermilk, which is the residue from the cream during the process of butter-making, is almost identical in composition and feeding value to separated milk, but the buttermilk supplied by butter factories to pig raisers is usually more or less diluted with wash water from the churns, and, of course, its feeding value is reduced according to the amount of water added.

Butter milk, like separated milk, may carry the tubercle bacillus and be a source of danger to pigs unless the cream or the butter milk has been pasteurised. In butter factories pasteurising is done before the cream is put into the butter churns; provided this is carried out efficiently, that is, if the cream is held at a sufficiently high temperature for a sufficient length of time, there should be no risk of the butter milk causing infection in the pigs.

Whey.

Although whey is sometimes classed with separated milk and buttermilk as a stock food, it is really in a class of its own. During the process of cheese manufacture, of which whey is the by-product, a proportion of the protein in the form of casein is removed in the cheese, leaving the whey comparatively low in protein content.

Although whey cannot be called a protein-rich food, it has a place in cheese-making districts, and is a very valuable adjunct to rations of grain and forage crops, provided some protein-rich concentrate is used to bring up the protein content of the ration. Meat meal in small quantities is useful for this purpose. Feeding experiments have shown whey to be approximately half the value of separated milk. As in the case of other milk products, whey should be pasteurised before it is fed to pigs in order to minimise the risk of disease in the stock.

(4) PASTURE AND FORAGE CROPS.

Pigs running on good grazing land have less chance of suffering from deficiency of necessary nutrients than pigs which are confined in bare yards or pens, and hand fed. The rotational cultivating, cropping, and grazing of pig paddocks helps to maintain the fertility of the land, and provides one of the most practical means of controlling diseases and parasites, particularly kidney worms and round worms, which cause serious losses to the pig industry.

It is known that the greater part of the protein in a plant is present in the young growing portion, and as a large amount of protein is required by pigs, the pasture crops are best fed off when they are young and rich in protein; also at this stage, the crops are more succulent and contain less fibre, thus making them more valuable as pig food. While cattle make fair use of mature grazing crops, pigs make much better gains when fed on crops which have not reached maturity.

Plate 41.
Baconers being finished on a self-feeder under grazing conditions.

Perhaps the most outstanding single pasture grass for pigs in most Queensland pig-raising districts is Kikuyu grass. It is a vigorous grower, and when well established, stands heavy stocking. The nature of its growth enables Kikuyu to withstand a lot of the rooting and tearing about which pigs give a pasture. It is palatable and nutritious, and will thrive in a wide range of climatic conditions. To check the tendency of the pigs to root about and destroy the pasture, they should be removed to another paddock or their snouts should be cut or a ring inserted in the snout to prevent the pigs from rooting. While a good deal of damage may be done by pigs rooting up a lucerne or a paspalum paddock, in many cases the rooting does good; in fact, pigs have proved themselves good pasture renovators on matted paspalum paddocks which required breaking up.

Lucerne.

Lucerne, like all other legumes, is rich in protein and minerals, and, therefore, valuable for young pigs and breeding stock. It is palatable and readily eaten by pigs of all ages. Good quality lucerne hay that is not too stalky makes excellent roughage for pigs; although it must only be fed in limited quantities to young stock, breeding sows can be maintained in good condition on lucerne hay with a small amount of grain. Pigs do not always appreciate lucerne hay for a start, and they may be given a little chaff or lucerne meal, either dry or soaked, and mixed with other foods, until they become accustomed to it. The best way to

feed lucerne hay is by placing it in a rack where the pigs can take it at will; a trough should be placed under the rack so that any leaf falling from the hay will be collected for the pigs. Farmers who have a supply of maize, lucerne, and separated milk have the material for supplying excellent rations to pigs, and in periods when the milk supply is low a good deal of the protein content can be made up by lucerne hay, which can be stored in a time of plenty.

There have been cases where a yellowish colour in pork—detrimental to the trade—has resulted from prolonged grazing on green lucerne, and, therefore, some caution is necessary in feeding green lucerne. However, it is not definitely known what amount of lucerne is required to cause this undesirable colouring, but it is known that pigs are often grazed on lucerne for months without any harmful result. To be on the safe side, the lucerne grazing should be used mainly for breeding stock and weaner pigs, and the other stock might be grazed only for short periods, or kept growing rapidly with the aid of other foods while on lucerne.

Cowpeas.

Cowpeas are a summer-growing legume, useful as a fodder crop for pigs when fed off with the young pods just filled out. In feeding value this crop resembles lucerne. Being an annual, it often fits in to the system of cropping pig paddocks.

Field Peas.

Field peas have a similar use to cowpeas, but they are a winter-growing annual crop. Field peas are a protein-rich crop which can be fed off before the seed pods are ripe, or it can be made into fair quality hay, which, together with the peas, makes an excellent fodder for brood sows. Sown with barley, oats, or wheat, and fed off in the young growing stages, field peas provide a nicely balanced pasture.

Peanuts.

Peanuts may be used as a forage crop for pigs, both the foliage and the nuts being eaten. Peanuts are highly nutritious, containing more than 40 per cent. of protein, and are rich in fat. Peanut meal with most of the oil extracted is available on the market, and is a similar food to linseed meal. A characteristic of peanut fat is that it is liquid (oil) at very low temperatures, and animal fat made up from peanut oil will not harden under ordinary chilling treatment, with the result that pork or bacon carcases from animals that have been fed on large quantities of peanuts are soft and oily and unsuitable for the trade.

Owing to their high protein and oil content, peanuts produce very rapid growth in pigs, and put a bright sheen on the pigs' coats. For that reason their use may be advocated for sows and litters up to weaning time, or for exhibition stock. For porkers and baconers, however, their use is dangerous, and for safety it should be discontinued a week or two after weaning.

Rape.

Rape is an annual crop which should be sown in March, April, or May, and in normal seasons should be ready for feeding off in two or three months after sowing. The cost of seeding rape is comparatively light, and the return from it is usually two or three grazings of succulent and nutritious fodder.

It happens occasionally that when young, tender-skinned pigs are grazed on rape which is wet with dew or rain, the rape has an irritating effect on the skin. This point should be watched in feeding rape. When the rape crop has been practically eaten down with only a few leaves showing on each plant, the stock should be removed until the crop recovers. In this way several grazings can be obtained in a season.

Cereal Crops for Forage.

For supplying green forage quickly in spring and summer, maize is very useful, being a quick grower, and it can be used at almost any stage of growth. If fine stems are required the maize may be grown thickly in rows. This is a wise practice if it is known that the crop will be wanted as green stuff for pigs because pigs make much better use of the finer-stemmed young maize than they do of the larger stems.

Oats, wheat, and barley either sown alone, or with rape or field peas, provide very useful pasturage during winter, and if carefully grazed the feeding period may be extended over several months. These crops should be grazed when they are about 10 inches high, for at this stage the plants are more succulent, more palatable, and contain more protein and less fibre than they do in the later stages of growth. The grazing should be so arranged that the crop is eaten down quickly and then rested until it is sufficiently re-established for grazing again.

Pigs should be moved from the crop paddock during wet weather if it is practicable, as their tramping and rooting may seriously effect the physical condition of heavy soils.

(5) ROOT CROPS.

Sweet Potatoes.

Sweet potatoes are a bulky carbonaceous food which may be used to some extent to replace grain in the ration, and add variety and succulence. About 4 lb. of sweet potatoes are equal to 1 lb. of grain. Where soil and climate suit the crop it is inexpensive to produce. The best means of harvesting in most cases is by turning the pigs in to the paddock. It is not only the tubers that are useful as food, but the vines also make good green fodder, although here a warning must be given to the effect that there are on record cases of prussic acid poisoning following the feeding of sweet potato vines to pigs. These cases, however, are so very few compared with the large number of pigs which are fed on this crop, that the risk of poisoning would appear to be very slight. The feeding of molasses is recommended to counteract any ill-effect from the vines. When pigs are fed on a fairly large amount of sweet potatoes they should be given liberal supplies of protein-rich foods, such as separated milk and meat meal.

Arrowroot (Canna edulis).

The arrowroot grown in the coastal districts of Queensland has a place in pig feeding in those districts, on account of its heavy yielding and hardy nature, and its ability to stand in the field for a long period before being harvested. Arrowroot is not a very nutritious crop, but it supplies a large bulk of succulent food which pigs relish.

Arrowroot is sometimes harvested and then boiled before being fed to pigs, but when one sees pigs harvesting the crop for themselves and doing very well, and wasting very little of the crop, one wonders

if boiling is really a wise practice. Although most of the nutriment is in the bulbs of arrowroot, the pigs will eat the tops, which are usually very succulent. Arrowroot is a carbonaceous roughage and should be fed in combination with more concentrated and protein-rich foods. When feeding arrowroot—as with all crops—it is advisable to run a temporary fence across the block to confine the pigs to a small area until they have harvested it satisfactorily. In this way, the waste can be kept at a minimum.

Mangels.

The particular value of the mangel as a root crop for pig feeding lies in its ability to withstand a dry spring, provided it is well established in the autumn. The growing period is somewhat long, but if sown in the autumn, the mangel should be ready for feeding early in the following summer when other succulent fodders are usually scarce, and if it is not required when fully grown, the crop may be left in the ground for a few months without much deterioration resulting

Mangels are a bulky, watery food containing about 85 per cent. of water, but they are succulent and palatable and at the same time they supply a certain amount of nutriment. Like the sweet potato and arrowroot, mangels are a heavy yielding crop and worthy of a place in the cropping system of pig feeding.

Isolated cases have been reported of deaths in pigs following their eating mangels; there is very little information on this point, but most users make a practice of allowing mangels to wilt for a few days after harvesting and before feeding them to pigs; this may be a wise precaution.

Artichokes (Jerusalem Artichokes).

Although the sweet potato takes the place of artichokes in most cases on account of its heavier yielding capacity, artichokes are grown to some extent as a pig food. The tubers may be dug by hand or ploughed, or the pigs may be turned on to the crop to do their own harvesting. If hand dug, sufficient tubers may be left in the ground to give a crop in the following season, and if the pigs are doing the job they should be removed before all the tubers have been eaten out; the land should then be harrowed and left to produce the next season's crop; being a carbonaceous roughage, the artichoke should be fed together with protein-rich concentrates.

Potatoes.

The ordinary English potato is usually too high in price as a human food to be used for pigs, but there are times when unmarketable potatoes are available for pig food. They are a carbonaceous food of fair feeding value, and should be boiled before being fed to the pigs. About 4 lb. of potatoes are equal to 1 lb. of grain as pig food.

(6) MISCELLANEOUS FOODS.

Pumpkins.

In practically every pig-raising district of Queensland, pumpkins can be grown with comparatively little trouble, and their usual heavy yields, together with their excellent keeping qualities, make this crop one of the most important for the pig raiser. Pumpkins contain over

80 per cent. of water, and therefore are bulky, but they are palatable to pigs, and are best fed raw. The seeds of pumpkins contain fair amounts of oil and protein, and they also act as a mild vermifuge (i.e., they expel worms from the digestive tract of pigs), so the seeds should not be wasted, but they should be fed with caution, as digestive troubles sometimes occur when excessive amounts of seeds are fed without the flesh of the pumpkin. Cases of yellow colouration in the pork of pigs fed heavily on pumpkins have been reported, and in this respect care should be taken not to overdo pumpkin feeding with porkers and baconers.

Melons.

Melons are sometimes used as pig food, but contain about 95 per cent. of water, and are therefore not so nutritious as pumpkins, which contain about 83 per cent. of water.

Molasses.

Molasses has its uses as a pig food, but unfortunately its value is often over-estimated, with the result that various dietetic troubles occur in the stock. Molasses contains about 57 per cent. of digestible carbohydrates which are in the form of sugar, and its digestible protein is nil. It is therefore a fat, heat, and energy producing food, but not a flesh former.

Molasses has a laxative effect on stock, and for this reason it is valuable during dry seasons, when succulent green fodder is not available, and particularly for breeding sows which are sometimes inclined to become costive about farrowing time. Stock are very fond of molasses once they become accustomed to it, and this high degree of palatability makes it a useful addition to a ration containing less palatable foods. Molasses should only be given to pigs in small quantities at any time, for if it is fed carelessly severe diarrhœa may result. Up to 1 lb. of molasses daily for each 100 lb. live weight pig has been fed successfully in a well-balanced ration, containing grain and protein-rich foods, the molasses replacing some of the grain.

When grains or other carbonaceous foods are not available cheaply, molasses may be used with success, provided it is not overdone. Molasses should always be fed in combination with protein-rich foods such as milk or meat meal, as it supplies no protein to the animal.

Garbage.

Waste foods from private house, boarding-house, hotel, shop, cafe, hospital, and home can be put to good use through the pig, which will change waste into edible pork with a fair degree of efficiency, and provided the business is properly founded and well conducted, garbage feeding of pigs can be a profitable undertaking.

It is a general practice to boil garbage for an hour before feeding it to pigs. This is a safeguard against disease to some extent, and at the same time the cooking increases the palatability of most garbage. During the boiling, any excessive amounts of fat can be removed by skimming. When too much fat is given to the pigs they tend to become soft in the carcase, and so are unsuitable for the bacon curer or the pork butcher.

A common error in garbage feeding is to add too much water, thus making the food too bulky. The addition of grain and green fodder to garbage improves the ration considerably. Weaners do not thrive on ordinary garbage and they should be given other more nourishing foods until they are about 60 lb. weight. Then the change to garbage should be gradual. Garbage containing fish should not be fed to pigs being grown for pork or bacon as the fish flavour is very strong and taints the carcase.

There is always an element of risk in garbage feeding, for one never knows when some poison or injurious substance may find its way into the garbage, and result in the loss of a number of pigs. Swine fever may be carried through pigs eating the flesh of pigs suffering from swine fever. Salt poisoning occurs occasionally through brine from pickled meat being placed in the garbage for pigs. Pigs appreciate a little salt, up to ¼ oz. daily for 100-lb pig, but large amounts may cause death.

BREEDING.

THE COMMERCIAL ASPECT.

When discussing breeds of pigs it should be understood that a breed is a group of animals of the same species whose heredity is segregated from other groups, and whose individuals derive their inheritance from a similar source. Pigs of one breed are usually selected and bred to a more or less common standard, but that standard varies in different environments and is differently interpreted by individual breeders, so that we see pigs of the same breed extremely variable in many characteristics, such as conformation and productiveness and usually only common in colour.

In view of the variation within breeds, it is not prudent to consider a breed of pigs as a standardised group of individuals which are identical in conformation and other characteristics.

Breeders of pigs adopt a "standard of excellence" for each breed and make this their basis of selection for mating, and show judges use it in making their awards. The "standard of excellence" is based on conformation, apparent quality, and apparent potential productiveness. The ideal conformation is deemed to be that which is most likely to give productiveness in the pigs and quality in the carcase.

These "standards of excellence" have no marked degree of definition, and their interpretation varies with individual breeders and judges.

The "standards of excellence" also include colour specifications for the skin and hair, these features being considered as some indication of the purity of breeding.

The pig is a utility animal, and the pig-breeding industry depends upon the ability of the pigs to convert certain food products into pork, for which there is a demand as food for humans.

The value of any breed or family of pigs depends upon its ability to breed freely and produce fast-growing pigs, which make economical use of the available food, and whose carcases provide meat of the kind which consumers desire.

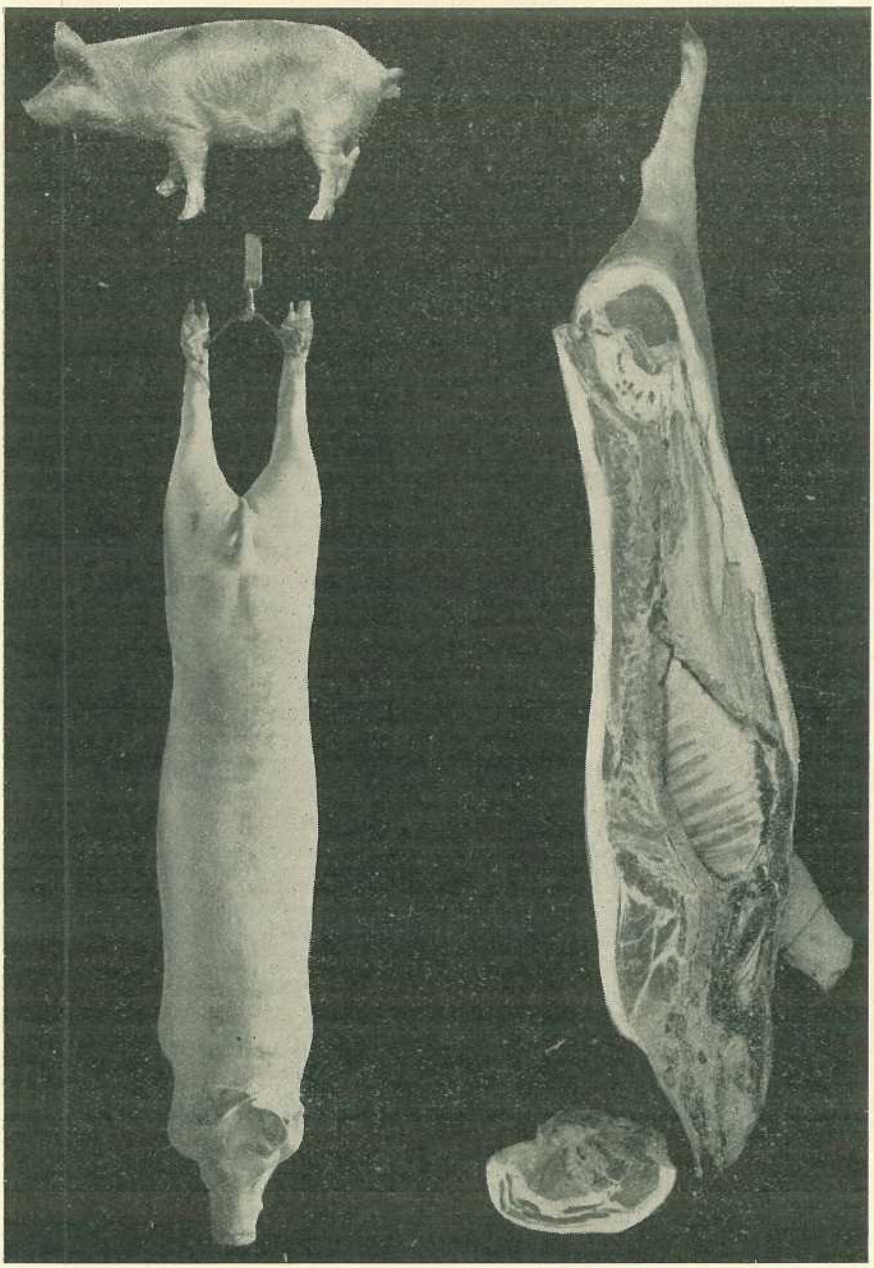


Plate 42.
The "finished" pig, its carcase and its cuts.

Before any pig or family of pigs can be valued for comparative purposes it is necessary to have some basis of valuation. The prolificacy of breeding stock can be measured and recorded, "age for weight" in their progeny can be measured by weighing, similarly food consumption per unit of pork produced can be measured; carcase quality, however, is more difficult to value because several features of the carcase must be considered, and further, the term carcase quality is vague and varies according to the markets which are being supplied.

The consumer plays such an important part in the pig industry that it is necessary to consider the requirements of the consumer before embarking on any pig-breeding programme.

Although the local, interstate, and overseas trades with which the Queensland pig industry is concerned require carcases of weight ranges varying from 60 lb. to 160 lb., there is a particular kind of carcase required by those markets, that desirable carcase being balanced in the proportion of its various parts, and having a large proportion of lean meat, with a comparatively small and well-distributed amount of fat.

Carcase quality has until recently been difficult to define, but with the recently adopted system of carcase appraisal which is now in use in Australia and England, the industry has a measure of carcase quality which sets a standard and allows comparisons to be made.

All the important characteristics of pigs can, therefore, be fairly accurately measured and on these standards the breeders of pigs should base their selection aiming at a correct balance between productiveness, economy and rate of growth, and carcase quality. It is also desirable that judging at pig shows should be conducted on the basis of utility as well as on those characteristics such as colour, shape of the head, and carriage of the ears, which distinguish one breed from another. Judging pigs on outward appearance alone goes so far as to enable breeders to compare the general appearance of their pigs with that of others, and to get the opinion of the judges on their stock, but unless such information gained at shows is used in conjunction with records of performance, it can do little more than keep the standard of a breed at its present level, and further improvement will be slow.

Improvement in livestock results from improved environment and the selection of those animals for breeding purposes which have the most desirable characteristics in their inheritance; if care is not continuously exercised in the selection of pigs they will quickly revert to inferior standards.

Carcase appraisal has been used sufficiently to provide valuable data on carcase quality of Australian pigs, and it is evident from those data that most pigs are deficient in body length, and most pig producers market their pigs in an excessively fat condition.

The illustrations in Plate 42 show a pig which gained the highest marks in a Queensland carcase competition; they are valuable in indicating the apparent condition of the live pig, whose carcase measured close to the standard.

TYPE CLASSIFICATION OF PIGS.

Under normal or average conditions pigs pass through three more or less distinct stages in their growth to maturity. In the early stage the bony framework is developing very rapidly, then at a later stage the muscular system is developed on and around the skeleton; then as the

pig approaches maturity it lays on fat very rapidly, both on and between the muscles. To provide carcases which are well proportioned and which carry a large proportion of lean meat with a light covering of fat, it is necessary that pigs should be slaughtered when they are just commencing on that rapid fattening stage, and before they become "thick."

All pigs do not reach this stage of maturity at the same weights; those which reach that desired stage of finish at light weights, say from 60 to 90 lb. carcase weights are called porker type, and those which reach it at heavier weights are known as baconer type. Among the baconers there are those which are finished at weights from 100 to 120 lb., and those which finish at weights from 130 to 160 lb., and are most suitable for the English Wiltshire bacon trade.

This classification of type can be carried to breeding stock which produce progeny of porker type, light baconer type or heavy baconer type.

Type classification can only be applied where pigs are kept under average conditions; intensive feeding and housing tend to produce earlier fattening, while limited feeding and grazing delay fattening, but grazing does not necessarily cause slow growth; pigs may grow and increase rapidly in weight even though they are not fattening. To produce an ideal light porker, light baconer or heavy baconer from the same type of pigs, the environment must be altered to suit.

Type in mature pigs is indicated mainly by their size of frame. (See Plate 43.)

Porker or baconer type classification is usually taken into consideration in judging pigs, but whether a particular breed should be porker type or baconer type is a matter of conjecture among breeders and judges; it is therefore to be expected that a variation in type will be seen within any one breed. The weight of opinion in Australia at present is in favour of directing the Berkshire and Middle White breeds to the porker type and the Large White, Tamworth, and Wessex Saddleback breeds to baconer type, although the majority of Tamworth and Wessex breeders are keeping their breeds closer to the lighter bacon type.

From the foregoing statements it is evident that pig breeders should fix their breed standards on porker, light baconer, or heavy baconer type classification, and give consideration to this when selecting or judging stock. It should also be realised that under average conditions there are pigs for pork and pigs for bacon. The commonest error in pig breeding in Queensland is the use of porker type pigs for the production of bacon weight carcases, which under normal conditions of feeding are much too fat and short for bacon trade requirements.

The figures in Plate 43 give an indication of the development towards maturity of the progeny of pigs of three distinct types. The degrees of finish of each type at weaner age, porker weight, light baconer weight and heavy baconer weight are shown under the figure of the mature pig which produces such a type.

Size in breeding stock is reflected as rapid growth in their pigs, and it is therefore the most important feature of any pig. Size within the breed or type is quickly lost in Queensland, due probably to mating pigs when they are too immature, and possibly to climatic and feeding conditions.

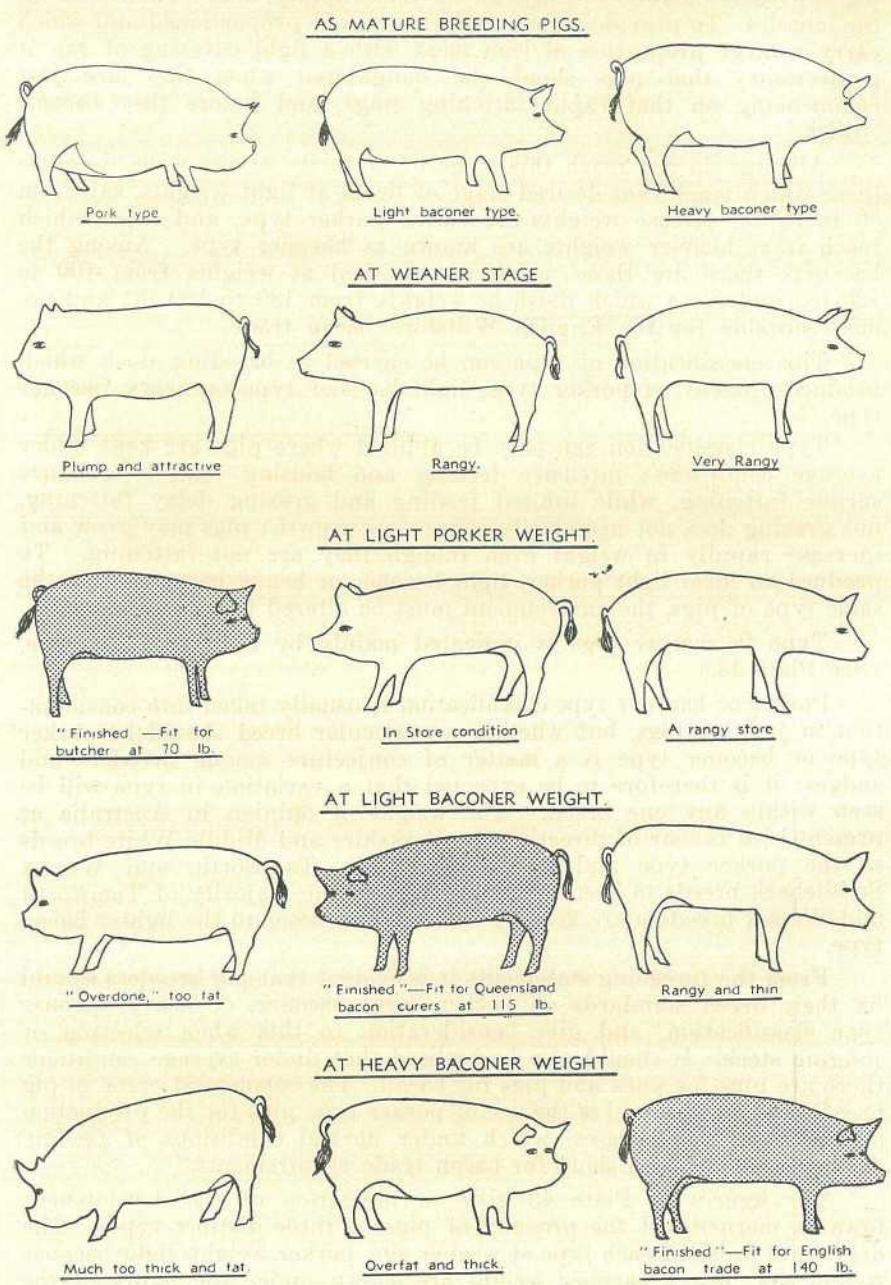


Plate 43.

An illustration of the different degrees of maturity of progeny of porker, light-baconer, and heavy-baconer types at various stages of their growth. The heavily-shaded pigs have reached the stage of maturity at which they should be marketed.

THE BREEDS OF PIGS.

There are many breeds of pigs in the world, at least twelve of which have been introduced to Australia, but at present there are five breeds prominent in Queensland; these are Berkshire, Large White, Middle White, Tamworth, and Wessex Saddleback.

As a prelude to the description of the breeds, it can be stated that several features are desirable in all breeds; these will be dealt with first, and the description of individual breed characteristics with illustrations will follow.

In breeding stock, size within the breed type is the first essential; pigs should be well grown for their age. Character as indicated by the gait, carriage of the head, and general appearance is another essential in stud stock. Docility, with feminity in the female and masculinity in the male are features to be desired. The good pig has strong, straight legs set well on the outside of the body; the feet should be fairly compact. The fore end of the pig should be comparatively light, the middle long, and the hams full and well fleshed. Both boars and sows should have at least twelve well-placed teats. As the teat characteristics of a boar has a relationship to the teats of his female progeny it is necessary to watch this feature in the selection of the sire.

Symmetry, full development, and freedom from abnormalities are further essentials in stud pigs of all breeds.

The Berkshire.

England is the home of Berkshire pigs and from English herds pigs have been sent to most countries to establish herds. In Australia the Berkshire is the most prominent among the several breeds of pigs, being found to adapt itself to a wide range of conditions.

The Berkshire pig is mostly used in Australia for the production of porkers, or, when crossed with the extreme baconer breeds, for the production of light weight baconers.

Within the Berkshire breed there is considerable variation of type, for example, the rangy type seen in the Canadian strains, which has been evolved for the production of baconers. The type of Berkshire favoured by most breeders and judges in Australia is that illustrated in Plate 44. This pig has all the characteristics of the breed, is a porker type, and yet well developed.

Early Berkshire breeders fixed as their standard colour for the breed, black with white points—i.e., white on the four feet, the face, and the brush of the tail—and this is the standard colour as set down by the breed societies for the present-day Berkshire.

It is well known to those who have had the handling of Berkshire pigs that the standard of colour and markings as set down for the breed is rarely attained, and it is a very difficult matter for breeders to get the exact marking which they require in the breed. Even when well-marked pigs are mated, the progeny usually show some variation from the ideal marking seen in the parent stock; but it must be understood that there is more chance of getting well-marked pigs by mating boars and sows which are well marked, than by mating those which are badly marked. While the breeder of Berkshires wishes to pay attention to the breeding of well-marked animals, he must not neglect other characteristics, such

as conformation, quality, and productiveness, which, after all, are the most important features of any breed of pig. It should be borne in mind that pigs are used primarily to produce pork, and it is often necessary for both the stud breeder and the show judge to overlook slight faults in the markings of the animals. So far as it concerns the farmer who is using Berkshire pigs for the production of pork and bacon, the colour markings count little, and the more important characteristics are productiveness, type, and quality.

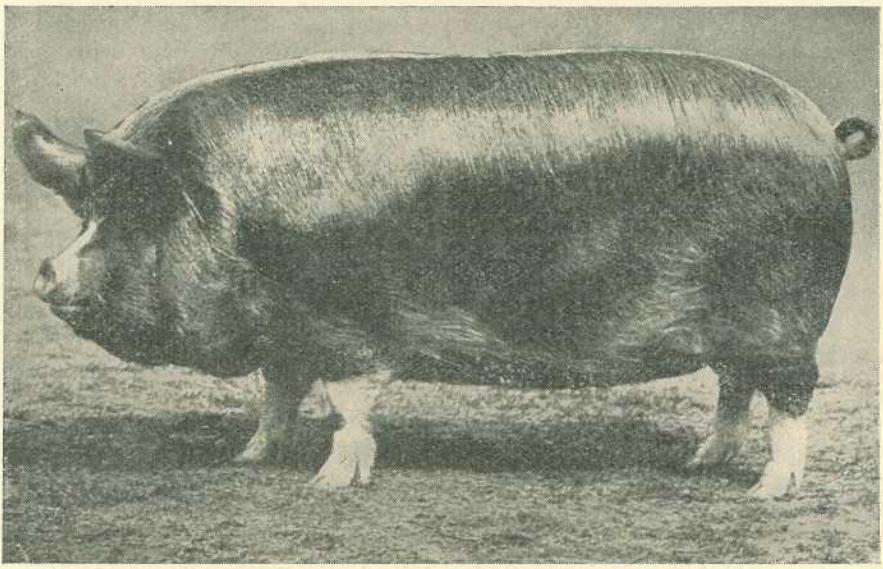


Plate 44.
A Typical Berkshire.

The Large White.

The Large White is one of the largest breeds, and is used extensively for the production of baconers in England, where the breed was evolved, and in most bacon producing countries to which it has been exported.

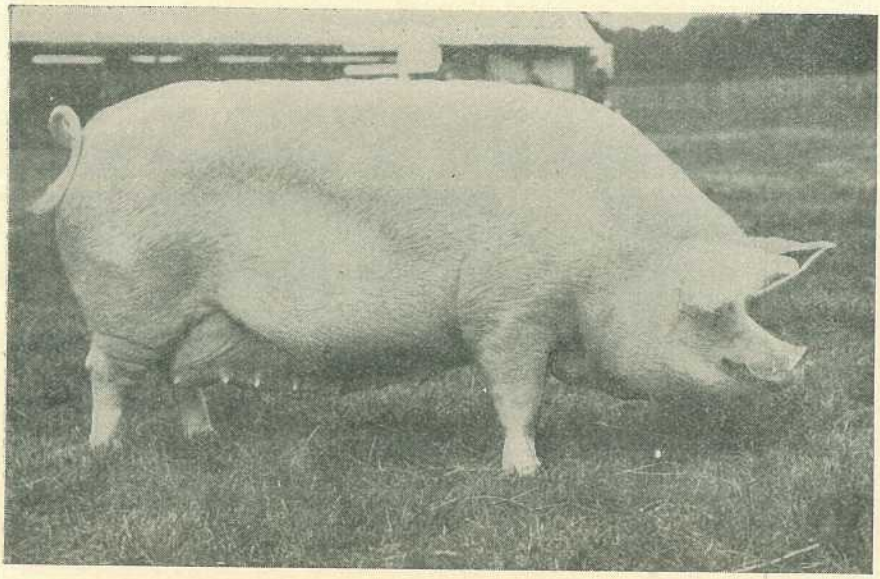
The Large White has white hair on a pinkish skin, although blemishes in the form of blue or black spots on the skin are frequent, and whilst considered undesirable are not a disqualification, as they do not indicate impurity of breeding.

The Middle White.

The Middle White is more compact in stature than the Large White, in fact, it is very similar in conformation to the Berkshire, and as such, the Middle White is a porker-type breed.

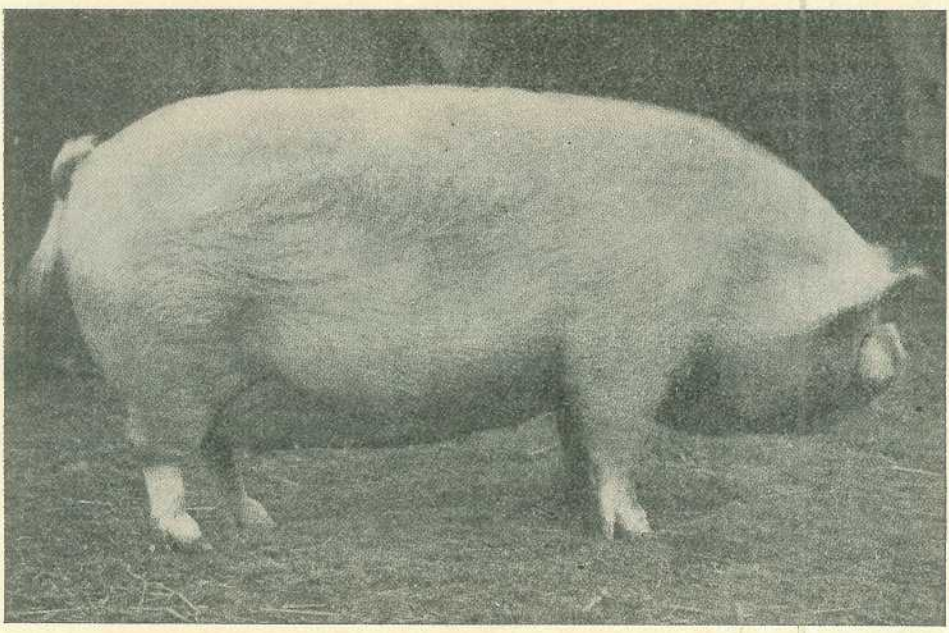
This breed was evolved in England, and is used there and in Australia fairly extensively for the production of light porkers.

The colour of the Middle White is white hair on a pinkish skin; blue or black spots do sometimes occur on the skin, and they are undesirable.



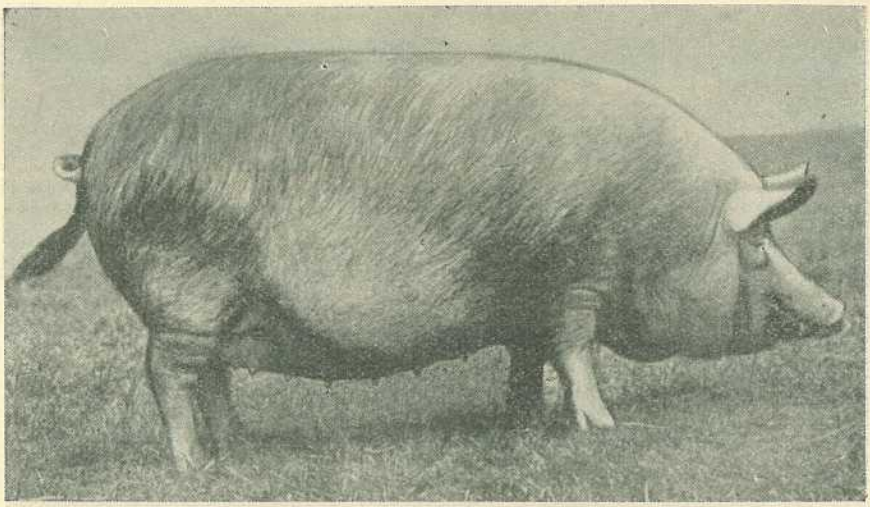
[*Photo.: Farmer and Stock Breeder.*

Plate 45.
A Typical Large White.



[*Photo.: Hosegood. Pig Breeders' Annual.*

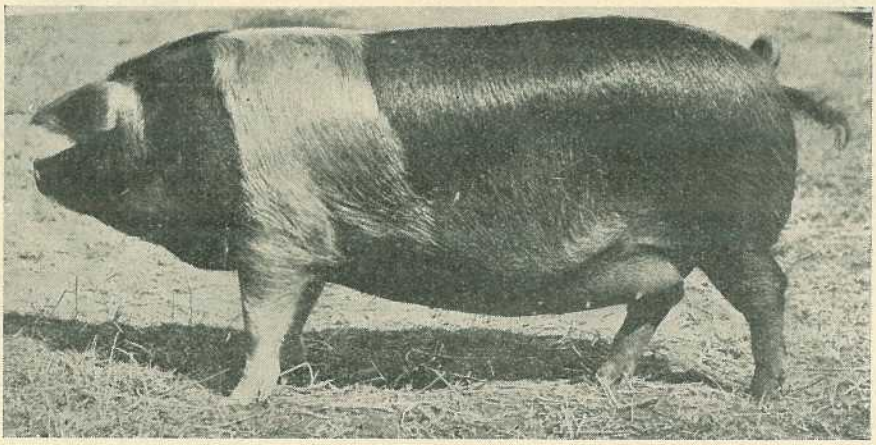
Plate 46.
A Typical Middle White.



[*Photo.: McCann. National Pig Breeders' Association Herd Book.*

Plate 47.

A Typical Tamworth.



[*Sport and General Photo.*

Plate 48.

A Typical Wessex Saddleback.

The Tamworths.

The Tamworth is another English breed and is of baconer type, although there is a tendency for breeders to select to a lighter bacon type which is more compact than the older Tamworth and the present Large White.

The colour standard of the Tamworth is golden red, and although there are usually some spots or patches of black skin, and some black hairs are prevalent, the black is undesirable and breeders endeavour to breed it out; but as with other breeds colour is not so important as quality and conformation.

The Wessex Saddleback.

The Wessex Saddleback, as the name denotes, is an English breed, which carries a white saddle over the shoulders and down the fore legs; the remainder of the colour is black.

The Wessex is a medium to large type of pig. The ears are carried forward over the face and are fairly long.

GENERAL MANAGEMENT OF THE HERD.

Young pigs should be well grown before mating; breeding from animals too early in their growth will, in a few generations, ruin their size, which is the most important characteristic of any pig. If the farmer wants to have large and fast-growing pigs, he must breed them that way as well as feed them that way. Usually pigs are well enough grown for mating at nine or ten months of age, or over 250 lb. live weight, and boars and sows must be kept apart until they reach that stage. If this is not done they will mate, perhaps, at five months of age.

MATING.

For best results the boar should be kept in a separate enclosure from the sows, and when a sow is hogging (which is usually well indicated to the observant pig-raiser) she should be placed with the boar, and allowed one service, then removed, and if it is practicable, she should be put in a yard on her own, so that she will not be knocked about by other pigs. Then it may be advisable to allow the sow to return to the boar for a second service on the following day. If the sow does not hold to the service she will be in season again in twenty-one days. The period of heat (œstral period) usually lasts for two days, although it varies in different sows from one to three days.

After the service has taken place, it should be recorded in a "breeding" record, together with date, then, three weeks later, the sow should be watched to see if she returns to service. From this record the expected date of farrowing can be determined by reference to a gestation chart.

GESTATION CHART FOR BREEDING SOWS.

Jan.	Date of Farrowing.	Feb.	Date of Farrowing.	March.	Date of Farrowing.	April.	Date of Farrowing.	May.	Date of Farrowing.	June.	Date of Farrowing.	July.	Date of Farrowing.	Aug.	Date of Farrowing.	Sept.	Date of Farrowing.	Oct.	Date of Farrowing.	Nov.	Date of Farrowing.	Dec.	Date of Farrowing.
1	22 April	1	23 May	1	20 June	1	21 July	1	20 Aug.	1	20 Sept.	1	20 Oct.	1	20 Nov.	1	21 Dec.	1	20 Jan.	1	20 Feb.	1	22 Mar.
2	23 ,,	2	24 ,,	2	21 ,,	2	22 ,,	2	21 ,,	2	21 ,,	2	21 ,,	2	21 ,,	2	22 ,,	2	21 ,,	2	21 ,,	2	23 ,,
3	24 ,,	3	25 ,,	3	22 ,,	3	23 ,,	3	22 ,,	3	22 ,,	3	22 ,,	3	22 ,,	3	23 ,,	3	22 ,,	3	22 ,,	3	24 ,,
4	25 ,,	4	26 ,,	4	23 ,,	4	24 ,,	4	23 ,,	4	23 ,,	4	23 ,,	4	23 ,,	4	24 ,,	4	23 ,,	4	23 ,,	4	25 ,,
5	26 ,,	5	27 ,,	5	24 ,,	5	25 ,,	5	24 ,,	5	24 ,,	5	24 ,,	5	24 ,,	5	25 ,,	5	24 ,,	5	24 ,,	5	26 ,,
6	27 ,,	6	28 ,,	6	25 ,,	6	26 ,,	6	25 ,,	6	25 ,,	6	25 ,,	6	25 ,,	6	26 ,,	6	25 ,,	6	25 ,,	6	27 ,,
7	28 ,,	7	29 ,,	7	26 ,,	7	27 ,,	7	26 ,,	7	26 ,,	7	26 ,,	7	26 ,,	7	27 ,,	7	26 ,,	7	26 ,,	7	28 ,,
8	29 ,,	8	30 ,,	8	27 ,,	8	28 ,,	8	27 ,,	8	27 ,,	8	27 ,,	8	27 ,,	8	28 ,,	8	27 ,,	8	27 ,,	8	29 ,,
9	30 ,,	9	31 ,,	9	28 ,,	9	29 ,,	9	28 ,,	9	28 ,,	9	28 ,,	9	28 ,,	9	29 ,,	9	28 ,,	9	28 ,,	9	30 ,,
10	1 May	10	1 June	10	29 ,,	10	30 ,,	10	29 ,,	10	29 ,,	10	29 ,,	10	29 ,,	10	30 ,,	10	29 ,,	10	1 Mar.	10	31 ,,
11	2 ,,	11	2 ,,	11	30 ,,	11	31 ,,	11	30 ,,	11	30 ,,	11	30 ,,	11	30 ,,	11	31 ,,	11	30 ,,	11	2 ,,	11	1 April
12	3 ,,	12	3 ,,	12	1 July	12	1 Aug.	12	31 ,,	12	1 Oct.	12	31 ,,	12	1 Dec.	12	1 Jan.	12	31 ,,	12	3 ,,	12	2 ,,
13	4 ,,	13	4 ,,	13	2 ,,	13	2 ,,	13	1 Sept.	13	2 ,,	13	1 Nov.	13	2 ,,	13	2 ,,	13	1 Feb.	13	4 ,,	13	3 ,,
14	5 ,,	14	5 ,,	14	3 ,,	14	3 ,,	14	2 ,,	14	3 ,,	14	2 ,,	14	3 ,,	14	3 ,,	14	2 ,,	14	5 ,,	14	4 ,,
15	6 ,,	15	6 ,,	15	4 ,,	15	4 ,,	15	3 ,,	15	4 ,,	15	3 ,,	15	4 ,,	15	4 ,,	15	3 ,,	15	6 ,,	15	5 ,,
16	7 ,,	16	7 ,,	16	5 ,,	16	5 ,,	16	4 ,,	16	5 ,,	16	4 ,,	16	5 ,,	16	5 ,,	16	4 ,,	16	7 ,,	16	6 ,,
17	8 ,,	17	8 ,,	17	6 ,,	17	6 ,,	17	5 ,,	17	6 ,,	17	5 ,,	17	6 ,,	17	6 ,,	17	5 ,,	17	8 ,,	17	7 ,,
18	9 ,,	18	9 ,,	18	7 ,,	18	7 ,,	18	6 ,,	18	7 ,,	18	6 ,,	18	7 ,,	18	7 ,,	18	6 ,,	18	9 ,,	18	8 ,,
19	10 ,,	19	10 ,,	19	8 ,,	19	8 ,,	19	7 ,,	19	8 ,,	19	7 ,,	19	8 ,,	19	8 ,,	19	7 ,,	19	10 ,,	19	9 ,,
20	11 ,,	20	11 ,,	20	9 ,,	20	9 ,,	20	8 ,,	20	9 ,,	20	8 ,,	20	9 ,,	20	9 ,,	20	8 ,,	20	11 ,,	20	10 ,,
21	12 ,,	21	12 ,,	21	10 ,,	21	10 ,,	21	9 ,,	21	10 ,,	21	9 ,,	21	10 ,,	21	10 ,,	21	9 ,,	21	12 ,,	21	11 ,,
22	13 ,,	22	13 ,,	22	11 ,,	22	11 ,,	22	10 ,,	22	11 ,,	22	10 ,,	22	11 ,,	22	11 ,,	22	10 ,,	22	13 ,,	22	12 ,,
23	14 ,,	23	14 ,,	23	12 ,,	23	12 ,,	23	11 ,,	23	12 ,,	23	11 ,,	23	12 ,,	23	12 ,,	23	11 ,,	23	14 ,,	23	13 ,,
24	15 ,,	24	15 ,,	24	13 ,,	24	13 ,,	24	12 ,,	24	13 ,,	24	12 ,,	24	13 ,,	24	13 ,,	24	12 ,,	24	15 ,,	24	14 ,,
25	16 ,,	25	16 ,,	25	14 ,,	25	14 ,,	25	13 ,,	25	14 ,,	25	13 ,,	25	14 ,,	25	14 ,,	25	13 ,,	25	16 ,,	25	15 ,,
26	17 ,,	26	17 ,,	26	15 ,,	26	15 ,,	26	14 ,,	26	15 ,,	26	14 ,,	26	15 ,,	26	15 ,,	26	14 ,,	26	17 ,,	26	16 ,,
27	18 ,,	27	18 ,,	27	16 ,,	27	16 ,,	27	15 ,,	27	16 ,,	27	15 ,,	27	16 ,,	27	16 ,,	27	15 ,,	27	18 ,,	27	17 ,,
28	19 ,,	28	19 ,,	28	17 ,,	28	17 ,,	28	16 ,,	28	17 ,,	28	16 ,,	28	17 ,,	28	17 ,,	28	16 ,,	28	19 ,,	28	18 ,,
29	20 ,,	—	—	29	18 ,,	29	18 ,,	29	17 ,,	29	18 ,,	29	17 ,,	29	18 ,,	29	18 ,,	29	17 ,,	29	20 ,,	29	19 ,,
30	21 ,,	—	—	30	19 ,,	30	19 ,,	30	18 ,,	30	19 ,,	30	18 ,,	30	19 ,,	30	19 ,,	30	18 ,,	30	21 ,,	30	20 ,,
31	22 ,,	—	—	31	20 ,,	—	—	31	19 ,,	—	—	31	19 ,,	31	20 ,,	—	—	31	19 ,,	—	—	31	21 ,,

NOTE.—Black figures in the above table indicate date of service.

This chart presents in an instructive form figures relating to the gestation period of brood sows. For example, a sow mated to the boar on 1st January is due to farrow on 22nd April; a sow mated on 1st July is due on 20th October. The normal period of gestation, *i.e.*, the period from the time of conception to the birth of the young pigs, is 112 days, this period is sometimes remembered as roughly three months, three weeks, and three days, or 16 weeks. With very young sows the period is sometimes of shorter duration, and instances are on record where young sows have farrowed at from 100 to 108 days after becoming pregnant; on the other hand, old sows in abnormal condition have been known to carry their young for more than 120 days.

SOW'S BREEDING RECORD.

Breed : Name : Registered Number : Date of Birth : Earmark :

Date of Service.	Date of Farrowing.	Sire or Litter.	Number Born.		Number Weaned.		Tattoo or Earmark Given and Date Weaned.	Died after Weaning.		Sold or Killed for Meat.		Stud Sales.		Gross Returns.	Remarks.
			Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.	Male.	Female.		

Such a record may be used in card or book form.

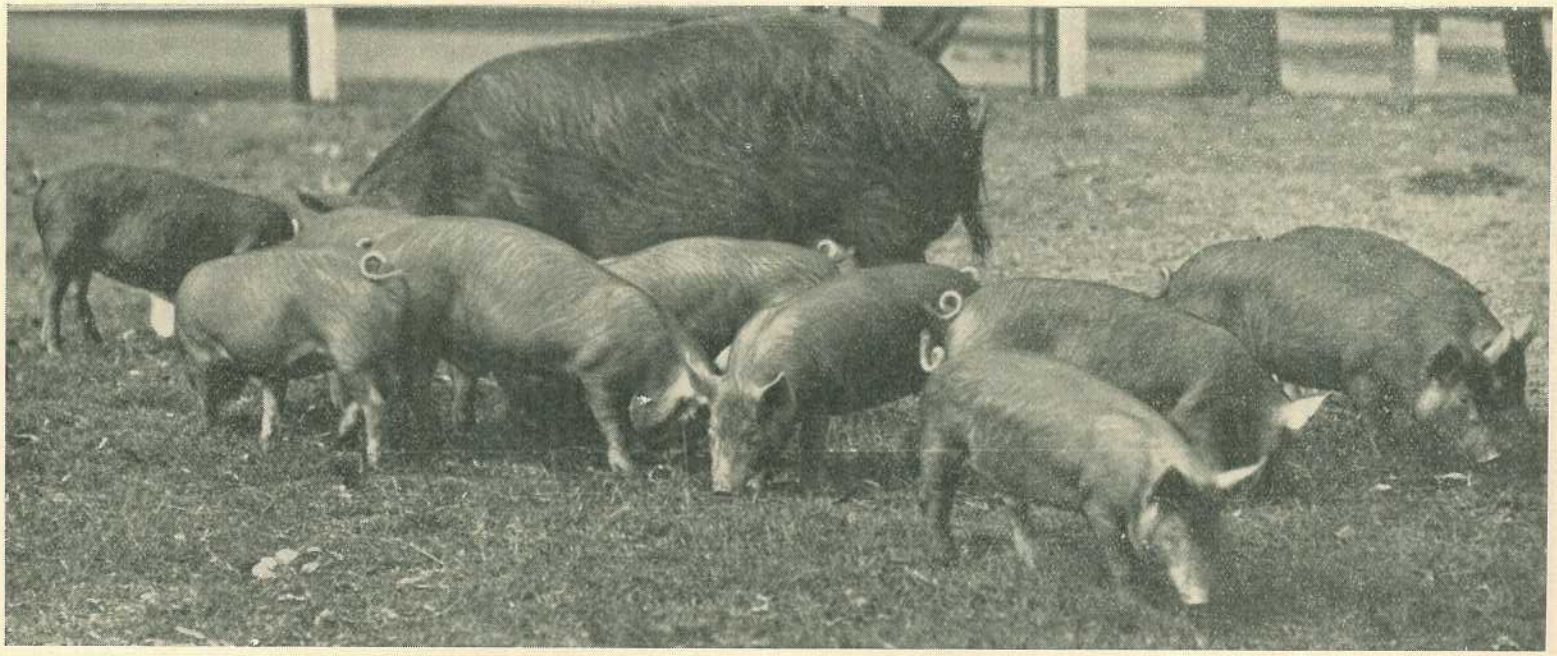


Plate 49.
The number and weight of the pigs reared in each litter reflect the efficiency of the business.

CARE OF IN-PIG SOWS.

At service time, the sow is usually in medium condition. She should then be fed so as to have her gradually improving up to farrowing time, when she should be in her best form, but not excessively fat.

Towards the end of the gestation period it is very advisable to clean all the lice off the sow so that the young pigs will not be infested soon after they are born. To destroy the lice, the sow should receive three applications, one week apart, of either a weak solution of a coal-tar disinfectant, or some cheap grade of oil, such as crude petroleum oil. These should be either sprayed or rubbed on to every part of the pig's skin.

FARROWING TIME.

Before the sow is expected to farrow she should be taken from the herd and placed in a run on her own where she can go into a clean and comfortable shed. Some short, dry grass or straw should be put into the shed for bedding, and this should be changed when necessary to keep the bed clean and dry. Care is essential at this period to prevent the sow from becoming constipated, which would cause trouble in parturition and may be followed by fever. Just prior to farrowing the sow should be fed very lightly, and the food should be of a laxative nature—green foods and a little molasses are very useful.

THE SUCKLING PERIOD.

It is important that the sow should not be fed for about twenty-four hours after farrowing, unless it is to give her a small drink. The first feed should be a light one, with half a cupful of castor oil added to help to put the sow in good form. For the first two weeks after farrowing the sow should be fed lightly.

Iron as a Preventive of Anæmia.

A deficiency of iron in the sow's milk has been proved to be the cause of anæmia in young suckers, the anæmia being indicated by a paleness in the pigs, a wrinkling of the skin, and diarrhœa. The trouble occurs from the time the pigs are born until they commence to eat solid foods. Where sows and litters are run on pasture the anæmia does not occur, as the pigs receive iron from nosing in the ground, but in intensive pens where pigs have no access to soil, trouble may be anticipated unless precautions are taken. Simple means of prevention, when litters are penned, consist of giving either a supply of mineral mixture containing sulphate of iron, or a quantity of fresh soil or turf in the pen where the suckers have access to it.

Some pig raisers get good results by mixing 2 lb. of sulphate of iron with 100 lb. of fresh soil and placing about a pound of this mixture on the floor of the intensive pen each day after the litter is born.

Individual care is most necessary for sows and litters until the youngsters are about three weeks old, and after that time several sows with litters of approximately the same age may be run together with good results; however, no other pigs should be run with these. When the pigs are three or four weeks old they may be provided with a self-feeder containing grain or meals; the sows may also be given access to the self-feeder during this latter half of the lactation period, one feeder being sufficient for several sows and litters. When a feeder containing dry foods is provided, there should also be an accessible water supply, even if the pigs are given milk in addition. The young pigs do very well on this system of feeding, and when it is desired to wean

them at eight weeks old the self-feeder should be enclosed with hurdles, which enable the young pigs to enter, but exclude the sows. The sow's food supply is so reduced that her milk flow ceases, and at the same time the young pigs take a larger amount of food from the trough, and thus weaning is achieved satisfactorily

The male pigs not required for breeding should be castrated when about six weeks old, as at this stage the operation is easily performed and it has little ill-effect on the pigs, which quickly recover if the operation is done properly, and they are treated with some disinfectant, then put into a clean grass run or on a clean floor. Ear tattooing and ear-marking can be done at the same time as castration.

WEANING.

The pigs should be weaned from the sow when they are eight to nine weeks old. After being separated a day, the sow should be put with the litter for an hour or so for the pigs to empty her udders. This should be repeated on the following day, by which time most sows will be dry, although, in some cases, it is necessary to put the sow back to the suckers for several days before she dries off. At this time the sow's feed should be very light, so that she will not make much milk. The sow will usually come on hogging when the litter is about nine weeks old, and if she is not too low in condition, she can be mated to the boar then, but in cases where the sow's condition is very low, it is preferable to withhold the service for at least three weeks.

The Growing Period.

From weaning time until marketing the growing pigs should be graded according to size into as many lots as convenient; under the grazing system, provided there is ample trough space to feed the pigs comfortably, two or three lots will be sufficient for the growing pigs; under the intensive system, pigs are usually kept in smaller numbers.

It should be the object of the pig raiser after weaning his pigs to have them growing rapidly until they are ready to market; there should be no "store" period, but the pigs should be fed in such a way as to have them "finished," but not excessively fat, when they reach their weight range as porkers, light baconers, or heavy baconers, as the case may be.

Weighing Pigs.

The total weight of a litter at weaning time gives a good measure of the efficiency of the sow's production and the piggery management. Work done in pig recording shows that a standard which breeders should aim at is an average of eight pigs reared per litter, and an average weight of 40 lb. per pig at eight weeks old.

As pork and bacon pigs are usually sold on a basis of weight, and as the ruling price per lb. varies according to specified weight limits, it is important to the pig raiser that he should have a fairly accurate knowledge of the weight of his animals before they are offered for sale.

Even after years of practice, guessing the weights of pigs is not so reliable as weighing them, and where regular consignments of pigs are sent from a farm the use of weighing scales can be recommended.

The weighing crate should be light yet strong; a convenient size for a crate to hold one bacon pig is 3 feet 6 inches long, 2 feet 6 inches high, and 1 foot 6 inches wide.

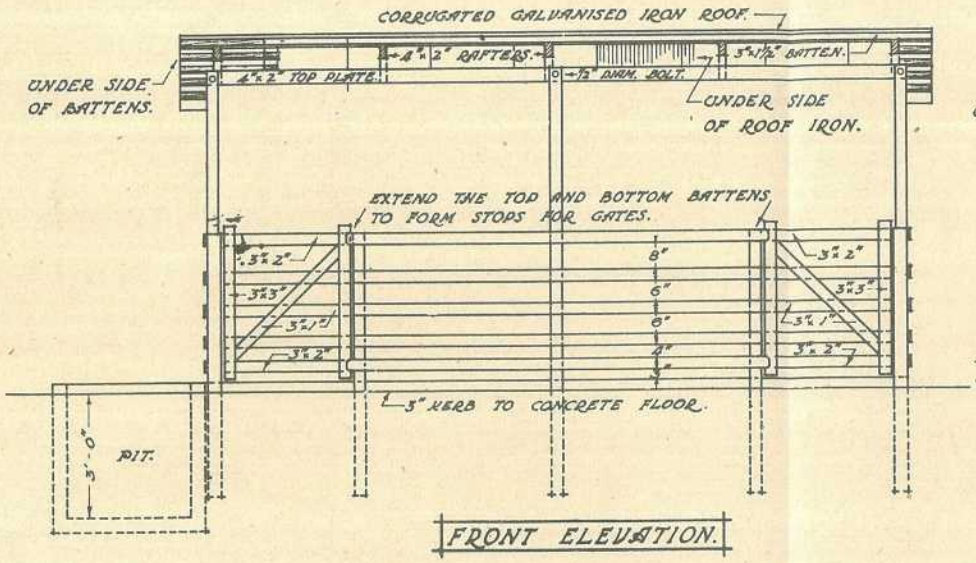
If the weighing crate is arranged in a race, the pigs can be brought from their pen, weighed, and then returned to the pen conveniently.

DEPARTMENT OF AGRICULTURE AND STOCK.

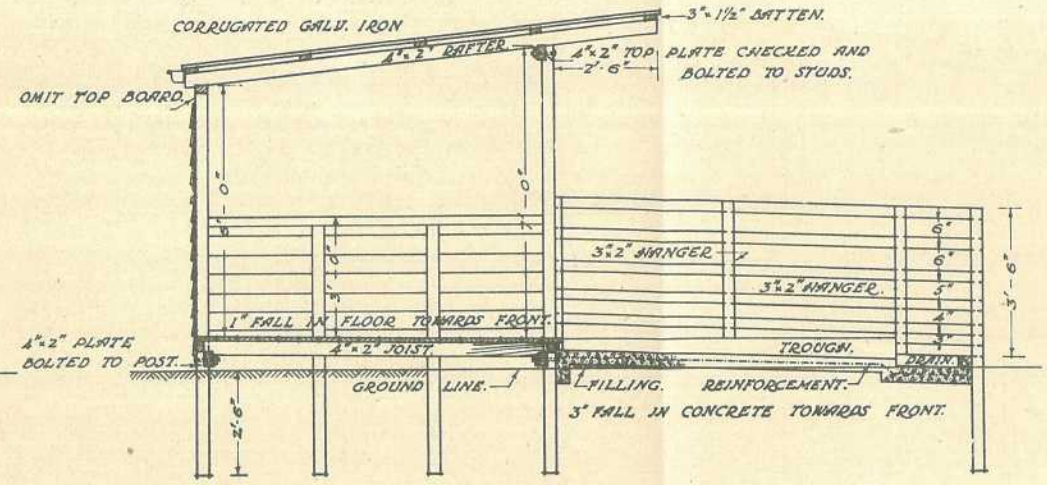
QUEENSLAND.

Plate 50.

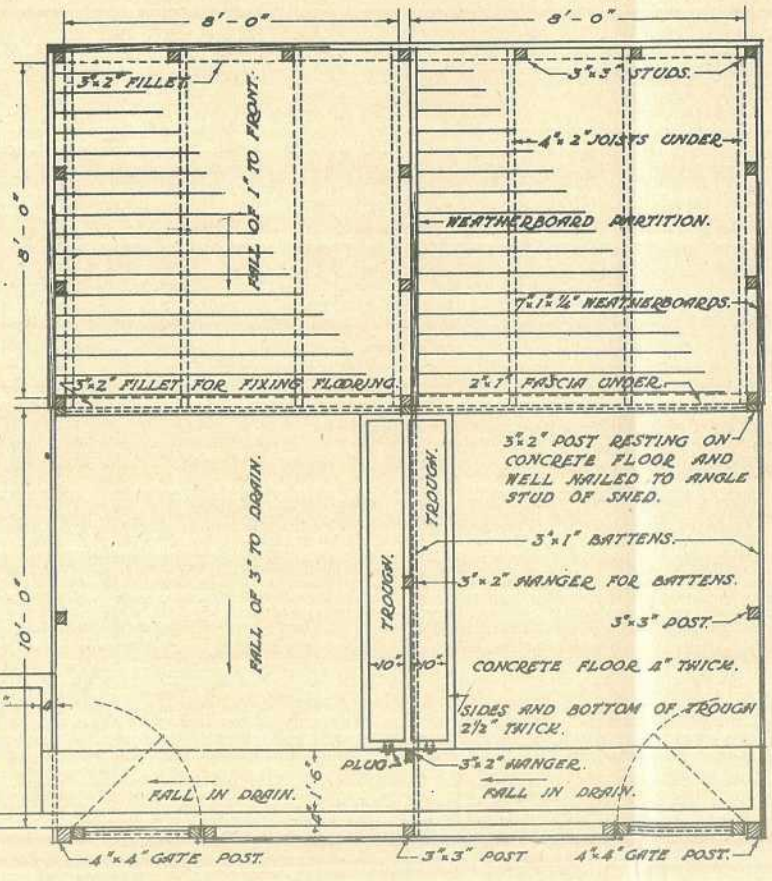
PIG PENS FOR INTENSIVE HOUSING.



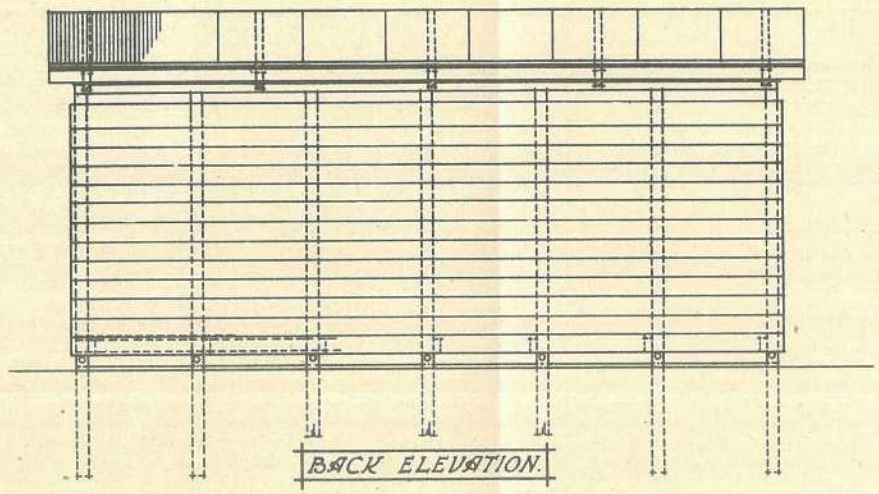
FRONT ELEVATION.



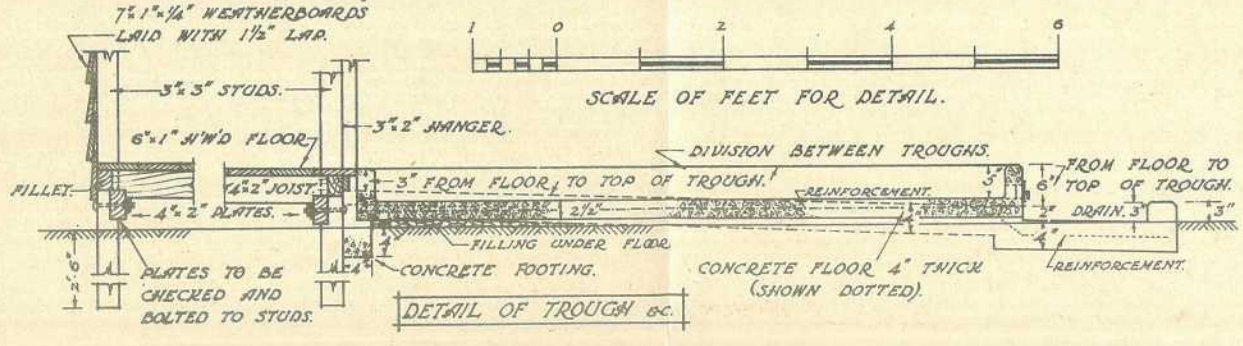
CROSS SECTION.



PLAN.

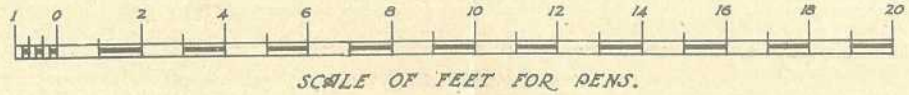


BACK ELEVATION.

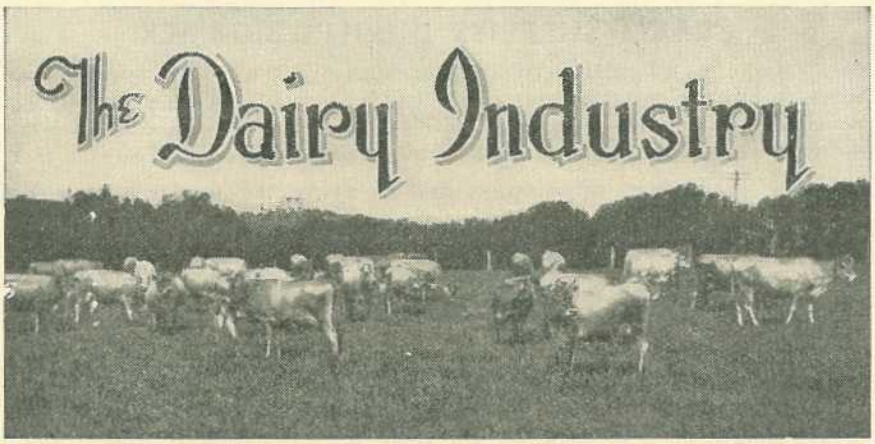


DETAIL OF TROUGH &c.

SCALE OF FEET FOR DETAIL.



SCALE OF FEET FOR PENS.



Variations in Cream Tests.

MANY dairy farmers sometimes wonder why their factory returns show variations in the fat tests of their cream. Actually, variations are bound to occur.

Conditions under which milk is separated lead to changes in cream tests, as shown by the following facts:—

The separator should always be run at the speed directed by the manufacturer. It is better to turn at too high a rate than too low, for, in the latter case, the fat loss in the skim milk is increased in proportion to the decrease in the number of revolutions.

The milk must be allowed to enter the bowl freely during separation. The level is automatically controlled by the float, and if the flow is partly shut off, a higher testing cream will result. An oversupply will result in a lower testing cream, and, more important still, excessive fat loss will occur.

Milk is at the best temperature to be separated as it comes from the cow, as it is less viscous than at lower temperatures, so runs easily through the separator, and more perfect separation of the fat results. At lower temperatures, due to the viscosity of the milk, separation becomes more difficult, with greater fat losses. It is doubtful whether any machine will do good work if the milk is below 80 degrees Fahr.

The quantity of skim milk or water used to flush the bowl usually varies considerably from day to day, and may cause a variation in the test of 2 to 5 per cent., depending on the quantity of cream. Vibration of the separator causes the skim milk and cream to be shaken together, so that they do not find their way to their respective outlets. Fat losses are increased by the escape of fat globules through the skim milk outlet.

Other factors which influence fat losses are the cleansing of the separator and the condition of the milk, but these should not cause any difficulty where there is a proper appreciation of the necessity for hygienic methods.

There is a daily variation in the fat content of the mixed milk from a herd, and this is sometimes appreciable. This affects the test of the cream, but does not influence the quantity. For example, if a herd produced 100 lb. of milk with a fat test of 4 per cent., there would be 4 lb. of butterfat, while, if the fat were 5 per cent., 5 lb. of butterfat would be the result.

—F. C. Coleman.

CREAM SUPPLIES DURING SUMMER.

Frequent and early delivery of cream to butter factories in summer is an important point in dairy practice. Daily delivery is not always possible in some districts, but nothing less than a four-times-a-week delivery should be the rule from October until March, inclusive.

The holding-up of supplies and delaying the cream carrier for the purpose of making certain that that morning's cream goes with the cream obtained previously should be avoided. The mixing of newly-produced warm cream with older and cooler cream is not infrequently the cause of cream being graded down on delivery at the factory platform.

Dairy farmers would be well advised to have their cream ready for the cream carrier on each morning of delivery. Should the morning's cream not be cooled down and ready on time, that particular cream should be held back for the next delivery; and, if this is done, better factory results will be obtained.

It has been reported that some dairy farmers make a practice of holding up the cream carrier for the purpose above mentioned, and, even were this not detrimental to their own cream, it is somewhat selfish and unfair to neighbouring farmers who desire their cream to arrive at the factory as early as possible.

As summer has come, the attention of all dairymen is directed to the necessity of supplying cream with a butterfat content of not less than 38 per cent.

A sound summer slogan for all cream suppliers is: "Frequent and early delivery and test around forty."

—A. Hossack.

COST OF SEPARATION LOSSES.

Every dairyman knows that a loss of milk-fat in separating means loss of money, but many do not realise the full extent of the loss. There is a small amount of fat which is not recoverable by mechanical separation; so this loss is unavoidable. A loss of 0·08 per cent. is not excessive, but if it is higher, either the mechanism or the manipulation of the separator is at fault.

The table hereunder will give some idea of the position when the actual loss of fat exceeds the amount which is not recoverable by mechanical means:—

Assuming that the average yield of milk is the modest amount of 1 lb. of commercial butter to 25 lb. of milk, the loss will be as follows:—

				Commercial Butter.
Loss of	0·08	per cent.	is equal to loss of	1 lb. in 50 lb.
„	0·09	„	„ „	1 lb. in 44 lb.
„	0·1	„	„ „	1 lb. in 40 lb.
„	0·2	„	„ „	1 lb. in 20 lb.
„	0·3	„	„ „	1 lb. in 13·3 lb.
„	0·4	„	„ „	1 lb. in 10 lb.
„	0·5	„	„ „	1 lb. in 8 lb.
„	0·6	„	„ „	1 lb. in 6·6 lb.
„	0·7	„	„ „	1 lb. in 5·7 lb.
„	0·8	„	„ „	1 lb. in 5 lb.
„	0·9	„	„ „	1 lb. in 4·4 lb.
„	1·0	„	„ „	1 lb. in 4 lb.

On the same basis of yield of butter from milk, a herd of cows producing 50 gallons of milk a day will produce in one year 187,062 lb. of milk yielding 7,482 lb. of commercial butter, which at 1s. per lb. is worth £374 2s.

A loss of ·1 per cent. would cause a loss of £9 7s., and a loss of 1 per cent. would be equivalent to a loss of £93 10s.

This example will serve to emphasise how necessary it is that a separator should be maintained in perfect order and be operated continually at its correct speed.

—L. A. Burgess.

ESSENTIALS IN DAIRY FARM LAYOUT.

There are two necessary adjuncts to a dairy farm which are often looked for in vain—a crush and an isolation paddock.

A crush is necessary for the handling of bulls and young stock, but few dairy farms are equipped with one.

An isolation paddock is very necessary, but is rarely provided.

How many diseases could be checked if a farmer had a good isolation paddock in which he could place and watch a suspected animal, without any danger of the animal coming into contact with the rest of his herd!

SELECTING A DAIRY HEIFER.

In the selection of a dairy heifer, the form and general character will, to a great extent, indicate whether she will develop into a good producer. When a heifer is quite young, the trained eye of the judge can see its dairy value and can discern the dairy type as distinct from the beef type. The production records of her ancestral dams on both sides are important factors in determining her future dairy value, while constitution is also important.

The form of the heifer with a future as a profitable producer is, in miniature, that of a good-type, fully-developed dairy cow. Dairy characteristics are indicated by an absence of surplus flesh; she is somewhat angular and spare. The head is typical of her breed, the eyes large and bright, and muzzle large, ears of average size, neck lean and lengthy, sloping with the shoulders. She is sharp over the shoulders, ribs well sprung, with good heart girth. The forequarters are light. Digestive capacity is indicated by the depth through the barrel from the centre of the back to the navel. Good depth indicates ample capacity to convert food into milk. The greater the depth through the middle, the greater the production is likely to be. The back is straight. There is a good length from the hip to the pin bones, and from the hip to the flank. The thighs are flat and free from fleshiness; the line of the thigh is incurving. The bones should be light and not coarse. The tail should be thin and free from flesh. All of these points should indicate that there is no tendency to lay on flesh.

The udder (as yet undeveloped), milk veins and wells are reliable indications of the heifer's future value as a dairy cow. The skin covering and surrounding the immature udder is soft and loose, with teats well placed. The milk veins can be followed with the finger and milk wells gauged. Comparatively well-developed milk veins and large milk wells also are important points in judging a dairy heifer.

Registered Hatcheries.

FOLLOWING is a list giving the names of the owners of hatcheries who have applied for registration up to and including the 20th December, 1938:—

Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire ..	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight-mile Plains ..	Elmsdale ..	White Leghorns and Australorps
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard ..	White Leghorns
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
F. J. Lambert, Acacia Vale, Townsville	Lambert's ..	Australorps and White Leghorns
J. McCulloch, White's road, Manly	Hinde's Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., Alva, The Gap, Ashgrove	Alva	White Leghorns and Australorps
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
J. A. Miller, Racecourse road, Charters Towers	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	Australorps, Brown Leghorns, and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Sussex, Rhode Island Reds, and Brown Leghorns
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg Young's ..	White Leghorns, Brown Leghorns, and Australorps

REDUCE FEEDING COSTS.

Every effort should be made to keep production costs down to a minimum. On many farms this is being done, but on many more feeding costs are too high.

The actual cost of foodstuffs is governed by supply and demand; therefore no material saving can be made at this point. Any change in the present ration fed is of doubtful value, because such a change may result in lowering the egg yield. Again, it is doubtful whether any substitute for the existing rations would be economical. This only leaves the actual practice or management of feeding open to question.

Summed up, the cost of production is governed to a great extent by the food consumed and the wastage. Any reduction in food consumption is followed by a reduction in egg production; therefore feeding costs cannot be reduced by feeding less food.

Food wastage is an appreciable factor in feeding costs. This applies irrespective of the actual cost of foodstuffs, and is applicable to dry mash, wet mash, and grain feeding. By far the greatest wastage occurs with the dry-mash system of feeding. This fact has been pointed out to many farmers, who have immediately remedied the fault.

Faults in the construction of hoppers are the cause of nearly all the wastage that occurs with the dry-mash system. There are many different designs of dry-mash hoppers, and a plan of a suitable hopper may be obtained on application to the Department of Agriculture and Stock, William street, Brisbane. This hopper embodies other important features in addition to that of minimising wastage. The most important thing about any feed hopper is the feeding trough, which should permit ample space for the birds to eat, at the same time preventing any of the mash being wasted.

The hopper referred to embraces these features within certain limits. It also permits the mash to fall freely. It must be understood, however, that some mashes will run or feed more freely than others. Therefore, no one hopper will prevent different grades of mash overfilling the trough and allowing the mash to be readily scratched out. The hopper recommended has a lath along the front of the trough, and in the event of the mash running too freely and permitting wastage, this lath can be shifted to reduce the space. This hopper is easily and cheaply constructed.

Recently a poultry farmer installed several of this type of hopper, and although production was maintained at the same level, the hoppers brought about a saving in food costs of approximately £4 a week. Some time ago another farmer installed similar hoppers, and reduced feeding costs from five bags to three bags of laying mash each week. These two illustrations should be sufficient to demonstrate that wastage can be prevented. In the latter instance, the farmer was confident that no wastage existed on his farm.

To ascertain if wastage is occurring, a rough estimate may be obtained by looking up the purchases of foodstuffs for the previous month or a longer period. As the birds consume approximately equal quantities of mash and grain, the quantities (by weight) purchased should be approximately the same. In the event of the quantity of ingredients for a mash exceeding the quantity of grain purchased, it indicates that the excess quantity is being wasted.

A more accurate method is to count the number of birds in one shed, then empty the hopper, refill it, and record the weight of mash supplied; the period which the mash lasts will indicate the true position, as each bird will consume on an average 2 oz. of mash daily. For example, 100 birds supplied with 100 lb. of mash will consume it in eight days; if it lasted only six days each bird would be wasting 4 oz. weekly; if it lasted seven days there would be a wastage of 2 oz. per bird weekly. Such a small wastage as outlined—of 2 oz. per bird weekly —does not appear to be of great importance, but with a flock of 1,000 birds this would amount to 6,500 lb. in a year and would cost about £35, based on present feeding costs.

Present high costs of all poultry foodstuffs make it essential for every poultry farmer to eliminate wastage. By putting into practice the advice offered, wastage will be minimised and the margin of profit increased.

—*J. J. McLachlan.*

SIZE OF EGGS.

Although the internal quality of the egg is of primary importance in determining price, the factor of size cannot be overlooked. Eggs are usually graded for sale according to size; but those averaging 24 oz. to the dozen are in greatest demand, not only in Queensland, but in the markets to which our surplus production is consigned.

In these circumstances, every poultry-raiser should strive to produce eggs that meet the requirements of the market. To do this, it is necessary to select breeders that will reproduce progeny capable of laying the maximum number of eggs closely approaching 2 oz. in weight. Most poultry-keepers, when selecting their breeders, know very little about the early performance of their stock in respect of size of egg—particularly the size of egg that a hen laid during her first year of production. As a breed is more prolific during the first laying year, it is then that the egg size is of particular importance.

All pullets, when commencing to lay, produce an egg very much under-sized. Some birds take a considerable time before their eggs reach the most desirable commercial size, and others, again, may take only a week or two. As it is an inherited factor, egg size is one of the chief points to be considered in selecting future breeders. Many pullets —the breeding stock of the future—will be coming into production within the next month or so, and it is suggested that poultry-breeders who are not entirely satisfied with the size of egg from their flocks should take the opportunity of selecting and marking pullets that commence to lay eggs of a 2-oz. standard early in life. Many of these birds may have to be rejected for some purpose or other; consequently, the number selected should be large enough to allow for a reasonable percentage of rejections.

—*P. Rumball.*

MILK AS A POULTRY FOOD.

Weather conditions have been so favourable this spring that many poultry-keepers may have had an excess of skim milk. Skim milk is an excellent poultry food, and if fowls are given all the skim milk they can drink, and even if fed on nothing else but grain, they will continue to lay well.

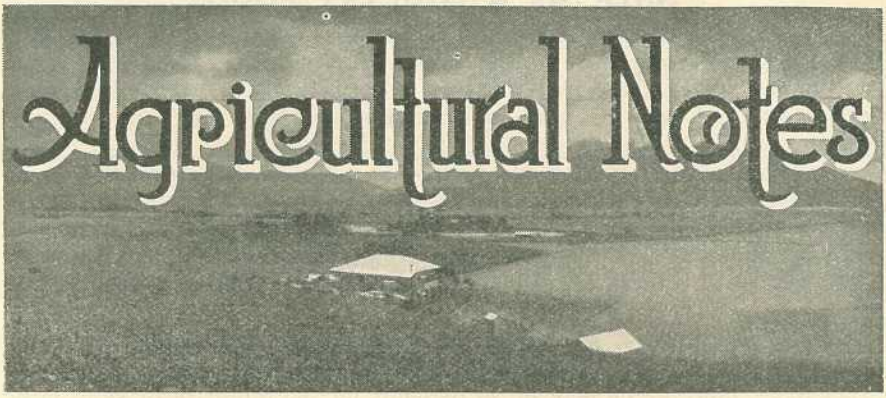
Farmers generally appreciate the necessity of efficient feeding, and, to give their fowls the necessary amount of protein, the use of one or other of the prepared mashes is advised. These mashes are usually fed with grain, the birds being given an equal quantity of each. In these circumstances, a sufficient amount of protein is made available to the birds.

The farmer who has skim milk to give his birds may, therefore, depart somewhat from his ordinary practice, for skim milk is a protein-rich food; how far he may do so depends on the quantity of skim milk available. If the birds are given only, say, half the skim milk they will consume, half the quantity of mash that is usually fed should be supplied, and the grain increased by about 50 per cent.

It will generally be found a sound practice when milk, mash, and grain are being fed to the flock, to give the birds all the grain that they will consume, and not force them to eat given quantities of mash. This practice will largely enable the birds to balance their own ration.

—*P. Rumball.*

Plate 51.
On the Beach at Granadilla, North Queensland.



Fallow for Winter Crops.

SUMMER fallowing methods are becoming the usual practice on wheat farms in the Maranoa district. The extension of this practice to include winter fodder crops is now advised, for although working costs may be reduced by a short preparation before sowing, the response to efficient fallowing will more than compensate for any extra outlay incurred. Financial loss through the failure of fodder crops may well equal that incurred through a failure for grain, particularly where good breeding stock are involved.

In a district where rainfall is erratic and generally of summer precipitation, there is no short cut to successful winter crop production, and without soil moisture conservation results are bound to be disappointing. Even in the past season, when abnormally heavy rains fell in May, wheat crops on fallowed land yielded more heavily and finished off better than those on unfallowed land.

The aim in preparing land for all winter crops should be the reduction of moisture losses caused by (*a*) surface run-off, (*b*) evaporation, (*c*) transpiration through weed growth. This can only be done by commencing the preparation as soon as practicable after harvest, and loosening the surface of the soil to a depth of about 4 inches and thus putting it in a fit condition to absorb moisture.

The growing popularity of the stiff shank type of implement for this purpose in loamy soils is evident in the Maranoa district, although periodic ploughing or sundercutting every two or three years will probably be an advantage.

Subsequent operations designed to reduce evaporation and control weed growth by means of the spring-tooth cultivator and harrows depend, of course, on the weather. The chief objective after completion of harvesting should be to stir the soil and catch the summer storms; the resulting crop will amply demonstrate the truth of the old saying that "Tillage is the best manure."

—*C. H. Defries.*

THE SCRUB TICK.

Of the many species of ticks which may attack domestic animals in Queensland, the scrub or bottle tick is one of the most important. An unfed female tick has yellow mouth parts and legs and a greyish abdomen. When engorged with blood the abdomen becomes reddish, and at this stage the female may measure up to $\frac{3}{4}$ inch in length. The male is uniformly yellowish, and never grows more than about $\frac{1}{5}$ inch in length.

The scrub tick is found among the scrubs of the eastern coast, where it lives normally on bandicoots and other marsupials. It does little harm among its native hosts, but should any domestic animal be attacked it may develop a paralysis which is frequently fatal. Dogs, cats, and sheep are most susceptible, but in the case of cattle and horses only young animals are, as a rule, affected.

Rather peculiarly, only the female ticks can cause paralysis, and the males are practically harmless. Furthermore, the disease becomes apparent only after the females have been attached for at least four days. The females are then nearly fully engorged, and the paralysis is thought to be caused by a poison which is secreted by the tick at about this time and injected into the animal. Should the tick be discovered and removed after feeding for only one, two, or three days, little harm will be done. Most cases of paralysis are seen in the spring, when, after remaining quiescent during the winter, the ticks become active again.

Dogs running in scrub tick country may be protected if given every six or seven days either a dusting with derris powder or a wash in a derris infusion. This infusion is made by soaking 2 oz. of derris powder in a gallon of water overnight and next morning adding sufficient soap to make a good lather. When being treated, the animal should also be examined for ticks in places which may not be accessible to the derris—such as inside the ears and between the toes.

For animals suffering from paralysis, a vaccine which is manufactured by the Commonwealth Serum Laboratory, Melbourne, is said to give good results. The use of a 2 per cent. solution of trypan blue is also claimed to be very effective. But no matter what remedy is tried, the more advanced the paralysis the more difficult it is to effect an improvement.

WILD SUNFLOWER—A POISONOUS PLANT.

Wild sunflower is an annual, growing about 3 to 4 feet high. It is commonly seen in clumps of a few dozen to several hundred plants. The flower is bright golden yellow, and the stalks fibrous and woody.

It is common in the Maranoa, Darling Downs, and Lockyer districts. Usually it is not eaten by stock because of its woody nature, and it is apparently only during dry periods, when other food is scarce, that cattle and sheep can be induced to eat it in any quantity.

It has been suspected of causing death in cattle and sheep, particularly in hungry stock which have been driven long distances and then brought on to country on which the plant is growing.

Wild sunflower came under suspicion recently on the Darling Downs, where some milking cows had died after having been turned into a paddock bare of most grasses but in which there were clumps of the plant in a mature state of growth. The characteristic post-mortem change was a distinct pneumonia, with some fluid in the chest cavity. Material was collected and fed to experimental animals, and there was no difficulty in producing the typical post-mortem changes, even when relatively small quantities of the plant had been given.

—C. T. White.

KIKUYU GRASS—A GOOD PASTURE BUT A BAD WEED.

Introduced from East Africa some years ago, Kikuyu grass has gained favour with dairy farmers, although many old-established stands now seem to be declining in productivity.

Kikuyu grass is a perennial which spreads rapidly over and through the ground by means of running stems. Both the surface and underground runners root freely at the nodes, anchoring the plant firmly in the ground and forming a dense turf which stands heavy trampling by stock. The stems carry a large quantity of leaf, and are very succulent. Under good conditions, Kikuyu grass makes a very dense growth, often 2 feet or more in height.

In Queensland the grass has adapted itself fairly well to different districts. It does best under warm, moist conditions, but will withstand a considerable degree of cold and keep green in spite of fairly severe frosts. For this reason, it is very valuable for late autumn and early winter feed. Its drought resistance is fairly good, and some success with the grass is reported from the Burnett and Darling Downs.

Kikuyu grass spreads most quickly and yields most heavily on loose, rich soils; and while it may provide fair grazing on some less fertile soils of a sandy or clayey nature, it is advisable to restrict plantings to rather productive soils, unless in special circumstances—such as when a grass is required for rough places or as a soil-binder to prevent erosion. Kikuyu grass makes a heavy drain on the soil, and periodical ploughing or severe cultivation is necessary to improve the soil conditions.

In Australia, Kikuyu grass sets seed very rarely, and commercial supplies are not available. It is necessary to establish the grass by planting pieces of the runners.

In addition to its value as a pasture grass, Kikuyu grass has some value for bracken control. If planted out in bracken, Kikuyu attracts stock, which trample down the fern while feeding on the grass.

Although a very valuable grass in its place, Kikuyu grass may become a troublesome weed if it is permitted to encroach on ploughed land. For this reason, it should not be planted near areas likely to be required for cultivation. In wet weather portions of the grass are often broken off by grazing animals, and these pieces may be carried on the hooves to other portions of the farm, and become established after trampling in. Patches started in this way on land required for cultivation should be dug out immediately.

—C. W. Winders.

RICE BY-PRODUCTS.

Rice grain is grown primarily for human consumption, but before it is used for this purpose it is subjected to various methods of preparation, which leave as by-products certain materials—polish, meal, bran, pollard, and hulls.

Rice Hulls.—These are the tough, flinty husks removed from the grain by threshing, and used for packing. They have practically no feeding value for stock; they contain a large proportion of silica, and may—because of the irritation they can set up—cause digestive troubles.

Rice Meal.—This should consist of the whole kernel ground after the removal of the hulls, and should include the starchy endosperm, germ, and bran coats.

Rice Bran.—This is the outer coat of the grain after the hulls have been removed; this portion usually contains most of the germ which is very liable to go rancid in storage.

Rice Pollard (Meal).—This designation is used to indicate a fraction composed of the polish, portion of the germ, part of the bran, and some starch; it really consists of the best part of the rice grain. It is sometimes refered to as "Rice Meal"; "meal," however, implies that the material is the "whole grain, ground." This substance contains only the layer between the starchy centre and bran, including a little of each of these.

Rice Polish.—This is that portion removed—after the removal of the bran—in order to produce the fine, smooth, even grain of commerce which pleases the eye; it is liable to go rancid during long storage.

Polished Rice.—The removal of the above-mentioned fractions leaves finally the starchy grain supplied by the grocer. All that is removed—consisting of the germ, protein layers, mineral matter, vitamins, and some starch—is fed to farm animals; "truly, man is wise to feed his animals so well!"

Analyses:—

	Crude Protein. Per cent.	Crude Fat. Per cent.	Crude Fibre. Per cent.	Ash. Per cent.
Rice hulls	2·0	0·5	34·40	20·0
True rice meal	8·0	2·0	8·0	..
Rice bran	11·0	10·0	13·20	14·0
Rice pollard	12·0	14·0	8·0	9·0
Rice polish	12·0	10·0	3·0	6·0
Polished rice	7·0	0·4	0·4	..

—*F. B. Coleman.*

Extension Trellis for Passion Fruit Vines.

J. McG. WILLS, Fruit Branch.

THE usual practice among passion-fruit growers is to cut back vigorous lateral growth which trails on the ground to within about 6 inches of the soil surface, the reason being that fruit lying on the ground becomes badly scarred and of little value except as low-grade or factory fruit. This shortening of laterals removes a considerable amount of growth capable of carrying a large quantity of fruit. A temporary extension trellis making it possible to increase the length of laterals—the fruit-growing growth of the vines—without hampering cultural, spraying, or harvesting work is, therefore, advisable, so that growers may get the maximum yield of high-grade, unblemished fruit at a minimum cost.

The accompanying diagram illustrates a simple and cheap way of attaching an extension set of wires to existing trellises. This extension system makes possible increased lateral growth for an extra 2 feet on each side of the vine, or giving a net gain of 4 feet over the whole lateral growth of the vine. In addition, the extra shade provided by the extension gives greater protection from the direct rays of the sun for the main stem of the vine; this is very noticeable where trellises are 6 feet or more above the ground. Moreover, a greater area of ground is shaded during hot weather, and this helps to keep the surface soil at a moderate temperature, reduces the loss of moisture through evaporation, and makes weed control easier, thus reducing chipping costs and allowing more time for spraying and other jobs. After the fruit has been picked, and, if seasonal conditions are suitable, the bearing laterals should be pruned right back. The extension trellis can then be lowered out of the way beside the trellis posts, thus allowing for full use of the space between the rows of vines for the planting of small crops or the planting of green cover crops.

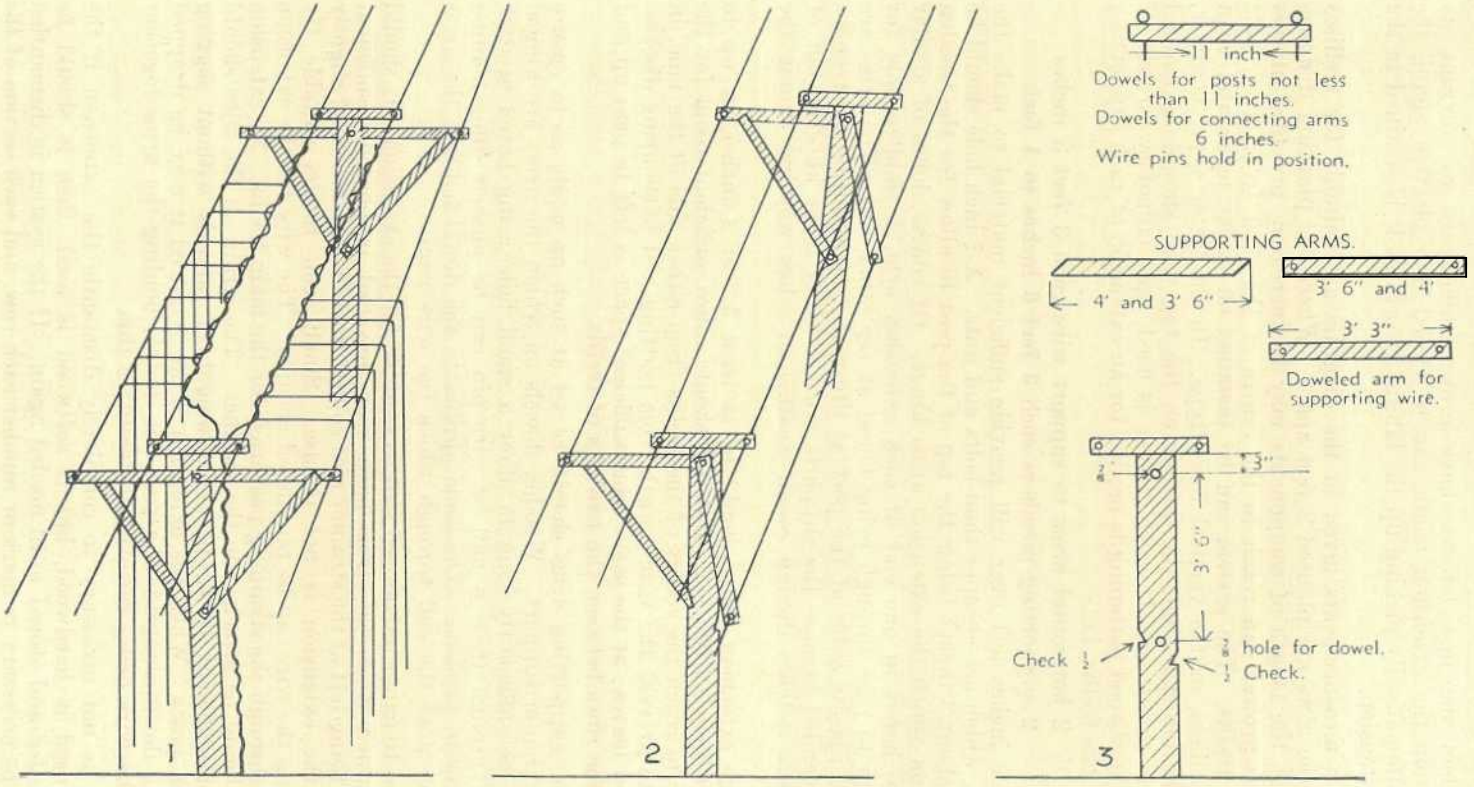


Plate 52.
Diagram showing how the Extension Trellis is attached to the Main Trellis.

When the new laterals have grown sufficiently to warrant its re-erection the extension trellis can be raised into position again, the wire automatically picking up the lateral growth as it is strained to the proper tension.

The measurements given in the diagram are suitable for trellises where the rows are planted 8 feet apart. Where the planting distance is wider, the length of components may be increased, provided always that the grower can reach to the centre of the vine from either side of the trellis. The system can be installed on either horizontal twin wire trellises, or the vertical fence type. In the latter type, however, only the laterals from the leaders on the top wire should be trained over the extension. If sawn timber is used, approximately 15 feet of 2 by 1 hardwood battening is needed for an extension at each supporting post in the trellis, i.e.,—

2 horizontal arms to support wire each 3 feet 3 inches
2 supporting members each 3 feet 6 inches to 4 feet.

The few inches left over will provide sufficient material to make the dowels, which are cheaper than bolts and nuts. A ⅜-inch hole should be bored about 3 inches below the top of the post to allow for the wooden dowel on which the extension arms hinge. Of course, holes of similar size are bored in one end of each extension arm, a smaller hole for the wire to pass through being bored at the other end. The arms are set on opposite sides of the post as illustrated. Dowelling is strongly recommended because the supports are not likely to be knocked out of the check notches during rough weather or when working among the vines.

The extension arms should be at least 3 feet 3 inches, or up to 3 feet 6 inches if desired, and this should allow sufficient room for the grower to reach the centre of the trellis from either side of the vine, in order to prevent the vine growth from matting and harbouring disease-infected leaves; at the same time, sufficient space is left to pass up and down the rows between the two sets of trellis.

The supporting arms should be set at such an angle as to ensure the maximum support. Wooden dowels on which the arms are hinged should be sufficiently long to allow a small hole being bored at each end. Through these a nail or wire pin can be pushed, thus holding the arms in position. The same applies to the dowel holding the arms together near the end through which the wire runs.

No. 10 gauge galvanised wire is suitable for the extension. It should be strained when the arms have been dowelled in position, sufficient length being left at the strainer post so that it can be slackened off slightly when the extension is not in use. Small iron rollers suitable for straining the wire can be purchased cheaply. The wire for the extension is run through the straining post used for the main trellis. No extension arms should be attached to the strainer. The strain on the wire should be just sufficient to support the weight of laterals without sagging between posts. When the extension is not required it may be dropped to hang down alongside the post, the dowels holding the arms together near the wire being removed to facilitate this.

It is not necessary to completely dismantle the extension if the wood used is hardwood, but if softwood is used, then it should be dismantled and stored until needed again. If the system is dismantled it will be necessary to mark or number each row, and each section of the extension; the posts also from which it is removed should have identification marks so that when required again each member can be re-erected in its original position.

MARKING TREES IN THE ORCHARD.

Because it is found impracticable to apply corrective methods immediately to drone fruit trees, or to trees known to require some specialised treatment for disease at some more opportune time, it is wise not to leave future identification of the tree to guesswork. The simplest way of marking such trees is by tying a narrow strip of cloth —preferably white—to a conspicuous limb.

In the case of individual trees giving light annual crops, pruning may be at fault. It is possible, too, that an individual tree may be a host of some serious pest that has not yet established itself throughout the orchard. The white rag indicator will serve as a reminder at a time later on when the necessary control can be conveniently applied. By marking the tree the observant orchardist also will be able to note from time to time the efficiency of the control applied.

Unsuitable varieties and poor fruit types observed during harvesting and marked are not likely to be overlooked when reworking is being done in the proper season if they can be easily identified.

—A. M. Richardson.

GLADIOLUS THRIPS.

The gladiolus thrips is frequently active in southern districts, and in some gardens and nurseries the blooms may be of little value.

The insect is a typical fringe-winged thrips about one-fifteenth of an inch in length and dark-brown, sometimes almost black, in colour. Normally both the adults and the small yellowish larvæ are confined to the more sheltered parts of the flower spike or the growing point, and the bulk of the injury is produced before the leaf or flower spike is unfurled. Colonies of larvæ may often be found in the small spaces between the closely-folded leaves of the plant and in the, as yet, unopened flower buds. The distinctive injury, consequently, often follows feeding on these younger parts of the plant prior to their emergence. Typical symptoms are an uneven silvering on the surface of the leaves, malformations in and discolorations of the flower spike, and a general bedraggled appearance of the plant. Though the damage to the plant is obvious, a secondary effect is lack of vigour in the corms which is frequently not appreciated. Any setback to the plant has an adverse effect on corms taken from it, and thrips injury is no exception to the rule. Control measures are, therefore, necessary.

As with most species of thrips, reproduction is very rapid, and populations may build up quickly to injurious levels. Continuous attention is, therefore, necessary, for it is much easier to retain control if treatment is applied before the plants are more or less "alive" with the insects. Similarly, corm protection is desirable to ensure freedom from infestation when planted out in the field. The essentials in control are, therefore, three:—

(*a*) Corms should be fumigated in paper bags at the rate of 1 oz. naphthalene per 100 corms for a period of one week before being stored during the off-season. A second treatment should be given just prior to planting out in the following season. If corrosive sublimate (1–1,000 for one hour) treatment is given before planting out, the second fumigation may be omitted.

(*b*) When planted out, suitable sprays should be applied as soon as the thrips appear, and at weekly intervals thereafter. If an outbreak was experienced in the previous season it is better not to wait for the appearance of the thrips but to apply an initial treatment when the plants are about 6 inches high. The most efficient spray contains Paris green 1 oz., brown sugar 2 lb., and water 3 gallons. A mist spray is desirable, and it is important to agitate the contents of the pump frequently to ensure an even discharge of the toxic ingredient, Paris green. The cost of this spray is not excessive, but it has the disadvantage of occasionally burning the leaves. A more expensive spray, suitable, perhaps, for garden purposes, is said to be equally effective and at the same time less harmful to the plants. It contains tartar emetic 2 oz., brown sugar ½ lb., and water 3 gallons.

The derris wet sprays provide a further alternative method of dealing with the thrips. Although they are somewhat less efficient than the foregoing sprays, they are very convenient to apply. Derris sprays should be mixed to the normal strength as recommended by the manufacturers, and applied to the plants weekly.

(*c*) Where possible, plantings should be arranged to allow a break of some months between seasonal operations, volunteer growth being suppressed throughout. In the absence of field hosts, the pest population will thus be at a minimum when corms are planted.

—*J. Harold Smith.*

BAGGING BANANA BUNCHES ON THE PLANTATION.

The benefits derived from bagging the bunches are not realised by the majority of banana-growers. Observations during the last five years have indicated that very definite beneficial results can be obtained by the bagging of the bunches during the whole year.

In the first place, it is necessary to point out that there is a distinct difference between the results obtained by bagging and those obtained by "cloaking," or wrapping a bag partly round the bunch. It is quite obvious that a bunch completely enveloped in a bag has more protection than one which is only partially covered; hence the improved results.

The only disadvantages of bagging are:—

1. The cost of the bags and the time required for slipping them on the bunches.

2. The extra time required when cutting the fruit, as opening the bag takes a little longer. This latter, however, can in time be practically eliminated, as growers with a little practice can estimate quite accurately whether the fruit is full or otherwise by feeling through the bag.

On the other hand, the advantages of the system are as follows:—

1. The production of fruit superior in length and circumference.

2. Uniform development, colour, and flavour of all the fruit on the bunch.

3. Greater protection of the fruit during transport to the packing shed.

4. Control of the banana thrips when used in conjunction with dusting as recommended for that insect.

5. The prevention to a very great extent of loss from sun-scorching, splitting of fruit, ravages of caterpillars and spotting bugs, undue exposure, and the spotting of fruit which occurs periodically, chiefly in low and damp situations.

6. Growers are enabled to maintain a better control of leaf spot, as all old and useless leaves can be cut off to assist in such control, there being no danger of the bunch being ruined by exposure to sun and cold. It has been observed during the last five seasons on several plantations where leaf spot has been severe and where bagging has been carried out that in the case of plants (carrying good bunches) which had been totally defoliated, when these bunches were examined the fruit was of a beautiful green colour, practically without blemish, and consisting of fully 95 per cent. of marketable fruit; whereas without bagging this fruit would have been from 75 to 100 per cent. definite loss.

—P. Mitchell and E. L. Miles.

SELECTING THE DEEP SUCKER IN BANANA CULTURE.

As the result of the favourable seasonal conditions, banana plantations are now making a flush of suckers. On the selection of the best sucker on each plant will depend the success of the following crop and the future life of the plantation.

The corm of a banana plant produces at least two rings of buds which at growing periods burst into growth. Of these, the top circle is about 2 inches from soil level and the lower circle is usually 2 or 3 inches below the top circle. Suckers from any of these buds do not send forth the correct follower.

At the base of the corm a bud is produced which bursts into growth at a particular stage in the life of the parent plant. From plantation trials extending over several years it has been found that the parent plant sends out the correct follower sucker when it has made three-quarters of its growth.

The maturity of a banana plant is governed, not by the time it is in the soil, but by the nature of the conditions during its growth. The deep follower produced at the right stage by the parent plant has more vitality, and its roots are deeper, and it retains its sword leaves longer. The shallow follower, on the contrary, develops its mature foliage early, and the corm rises above soil level, thereby preventing the effective functioning of its higher roots.

The careful digging-out of a three-quarter mature plant will reveal the habit of sucker formation, both shallow and deep. If suckers are planted with the side of severance downhill, the general experience is that the correct follower will invariably appear just where it is wanted —i.e., uphill.

—J. H. Mitchell.

The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

IN December apples reached the highest level for some years, up to 18s. per case being realised. Pineapples, after a period of alarmingly low prices, were selling at high rates, prices in the Southern States being much higher than for some time. A pleasing experience of the pineapple trade is the great improvement in packing shown in Magnetic Island consignments. Practically all consignments are arriving in good sound condition. Stone fruits are now in full supply, but are generally smaller in size than usual. New season apples are now on sale. Growers are warned against marketing small immature fruit, as its sale will not be permitted. Bananas are maintaining prices at moderate rates. Prices prevailing immediately prior to the holidays were:—

Bananas.

Brisbane.—Cavendish: Sixes, 4s. to 7s. 6d.; sevens, 4s. 6d. to 8s.; eights, 5s. to 10s.; nines, 6s. to 11s.

Sydney.—Cavendish: Sixes, 10s. to 14s.; sevens, 13s. to 16s.; eights and nines, 16s. to 18s.

Melbourne.—Cavendish: Sixes, 7s. to 11s.; sevens, 10s. to 12s.; eights, 11s. to 13s.; nines, 12s. to 14s.

Adelaide.—Cavendish: 17s. to 18s., all sizes.

Brisbane.—Lady's Finger, 2d. to 9d. per dozen.

Pineapples.

Brisbane.—Smooths, 6s. to 14s. per case; 2s. to 7s. per dozen; Roughs and Ripley's, 9s. to 13s.; few Northern higher.

Sydney.—Smooths, 10s. to 16s.; Bowen, 12s. to 18s.

Melbourne.—16s. to 20s.; choice Bowen to 22s.

Adelaide.—16s. to 18s. per tropical case.

Papaws.

Brisbane.—Yarwun, 6s. to 9s. tropical case; Gunalda, 4s. to 5s. bushel case; Locals, 2s. to 4s. bushel case.

Sydney.—3s. to 12s. tropical case.

Melbourne.—8s. to 12s. tropical case.

Some very poor quality fruit has been seen on this market. Only best quality fruit is wanted for the development of this market.

Mangoes.

Brisbane.—Fibreless varieties, 10s. to 14s. per bushel; Commons, 4s. to 7s. 6d.

Sydney.—Choice varieties, 16s. to 18s. per bushel; common varieties, 4s. to 7s. per bushel.

Melbourne.—Best varieties, 12s. to 15s. per bushel; common types unsaleable.

CITRUS FRUITS.

Oranges.

Brisbane.—N.S.W. Valencias, 9s. to 13s. per bushel.

Lemons.

Brisbane.—Locals, 6s. to 10s.; Gayndah, 8s. to 16s.; Victorian, 10s. to 16s.

STONE FRUITS.

Peaches.

Brisbane.—Locals, 6d. to 1s. per tray; Stanthorpe, 3s. to 4s. per bushel; Specials, 5s. to 7s. 6d. half-bushel.

Nectarines.

Brisbane.—5s. to 7s. half-bushel.

Plums.

Brisbane.—Stanthorpe Wilson's, 2s. 6d. to 6s. half-bushel; Shiro, 2s. to 4s.; others to 4s.

Cherries.

Brisbane.—4s. to 6s. per 12-lb. box.

Apricots.

Brisbane.—N.S.W., 6s. to 11s. half-bushel; Stanthorpe, 2s. to 8s.; small fruit hard of sale.

Passion Fruit.

Brisbane.—4s. to 6s. half-bushel; second grades lower.

Sydney.—6s. to 10s. half-bushel.

Melbourne.—4s. to 7s. 6d. half-bushel.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Crofton, 13s. to 17s.; Democrat, 13s. to 17s.; Yates, 10s. to 17s.; N.S.W. Granny Smith, 12s. to 16s.

Many lines of apples would have returned better prices if placed upon the market a month or so earlier.

Good quality early cookers from Stanthorpe, 9s. to 11s.; small fruit unsaleable.

Pears.

Brisbane.—Josephine, 12s. to 14s.; Winter Cole, 12s. to 17s.

Grapes.

Brisbane.—Local Whites, 4d. to 6d.; Blacks, 5d. to 8d.

Tomatoes.

Brisbane.—Local Ripe, 2s. to 6s.; Coloured, 4s. to 9s.; Green, 2s. to 8s.

MISCELLANEOUS (BRISBANE).

Cabbages.—6d. to 3s. per dozen; *Stanthorpe* to 8s. bag.

Beans.—5s. to 7s. sugar bag.

Peas.—6s. to 7s. 6d. sugar bag.

Sweet Potatoes.—2s. to 3s. bag.

Lettuce.—1s. to 3s. per dozen.

Pumpkins.—3s. to 5s. per bag; *Melbourne*—£7-£9 per ton; *Sydney*—7s. to 9s. bag.

Beetroot.—2d. to 8d. bundle.

Cucumbers.—5s. to 9s. bushel case; 6d. to 2s. dozen.

Marrows.—1s. to 3s. dozen.

Chokos.—6d. to 9d. dozen.

PUBLICATIONS.

A leaflet on marketing cherries is now available free on application to the Department of Agriculture and Stock.

Thinning and Spacing of Cotton.

THERE is a decided tendency amongst many growers in Queensland to refrain from thinning their cotton crop. This has been brought about in an attempt to reduce cost of production; particularly is this true of growers with large acreages. Experiments carried out by the Department of Agriculture and Stock in conjunction with co-operative farmers have definitely proved, however, that thinning cotton is necessary under most conditions.

Unthinned plants always tend to be more sensitive to climatic conditions. In wet seasons, particularly if on soils of a fertile nature containing a high nitrate content, unthinned plants generally grow tall and spindly, which results in the loss of a bottom crop through the suppression of the lower fruiting branches. Under such circumstances the crop of bolls usually forms late and is thus subjected to the sucking insects that occur generally in greater numbers during the latter part of the season. The lint produced under such conditions is frequently of a wasty, weak nature, containing a high proportion of stains and yellow spots. In dry seasons when plants are left unthinned, the competition for moisture and plant food soon becomes acute, causing the loss by shedding of the middle and top crops of flower buds, small bolls, and finally restricts the development of the remaining bolls, which frequently open prematurely. Such restriction of boll development generally lowers the quality of the cotton contained therein, the fibres usually being short, weak, and of a wasty type.

The fact that soils and climatic conditions and the habit of growth of the variety exercise a determining influence on what is the best spacing, makes it advisable for each grower to carry out spacing tests over a series of years, to ascertain the most suitable spacing for his conditions.

Definite results have been obtained, however, that indicate spacings of 20 to 24 inches are necessary for normal plantings on the harder, less-fertile clay loams and loams of the forest slopes, particularly in the

drier districts where the drought resistant, more vigorous varieties, such as Lone Star and Mebane, are required. In cases where late planting is effected, spacing around 18 inches may be advisable as fewer bolls per plant are likely to develop in late-planted crops, and the extra number of plants per acre may make up the deficiency.

The results that have been obtained on the alluvials where varieties such as Indio Acala, Miller, New Boykin, and Half and Half are grown, have been more variable, but the general indications have been that from 12 to 15 inches spacing when the plants are from 5 to 8 inches tall, can be relied upon to yield well over a series of years, and the quality of the fibres will not be seriously affected by the ordinary adverse climatic conditions likely to be experienced.

The results of time of thinning experiments indicate clearly that it is best to thin when the plants are from 5 to 8 inches high, as this prevents the plants from growing tall and spindly and reduces competition for moisture and plant food. If the field has been cultivated and cross-harrowed to eliminate early weed growth, the thinning operations can be performed easily and rapidly when the plants are at this stage.

In thinning, or "chopping" as this operation is frequently called, it is necessary to have the hoe sharp, a light goose-neck type being the most suitable, with the length of the handle adjusted to suit the operator. The plants should be chopped just below the surface of the ground to prevent their regrowth. Where this method is used, the same stroke removes any young weed or grass growth in the row, thus resulting in a greater efficiency being obtained that allows of a larger acreage being thinned per day per man with a lowering cost of production.

After the thinning operation is completed, a thorough cultivation should be given as soon as possible to re-establish the mulch between the rows and around the plants. Generally not more than three or four cultivations should be required after the one immediately following thinning, if cotton is grown in rotation with Rhodes grass, but more may be necessary in old cultivations. At each of these operations it is recommended that the soil be worked towards the plants, as this not only helps to control weed and grass growth, but establishes a brace around the plants which assists in preventing them from being blown over during severe storms when the soil is wet.

—R. W. Peters.

CULTIVATING YOUNG COTTON.

Suitable planting rains have occurred in most of the cotton districts; so weeds are likely to become troublesome over extensive areas, particularly where cotton is being grown on old cultivations.

If showery conditions are experienced when the plants are young, the most economical way to prevent grass and weed growth and to re-establish the surface mulch is to harrow across the rows with a spike-tooth harrow, with the teeth set at a slightly backward angle so that they will not penetrate too deeply. This method will not only cheapen the cost of cultivation by lessening the amount of hard chipping,

but will tend to thin out the sand somewhat; which will be beneficial if a 15 to 20 lb. rate of sowing has been applied. This method is not suitable if the land contains trash on the surface.

As soon as the rows are well defined, a thorough cultivation should be given as close to the rows as possible without covering the seedlings with soil. For this purpose the wiggle-tail type of machine, where the steering is controlled by the driver rather than the horse, does very good work, particularly if the soil fenders are used, as cultivating to within a few inches of the plants can be accomplished without too much soil being moved against them.

In most seasons, this cultivation should establish a good mulch and check the early weed or grass growth sufficiently to enable the cotton seedlings to become well established.

In many seasons it will not be necessary to cultivate more than once after the seedlings appear before the plants are ready for thinning. In a wet season, however, such showery conditions are usually experienced that on old cultivations summer grass and pigweed seedlings become established around the plants to such an extent that cross-harrowing will not remove them. Where this occurs, it is advisable, before thinning, to use disc cultivators, with the discs set to throw the soil from the plants, to a depth of 3 inches. This operation will cut away the grass and weed growth and leave only a narrow strip of plants, weeds, and grass. With the crop "barred off" in this manner, one stroke of the hoe will generally remove the remaining grass and weed growth, as well as any cotton plants required to be chopped out. As soon as the thinning is completed, the field should be cultivated with a tine-equipped machine with the inner tines set to throw the soil around the plants, thus establishing a good mulch to reduce evaporation and brace the plants.

In some instances in past seasons, after the cotton has been thinned, growers have experienced difficulty in maintaining clean cultivation on old cropping areas during prolonged showery periods. Under such conditions, summer grass grows so rapidly as to soon become too well established for eradication by ordinary methods of cultivation. Growers who have been faced with this difficulty have found that satisfactory control of the grass can be obtained with the walking mouldboard plough. The method most used is to plough away from the cotton plants, running the plough as closely as possible to them, and set shallow so as not to cut the lateral roots excessively. The return trip is made in the same centre, cutting away from the adjacent row. The completed round not only cuts away the grass and weeds from the cotton, but also throws soil over the growth between the two rows, thus tending to smother it sufficiently to allow of satisfactory growth of the cotton plants.

A week later the process is reversed, the ploughing throwing the soil back to the cotton plants to prevent excessive drying-out around them, and also smothering weed growth between the plants and killing the growth remaining in the centre which was not ploughed at the first operation.

—R. W. Peters.

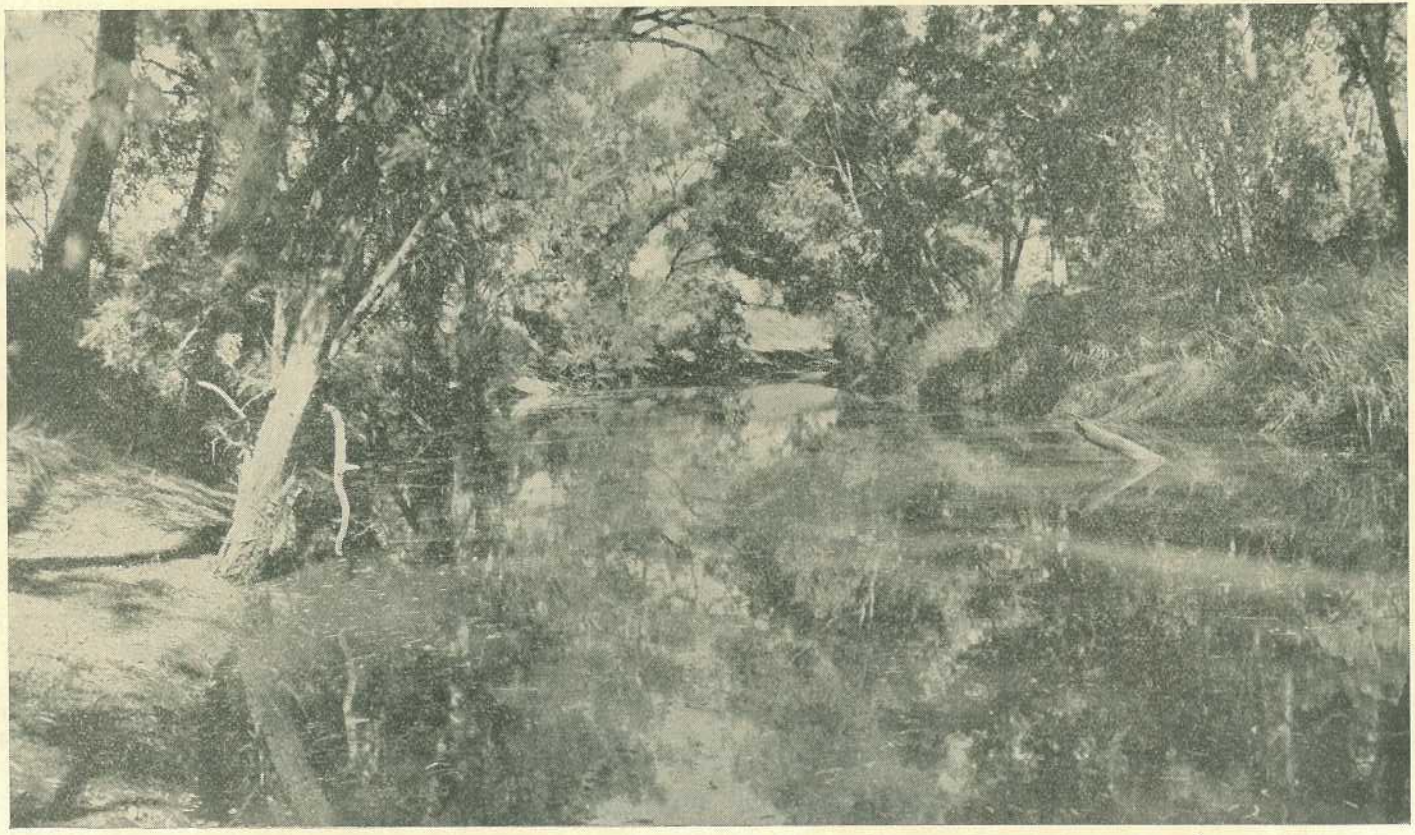


Plate 53.
A Bend in the Barcoo River, near Barcaldine, Central-Western Queensland.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and Jersey Cattle Society, production charts for which were compiled during the month of November, 1938 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Burradale Lovely 9th	W. F. Kajewski, Glenroy, Glencoe	7,806·40	326·941	Empress Kitchener of Burradale
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Sunlit Farm Rose	W. H. Sanderson, Mulgeldie	8,756·3	347·703	Kalinga Vesta's Prince
Glenroy Millie	W. F. Kajewski, Glenroy, Glencoe	8,360·05	335·131	Park View Glider
Rhodesview Kitty 11th	W. Gierke and Sons, Helidon	8,390·64	323·608	Rhodesview Red Knight
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Rhodesview Kitty 13th	W. Gierke and Sons, Helidon	8,402·86	310·164	Blacklands Prospector
Rhodesview Biddy 14th	W. Gierke and Sons, Helidon	7,771·42	272·965	Blacklands Prospector
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Valera Sheila 3rd (254 days)	M. C. and A. M. Sullivan, Pittsworth	7,516·97	306·544	Rosenthal Lord Bine
Glenroy Emerald 3rd	W. F. Kajewski, Glenroy, Glencoe,	8,175·0	303·802	Park View Glider
Valera Tiny 2nd	M. C. and A. M. Sullivan, Pittsworth	6,940·49	272·665	Daphne's Boy of Blacklands
Penrhos Buttercup 3rd	C. H. Wethered, Canning Downs South	6,093·05	253·552	Rosenthal Pendant's Prince
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Applegarth Rosaline	W. H. Sanderson, Mulgeldie	6,799·1	283·609	Greyleigh Crowner
Newhaven Isabel	E. O. Jeynes, Raceview	6,856·97	279·774	Fairy Bower Brilliant

JERSEY.

SENIOR, 4 YEARS (STANDARD 330 LB.).				
Pretty Maid X. of Grassmere	G. Schroder, Warra	7,972·33	363·131	Grassmere Duke
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Carnation Sweet Jess	H. G. McKnight, Gowrie Junction	6,577·0	348·775	Carnation Lucy's Ginger
Romsey Queen Rose	J. Wilton, Raceview	5,708·51	341·797	Retford May's Victor
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Glenview Cherub	F. P. Fowler and Son, Glenview, Coalstoun Lakes	6,285·4	361·487	Trinity Governor's Hope
Lermont Cowslip	J. Schull, Oakey	5,539·9	275·357	Woodside Golden Volunteer
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Westbrook Sylvia 2nd	The Farm Home for Boys, Westbrook	6,333·4	344·157	Oxford Golden Dreamer
Glenmoore Spotted Pansy	L. J. Comiskey, Warra	5,915·43	310·85	Diamond King of Glenmoore
JUNIOR 2 YEARS (STANDARD 230 LB.).				
Westbrook Lucy 2nd	The Farm Home for Boys, Westbrook	5,951·95	327·946	Oxford Gem's Ambassador
Westbrook Safety 14th	The Farm Home for Boys, Westbrook	6,440·5	322·243	Oxford Gem's Ambassador
Grange Vale Bonita	T. Gillespie, Ravenshoe	5,448·35	317·907	Banyule Supremacy
Grange Vale Glory	T. Gillespie, Ravenshoe	4,336·5	265·565	Banyule Supremacy

General Notes

Staff Changes and Appointments.

Mr. C. B. Buxton, Police Magistrate, Innisfail, has been appointed also chairman of the Goondi, Mourilyan, South Johnstone, and Tully Local Sugar Cane Prices Boards, and an agent of the Central Sugar Cane Prices Board for the purpose of making inquiries under section 5 (2A) of the Regulation of Sugar Cane Prices Acts in regard to sales and leases of assigned lands, in the place of Mr. R. H. Allen, transferred.

Constable J. A. Reimer, Miles, has been appointed also an inspector under the Brands Acts.

Mr. R. H. Nissen, manager of Warrinilla Station, Rolleston, has been appointed an acting inspector of stock.

Messrs. D. C. Redmond, H. L. Pysden, and C. Schindler (Warwick), C. G. Martin (Green Island, via Cairns), A. W. Kirke (Lake Eacham, Yungaburra), and H. L. Lipke (Imbil) has been appointed honorary protectors under the Fauna Protection Act, and honorary rangers under the Native Plants Protection Act.

Mr. F. Caine, Inspector of Stock, has been appointed District Inspector of Stock, Department of Agriculture and Stock.

Constable M. P. O'Shea, Emu Park, has been appointed also an inspector under the Slaughtering Act.

Mr. H. E. Ball, Yeppoon road, via Rockhampton, has been appointed an honorary protector under the Fauna Protection Act.

Stanthorpe Fruit and Vegetable Levy.

The Stanthorpe Fruit and Vegetable General Levy Regulation in force under the Fruit Marketing Organisation Acts has been extended for a period of two years as from the 23rd December, 1938. The Regulation, which came into operation in its present form in 1936, has been extended previously for twelve monthly periods.

State Wheat Board.

Executive approval has been given under "*The Wheat Pool Acts, 1920 to 1930,*" to the appointment of Mr. W. A. Dean (Warwick) as chairman of the State Wheat Board for the period from 24th October, 1938, to 31st August, 1941. In addition, Messrs. J. G. Tod (Goomburra), A. C. V. Bligh (Condamine Plains), W. J. Brimblecombe (Pirrinuan), T. W. McIntyre (Yarranlea), and R. Wilson (Acting Director of Marketing) have been appointed to the Wheat Board for the abovementioned period.

Pig Importation Restriction.

An Order in Council has been issued under the Diseases in Stock Acts prohibiting the introduction into Queensland of any infected or suspected swine from New South Wales and Victoria unless such swine are accompanied by a declaration by or on behalf of the owner, and a certificate of health signed by a Government veterinary surgeon or inspector of stock that they are free from disease and have not been in contact with pigs suffering from swine dysentery.

Contagious Bovine and Porcine Abortion.

An Order in Council has been issued under the Diseases in Stock Acts, declaring contagious bovine abortion and contagious porcine abortion to be diseases under and for the purposes of the abovementined Acts. A regulation, also approved to-day, provides that the owner or person in charge of any cow or sow which has aborted shall notify the nearest inspector thereof, and shall insolate such animal.

Butter and Cheese Boards.

Orders in Council have been issued under the Primary Producers' Organisation and Marketing Acts extending the operations of the Butter and Cheese Boards, respectively, for the period from 1st January, 1939, to 31st December, 1941.

Milk Supply Act.

By proclamation, "*The Milk Supply Act of 1938*" came into force on 12th December, 1938.

Egg Board.

The election of five growers' representatives on the Queensland Egg Board resulted as follows:—

District No. 1.

	Votes.
A. C. M. Smith, Gooroolba	69
R. B. Corbett, Woombye	66

District No. 2.

F. S. Morrison, Kenmore, *via* Indooroopilly	107
M. H. Campbell, Albany Creek	77

District No. 3.

T. Hallick, Wynnum	159
C. Hodges, Kuraby	119

District No. 4.

J. De Vris, Rosewood	Unopposed.

District No. 5.

	Votes.
O. A. W. Evans, Warwick	63
W. T. Hughes, Toowoomba	51

An Order in Council has been approved under the Primary Producers' Organisation and Marketing Acts, which extends the operations of the Queensland Egg Board for the period from 1st January, 1939, to 31st December, 1944.

Dairy Products Stabilisation Board.

An Order in Council has been issued under "*The Dairy Products Stabilisation Acts, 1933 to 1936,*" providing that the Dairy Products Stabilisation Board shall continue in office for a further month—that is, until the 31st January, 1939. The present Board was constituted for the period from 1st May, 1936, to 31st December, 1938.

Rural Development Board.

"*The Rural Development Transfer and Co-ordination of Powers Act of* 1938" came into operation on the 22nd December, 1938.

An Order in Council has been issued under the Act constituting the Rural Development Board, and appointing Messrs. Robert Wilson (Representative of Department of Agriculture and Stock), E. A. Crosser (Representative of Treasury Department), and J. L. Callaghan (Representative of the Land Administration Board) to be the members thereof as from the 1st January, 1939. Messrs. Wilson and Callaghan have been appointed Chairman and Deputy Chairman, respectively, of the Board.

Papaw Levy.

The Papaw Levy Regulation which has been in force under the Fruit Marketing Organisation Acts for a number of years has been repealed, and a new Regulation empowering the Committee of Direction to make a levy on papaws for a period of one year from the 10th December, 1938, has been issued in lieu thereof.

The levy now to be enforced, in addition to being used for defraying the expenses of advertising in the interests of the papaw-growing industry, will also be a contribution by the Committee of Direction towards the salary of a papaw research officer employed by the Department of Agriculture and Stock.

The amount of the levy shall be, on papaws sold or delivered, whether by rail, road, or boat, to factories, at the rate of 3s. 4d. per ton; on papaws sold or delivered by rail to persons or firms other than factories, at the rate of 1s. 8d. per ton, and on papaws sold or delivered otherwise at the rate of 1d. for every two cases, or part thereof. The levy on all papaws railed from any Queensland railway station (other than Toowoomba, Central, Roma Street, Brunswick Street, Woolloongabba, and South Brisbane) to any other Queensland railway station may be collected by the Commissioner for Railways to the extent of 1s. 8d. per ton, inclusive of cases, with a minimum of 1d.

Wild Life Preservation.

An Order in Council has been issued under the Fauna Protection Act declaring properties in the parishes of O'Connell, Rodd's Bay, and Polmaily, in the Shire of Miriam Vale, to be a sanctuary under the abovementioned Act.

Answers to Correspondents

Shade Trees in the North-West.

J.J.O'S. (Bookin, G.N.R.)—

1. Weeping Fig, *Ficus Benjamina.*—You asked especially about this. They make very handsome trees, and we think would be all right, provided you could give them protection from the winter frosts in their early stages. We would advise you to get large plants of these in petrol tins or similar receptacles from the Botanic Gardens, Townsville.
2. Queensland Nut, *Macadamia ternifolia.*—We think this would do quite well in your district. Plants are obtainable through the ordinary commercial channels, or if you want particular varieties you could get them from Mr. W. R. Petrie, Petrie, North Coast Line, a nurseryman who makes a speciality of these and other nut-bearing plants.
3. Bottle Tree—narrow-leaved variety, *Sterculia rupestris;* broad-leaved variety, *Sterculia trichosiphon.*—Both these should do quite well in your locality. The former is the better of the two in your district. If not obtainable through the ordinary commercial channels you may probably get some plants through the Brisbane City Council, either from the Botanic Gardens nursery or the Department of Parks and Gardens. The usual charge is 2s. a plant.
4. Currajong, *Sterculia diversifolia.*—Obtainable from commercial nurseries.
5. Acacia, *Albizzia Lebbek.*—This is the common acacia of the West, and it does remarkably well, although rather subject to borer attack. You may probably obtain plants from the Botanic Gardens, Townsville, or Rockhampton.
6. *Acacia arabica.*—Makes a beautiful tree in the West. If not obtainable elsewhere we think you could get plants from the Botanic Gardens, Rockhampton, at, probably, about 2s. a plant.
7. Chinese Celtis, *Celtis sinensis.*—This is commonly called Portuguese Elm, and does remarkably well in western localities. It is deciduous, but in the summer makes a beautiful umbrageous head. This applies to the bottle trees. It is raised in the Brisbane Botanic Gardens in fair quantities, and we think the Curator may supply you with plants. At present, we do not think it is generally in trade. It is a tree very strongly recommended.
8. Parkinsonia Tree, *Parkinsonia aculeata.*—You may object to this on account of the thorns and its tendency to run out and become more or less of a pest.
9. White Cedar, *Melia dubia,* does well in the West. Plants are obtainable through most of the ordinary commercial nurseries.
10. Pepper Tree, *Schinus molle.*—Same remarks apply as to White Cedar.
11. *Bauhinia Hookeri,* Native Bauhinia.—We have several native Bauhinias, and this is one of the best. It is a very slow-growing plant, but eventually makes a beautiful tree. We think the Botanic Gardens, Brisbane, or the Brisbane City Council nursery may supply it.
12. Camphor Laurel, *Cinnamomum camphorum.*—We think this is worthy of a trial.
13. Citron Gum, *Eucalyptus citriodora.*—We think it is worth growing; if lopped it makes quit a good head.

Needle Burr.

WIDGEE (Gympie)—

The specimen is needle burr, *Amarantus spinosus,* a weed with a wide distribution in the tropical regions of the world. It is very common in North Queensland and is now and again seen in more Southern parts. We have seen it in the Numinbah Valley, about Brisbane, and about Rosewood, but it does not seem to have spread widely in any of these areas. It has been declared noxious in three Northern shires—Herbert, Eacham, and Hinchinbrook. The plant is not known to possess any poisonous or harmful properties. The young shoots and leaves, like other species of Amarantus, have been used by Asiatics as a substitute for spinach.

Soil-saving Plants.

A.M.McL. (Springsure)—

For planting on black-soil gullies to prevent erosion, the following are some suggestions:—

Cynodon plectostachyum, related to the common couch grass. It has been introduced by the Department of Agriculture and Stock.

Digitaria eriantha, woolly finger grass, worthy of a trial. *Panicum makarikariensis*, this is a rather coarse panicum, probably of not much value as a fodder, but useful for your purpose. The Department imported roots some time ago, and now have it growing well.

Yellow Cockspur.

J.T.S. (Warwick)—

The weed specimen is *Centaurea solstitialis*, variously known as yellow cockspur thistle, yellow star thistle, or St. Barnaby's thistle. In Queensland, it is probably best known as "star thistle," although this local name more correctly belongs to an allied species naturalised in the Southern States, but which, so far, has not made its appearance in Queensland.

The yellow cockspur is a native of Southern Europe, and is now naturalised in many countries. It is a much more abundant weed in the Southern States than in Queensland. It is not known to possess any poisonous or harmful properties, but can become a pest.

Cape Cotton.

G.T. (Waterford)—

The specimen is the Cape cotton or balloon cotton, *Gomphocarpus fruticosus*, a native of South Africa, now a naturalised weed in many countries. It is very abundant at times in parts of Queensland, and can become a very serious pest. It has been accused of poisoning stock, and feeding tests carried out at the Animal Health Station, Yeerongpilly, prove that the plant is definitely poisonous. Generally, however, stock do not normally eat it in sufficient quantities to cause trouble.

It is quite a handsome plant, and on this account is sometimes allowed to remain in gardens. The fluff inside the balloon-like pods is of no value as a cotton, but the inner bark on the stems yields a very strong tough fibre.

Wild Heliotrope.

W.J.G. (Mount Esk Pocket, via Esk)—

The specimen is wild heliotrope or blue-topped heliotrope, *Heliotropium anchusiæfolium*, a native of South America, now a naturalised weed in Queensland and the Southern States. Though a heliotropium, it is most commonly known in Queensland as "wild verbena," and has caused much concern on the Darling Downs, particularly around Warwick. It is not known to possess any harmful or poisonous properties.

Chicory.

J.W.M. (Groomsville, via Pechey)—

Your specimen is chicory, *Cichorium Intybus*. The cultivated form of the chicory possesses a big carrot-like root, which is much used in Europe as an adulterant of coffee. When it runs out and becomes wild, the root becomes comparatively thin and spindly. It is quite naturalised in Australia, and is something of a pest in the Southern States, particularly South Australia. It has been established in Queensland on the Darling Downs for some years, but does not seem to have spread to any great extent. We were interested in your remarks about stock eating it.

Burr Trefoil.

S.C.S. (Mackay)—

The specimen is the burr trefoil, *Medicago denticulata*, a plant very widely spread in Australia and in Queensland, most abundant on the Darling Downs. It is generally regarded as an excellent fodder, particularly for sheep. On the whole, it seems to be preferred when it is drying off somewhat, and not when green and luxurious. It has the advantage that it is one of the few winter-growing legumes which can be said to thrive under Queensland conditions. The only objection to the plant are the burrs, which cling to the belly-wool of sheep.

Rural Topics

Fat Lamb Experiments in Victoria.

Here are some interesting results from fat lamb investigations at the Rutherglen Experiment Farm, in Victoria. There it has been proved practicable to carry from May to November 2¼ large-framed ewes and their lambs to the acre on improved pasture; and sufficient feed remains to carry the ewes and unsold lambs from December to April. In addition, it has been possible, in some seasons, to conserve considerable quantities of pasture hay and silage. Heavier stocking would have resulted in poorer fattening of lambs, less wool per ewe, or the necessity for heavy hand feeding in some seasons, while lighter stocking would have given larger lambs, fewer "reject" or "carry-over" lambs, but a smaller possible output. Victorian weather conditions differ very much from those of Queensland—it must be remembered that substantial winter rainfall is the usual experience down South—still, fat lamb investigations there are naturally interesting to Downs farmers who are either engaged in lamb raising or are thinking about starting in that industry.

Except for short periods, all sheep and lambs were grazed together, the flock moving from paddock to paddock.

The Border Leicester rams produced average lambs of heavier dressed weights than did the Southdowns. The Southdown rams produced a larger percentage of first-quality lambs than the Border Leicesters. The Southdown lambs matured earlier, and were prime at lower weights than the Border Leicester lambs—an important factor where early lambs are more valuable than mid-season lambs of equal weight or in districts where green pasture is short-lived or goes to seed early.

Results from the Dorset Horn cross were inconclusive. They were not better than the Border Leicester crosses in their return as export lambs.

Queensland Farm Horse Standards.

Stallion registration figures for the year show that Queensland's standard of horses has shown a marked rise. Four years ago, when the Government began the system of veterinary examination of stallions and certifying for soundness, the total rejections by the vets. amounted to 25.7 per cent. Last year they fell by more than half—12.8 per cent., to be exact. Every year these examinations have shown a progressive drop in the number of rejections. The natural result of this improvement in our farm and blood horse standards is that buyers are operating with much confidence in the State.

Pasture Research.

According to the *Journal of the Council for Scientific Research* (November, 1938), recent investigations have demonstrated the vital importance of protein in the production of wool fibre, and have shown that protein deficiency of natural grazing lands is an important factor limiting the extension of the wool industry, and so methods of improving pastures from that point of view in sheep country of low rainfall call for thorough investigation. To help along this good work, the Australian Wool Board has made a grant of £2,000 for the present year.

Those Whom the Farmer Feeds.

Speaking at a public gathering at Toowoomba recently, the Government Statistician, Mr. Colin Clark, said that the average Australian farmer or farm worker at the present moment is feeding himself and his dependants and three other workers in Australia and their dependants and about four workers overseas and their dependants. He added: "It is precisely because of the great productivity of the rural producer in Australia that we are able to feed without difficulty the large town population which we have in this country—feed a town population or non-agricultural population who now number 75 per cent. of all the Australian people, and who are by no means able to consume all the food which the remaining 25 per cent. can produce. Taking all our primary produce together, we have to export practically half of our output."

When we come to think that out, the point that comes right home to us is that the more productive farming becomes the larger is the industrial population which it can support. So far as we can look into the future, the same trends are going to continue, but, as Mr. Clark pointed out, the agricultural and pastoral industries are becoming more and more efficient, and as a result they are able to support a larger and larger town population. The town people are, of course, not fed for nothing. They, in turn, produce what the farmer needs while providing the farmer with his home market, which is his best market.

South Australian Experience of Soil Erosion.

The committee appointed by the South Australian Government to investigate soil erosion in that State has presented a valuable report and which has a definite interest for Queensland farmers. The report lays great emphasis on the danger of over-stocking, which is a constant menace in country liable to drift.

If the report does nothing else, it will at least arouse public opinion. Boiled down, its major conclusion is that we must change our ways in the use of land.

"Change the system!" is the easy answer to everything, but it does not follow that to change the system settles anything. It does not make the spendthrift suddenly thrifty, for instance, nor the careless careful. The essential change comes slowly in the experience of men and women. Generally it comes under pinch or under conditions which lead to a pinch. "He is the greatest patriot who stops the most gullies."

Price and Consumption.

The organisation of world supplies to the British market is now so stabilised that it may safely be assumed that the average prices over the last five-year period are not likely to be exceeded. Since price governs consumption, a higher range of values cannot reasonably be expected. Towards the end of 1937 a sharp increase in the price of butter was followed by a marked fall in its consumption. In the United Kingdom the apparent consumption of butter was estimated at a little more than 24 lb. a head, as against 25 lb. in 1936, when prices were lower. On the other hand, margarine consumption rose to nearly 9 lb. a head last year. This factor of price and consumption has to be closely considered, and if profitable results are to be maintained farmers will be more than ever driven back to the issue of cost of production.

Importance of Farm Manure.

For every pound of grain, hay, straw, or other produce taken from the soil there is a certain loss of plant food elements. When the crops are sold from the farm the loss is equal to the total amount of plant food taken up by the crops. When the crops are fed to the livestock on the farm the loss is somewhat smaller, for much of the plant food is returned to the soil in manure. Farm manures are an important and valuable by-product of the farm.—*The New Zealand Farmer.*

Mowing Pastures.

A farm practice that pays big dividends is mowing pastures wherever it is practicable. Where there is any quantity of uneven grass or weeds ungrazed the cows will do a much better job of grazing afterwards and the weeds will be better controlled if the mowing machine is used. The earlier this is done the better, but any time during summer is good.—*The New Zealand Farmer.*

Milking Goats in Germany.

Everyone who has lived in the mining and western pastoral centres in Queensland has an appreciation of the goat and its value in domestic economy. From Germany comes the news that in addition to organising milk production from dairy cows the German Government is encouraging an increase in the number of milking goats. During the war German goat herds increased to 4,600,000 head, but after the war goats were neglected. Last year's efforts brought the number to 2,400,000. German experts are now teaching the people that the annual yield of buttermilk from one goat covers the whole needs of one citizen, and that each additional goat means an advance in the nation's supply of edible fat. Every German working man who has the means of rearing it has been promised a first-class goat to enable him to improve his standard of living.

Cows are Cows.

Some people say that milking should be so done that there would be no need for a strainer. A fine thought that, and we would all like to agree, but cows are cows and dairy workers are dairy workers—all of which means that a strainer is pretty much a necessity in every dairy. Now we all use a strainer to prevent foreign material from getting into the can. Look at the strainer you are now using, and ask: "Is it doing that job?" If you are using a cloth, how about the answer? It may be right if the cloth is boiled after every milking and kept in the sunlight and free from dust. If you are using a fine mesh brass wire strainer, take a tooth pick and dig into the seams. Are there any "wogs" being washed into each can as the milk passes through the strainer? Or is the strainer broken away from its frame? Maybe it is badly dented and thus not easily washed.

A good strainer is easy to clean, has no seams, is fitted with cotton pads that are thrown away after use, and protects the cotton from damage as the milk is poured in.

Science and Farming.

Science with practice is a familiar and commendable motto. Its application is largely negatived, however, if the farmer knows so little of the sciences on which the principles of his practice are based that much of the work he does is hidden from him as to purpose, and he follows disinterestedly along the paths he is advised to be the best. How much or how little, or rather what standard of education does a man to be a successful, intelligent, and progressive farmer require? The subject has been discussed in many moods and tenses. Commissions have explored it and agricultural experts without number have pronounced opinions on it. Many take the view that the teachings of agricultural science require to be translated to the farmer rather than that he should be expected to grasp them through his own understanding. Others hold a contrary opinion, and would have the education of the farming community so thorough and complete as to ensure competence to undertake every phase of farm work.

An advocate of the latter proposition argues that sooner or later some guarantee of efficiency for the productive occupation of land will be demanded from the man who wants to be a farmer. If that ever comes to pass, education in the principles and practice of agriculture as well as in practical field work will determine whether a man will be allowed to farm or not. It sounds fantastic, certainly, but if the idea is studied closely some points will be admitted to commend it.

Half a Million Pounds Lost every Year.

The Australian Veterinary Association estimates that the dairy industry loses £500,000 in round figures every year from tuberculosis.

They point out that tuberculosis is one of the three most serious diseases of Australian cattle, and that it is of importance from both the human health and economic aspects.

We have shown by actual example that bovine tuberculosis can be eradicated from and kept out of herds and areas, and we know of no reason why the system of eradication should not be extended gradually into a continent-wide campaign. It would take some years to do, of course, but what other dairy countries can do we can do—if not go one better. The tuberculin test is the safest means of controlling the disease in cattle and so safeguarding human health and saving that half-million pounds which is definitely an avoidable loss to the dairy industry.

A Good Litter of Pigs.

A litter of Wessex Saddleback pigs bred by Mr. R. Turpin, Kentville, via Lowood, was officially weighed when eight weeks old on the 26th November, and made a total weight of 555½ lb., the thirteen pigs which were reared from the fifteen born averaging 42.7 lb. each.

The litter was from Pensilva Ace 3rd and was sired by Pensilva Vane 2nd. The dam previously produced a recorded litter of twelve pigs weighing 624½ lb. at eight weeks old.

The Concrete Mixture.

Sand that is to be used in concrete work on the farm should pass through a wire screen with one-fourth inch mesh. It should be clean and free from vegetable matter, loam, or excess amounts of clay. Gravel should range in size from one-fourth inch up to 1½ to 2 inches for ordinary concrete work. Water that is satisfactory for drinking is clean enough to use in the concrete mixture. The amount of water used should be proportioned to the cement. In most farm work use 5 gallons water to one sack of cement. If sand is wet, reduce the water to 4½ gallons. Too much water weakens the concrete.

Testing Tells the Profitable Cows.

Better herds is a prime factor in dairy progress. The only sure way of improving a herd is to have its production recorded systematically and regularly and to use a registered and pure-bred bull of known and definite production strain. First, it is necessary to ascertain the highest and lowest producers in a herd, and the only way that can be done is by having the herd recorded for production. The Herd Improvement Scheme operated by the Department of Agriculture and Stock will show the farmer the cows that are producing at a profit and those that are eating up the profits; and it is from the profitable cows only that calves should be reared for replacements to build up a herd of high producers. The scheme also gives a line on the qualities of the bull when his progeny come into profit. It is not practicable, of course, to cull out all the cows that are not up to the highest standard, but the gradual raising of the general standard of the dairy herds of the State is obviously a worth-while objective.

Orchard Notes

FEBRUARY.

THE COASTAL DISTRICTS.

FEBRUARY in coastal Queensland is frequently a wet month, with plant growth rampant. Where green cropping is not practised it is not always possible to keep weed growth in check by cultivation.

The main crop of smooth-leaf pineapples will be ready for canning, and care should be taken to see that the fruit is sent to market with the least possible delay and in the best possible condition.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well-filled.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees which have recently been thinned out, and which must be removed. Citrus trees may be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees.

A few late grapes and mangoes will ripen during the month.

Strawberries may be planted towards the end of the month, and, if early ripening fruit is desired, care should be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertilizer, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT SOUTHERN AND CENTRAL TABLELANDS.

THE marketing of later varieties of peaches and plums and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice in these notes for the two previous months with regard to handling, grading, packing, and marketing is again emphasised.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market.

Early in the month it will be necessary to keep a careful watch on the crop of late apples for codling moth. If there is a slightest indication of attack, a further spraying will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit fly must also be systematically fought wherever and whenever found, and no infested fruit should be allowed to lie on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least before packing. This tends to tighten the hold of the individual berries on the stem and prevents their falling off.

In the western districts winemaking will be in progress. Here again care is necessary, as the better the condition in which the fruit can be brought to the press the better the prospect of producing a high-class wine.

Where necessary and practicable, citrus trees should be given a good irrigation, as this will carry on the fruit until maturity, provided it is followed up by systematic cultivation so as to retain sufficient moisture in the soil.

Farm Notes

FEBRUARY.

A LATE sowing of sorghum will provide succulent fodder during the early winter months, or if not required for immediate use, the crop may be conserved as silage or stover. The saccaline variety is favoured for this purpose, as it will withstand mild frosts, and continue to supply good feed well into the winter months.

There is still ample time to make a sowing of the early maturing millets, Japanese millet, white panicum, or French millet, if additional green fodder is desired, while buckwheat is also suitable, as it will mature in eight to ten weeks.

In the cooler districts, a first sowing of oats, barley, or wheat for grazing may be made towards the end of the month, but elsewhere March sowings will be sufficiently early.

February is regarded as the best month for planting the late or autumn potato crop, the acreage planted exceeding that of the spring or early crop, because of the increased soil moisture usually available.

Plant whole seed, preferably not less than 2 inches in diameter, and treat with hot formalin or corrosive sublimate in accordance with recommendations issued by the Department of Agriculture and Stock. Farmers who are dissatisfied with their returns, and who do not regularly apply fertilizers, would be well advised to ascertain the increased yields usually resulting from their judicious use.

First sowings may be made of mangolds, swedes, field turnips, &c., utilised for pig and cattle feed. Crops should be drilled in spaced rows so as to permit of cultivation between the rows, and the thinning of plants to suitable distances apart. Where only small areas are sown, the "Planet Jn." type of hand seeder will be found very useful. Because of the importance of increasing the area under lucerne, attention should be given to the adequate preparation of land reserved for late March-May sowings. The semi-permanent nature and value of a lucerne stand certainly warrant the best possible seed-bed, as once the crop is established only light surface cultivation can be given.

In the wheat areas, summer fallows will now be in fair condition, and with the assistance of sheep to keep down weed growth, good tilth can be maintained by the use of rigid tyne cultivators, spring tooth cultivators, and harrows. Wheatgrowers generally are well aware of the importance of maintaining a good surface mulch.

Maize and other row crops will now be well advanced, so that any cultivation given should be as shallow as possible consistent with the work of weed destruction.

The harvesting of a variety of crops will occupy much time as the season advances. Too much care cannot be given to the grading, bagging, baling, and generally attractive packing of all products placed on the open market, as inferior grades or poorly packed produce rarely realises profitable returns.

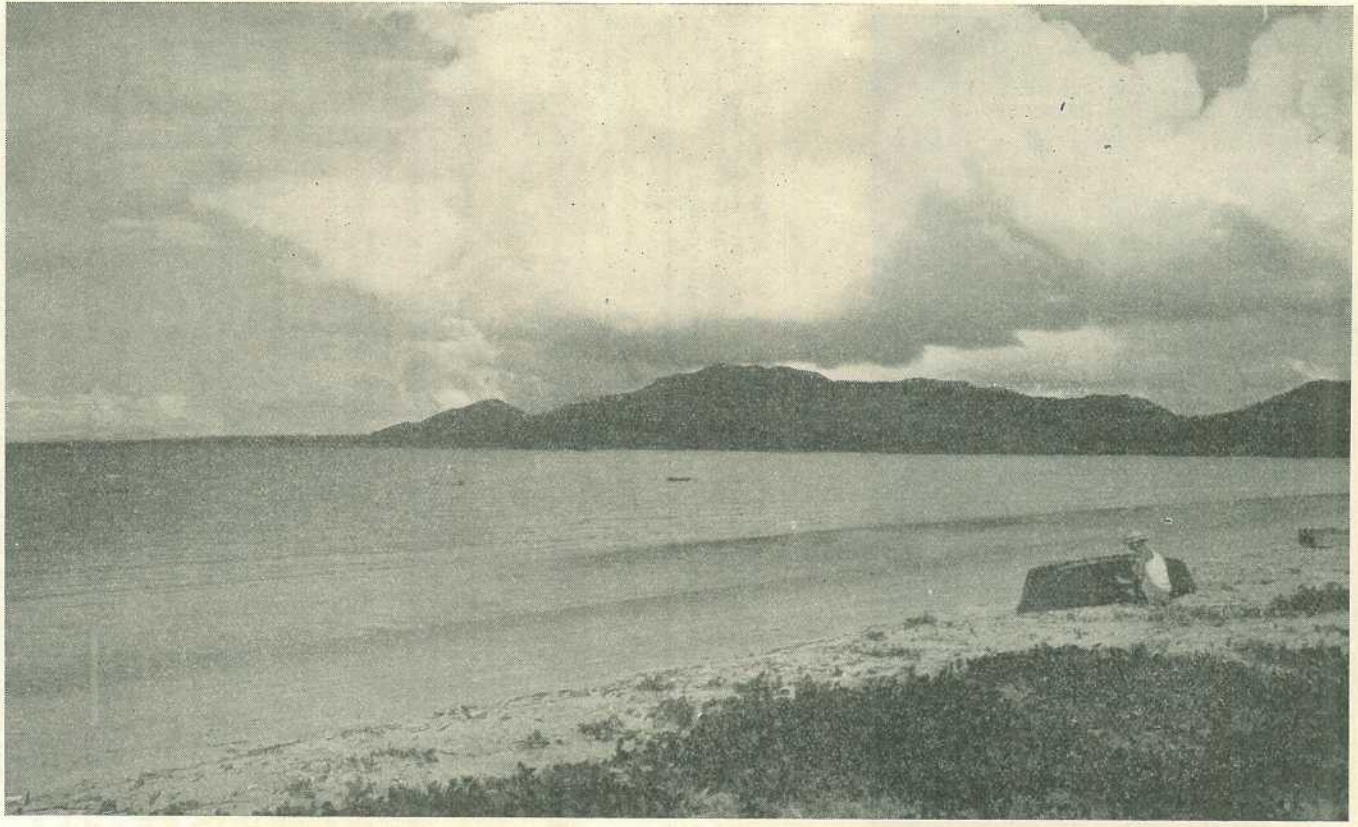
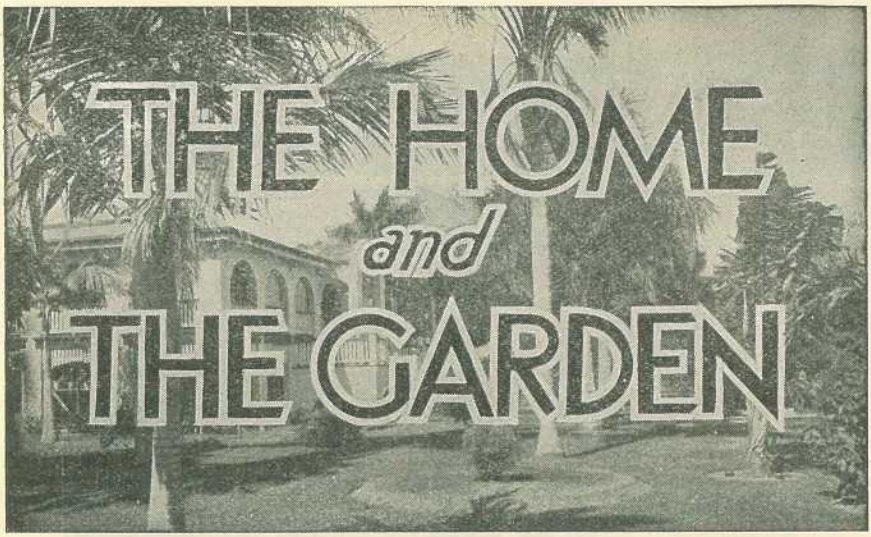


Plate 54.

GATHERING STORM CLOUDS OVER SHELTERED WATERS.—A beach scene near Granadilla, North Queensland.



Our Babies.

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

HOLIDAY HINTS.

The Baby.

THE simplest of all problems is the feeding of the breast-fed baby—in fact, he is not a problem at all as far as his feeding is concerned.

The bottle-fed baby presents more difficulty. Babies fed on cow's milk are frequently upset while travelling by rail or steamer. Railway carriages are usually unsafe places for keeping milk, especially in hot weather. Unless very carefully packed in ice, the milk goes bad very quickly. It is risky to rely upon milk procured from refreshment-rooms. Thermos flasks may be dangerous holders of milk. If they are used, first thoroughly wash and heat the flask before pouring into it the milk mixture heated to just below boiling point, the mixture having been boiled for several minutes beforehand. Keep the flask well corked, and, when pouring out sufficient milk for each feed, do so as quickly as possible and recork immediately to prevent the milk in the flask falling appreciably in temperature. Germs do not grow and multiply in milk which is kept very hot—namely, about 130 degrees Fahr. If the milk cools to anywhere near blood heat the milk in the flask becomes a positive danger. The milk poured out for baby's feed can quickly be cooled to the right temperature and he can have his bottle whenever it is due, without regard to stations.

It is a good thing to take an ordinary bottle of boiled water also, as baby is very likely to be thirsty, and it is also useful for rinsing out the bottle and washing the teat. A jug of hot water obtained at a refreshment-room serves to heat water for drinking and can be used for scalding out the various utensils used in feeding.

It is a good plan to have more than one feeding bottle and teat so that if it is difficult to wash them properly during the journey fresh ones can be used. Never keep any milk which has been left in the feeding bottle. If baby does not finish his feed throw away what is left and pour out fresh milk from the flask for the next feed. A handy way to carry the bottles and teats is to place them in a small tin box such as a biscuit box. Wrap the bottles and teats in a piece of clean boiled butter muslin and pack them into the tin. A spoon, a measure or small jug marked in ounces, and any other small utensil may also be placed in the tin.

In any journey lasting more than half a day it will be safer to carry some form of good dried milk. Boiled water can always be obtained at the stopping places or a supply can be taken from home. When changing a baby from a milk mixture to another to which he has not been accustomed, always begin with a mixture less than full strength. At the end of the journey return to the baby's ordinary food. It is better to underfeed than overfeed a baby while travelling.

Food for the Bigger Children.

The toddler may be the most difficult to cater for, but a little forethought will save much worry and trouble. Remember that a day on somewhat short rations will do no harm; whereas a day on unsuitable food consisting of odds and ends may lead to an upset.

Pack a tin with rusks of twice-baked bread, buttered or not as desired, some wholemeal bread and butter. Fruit such as oranges, apples, or papaw is useful. For the older children, sandwiches of lettuce, scrambled egg, and tomato make a wholesome meal. These are suggestions to which a mother will be able to add her own.

Clothing and Wraps.

Railway carriages are sometimes hard to ventilate; they are either too draughty or too stuffy. Do not allow the children to get overheated. Try to adjust their clothes to suit the time of day and the temperature. Whenever possible, take them for a walk on the platform of the stations.

Needless to say, a plentiful supply of napkins is a necessity. A mackintosh bag is a useful receptacle for wet napkins. If this is not procurable, make tight little parcels of them in several thicknesses of old newspaper. A bundle of newspapers is always handy when travelling.

A light rug and a cushion are necessary when travelling with small children.

Sleep.

It is important to provide for sleep for the little ones if overfatigue and fretfulness are to be avoided. This may be difficult if the train is crowded, but a bed may be improvised by placing a board from one seat to the next. With a cushion and a rug placed upon it this makes quite a comfortable bed for the toddler.

The Dress Basket.

A dress basket is almost indispensable when travelling with a young baby, making, as it does, a comfortable bed and a container for all the baby's clothes. Babies will require very little nursing if a dress basket is provided.

Toys and Playthings.

A few simple toys and picture books provide an interest for the child.

Conveniences.

On the long-distance trains these days ladies' compartments are provided, and these help to lighten the difficulties of travelling for the mother with children. It is wise not to allow children to use any lavatory. A circular pad made out of several thicknesses of paper makes a useful covering for the ordinary seat. If room can be found for it, a little enamel chamber is handy.

Avoidance of Sunburn.

While the children are on holiday allow them fresh air, light, and wholesome food, but avoid sun-burning, which may have serious consequences. Allow time for their skin to become accustomed to the sun. Expose them to the direct rays at first in the early morning and late afternoon only.

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

IN THE FARM KITCHEN.

Choosing Fruit and Vegetables.

The importance of fruit and vegetables is being realised more and more every day, but the time has still to come when they will be taken for granted as an essential part of the everyday diet.

It is surprising to find what a number of people eat fruit only occasionally, instead of at least once a day, as they should. Men often look down on it as a regular addition to the diet with a sort of "Oh, it's all right for the kids, and looks nice on the sideboard, but I don't need it" outlook, which must be overcome if fruit is to assume the place in the diet which its value merits.

And that value is indisputable. Fruit is our best source of certain vitamins, particularly vitamins A and C. Also, its high cellulose content gives the "ballast" or "roughage" necessary in any well-balanced diet to stimulate the activity of the digestive canal. Even tiny babies can take fruit juice with advantage. Orange or tomato juice, both excellent sources of vitamin C, have been proved time and again to be a valuable addition to their diet. Fresh fruit is undoubtedly the best, but many canned fruits retain much of their vitamin content. Vitamin A withstands drying fairly well, so that fruit—such as dried apricots—may be used when fresh supplies are not available.

Hard fruits have the additional advantage of excellent cleansing properties. A piece of hard apple at the end of each meal is a dental safeguard as well as a pleasure.

Too many people make the mistake of buying only the temperate fruits—apples, pears, peaches, grapes. This may be a manifestation of the true British habit of despising our own products, or it may be due to lack of knowledge of the value of our tropical fruits. Whatever the

reason, a change of view is necessary. Our Queensland fruits—pine-apples, bananas, paw-paws, mangoes, custard apples, and passion fruit—are veritable storehouses of nutrient essentials, and as such deserve a prominent place in the fruit-dish.

Vegetables, both raw and cooked, are equally essential to the diet, and their value should be proclaimed from the housetops. Vegetables are necessary for three main reasons—firstly, because of their mineral salts such as lime, phosphates, iron, sodium, and iodine—most vegetables contain some or all of these salts, carrots, silver beet, peas, beans, and potatoes being particularly rich in them—secondly, because of their vitamin content. The vegetables just mentioned are rich in both vitamins and mineral salts, but *all* vegetables contain some vitamins. Thirdly, like fruit, vegetables provide roughage in the diet.

Everyone should have one serving of potatoes and at least one serving of another vegetable each day—a green or leafy one such as peas, beans, cabbage, or lettuce, or a yellow one such as carrot, pumpkin, or parsnip.

Salads are a pleasant and nutritious means of combining a number of vegetables, and it would be difficult to find anything more enticing than a crisp, daintily-arranged salad on a hot summer day. It is surprising what a number of different combinations can be devised to prevent monotony. Lettuce, tomato, cucumber, and asparagus; shredded cabbage, pineapple, and beetroot; and lettuce, potato, banana, and chopped walnuts, are a few suggestions.

In our climate many salad vegetables flourish all the year round, and it is a mistake to confine the use of them to the summer. The advantages of fresh fruit and vegetables are numerous, even in winter.

Always remember to wash vegetables carefully in running water before using them, as this will remove traces of spray and any dust that they may have gathered in their journey from the markets.

When cooking vegetables, there are four golden rules to remember if their nutritious qualities are to be preserved:—

1. Do not overcook them; quick cooking for a short period—about ten minutes—is best, as it does the least harm to the vitamins.
2. Use as little water as possible. Steam them if possible, but in any case cut down the water to a minimum, as it extracts the mineral salts.
3. Do not use soda—it kills some of the vitamins.
4. Use the water in which the vegetables are cooked as a base for soups, broths, &c.

The importance of fruit and vegetables may be judged by the fact that they form two of the five foundation foods—milk, meat, the dairy products, fruit and vegetables—upon which any well-balanced diet is based. So if there is a thought of economising on food-bills let biscuits and puddings be cut out rather than the fruit and vegetables, which have such an important influence on general health.

Recipe for fruit punch.

Served cold in tall glasses, fruit punch should be hailed with delight by anyone in summer weather. The requirements are—½ cup lemon juice, 1 cup orange juice, grated rind of half an orange, 1 tablespoon grated lemon rind, 1-2 cups of chopped fruit (bananas, oranges, apple, pineapple, pawpaw, passion-fruit), 1 quart of water, ¾ cup of sugar.

Cook sugar and water for three minutes, cool, and mix with the orange and lemon juice and grated rind. Add the fruit and ice.

BANANAS ON THE MENU.

Banana Honeycomb.

Take 4 bananas, 1 pint hot water, 1 packet vanilla jelly crystals, cochineal.

Dissolve the jelly crystals in the hot water and leave until it is beginning to set. Peel the bananas and mash to a fine pulp, then add to the jelly and whisk all together for a few minutes. Stir in a few drops of cochineal. Turn into a wet mould to set, then turn on to a glass dish. Decorate base with slices of banana.

Banana Crescents.

Take 4 or 5 slices tinned pineapple, a few glace cherries, bananas (as required).

Peel the bananas and cut into slices. Cut the pineapple slices into halves, and place the two pieces together (one on top of the other). Put these in rather a shallow dish, and arrange slices of banana on them in the form of a crescent, making each slice overlap the previous one. Place a thick piece of banana in the centre hole of the pineapple and stick a cherry on top of it. Pour a little syrup round and serve with cream.

Chartreuse of Bananas.

Take 1½ pint packets of lemon or pineapple jelly crystals, ½ gill sherry, 5½ gills hot water, 4 or 5 bananas.

Dissolve the crystals in hot water according to directions on the packet; when cold, stir in the sherry. Rinse a plain mould with water, pour a little jelly in the bottom and leave to set, then decorate with pieces of banana (dipped in jelly). When set, cover with jelly to about a depth of half an inch, and when this is set cover with jelly and set again. Now add sliced bananas (also dipped in jelly), place them all over in rings, and let each slice overlap the previous one. When set, cover with jelly to the depth of half an inch, and when this is set proceed in the same way until the mould is full. When quite firm, dip in warm water, turn on to a dish, and serve with cream.

Note: Put a little of the jelly aside and use for dipping the bananas in.

Banana Russe.

Take 2 tablespoonfuls chopped banana, 2 egg-yolks, ½ pint milk, ½ oz. gelatine, ½ gill water, 3 tablespoonfuls sherry, 4 sponge-fingers, 4 whole bananas, whipped cream and cherries to decorate, sugar.

Make a custard with the egg-yolks and the half-pint of milk. Add sugar to taste. Mix in chopped bananas, the sherry, and gelatine dissolved in the water. When beginning to stiffen, pour into a buttered mould lined with split bananas and sponge-fingers. When set, turn out and decorate with cream and crystallised cherries.

Banana and Marmalade Pudding.

Take 3 bananas, 1 gill milk, 2 oz. flour, 4 oz. suet, 2 eggs, 8 oz. breadcrumbs, 2 oz. castor sugar, 2 oz. marmalade, custard to serve.

Mix the shredded suet thoroughly with the flour. Add breadcrumbs and sugar. Stir milk and eggs into marmalade. Beat well, then add sliced bananas. Mix well together. Grease a pudding basin and fill with the mixture. Cover with greased paper and steam for one and a-half hours. Serve with custard sauce.

Baked Banana Custard.

Take 2 bananas, grated rind ½ lemon, 1 level tablespoonful custard powder, ½ pint milk, 1 oz. castor sugar, 1 cupful stale breadcrumbs, grated nutmeg, grated rind ½ orange.

Well butter a pie-dish. Line it with bread-crumbs. Arrange thin slices of banana on top and sprinkle with a little grated lemon and orange rind. Cover with another layer of breadcrumbs, banana (sliced), and rinds, then top with breadcrumbs and sliced banana. Make a custard milk, powder, and sugar. Pour over the pudding, sprinkle with a little grated nutmeg, and bake in a moderate oven for about forty minutes.

Banana Border.

Take 3 sponge-cakes, ¾ pint packet pineapple jelly crystals, ¾ pint hot water, 2 or 3 bananas, 1 oz. almonds, cochineal, ¼ pint cream, sugar, vanilla flavouring.

Dissolve jelly crystals in hot water and leave till cold. Crumble the sponge-cakes. Blanch and cut the almonds. Add both these ingredients to the jelly and colour with a few drops of cochineal. When it is almost beginning to set, stir it up and turn into a wet border mould. When quite set, turn out carefully. Peel and slice the bananas and arrange round the border; put a few pieces in the centre hole. Whisk cream until it stiffens, sweeten and flavour to taste, and pile in the centre.

Banana Bulbs.

Take 1 round flat sponge-cake, ½ pint packet cherry jelly, 1 gill hot water, bananas as required, 1 gill milk, chocolate hundreds and thousands.

Put the sponge-cake in a dish; choose one only a little larger than the sponge. Cut small rounds out all over it, using a cutter about the same size as the banana. Cut the ends off some bananas and arrange one in each hole, the point end upwards. Dissolve the jelly in the hot water, and, when cold, stir in milk and pour over the sponge. Leave to set, then sprinkle the sponge with chocolate hundreds and thousands.

Banana Globe.

Take 4 oz. rice, 4 bananas, vanilla flavouring, 1 tablespoonful castor sugar, ¼ packet lemon jelly crystals, ¼ pint hot water, 1 pint milk, 1 oz. butter, angelica.

Wash the rice, put it into a saucepan with the butter and milk, and cook very gently until tender and until all the milk is absorbed and the mixture very stiff, keeping it stirred very frequently. When ready, stir in sugar and a few drops of vanilla. Turn the rice into a pudding cloth and tie in a round ball, then hang up and leave until next day, when it will be quite firm. Dissolve the jelly crystals in hot water and leave until almost begining to set. Peel and slice the bananas thinly. Remove the pudding-cloth and stand the rice in a shallow dish (if liked, put an upturned saucer in the dish and stand it on that).

Banana Trifle.

Take 6 bananas, 1 lemon, 4 sponge-cakes, ¼ lb. strawberry jam, ½ pint thick custard, 1 wineglassful sherry, ¼ pint cream, 1 tablespoonful castor sugar, ½ teaspoonful vanilla essence, glace cherries, angelica.

Split open the sponge-cakes, cut in half lengthways, spread with jam, and arrange in a deep trifle dish. Soak them with sherry. Peel the bananas, cut them in slices, and soak them in strained juice of the lemon. Arrange them on top of the sponge-cakes, and pile high in the middle. Pour over the custard and allow time for it to soak in. Decorate with whipped cream, glace cherries, and sprigs of angelica. Serve very cold.

Banana Pudding.

Take 4 large bananas, juice and grated peel, ½ lemon, 1 tablespoonful castor sugar, 2 eggs, cake-crumbs.

Mash the bananas smoothly, add the sugar, lemon rind and juice, and the well-beaten egg-yolks. Whip the egg-whites to a stiff froth, and fold in gently. Well butter a pie-dish and strew with sifted cake-crumbs. Pour the mixture over, stand in a tin of cold water, and bake in a moderate oven till set.

Banana Cream Mould.

Take 1 cupful banana pulp, 1 cupful milk, 3 dessertspoonfuls gelatine, 1 cupful icing sugar, 1 gill whipped cream.

Dissolve gelatine in a little hot water. Stir in sugar and scalded milk. Cool. Stir in banana pulp and most of the whipped cream. Pour into a wet mould. When set, turn out and decorate with remaining whipped cream.

Banana Blanc Mange.

Take 1½ pints milk, 1¾ oz. cornflour, 1 lemon (rind only), 1 tablespoonful sugar, 3 bananas.

Mix the cornflour to a smooth paste with some of the milk. Put the remainder into a saucepan, add the grated lemon rind and sugar. When hot, stir on to the cornflour. Return to the saucepan and bring to the boil, keeping it well stirred, then boil gently for a few minutes. Draw aside, stir in the sliced bananas, and pour into a wet mould. When set, turn out carefully.

Banana Grapefruit.

Take 2 grapefruit, 4 bananas, desiccated coconut, castor sugar, glace cherries.

Peel the bananas and mash to a pulp. Cut the grapefruit into halves (across the sections), remove the centre pith and pips. Then loosen the fruit from the rind and pith by cutting it all round the edge. Now cut between each section. Turn all the grapefruit pulp and juice into a bowl (but not the skin), and mash up; then mix the banana pulp and dredge with castor sugar. Remove the remaining skin from inside grapefruit rinds, then serve the prepared pulp in the latter, and sprinkle with a little desiccated coconut. Arrange a glace cherry in centre.

AN IDEA WAS BORN.

Most people have heard of the Kingsley Fairbridge Farm Schools in Western Australia, New South Wales, and Vancouver Island (British Columbia). And the great majority of them think the schools were founded out of sympathy for the children of the slums of Britain. That is a mistake. Sympathy there certainly was, but Mr. Fairbridge, who was a South African, had the instincts of an Empire builder, and his first objective was to provide farmers and farm workers for Rhodesia. He loved the life of the veldt and the mountains; he wanted others to know and love it, too. He went to England to study the situation. Farming is supposed to be easy, he reflected, but after long and deep consideration he decided (he was a Rhodes scholar at Oxford) that "by the side of modern agriculture, the practice of medicine was child's play." And then his great idea was born. Train the children to be farmers. Not in England, but in the lands where they will farm. And the dreamer said: "I saw great colleges of agriculture springing up in every man-hungry corner of the Empire. I saw little children shedding the bondage of bitter circumstances, and stretching their legs and minds amid the thousand interests of the farm. I saw waste turned to providence, the waste of unneeded humanity converted to the husbandry of unpeopled acres." While he earnestly sought to benefit the children, the benefit to the Dominions was the objective that Fairbridge had most at heart.

. . . Perhaps child immigration, and financial assistance, might be obtained from the Fairbridge organisation; but would it not be better for New Zealand (and Australia) to train its own orphan children and equip them so that they may become future farmers? "As the twig is bent, the tree's inclined," and if these children were "brought up on the land," and had their ambitions directed towards farming as the most desirable avocation, they would most likely stay on it. Our orphanhood statistics show that there is an abundance of material at hand. Mr. Fairbridge has pointed the way, and if the lessons his institutions have learned were availed of, substantial benefits might be conferred upon the children, and the Dominions.—*The New Zealand Farmer.*

We have received a number of Order Forms for this Journal from which the names of the senders have been omitted. Until the senders supply their names the Journel cannot, of course, be despatched.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

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

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of years' records.	Nov., 1938.	Nov., 1937.		Nov.	No. of years' records.	Nov., 1938.	Nov., 1937.
North Coast.	In.		In.	In.	*South Coast–contd.*	In.		In.	In.
Atherton	2·47	37	6·82	6·38	Gatton College ..	2·81	39	5·97	3·34
Cairns	3·87	56	3·54	2·42	Gayndah	2·96	67	6·13	4·08
Cardwell	4·17	66	3·52	4·34	Gympie	3·29	68	3·72	6·34
Cooktown ..	2·50	62	2·10	1·27	Kilkivan	2·60	59	6·66	3·60
Herberton ..	2·60	52	5·12	3·81	Maryborough ..	3·22	67	4·21	3·97
Ingham	3·80	46	5·69	3·52	Nambour	4·24	42	5·53	13·49
Innisfail	6·37	57	6·02	13·66	Nanango	2·77	56	5·57	4·62
Mossman Mill ..	4·49	25	6·28	7·90	Rockhampton ..	2·44	67	3·86	3·01
Townsville ..	1·89	67	2·87	1·93	Woodford ..	3·32	51	2·85	6·26
Central Coast.					*Central Highlands.*				
Ayr	1·79	51	0·19	4·28	Clermont ..	2·00	67	6·51	1·64
Bowen	1·26	67	0·69	0·75	Gindie	2·20	39	..	4·90
Charters Towers ..	1·45	56	1·73	2·45	Springsure ..	2·21	69	9·19	5·19
Mackay P.O. ..	3·10	67	2·71	4·33	*Darling Downs.*				
Mackay Sugar Experiment Station	2·79	41	5·30	2·35	Dalby	2·83	68	7·76	7·58
Proserpine ..	2·90	35	3·26	4·14	Emu Vale ..	2·74	42	4·75	4·89
St. Lawrence ..	2·40	67	2·40	2·16	Hermitage ..	2·58	32	..	2·67
South Coast.					Jimbour	2·58	50	4·85	3·92
Biggenden ..	2·74	39	5·78	1·94	Miles	2·64	53	3·83	4·80
Bundaberg ..	2·69	55	5·72	1·71	Stanthorpe ..	2·74	65	3·09	5·11
Brisbane	3·80	86	4·76	7·94	Toowoomba ..	3·33	66	3·91	5·02
Caboolture ..	3·65	51	3·08	10·81	Warwick	2·63	73	4·25	3·43
Childers	2·74	43	5·82	1·47	*Maranoa.*				
Crohamhurst ..	4·50	45	4·31	11·24	Bungeworgorai ..	2·29	24	..	0·30
Esk	3·25	51	6·34	3·63	Roma	2·17	64	1·18	1·78

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—NOVEMBER, 1938.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·84	86	73	89	12, 25	70	4	210	10
Herberton	..	82	62	92	25	55	24	512	12
Rockhampton	29·92	87	69	98	24	64	30	386	13
Brisbane	29·97	81	66	94	23	62	4	476	13
Darling Downs.									
Dalby	29·94	84	62	97	24	56	21	776	11
Stanthorpe	..	78	55	91	24	51	7, 15, 21	309	10
Toowoomba	..	78	58	93	24	50	1	391	12
Mid-Interior.									
Georgetown	29·72	96	72	103	25, 27	66	7	330	11
Longreach	29·82	100	70	108	24, 27	62	6	83	5
Mitchell	29·88	91	65	101	24	57	30	304	6
Western.									
Burketown	29·82	95	76	103	26, 27	70	22	310	7
Boulia	29·73	99	74	107	9	62	1	16	2
Thargomindah ..	29·83	97	69	107	9	59	1	72	6

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

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

Phases of the Moon, Occultations, &c.

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

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

On 3rd May a total eclipse of the Moon will be visible in Australia unless clouds draw a curtain over the often colourful phenomena. Of a partial eclipse only the ending will be seen in the eastern part of our great island.

On 3rd January our planet Earth reached a point in its elliptical orbit where it will be in Perihelion, nearest the Sun—nearer by more than 3,000,000 miles than at its maximum distance near our Winter Solstice.

Mercury will reach its greatest distance west of the Sun, 23 degrees, on the 3rd; but Venus, now the Morning Star, will be seen as much as 47 degrees west of the Sun on the 30th from an early morning hour until daybreak, rising 3 hours 22 minutes before the Sun on that date.

Mercury rises 3.28 a.m., 1 hour 32 minutes before the Sun, and sets at 5.8 p.m., 1 hour 42 minutes before it, on the 1st; on the 15th it rises at 3.40 a.m., 1 hour 31 minutes before the Sun, and sets at 5.28 p.m., 1 hour 23 minutes before it.

Venus rises at 2.18 a.m., 2 hours 42 minutes before the Sun, and sets at 3.36 p.m., 3 hours 14 minutes before it, on the 1st; on the 15th it rises at 2.3 a.m., 3 hours 8 minutes before the sun, and sets at 3.29 p.m., 3 hours 22 minutes before it.

Mars rises at 1.16 a.m. on the 1st and sets at 2.32 p.m.; on the 15th it rises at 12.53 a.m. and sets at 2.15 p.m.

Jupiter rises at 8.53 a.m. and sets at 9.55 p.m. on the 1st; on the 15th it rises at 7.28 a.m. and sets at 9.52 p.m.

Saturn rises at 12.1 p.m. on the 1st and sets at 11.48 a.m. on the 2nd; on the 15th it rises at 11.10 p.m. and sets at 11.2 a.m. on the 16th.

A display of most brilliant constellations will compensate for the dearth of popular phenomena in our evening sky this month. Among the great, first-magnitude stars Capella is one of the finest. It is near the northern horizon, in the large five-cornered constellation Auriga, and best seen when the V-shaped Hyades are high. Above all Jupiter will be seen wonderfully large and bright when near the western horizon.

4th Feb.	○ Full Moon	5 55	p.m.
11th ,,	☾ Last Quarter	2 12	p.m.
19th ,,	● New Moon	6 28	p.m.
27th ,,	☽ First Quarter	1 26	p.m.

Perigee, 4th February, at 10.0 a.m.
Apogee, 17th February, at 12 noon.

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

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

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