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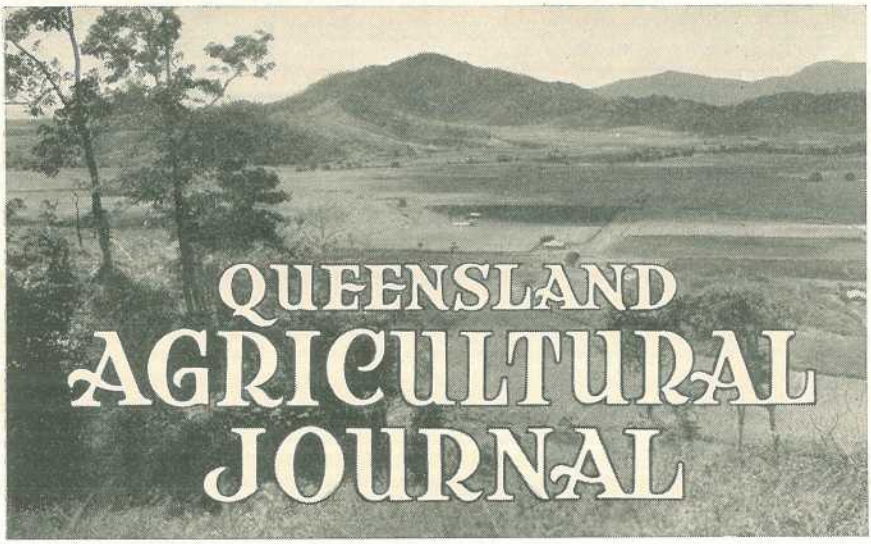
ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, and all other persons in Queensland and Northern Territory whose main source of income is from the land; also Schools, Schools of Art, Agricultural Societies and Students in Queensland, **One Shilling.** All others, **Ten Shillings.**



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Event and Comment.

Pig Carcase Competitions.

WITH the present emphasis on increased production of food for the United Kingdom, pig producers may well turn their thoughts to the export market, and, as pig raising fits in with diversified farming practice in Queensland, with our farm grains eminently suited for the production of a first-class product and climatic conditions equalled in few other countries, it would appear that an opportunity is being offered to the industry to firmly establish itself on the overseas market.

In the past pig production has been confused by, among other things, the variety of breeds and market gambling. However, producers should now make every effort to consolidate and concentrate on the production of a regular supply of a particular class of pig for an established market. Other countries have been faced with the necessity of satisfying a definite demand for a certain type of carcase, and have successfully tackled the problem of modifying their local types to fall in line with newer requirements. We are fortunate, however, in that the type required for our home markets is similar to that required for the export trade. Our methods, whether of production or processing, should advance to a higher level of efficiency if we are to be successful on the world's markets, and although the bacon type of pig is established throughout the country we should have selective breeding, better management and feeding, together with carcase grading. Payment for pigs on a quality basis will assist in building up the industry. Standards of quality should be the measuring stick for payment and development

of a sound commercial bacon pig. Standards have been the backbone of the highly successful production and marketing policies of Denmark and other countries, which have secured a position of importance in the British bacon market and are therefore no experiment.

Co-operation should be achieved among all branches of the industry, and this may be ensured by the adoption of standards which will properly relate the raw material to the finished product, of which type and quality are dictated by the consumer. It is apparent that there should be a very close relationship between the standard of the raw material or bacon pig and the standard of the cured product, and that the standard adapted for the raw material is the predominating factor in determining bacon quality. Such standards should be designed simply to set out in a concrete form the type of pig which will, when slaughtered, cured, dressed, and smoked, provide the desirable qualities and weight when later graded as bacon.

The more completely the producer is convinced of the importance of such a standard and its attainment through the whole process of production, the more likely he is to find the business of pig-raising profitable.

The grading of the pig is necessary for the protection of the producer of quality stock, whereby the efficient farmer is properly rewarded. The only logical standard is that determined by the requirements of the consuming public, in other words the commercial standard. Since the pure-bred pig is the fountainhead for commercial breeding, such pigs should be judged according to commercial standards, which are characterized by length of body, with minimum of fat and maximum of lean meat.

At the present time, probably no class of farm animal in Queensland better illustrates the desirability of type and standard than the pig. Both the breeder of pure-bred pigs and the producer of market pigs should, from now on, look from the same window, and in this regard the recent amalgamation of all pig producing interests under the Australian Pig Society is a move in the right direction and farmers are urged to give the Society their wholehearted support.

Efforts are being made to assist farmers generally to determine for themselves the correct type of pig to produce for present-day markets by fostering carcase competitions; in this respect show societies in many districts are including special classes in their pig section schedules, and it is hoped that these classes will be strongly backed by all producers. Evidence of growing interest in such competitions is shown by the record number of 60 entries received for the special baconer competition at the Beaudesert Show.

The Department of Agriculture and Stock is co-operating with the Australian Meat Board in the sponsoring of State pig-carcase competitions, particulars of which have been given wide publicity.

A New Type of Fertilizer Spreader.*

By G. CAMUGLIA.

THE fertilizer spreader to be described was designed specifically for the purpose of distributing sulphate of ammonia, but it may be used successfully with all common types of fertilizer.

In the design of this machine it was considered that the following features were essential:—

(*a*) The machine must be narrow enough to pass freely between the rows of cane, even when the crop was comparatively well developed;

(*b*) It must be light enough to make haulage easy;

(*c*) It must be strong enough to carry a reasonable quantity of fertilizer and to crush the hard lumps which occur in sulphate of ammonia;

(*d*) It must have as few moving parts as possible. The feeding device must be made of a material capable of resisting the chemical and physical action of the fertilizer and must be easy to clean.

Of these requirements the last was the most difficult to fulfil. A trial was made with a hardwood roller but this wore too quickly under the abrasive action of the material. Finally, a cast-iron roller was found suitable.

The implement is illustrated in Plate 61. It will be seen to consist of a simple carriage, 35 inches wide, on which rests a wooden hopper capable of holding one bag of fertilizer. At the bottom of this hopper is a cast-iron roller, four inches in diameter, in which are cut four helical grooves, each $\frac{5}{8}$ inch deep. The roller forms a rigid portion of the axle of the carriage. The wheels run free on the axle or may be locked to the axle by means of a manually operated pawl. When the pawl is engaged the roller rotates with the wheels.

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* Paper presented at the Innisfail Conference, Q.S.S.C.T., May, 1947, and reprinted from the *Cane Growers' Quarterly Bulletin* (Bur. Sug. Expt. Stns., Dept. Agric. & Stk., Q.) for October, 1947.

Plate 61.
TWO VIEWS OF FERTILIZER SPREADER.

Beneath the roller lies a flat cast-iron plate with a slot, $\frac{1}{2}$ inch wide, parallel to the axis of the roller. A second plate sliding underneath this plate has its edge cut to a *V* shape, so that by advancing or withdrawing the lower plate, less or more of the slot is uncovered. The sliding plate may be locked in position by means of a bolt and wing nut. The adjustment provided enables the rate of application of fertilizer to be set within the range of one-half bag to four or more bags per acre. The stream of fertilizer emerging from the slot is divided and directed to two points of application by two sloping chutes, visible in the illustrations.

When drawn by a horse this spreader is capable of treating 14 to 16 acres per day—the operator riding on the carriage. The implement could be attached to a narrow tractor, in which case it could treat 20 acres per day. Provision is made for other implements to be attached to the rear of the spreader.

Mechanical Fertilizing.

By S. O. SKINNER.*

THE mechanisation of general cultivation work on the cane farm has progressed rapidly in recent years by the use of fast light tractors and their attachments, but it is somewhat surprising that similar progress has not occurred with the mechanisation of fertilizer distribution.

Most growers appreciate that hand spreading and vibrator methods are slow and laborious, as well as comparatively costly, and some have devised various attachments for their speedy tractors for particular fertilizing work, thereby making a satisfactory saving of labour. It is considered, however, that there is much scope for local or larger implement manufacturers to design an all-purpose distributor that could be used in conjunction with planting, cultivating and ratooning. In this connection, it is interesting to record the performance of an attachment purchased last year by Mr. A. G. E. Hansen, of the Qunaba Mill Area, from which most encouraging results have been obtained.

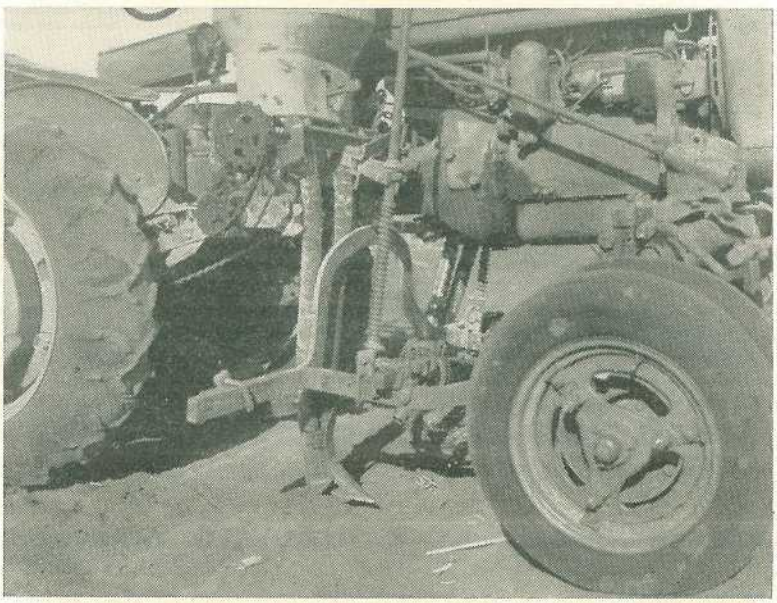

Plate 62.

Side View of Fertilizer Attachment, Showing Chain Drive from Rear Wheel, and Arrangement of Hose Outlets on Cultivator Tyne.

The two photographs (Plates 62 and 63) show the distributor, which is one of the normal attachments for such tractors for vegetable cultivation. Two bins, each of approximately two kerosene tins in capacity, fit beside the fuel tank. Feeding from both containers is performed by internal cogs which are operated by a link chain and sprocket from off the rear wheel. Both bins have two chutes with flexible metal hoses which lead down to ground level. Normally, the hose outlets are attached behind tynes or similar cultivating tools.

* In the *Cane Growers' Quarterly Bulletin* (Bur. Sug. Expt. Stns., Dept. Agric. & Stk., Q.) for July, 1947.

The fertilizer is cut off at the end of drills by a dog clutch which automatically throws the gearing out with the pneumatic lifting of the tilling attachments. Rate of application can be adjusted from 60 to 600 lbs. per acre.

As indicated later, the grower has used the attachment in conjunction with practically all tractor operations. Its only limitation appears to be in the application of fertilizer to the drills during planting, where the furrows are opened by the planter itself. In this case, the extension of the flexible hoses to the planter at the back of the tractor does not allow sufficient fall for the fertilizer to flow after it leaves the bins. This limitation, however, is somewhat offset by the fact that cane planters are made usually with a special distributor for the purpose. However, the distributor on the cane planter cannot be employed independently

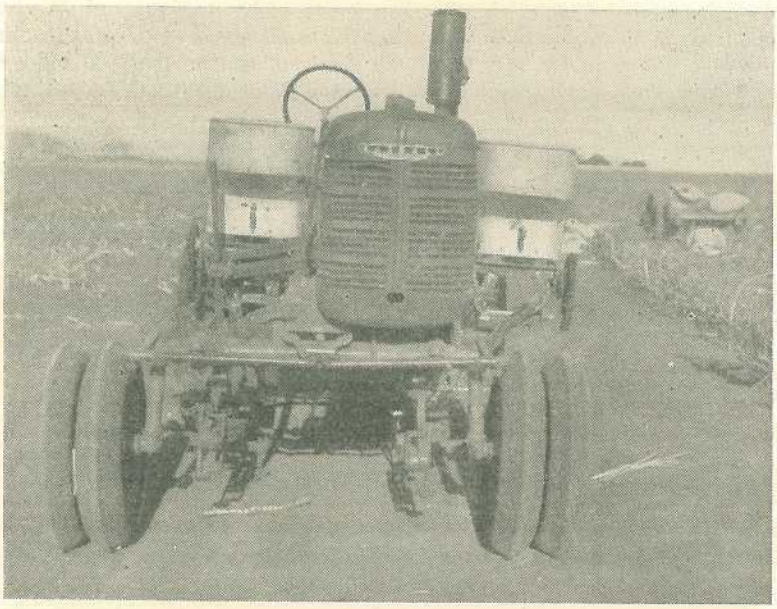

Plate 63.
FRONT VIEW OF FERTILIZER ATTACHMENT ON TRACTOR.

for later work, and the need for a further machine still exists. An improvement in the distributor illustrated would be a modification whereby the fertilizer attachment could be placed further back. This would eliminate the cost of the planter distributor, and also simplify its use with grubber ratooning. In the case of the latter with the present arrangement, and with the grubber either as a rear attachment or separate implement, the flexible hoses of the distributor have to be extended to small tynes as shown in the photograph Figs. 5 and 6. This prevents deeper placement of fertilizers, which would be obtained from behind the more powerful and deeper working grubber blades.

The distributor has not performed well with lumpy fertilizer, either sulphate of ammonia or mixtures, the trouble being due mainly to small lumps clogging together in one chute and causing a stoppage. The grower, however, has found it convenient and quick to tip the bag of fertilizer, as required, from the back of his farm trailer through a seven-eighths inch round hole sieve rested on a container. It is claimed

that this cannot be regarded as extra work since in any case the weight of present sized bags of fertilizer necessitates emptying into smaller containers to allow of filling most distributing receptacles. In one instance, during a slack day, the grower tipped, broke lumps and re-bagged some of his fertilizer into convenient smaller amounts in the storage shed. This prior breaking of hard lumped bags was found to be time saving, as it made filling of the distributor later a matter of minutes only.

The attachment has been used for all fertilizing operations on the farm, including:—

(1) For planting, in the case where the drills have already been opened, by applying the fertilizer to the open drills;

(2) For grubber ratooning, by taking the hose outlets to cultivating tynes;

(3) For top dressing, both with sulphate of ammonia and mixtures, in conjunction with cultivation;

(4) For rapid top dressing, without cultivation.

The adaptability of the fertilizer distributor is shown by the following instance—From accumulated sundry fertilizer stock, the grower desired to apply two different mixtures, as well as sulphate of ammonia and potash. By means of the two separate bins and sets of hoses, it was possible to apply two different mixtures at the one time to a block of cane and the potash and sulphate of ammonia in another operation to another block.

It was found also, when top dressing with sulphate of ammonia, that a better spreading was obtained than by hand. This was achieved by leaving the end 12 inches of the hoses loose, thus allowing them to swing freely with the movement of the tractor. In operation, this action gave distribution beside and around the stools, and under leaf level, thus eliminating any possibility of burning from the sulphate of ammonia falling on tender foliage. Since the fertilizer is normally applied with this attachment when carrying out other cultural operations, the acreage fertilized per day is of the same order as that covered by the tractor when used for planting, ratooning, cultivating or grubbing, less the slight loss of time in refilling the fertilizer bins.

The excellent rate at which the combined operations of fertilizing and cultivating were carried out, when using the scarifier attachments, was even improved in some instances. For example, where thorough cultivation was not essential, tynes were spaced wider than normal and every second row was straddled. By using the four hoses, the grower was able to fertilize both sides of each straddled row and one side of the adjoining two rows, and by repeating this operation on every alternate row, all drills were fertilized on both sides. Where top dressing only was required, similar straddling of alternate rows enabled a speedy cover of the field.

The cost of the distributor was approximately £29. It is not claimed that this particular attachment is the ideal one, or that there are not other distributors of equal merit, but its performance does demonstrate very clearly, the cheapness and rapidity with which large areas can be covered. It has shown, moreover, that labour costs can be reduced and that fertilizer distribution can be a less laborious task when combined, in the manner described above, with routine cultivation work.

Notes on the Common Reed.

By N. McD. SMITH.*

THIS plant, known as Reed Grass† and sometimes called Bluejoint Grass, Sword Grass, or Peashooter Grass, is widespread, and occurs along watercourses in the temperate to tropical zones of the world. From the banks of streams it has spread up the delivery ditches and secondary branches of drainage systems to cultivation in the Moreton district (Queensland.)

Its presence is always observed in a marshy environment, yet occasionally an isolated patch may be seen out of its normal surroundings. This can most likely be traced to filling being brought from a swamp or bank of a stream to build up a depression, in which case small portions of the underground runners have been included in the load. These runners are capable of producing shoots and constitute the major means of propagation as a careful check has not revealed any seedlings from the winter-blooming seed heads in the Moreton or Maryborough areas.

Some interesting facts about the Reed Grass relate to its botanical name and uses made of the stem. It seems that the genera name of Phragmites is derived from the Greek "phragma = a fence" and no doubt refers to the fence-like growth habit of the plant.

In England the reeds are gathered and utilised as a thatching, some reports stating it will last for eighty years. In more stoutly grown plants the stems were used as arrow shafts by the North American Indians, and also the early English. In England, before the introduction of quills, the stems were used in the making of pens.

As to its human food value, a reference states that the youngest shoots made an excellent ingredient for pickles.

Most of the cane-producing land of the Moreton district is low lying and it is here that Reed Grass has become a pest. In the most part the nuisance lies not in the choking out of cane, but in harvesting operations, when the swordlike edges of the leaves inflict wounds on the legs and arms when loading. If cut off at ground level the stump can also inflict painful cuts to the unprotected feet of the unwary. Where cane blocks are situated bordering swamps, and inadequate drainage is provided the Reed is a difficult proposition to control, and in some cases has gained mastery over the cane and other weeds.

Spread is not readily noticed as the shoots delay in development for some time before making maximum growth. If in wet conditions, and left undisturbed, progress is rapid, which necessitates regular clearing of drains every year.

Propagation by means of notched underground runners makes eradication most difficult, and as a piece containing one eye will shoot the problem in relation to spraying is intensified. From the headland ditches the pest has been observed to spread into cultivation from

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* In the *Cane Growers' Quarterly Bulletin* (Bur. Sug. Expt. Stns., Dept. Agric. & Stock, Q.) for January, 1948.

† *Phragmites communis.*

portions of underground runners thrown out on the bank with sludge during cleaning. In one instance a ditch 6 feet deep was dug across a neck to shorten a creek and, at the bottom, cut ends of the Reed could be seen. Within two weeks each of these rhizomes had developed shoots of up to 6 inches long and gave indications of developing into a strong stand. The diggings from this ditch were covered with shoots within the two weeks, and patches where the soil had been carted to fill a hollow were showing indications of a future menace.

Plate 64.
The Flower Head of the Common Reed Grass.

Chipping with a hand hoe or tearing and bruising with a scarifier will effect a temporary control until the cane can compete for sunlight. This is not an entirely satisfactory method as the operation promotes a stronger stool and breaking off of small subterranean pieces serves to spread the pest further along the row.

Spraying with the usual type of arsenical sprays has not been a success as, although the outer leaf sheath and leaves have been burned brown, the leaf spindle shoots again as the tight-fitting leaf sheath does not allow the material to penetrate down the stalk. A waxiness over all parts of the plant necessitates the use of a spreader for

complete coverage. Chipping and spraying have not had a marked weakening effect as new shoots appear between treatments, and as the operation must be regular and short-spaced this cannot be done as part of the normal farm routine.

Apart from the arsenicals used there has been a trial with a chlorate type of weed killer, but without success.

By far the best means of control is feeding off with horses as they are able to nip the shoots off close to the ground. The young growth is palatable and, if convenient to work in with the farm rotation, a grazing period of 18 months to 2 years will effect eradication. For areas along ditches the problem is very difficult as fencing off and grazing such irregular areas is not always practicable, and constant hoeing is necessary.

In the coming season some experimental work will be conducted on the possibilities of control, using the new hormone weedicides "Methoxone" and "2, 4-Di-weed" in combination with some of the well known chlorate type sprays such as "Atlacide."

A New Cane Lift.

By C. G. STORY.*

A RECOGNIZED characteristic of the Australian farmer is his ingenuity, and his ability to improve on existing farm machinery. To the ranks of those who have helped in this respect may be added the name of Mr. D. Treacy, Mackay, who has invented and provisionally patented a device whereby the slow and laborious task of truck-to-tramway cane-loading may be facilitated. His method will fulfil a long felt want at this stage of the harvesting programme.

One costly and time-consuming job in the crushing season is cane loading under present conditions, where the cane is lifted from lorries to tramway trucks or railway waggons. The methods at present in current use are (*a*) the use of chain block or hoist driven by an endless chain which is generally manually operated, (*b*) the use of lifting tackle driven by a motor cycle or light engine, (*c*) an engine-operated endless-chain hoist, (*d*) the method in common use with railway cane (the horse-operated lift which uses the principle of capstan and bar). The new device, and one which should prove very popular, is operated by driving the rear wheels of a truck on two sets of rollers. The gantry consists of two heavy posts and one transom, the same as that used for the endless chain method. Two parallel axles, each with a roller at each end, are placed beneath and at right angles to the tramline; these are supported in plummer blocks mounted on a steel framework. The wheels of the truck rest between each pair of rollers and when the wheels are driven in second gear they set the rollers in motion. To the front driven axle is attached a small cogwheel, which meshes with and drives a larger toothed wheel which operates the winding drum. To this drum

* In the *Cane Growers' Quarterly Bulletin* (Bur. Sug. Expt. Stns., Dept. Agric. & Stk., Q.) for January, 1948.

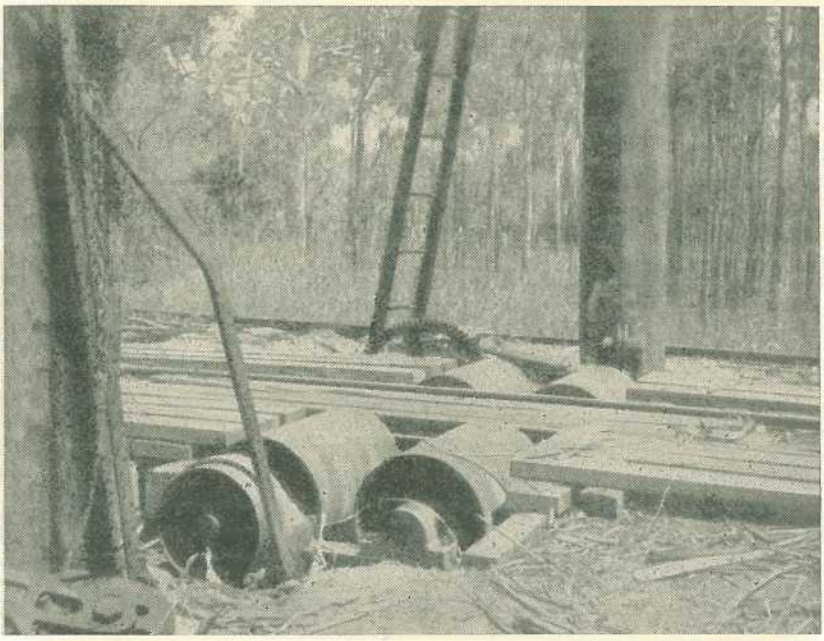


Plate 65.
LOOKING ACROSS THE MACHINE FROM THE BRAKE SIDE.

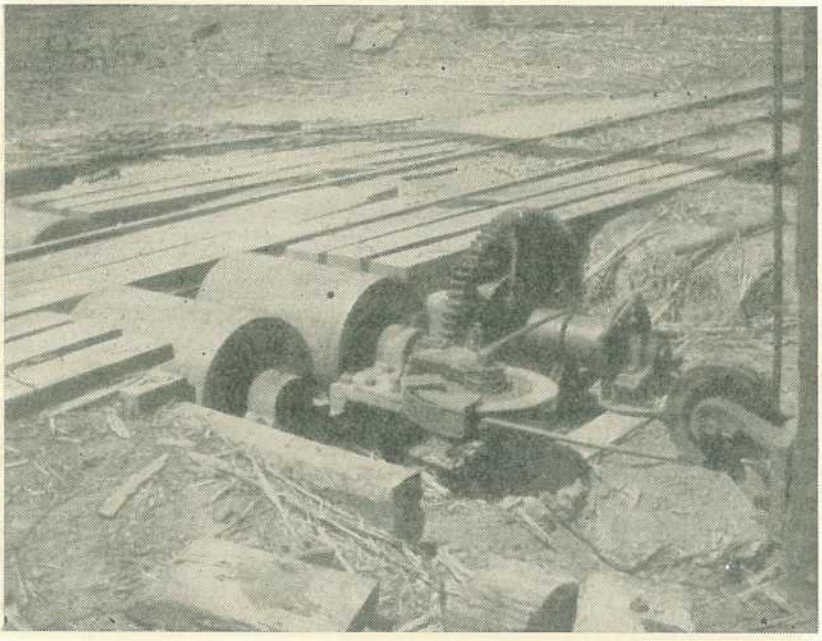


Plate 66.
THE WINDING GEAR SHOWING TWO LEADING BLOCKS, MESHED COG-WHEELS, WINDING DRUM AND ONE SET OF ROLLERS.

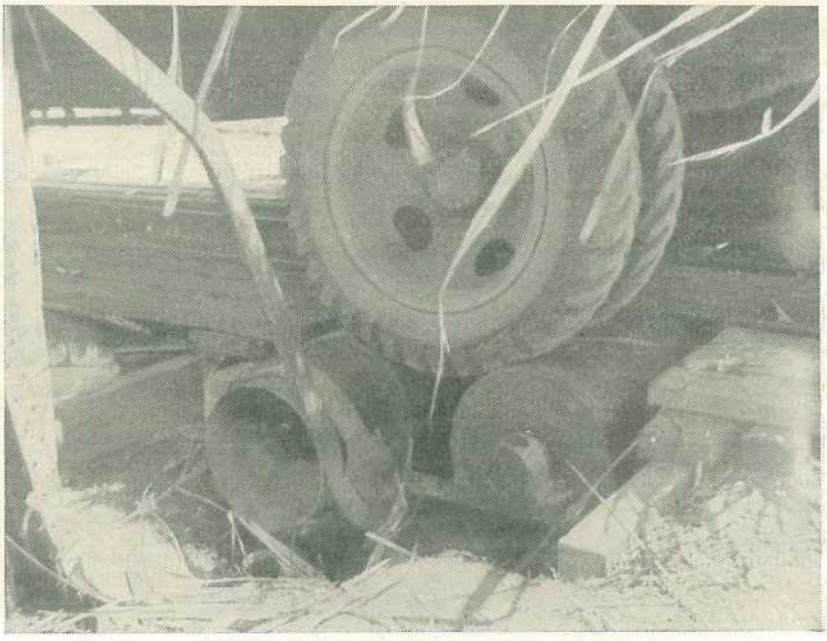


Plate 67.
WHEELS OF TRUCK IN POSITION TO DRIVE ROLLERS.

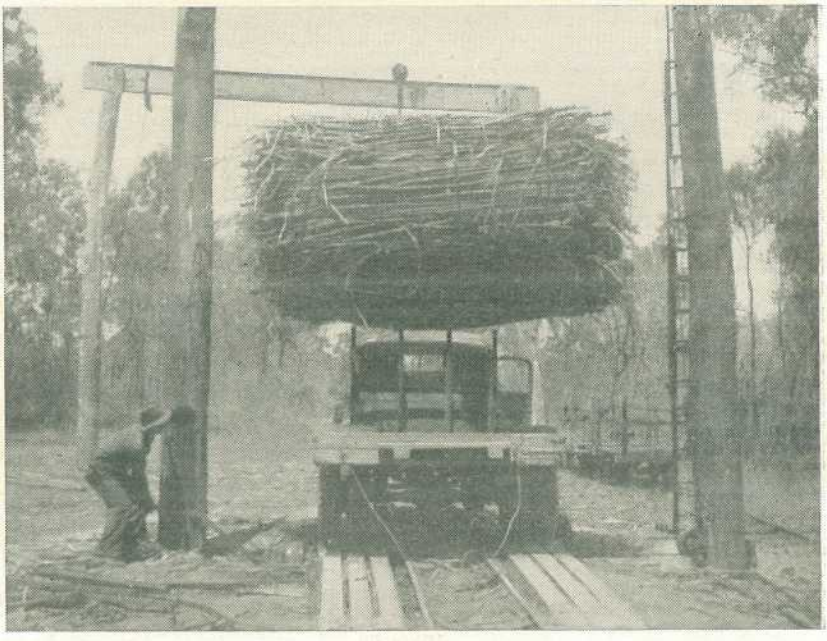


Plate 68.
APPLYING THE BRAKE AFTER THE LOAD IS RAISED FROM THE MOTOR TRUCK.

is attached a 2½-in. steel wire rope. To change the direction of the wire rope in order that the power may be favourably applied, two leading blocks, one horizontal and one vertical, are used near the base of one post. The rope passes through these two blocks then through two pulley wheels on the transom, one near the top of the post and the other in the middle of the transom, directly above the tramline where the load is to be lifted. The rope is then taken through a single block and the end made fast to a U-bolt on the transom. The wire slings around the load of cane are attached to the hook of the single block. As the large cogwheel is driven, the rope winds on its drum and the load is lifted by the wire rope, raising the single block. When the motor truck is removed, a sensitive brake holds the load in position and controls

Plate 69.

Mill Truck in Position and Load being Lowered by Means of the Brake Mechanism.

the lowering of the load when the tram truck is placed under it. The load can be lifted the required height in ten seconds, while the lorry driver may comfortably unload the lorry, load the tram truck ready for despatch, and leave the loading area within five minutes. There is no skidding between the rubber tyres of the lorry and the metal of the rollers even when the lorry is empty. Wet tyres and drums do not affect the friction; rollers may be turned with one's foot and there is no wear and tear on the lorries. Mechanical trouble should not arise owing to the small number of moving parts. The outfit readily handles 3 to 4 tons and could accommodate heavier loads. The drivers of the trucks using this lift appreciate its value and the old manually-operated endless-chain lift hangs idle, mute testimony to the more progressive, efficient and expeditious method of loading.

Papaw Culture in Queensland.

G. W. J. AGNEW, Experimentalist, Horticulture Branch.

PAPAWS grow best in the wet tropics, where the high temperatures and rainfall provide conditions for continuous growth and development during most of the year.

A warm sheltered position on rich well-drained soil with abundant rain will produce high-yielding vigorous plants. Optimum conditions such as these are not encountered on the majority of Queensland's papaw plantations, as by far the greater number occur on the south-eastern coast, where winter temperatures during the four months from June to September, combined with cold winds and frequently occurring early summer droughts, are often sufficiently severe to affect adversely the development of the plant (Plate 70) or the maturation of the fruit. Occasional severe frosts, such as occurred in 1943, cause widespread damage among papaw plantations in low situations. By contrast, North Queensland plantations are not subject to the effects of frost or cold wind and the rainfall is much more favourable; however, cyclonic winds do occasionally take toll of plants in exposed positions on the tropical coast.

Although some hazards do exist, many excellent plantations are to be found in various select positions along almost the whole length of the Queensland coast. The following districts are the chief sources of papaws in this State:—

South Coast, from Coolangatta to Cleveland;

Brisbane district, including Sunnybank, Brookfield, and Aspley;

Near North Coast, in the vicinity of Nambour, Gympie, the Mary Valley, and Gunalda;

Plate 70.

THE EFFECT OF WINTER CONDITIONS ON PAPAW PLANT DEVELOPMENT IS SHOWN BY THE CONSTRICTION OF THE STEM.

Central Coast district, principally the Yarwun area, Rockhampton, and Mackay;

Far North Coast areas of Ayr, Townsville, Cardwell, and Cairns.

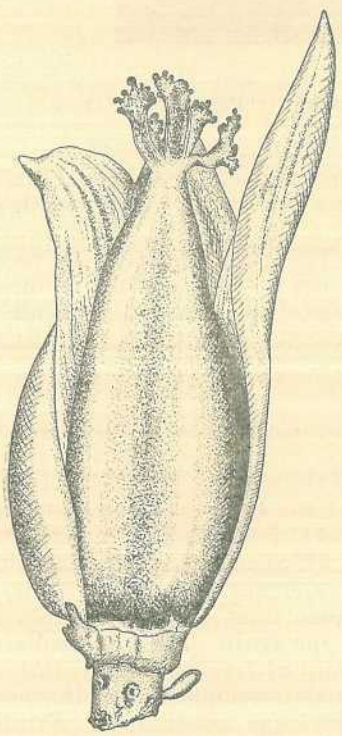
Owing to the long distances from the larger southern markets and the attendant transport difficulties associated with such a perishable product, together with the absence of canning facilities in the north, the far north coast, though eminently suited to papaw growing, has been largely limited to supplying small local markets.

Whilst the papaw is not a very difficult plant to grow, it will be found that attention to a number of details will materially enhance the prospects of establishing a commercial plantation and increasing the yield therefrom. The following sections deal with the important points to be observed.

FLOWER AND PLANT TYPES.

A great deal of misunderstanding exists with regard to the occurrence and function of papaw flowers. This is attributable to the complexity of flower and plant types.

Flower Types.



[*Drawing by William Manley.*

Plate 71.

Pistillate ("Female") Papaw Flower.

Most species of flowering plants bear hermaphrodite flowers, with the reproductive organs of both sexes in combination, that is, both pistil and stamens occur within the same flower. There are, however, three primary flower types in the papaw, namely pistillate, staminate, and hermaphrodite or bisexual, and individual trees may bear one, two, or very rarely, all three of these. Generally, where more than one flower type occurs in a single plant, their co-existence is for brief periods only.

Pistillate flowers (Plate 71) are those which express the characters of femaleness only. They have five petals, free for their entire length, surrounding the female reproductive organ, the pistil, which is the flask-shaped structure protruding outwards from the centre of the flower. The upper portion of the pistil, the stigma, opens its five crinkled lobes at full bloom as receptive surfaces for pollen. The lower bulbous part of the pistil is the ovary, which is hollowed to form a cavity attached to the lining of which are the ovules, or seeds-to-be (Plate 72).

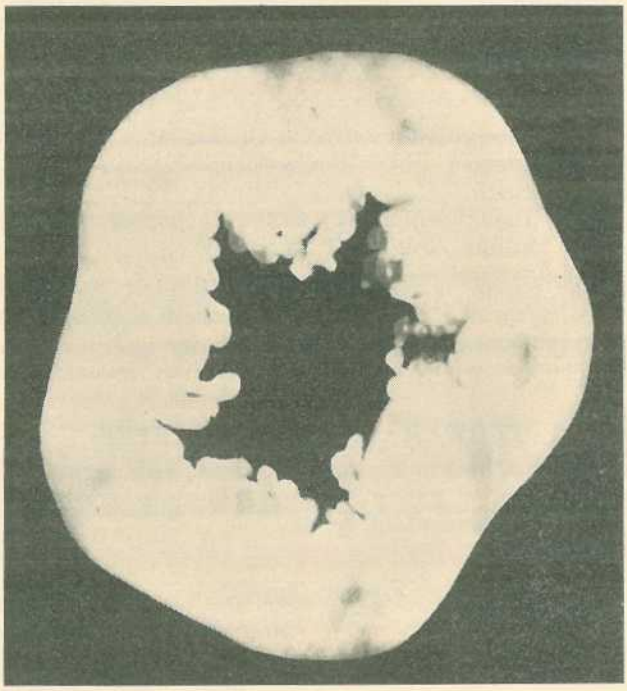


Plate 72.
CROSS SECTION OF THE OVARY OF A PISTILLATE ("FEMALE") PAPAW FLOWER SHOWING OVULES.

Flowers in which maleness only is expressed are staminate (Plate 73). The comparatively small petals of these flowers are fused together for slightly over half their length, forming a slender tube, which bears the stamens or male reproductive organs. There are ten stamens, each of which has a yellow lobed anther at its apex. The anthers produce pollen which is liberated in the late bud stage, just prior to the opening of the flower. Staminate flowers cannot produce fruit, since the pistil, which takes the form of a fine thread with a bulb at the base, is rudimentary and functionless.

Hermaphrodite flowers of the papaw are classified into three types, pentandria, intermediate, and elongata, according to the nature of their structural modifications. The importance of the various flower structures lies in the effect which they produce on fruit type. The pentandria type (Plate 74) is somewhat similar in general features to the pistillate type, except that it has five large stamens which arise near the base of the petals, and lie along grooves on the outer surface of the ovary. Pentandria flowers produce a typically squat fruit with deep grooves and well-defined petal scars at the base of the fruit. The intermediate type (Plate 75) comprises an indefinite group of freakish and distorted flowers, exhibiting various degrees of sexual development; malformed stamens and pistil are present in many grotesque associations. Fruits produced by intermediate flowers are extremely irregular in structure, and usually are of no commercial value.

The elongata (Plate 76) is the commonest hermaphrodite flower type. It has an elongate pistil partly enveloped by the petals which are united for portion of their length, thus forming a collar around the ovary.

There are ten stamens attached to the throat of the petal tube. Elongata flowers give rise to long fruits resembling in this respect a cucumber, or they may be pear-shaped. The seed cavity is comparatively small and often takes the form of a number of deep fissures, from which seeds are difficult to extract.

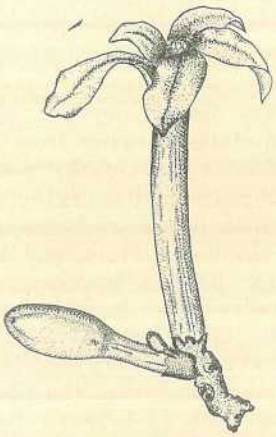


Plate 73.
STAMINATE ("MALE") PAPAW FLOWER.

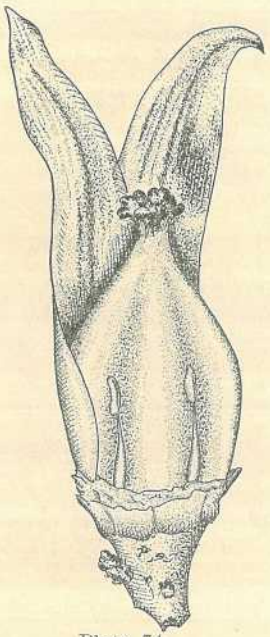


Plate 74.
PENTANDRIA TYPE OF HERMAPHRODITE ("BISEXUAL") PAPAW FLOWER.

Plate 75.
INTERMEDIATE TYPE OF HERMAPHRODITE ("BISEXUAL") PAPAW FLOWER.

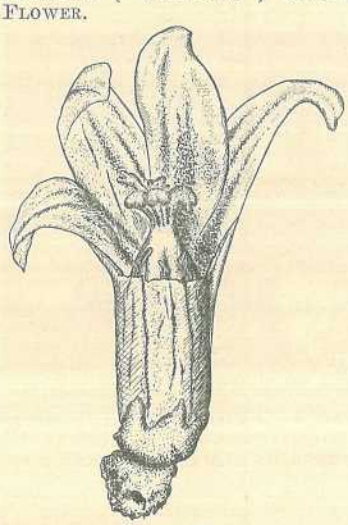


Plate 76.
ELONGATA TYPE OF HERMAPHRODITE ("BISEXUAL") PAPAW FLOWER.

[Drawings by William Manley.

Dioecious Papaw Plants.

Plants normally bearing either pistillate or staminate flowers only are collectively referred to as dioecious. Colloquially, trees bearing pistillate flowers are termed "females," whilst those which normally bear staminate flowers only are referred to as "males."

Plate 77.

"FEMALE" PAPAW TREE IN BEARING, SHOWING FRUIT PRODUCED BY PISTILLATE ("FEMALE") FLOWERS.

The flowers of female trees are produced on single or but simply-branched stalks varying from one to several inches in length, according to the characteristics of the strain. A principal flower is borne at the apex of the flower stalk, and smaller subsidiary flowers appear on the flower stalk further back towards the leaf axil. The size and number of subsidiary flowers vary considerably on the one tree during the flowering season as well as between trees of dissimilar strain.

Fruits produced by the pistillate flowers of female trees are usually rounded or oval in general outline (Plate 77), whilst common irregularities occur in the form of beaked fruits or fruits which taper away at the stalk end.

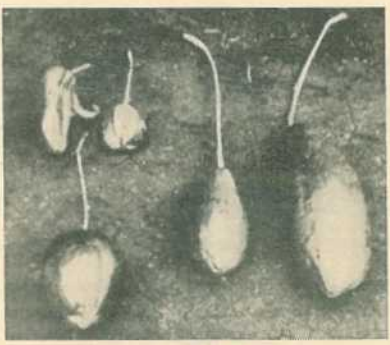


Plate 78.

PAPAW FRUIT TYPES PRODUCED BY HERMAPHRODITE ("BISEXUAL") FLOWERS ON "MALE" TREES.

The staminate flowers of male trees are produced in large numbers on profusely branched stalks, which attain a length of from three to five feet. Some male trees bear a number of reduced hemaphrodite flowers at the terminals of these stalks, particularly during the cool spring and autumn months. The pistils of these flowers become sufficiently developed to enable them to produce fruit (Plate 78) and large crops may be produced in this way, though the fruits are extremely variable in quality and are often of inferior type.

Hermaphrodite Papaw Plants.

All three hermaphrodite flower types are produced on flower stalks in a similar fashion to that of pistillate flowers on female trees. In the case of hermaphrodite flowers, however, the subsidiary flowers are in many instances functional staminate ones or abnormal hermaphrodites.

Plate 79.

HERMAPHRODITE ("BISEXUAL") PAPAW TREE IN WHICH THE ELONGATA FLOWER TYPE PREDOMINATED.

Plate 80.

HERMAPHRODITE ("BISEXUAL") PAPAW TREE IN WHICH THE PENTANDRIA FLOWER TYPE PREDOMINATED.

In some cases, and particularly during the cool months, staminate flowers may be almost exclusively produced, and the trees then become virtually functional males for a limited period.

The three types frequently occur in the same tree, generally with pentandria (Plate 74) and elongata (Plate 76) predominating from time to time during the flowering season. In other trees again, one of the three types, commonly elongata, predominates throughout the life of the plant (Plates 79 and 80).

In Queensland, trees which bear practically all elongata flowers and which characteristically produce long, narrow fruit are popularly called "Long Toms." At one time this term may have signified one distinct strain, but at present it is applied indiscriminately to any long-fruited strain, and the use of the term Long Tom as representing a horticultural variety is now misleading.

Plate 81.

PAPAW FRUIT TYPES PRODUCED BY PENTANDRIA, INTERMEDIATE, AND ELONGATA HERMAPHRODITE ("BI-SEXUAL") FLOWERS.

Fruit produced by pentandria, intermediate, and elongata hermaphrodite flowers are illustrated in Plate 81.

FRUIT AND SEED SETTING.

Normally, effective fruit development depends upon successful fertilization of the ovules (Plate 72), resulting in fully-formed and well-seeded fruits (Plate 82). In the central and south coastal districts, however, it is common to find trees bearing a number of undersized, seedless, and near-seedless fruits, particularly on female trees. These fruits may drop off in the early stages of development or they may be carried to maturity. All degrees of fruit size are encountered, from

Plate 82.

PAPAW TREE BEARING CROP OF EVENLY-DEVELOPED FRUIT, INDICATING FAVOURABLE NATURAL POLLINATION.

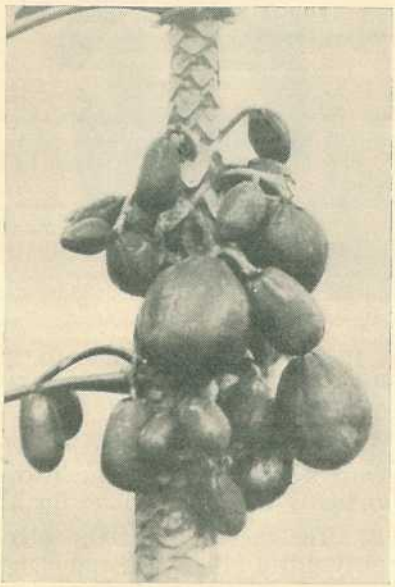


Plate 83.

PAPAW TREE CARRYING LIGHT CROP OF UNEVENLY-DEVELOPED FRUITS, INDICATING DEFECTIVE POLLINATION.

those almost fully developed to those about the size of a hen's egg (Plate 83). The weight and size of the fruit are roughly proportional to the number of seeds set (Plate 84), varying with the individuality of the tree, and with seasonal conditions at the time of flowering.

From their experience in the Madras Presidency of India, Cheema and Dani (1930) concluded that seedlessness in the papaw is due to lack of pollination. Recent investigations in Queensland have confirmed this conclusion, except that there are cases where seedlessness is a heritable characteristic. In describing the occurrence of seedless papaws in the Union of South Africa, Hofmeyr (1938) states that climate and deficiency of available pollen are probably the determining factors.

At times when pollen has been abundantly produced by male trees which have comprised as much as 10 per cent. of the tree population, examinations have shown that only a small proportion of the fruit

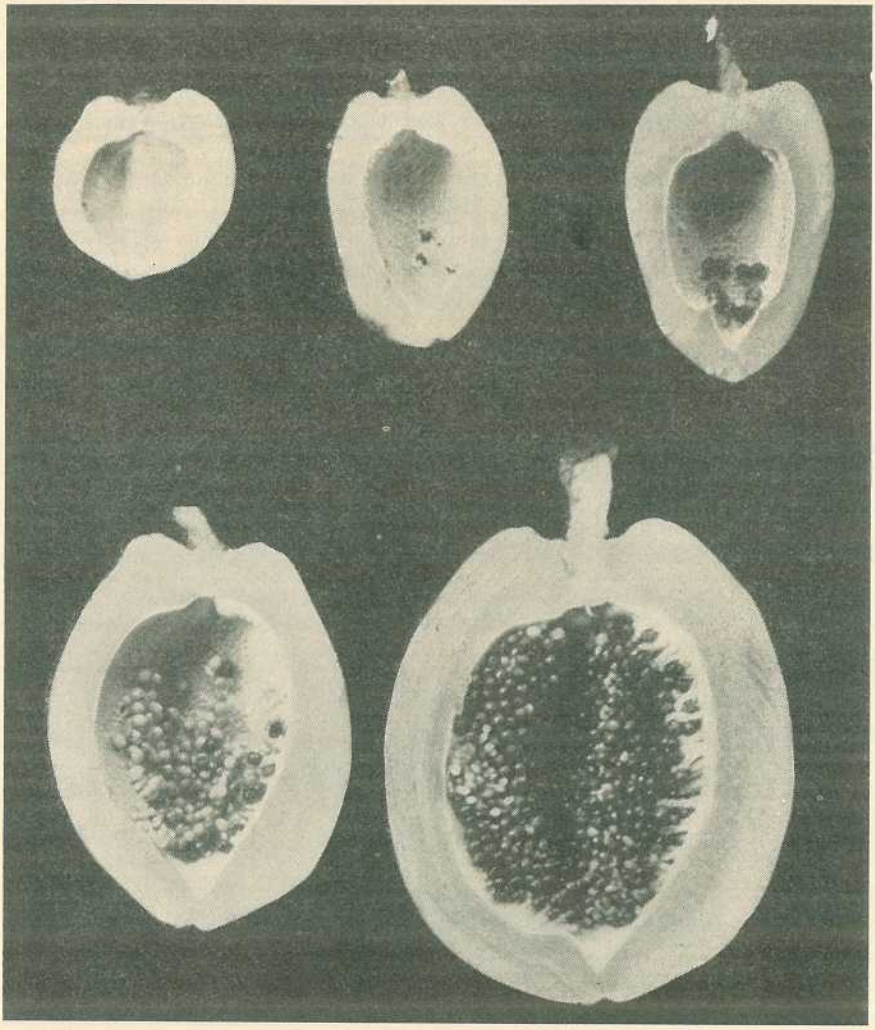


Plate 84.

Papaw Fruit Showing the Reduction in Size and the Variation in Shape Resulting from Defective Pollination.

developed with a full complement of seed, as the result of natural field pollination, whereas flowers hand pollinated at the same time produced well-seeded fruits.

At certain times of the year, flowers which have been covered to prevent pollination have produced small seedless fruits parthenocarpically, that is, without the stimulus of pollination and fertilization. When defective pollination thus occurs, trees which bear a large number of subsidiary flowers often produce a large crop of small seedless and near-seedless, misshapen and crowded fruits.

Observations in southern Queensland during 1939, 1940 and 1941 showed that, with occasional exceptions, staminate flowers of male trees produced large quantities of pollen throughout the flowering season, which extends from October to July. There were, however, brief periods when pollen was not produced, though there was an abundance of

flowers. Two such periods were observed during the 1940-41 flowering season. These definite non-functional periods were of two to three weeks' duration, and during them pollen was absent from the mature anthers of staminate flowers; the presence of pre-pollen forms, or tetrads, in mature anthers confirmed the fact that pollen abortion had taken place.

Defective pollination is considered to be one of the chief cultural problems of dioecious papaws in the central and south coastal areas of Queensland, and it is therefore at present a subject of investigation. It is responsible for a considerable falling-off in yields, because of a reduction in the size and number of fruits (Plate 85), for irregularity in

Plate 85.
EIGHTEEN-MONTHS-OLD TREES, SHOWING POOR SETTING OF FRUIT.

fruit shapes within the one tree and, in certain instances, for permitting prolific subsidiary fruit development, resulting in a crowded undersized crop. At the present time hand pollination appears to be the only suitable corrective available, but the limit of its practical application is exceeded in plantations of tall trees, where difficulties are encountered in handling flowers to be pollinated.

Occasionally trees are found which bear almost an entire crop of fully-developed fruits, which are seedless or which have only one or two seeds in some of the fruits. The ovules in these instances are shrivelled and shrunken even in the bud stage of the flower, which suggests embryo abortion. There is evidence to show that this condition of seedlessness is a heritable character. At Nambour, seedlessness has reappeared in the progeny of a plant selected for this character.

PROPAGATION.

Seed Supply.

Until certified seed of proved varieties is available for general distribution, the papaw grower must rely for planting material on seed from fruit of recognized high-yielding trees, which produce good quality fruit (Plate 77).

Seed Treatment.

Seed freshly taken from the fruit should be cleared of the pulpy placental threads which generally adhere to them. The small membranous sacs of fluid surrounding the seeds may be broken by rubbing on a rough hessian bag over a board and the seeds then freed of these by washing in water. They should then be placed in the shade, in shallow dishes, cardboard boxes, or trays, to dry.

If it is intended to store the seed for a long period, it should be dusted with a fungicidal dust suitable for seed treatment and then stored away from the light in air-tight containers.

Time of Planting.

Successful germination may be obtained with papaw seeds at any time during the summer, from September to March.

Unless storm rains are experienced or irrigation is available, the early summer is a hazardous period in which to plant out young papaws, owing to hot drying winds and the danger from hailstorms, which can seriously damage such young tender plants. If seeds are planted in late spring (October) they germinate in about ten days and the plants make rapid progress and commence flowering before winter retards further growth.

More commonly, however, seeds are planted during midsummer (December) and young seedlings are then ready to transplant during late February or early March, when monsoonal rains usually provide wet and cloudy conditions suitable for the establishment of young trees in the field. These plants usually attain a height of about 2 feet before growth is virtually stopped by winter conditions, and flowering occurs about November. In this way March-planted trees generally bear their first crop closer to the ground than do trees planted early in the summer, which have a longer growing period during which the trunk may elongate appreciably.

Raising Seedlings.

There are a number of methods which may be used successfully in raising young papaw plants.

Seeds may be planted out directly in the field in their permanent positions. This method is generally adopted when plantings are made hurriedly, and also when planting in conjunction with crops such as pineapples, when the seeds are so placed that the leaves of the pine-apples or other crop plant give protection and shade to the young seedlings. Planting out seed in an open field demands that constant care and attention be given, as otherwise many losses occur through the effects of insect enemies, disease, and unsuitable weather. It is also necessary to have a fairly large supply of seed, as generally about a dozen seeds or more are planted to each tree position, and thinning operations carried out later if necessary. The advantages claimed for this method are that the procedure is simple; it eliminates losses due to transplanting; and deeper rooting is obtained.

Another method is to plant seed in prepared seed-beds and dig out seedlings for transplanting when they are about 6 inches high. A large seed-bed space is required for this practice, as plants cannot be spaced closer than about 4 inches apart without growing spindly. Roots are generally disturbed when transplanting is done and unless the lower leaves are pinched off the plants will probably wilt. A worth-while practice, which reduces losses in transplanting from a seed-bed, is the wrapping of stems with a roll of firm paper from old books. This prevents scorching of the stems and keeps plants upright. It is always preferable to transplant on wet, cloudy days.

Plate 86.
YOUNG PAPAW TREES IN ROCKY COUNTRY.

A third, and probably the most certain method of obtaining a good strike with young trees is that of planting in containers. Either the seed is planted directly in the containers, or seeds are first sown in shallow seed boxes holding 4 to 6 inches of soil, and when the plants are about 2 inches high they are transferred to containers such as fruit-preserving cans, sheet-metal tubes, or earthenware pots. Containers made from pineapple paper mulch have been used successfully for this purpose. When seedlings are from 6 to 8 inches high they are transplanted with the soil intact. Planting can be carried out successfully during dry weather provided plants are watered in, so that wilting does not occur. Two or three plants may be left in each container and later separated out at planting.

When transplanting, it is necessary to place plants at the same depth in the soil in their new positions as when they were in the seed-bed, otherwise the stems may become diseased. The importance of placing plants at the correct depth is often overlooked, with consequent failure.

PLANTING.

Tree Positions for Dioecious Papaws.

As there is no certain method of distinguishing "male" from "female" trees before flower buds appear, it is necessary to plant out at least three or four seedlings to each ultimate tree position. Normally, approximately 50 per cent. "males" and 50 per cent. "females" should result from a "male" and "female" cross, and the multiple planting allows for culling of any unwanted "male" trees. Thinning should be done so as to leave one "male" as a pollinator for every ten "females." In each tree position, only one "female" tree should be allowed to grow past the first flowering period, otherwise the plants become spindly.

If leaves are trimmed and roots carefully preserved, culled "female" trees can be dug out and replanted to other positions in wet summer weather. These trees will be set back somewhat, but if in healthy growing condition they soon recover.

Tree Positions for Hermaphrodite Papaws.

It has been demonstrated, both in Queensland and overseas, that if hermaphrodite papaws are self-fertilized two-thirds of the progeny will be hermaphrodite and the remainder "females." If "females" are crossed with hermaphrodites, half the progeny will be hermaphrodites and the other half "females." In practice, this means the elimination of "male" trees in a planting where crosses of these types have been used, and all trees arising from the seed from these matings will be fruit-bearing; therefore, only one tree need be planted to each tree position. Good yields have been obtained in Queensland plantations of the hermaphrodite-female crosses.

If hermaphrodites only are required in the planting, then by planting three or four plants to each tree position the "females" can be culled out as in the case of superfluous "males."

Determining Sex of Papaw Plants in the Field.

The sex of young papaw trees may be determined when the young flower buds have appeared in the upper leaf axils near the growing point, and when the buds have grown to about ¼ inch in length. If the young bud is a branched structure, with a bud at the end of each branch, the sex is "male." If a single bud appears, and on unfolding the immature petals a bulb-like structure is exposed, the sex is "female." If a single bud appears, and on unfolding the petals a number of small pollen sacs are visible, the sex is "hermaphrodite."

Spacing.

Spacing distances for papaw plants in the field range from 6 feet by 6 feet to 12 feet by 12 feet according to the particular conditions. It has been observed that trees on virgin rain-forest land grow very tall in the first year if planted too closely together, and thus often much of the first crop must be harvested by ladder. A spacing of 8 feet by 12 feet or 10 feet by 10 feet has been found suitable in these circumstances. Some growers plant 6 feet by 6 feet; but generally this is considered to be too close, for though good crops have been produced with this spacing, the trees commonly become spindly. A close planting tends to give greater protection to fruits, greatly lessening the effect of

adverse winds and sun scald. As the papaw is primarily a surface rooting plant, the soil surface should be kept shaded during the hot dry summer months, and close planting tends to achieve this end.

It was demonstrated in Florida that a 6 feet by 6 feet spacing actually increased the weight of fruit produced by 62 per cent. on the average over other plantings spaced 6 feet by 9 feet and 6 feet by 12 feet. This large increase in yield is explained by the extra number of trees planted per acre. Trees with the wider spacing of 6 feet by 12 feet actually produced more fruits per tree, the average being 23 as against 19.3.

An 8 feet by 8 feet spacing is considered to be generally satisfactory for average plantation conditions, except for the convenience of cultural operations or the peculiar requirements of certain varieties; wider spacings such as 9 feet by 9 feet, 10 feet by 10 feet, or 8 feet by 12 feet may be found to give greatest efficiency in particular circumstances.

TABLE OF SPACING DISTANCES FOR SQUARE PLANTING.

Distance Apart.	Number of Trees per Acre.
6 ft. x. 6 ft.	1,210
7 ft. x 7 ft.	889
8 ft. x 8 ft.	680
9 ft. x 9 ft.	537
10 ft. x 10 ft.	435
12 ft. x 12 ft.	302

GROWTH AND DEVELOPMENT.

During 1940 and 1941 an experimental area of 500 trees of the Florida Betty variety was established at Nambour, on the Near North Coast, on land which had previously grown pineapples. The following observations were made on 32 trees representative of the planting.

Flower Production and Fruit Set.

During the principal flowering period from November to late January the average number of flowers produced per tree was 46, or slightly more than an average of four flowers per week. The percentage fruit set varied from 47 per cent. to 73 per cent. for individual trees, with an average setting of 63 per cent. for all flowers produced. A much lower percentage fruit setting could be expected from the late summer flowering, as the protracted wet weather often experienced in February, March, or April prevents natural pollination. There were slightly more than 10 per cent. "male" trees in this plantation to act as pollinators.

Yields.

The following table gives the percentage of fruits in grades according to weight, the largest fruits being mainly produced by December flowers:—

Fruit Weight.	Percentage.
Less than 1 lb.	4·3
From 1 to 2 lb.	12·8
From 2 to 2½ lb.	30·8
From 3½ to 5 lb.	29·3
5 lb. and over	22.8

Average tree production for the first crop from the main flowering period (November to January) was 29 fruits per tree, with average weight of 2 lb. 14 oz. per fruit, which gives a crop yield of 83·4 lb. per tree. This is equivalent to slightly more than 3 bushels.

Fruit Development.

The time taken for complete fruit development from flowering to maturity of the fruit varied from 175 to 275 days. Fruit from early summer flowers reached maturity in much less time than did those from late summer flowers.

Month of Flowering.	Fruit Development in Days.
November	175 to 185
December	175 to 240
January	230 to 260
February	255 to 275
March	230 to 260

Plate 87.
A Branched Papaw Tree.

The foregoing indicates that an early winter crop maturing in May and June was produced by November and December flowers, whereas the spring crop in August and September was produced by late summer flowers. The effect of winter in retarding maturation is evident by the additional time taken to reach maturity—in this instance from 50 to 70 days.

BRANCHING.

Branching (Plate 87) commonly occurs in papaws as a result of injury to the growing tip. Some strains, however, have a tendency to branch more than others and will do so to a considerable extent, even in the absence of an injury.

Where optimum conditions for vigorous growth are experienced, allowing young trees to carry branches has been successful; but most branched trees produce smaller fruit than single stemmed trees and, except under the most favourable growing conditions, the practice is not recommended.

Highly placed branches are often broken off from the main stem by wind or by the weight of fruit they are carrying, and branches which project at an angle from the main stem require propping or tying back to avoid this trouble.

CUTTING BACK.

Aged trees which are in a healthy condition can be rejuvenated by cutting the stem down at a point about 2 feet above ground where the stem is not hollow. This can also be done with young trees that have grown too tall for convenience of harvesting. After being so cut, the tree will shoot from a number of places on the stump, and two or three of the most vigorous shoots are then allowed to grow. This cutting operation should be done during the early spring so as to allow a sufficiently long growing period for the plant to recover. It is a good practice to cover the cut surface of the stem with a tin to prevent cracking and subsequent decay.

HARVESTING.

In southern Queensland, though small quantities of fruit may be ripening throughout most of the year, there are two important harvest periods—one during April, May, and June, and the other, which is really the main one, during September, October, and November. In northern Queensland harvesting is spread over a longer period.

For local markets fruit should be harvested in the firm-ripe stage when the first colour is showing, and should fully ripen in from four to five days. For export to Southern markets fruit should be picked at an earlier stage, allowing about eight days before fully ripening. The stage of maturity, as gauged by external colouring of the fruit, will vary according to seasonal conditions, the variety grown, and the requirements of the buyer, but generally the fruit should be harvested at an earlier stage in the summer than in the winter.

Great care must be exercised in harvesting papaws in the firm-ripe stage as they bruise easily. The fruit should be cut from the tree and not pulled, as pulling often results in damage to the basal end. Fruit stalks should be cut close to the tree stem, to prevent remaining fruits from rubbing on the stub. Finally, the stalk on the fruit should be trimmed before packing.

The milky latex which exudes from the broken rind of immature papaws causes considerable irritation to the skin of the operator handling them for any lengthy period and the wearing of rubber gloves and an apron is therefore recommended.

SOILS AND FERTILIZER REQUIREMENTS.

In Queensland, papaw plantations are placed either on virgin land recently cleared of rain-forest or hardwood forest, or on "old land," which has been under cultivation to pineapples, bananas, or other crops for several years. These soils vary considerably in type and include brown sandy soil, alluvial clay loam and red volcanic loam.

Many plantations are necessarily placed high up on hillsides to avoid frost, and are thus frequently associated with rocky and gravelly soils. A free draining soil is essential to healthy growth; waterlogging will result in stunted growth which is generally accompanied by disease.

Where natural soil fertility is high, excellent yields of high-quality fruit have been obtained without the use of fertilizers. More typically, however, plantation sites occur on soils of low or medium fertility, in which plant nutrient materials have been depleted by continuous cropping over a long term and by losses due to erosion and leaching. The papaw tree draws heavily on the water and plant food supply of the surrounding soil for at least eight months of the year during its active growing period, and to support and maintain this long period of activity liberal amounts of water and plant food must be available.

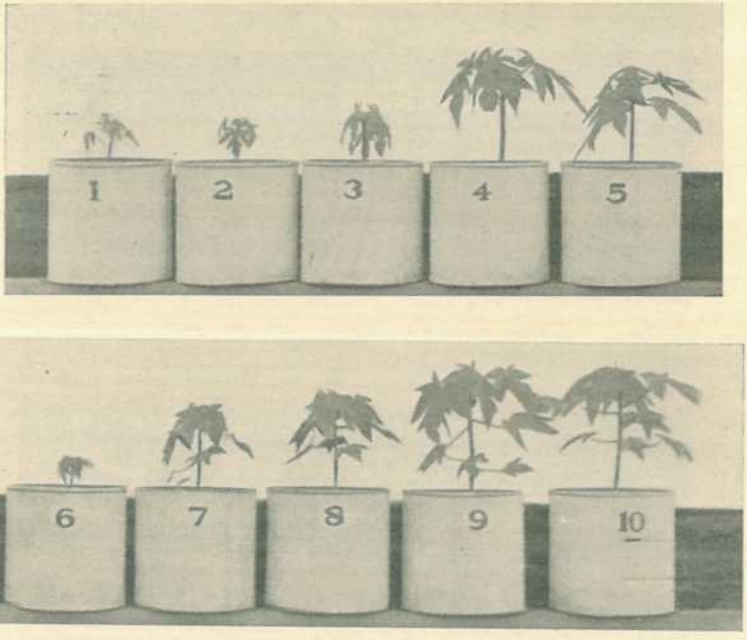


Plate 88.

Showing the Effect of Organic Manures (Pots 4, 5, 9, 10) Compared with Inorganic Fertilizers (Pots 2, 3, 7, 8) and no Fertilizer (Pots 1, 6). The Lower Series was Limed.

During 1940 and 1941 experiments were conducted at Nambour, on a brown sandy loam, typical of much of the soil on which this fruit is grown. All trees in the experiment received the same amount of nitrogen. There were no responses to phosphate or potash treatment, except in the case of phosphate after liming. Phosphates significantly increased the yield in the presence of lime and depressed the yield in the absence of lime. (Hydrated lime was applied at the rate of 4 tons per acre.) Soils under this test ranged in pH value from 4·5 to 5.

Experiments conducted at the Hawaiian Agricultural Experiment Station have shown that ample supplies of nitrogen and phosphate are necessary and that an increased quantity of potash is required after the flowering stage has been reached. The use of a 6 : 12 : 6 mixture, given at the rate of 2¼ lb. per tree per year, in four quarterly applications, has been found beneficial.

Comprehensive experiments conducted in Florida demonstrated that greatly increased yields were obtained from comparatively large annual applications of fertilizer. The recommendations for that State include the use of a 5 : 6 : 5 mixture for young trees, given at the rate of 3 to 4 oz. per month, and for mature trees up to 1½ lb. of a 4 : 8 : 8 mixture per month during the growing season.

In North Queensland, results of trials with potted seedlings, which were conducted with young seedling papaw plants up to 15 weeks after germination, indicated that favourable growth response was obtained

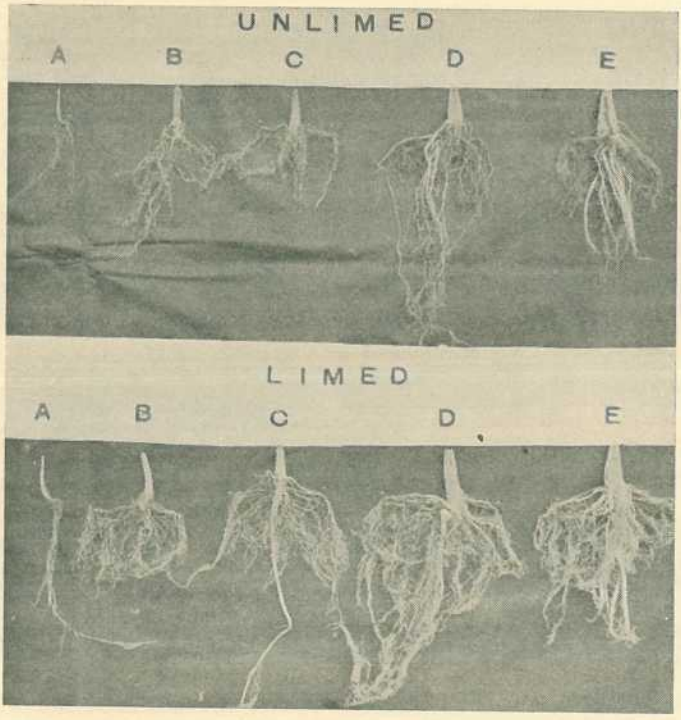


Plate 89.

SHOWING THE EFFECT OF LIMING ON ROOT DEVELOPMENT OF PAPAWS.

from the use of organic fertilizers, particularly dried blood. The growth increase for plants receiving organic fertilizers, as determined by stem height, was measurably greater than was the case where an equivalent amount of nitrogen was supplied as sulphate of ammonia. This is shown in Plate 88, where pots 4 and 5, in an unlimed series, and pots 9 and 10, in a limed series, received organic manures.

VALUE OF LIME.

Plate 89 illustrates the effect of liming on the root development of young papaw seedlings grown in pots. A more vigorous fibrous root system was developed in all plants receiving lime. There was no general significant increase in stem height due to lime in this experiment. In this pot trial plants receiving no lime showed chlorotic symptoms and dropped their lower leaves prematurely, leaving an "umbrella" top as seen in Plate 88 (Nos. 1 to 5 were unlimed and Nos. 6 to 10 were limed). This experiment was conducted at South Johnstone, North Queensland, on silty alluvial loam with pH of 4·7 to 5·7.

In a pot experiment with Nambour sandy loam more than 100 per cent. increase in height during the first 21 weeks was obtained by the application of hydrated lime at the rate of 4 tons per acre.

GENERAL FERTILIZER RECOMMENDATIONS FOR QUEENSLAND.

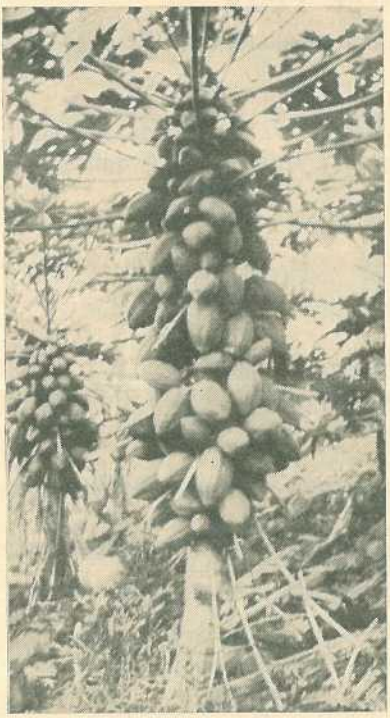


Plate 90.

A Young Papaw Tree in Crop, Gunalda District.

Although much information remains to be obtained by experiment under varied soil conditions in order to put forward recommendations which will suit each of the diverse soils on which papaws are grown, it is considered that the following measures will prove satisfactory in most instances.

An 8:12:6 mixture applied at the following rates per tree:—

(1) 4 oz. for trees up to 3 months old;

(2) 12 oz. for trees up to 6 months old;

(3) 2 to 3 lb. for trees 1 year old and upwards.

Fertilizer should be applied in three or four applications during the growing and blossoming period in September, November, and February, with a light application in April. On depleted soils a basal dressing at time of planting is to be recommended.

Hydrated lime as an initial application, broadcast at the rate of 3 to 4 tons per acre, or an equivalent amount of some other form of lime, should be beneficial, particularly on soils registering below 5·5 on the pH scale.

Lime, applied about three months in advance, combined with a legume cover crop before planting the trees, will assist in restoring fertility in many so-called "worn-out" coastal orchard lands, which it is intended to plant with papaws.

CULTIVATION.

The manner and method of cultivation of papaw plantations vary considerably with the type of plantation. Many of these are so steep and rocky that anything other than hand cultivation is precluded. The distance of plant spacing will also influence the method of cultivation employed. Owing to the shallow-rooting habit, it is impossible to do more than stir the first 3 or 4 inches without doing considerable injury to the roots. It is imperative, however, that weeds be suppressed, particularly during the dry spring and early summer months. Papaws respond well to mulching with dry grass hay, cowpea hay or other litter. The mulch cover, besides retarding surface evaporation, also helps to suppress weed growth and is a constant supply of decomposing organic matter, slowly building up the humus content of the soil.

Useful Water Data.

1 inch of rain equals 22,622½ gallons per acre, and about 14,000,000 gallons per square mile.

1 inch of rain equals about 100 tons of water per acre.

1 inch of rain equals about ½ gallon of water per square foot.

1 inch of rain in a year falling on a square mile would yield, if stored, about 38,000 gallons per day.

1 cubic foot of water equals 6·23 gallons and weighs nearly 62½ lb. or 1,000 oz.

32 cubic feet of water weigh 1 short ton (2,000 lb.).

36 cubic feet of water weigh 1 long ton (2,240 lb.).

1 gallon of water weighs 10 lb.

224 gallons of water weigh 1 long ton.

The British Imperial gallon equals very nearly 1⅕ United States gallons.

1 gallon equals 4·5449 litres.

A column of water 1 foot high exerts a pressure of 0·433 lb. per square inch or 62·352 lb. per square foot.

Water containing the following grains of salt per gallon contains the indicated number of pounds of salt per acre inch:—

1 grain per gallon equals 3·23 lb. salt per acre inch.

5 grains per gallon equals 16·15 lb. salt per acre inch.

10 grains per gallon equals 32·3 lb. salt per acre inch.

20 grains per gallon equals 64·6 lb. salt per acre inch.

30 grains per gallon equals 96·9 lb. salt per acre inch.

40 grains per gallon equals 129·2 lb. salt per acre inch.

N.J.K. in the *Cane Growers' Quarterly Bulletin* for January.

"Leg Itch" of Sheep in Queensland.

G. R. MOULE, Officer-in-Charge, Sheep and Wool Branch.

LEG itch is a disease of sheep which is caused by a specific mite* known as the "leg mite." Similar mites occur extensively in other States of Australia and in New Guinea, America, and England. In England they are known as "harvest mites," and in South Australia they cause a condition of man known as "duck-shooters' itch."

For many years a condition known as "black soil itch" has affected humans in the Clermont, Emerald, and Springsure districts of Queensland, and this was considered by local residents to be associated with the presence of a tiny mite which appeared to be restricted in its distribution to the black soils of the central highlands.

When investigations were commenced in 1944 into a peculiar condition affecting the legs of sheep on properties near Clermont, attention was soon focused on the mite which had been known for so many years to attack man. Subsequent work incriminated these mites as being responsible for initiating the trouble in sheep.

The Leg Mite.

The life cycle of the leg mite has not been determined, but it is known that mites of this type go through various well-established stages in their development. The female adults live in the soil and are about one-twenty-fifth of an inch long. Their eggs hatch into a minute but very active larval form (Plate 91). It is this larval mite which parasitises warm-blooded animals, including man, sheep, horses, and kangaroos. After feeding from the body fluids for from three to five days the larval mites return to the soil and moult to become nymphs. After another moult the nymphs become sexually mature adults. It is not known what type of foodstuffs the nymphal and adult mites prefer, but apparently they do not parasitise the warm-blooded animals.

The larvae are particularly interesting because of their unique method of obtaining food from their hosts. Their attack does not cause any irritation for some hours. This period is apparently spent in selecting a suitable site and in boring through the hard layers of the outside skin. Following the initial piercing of the skin the mites develop a thick-walled feeding tube, with a narrow bore, which lengthens as the

* *Trombicula sarcina.*

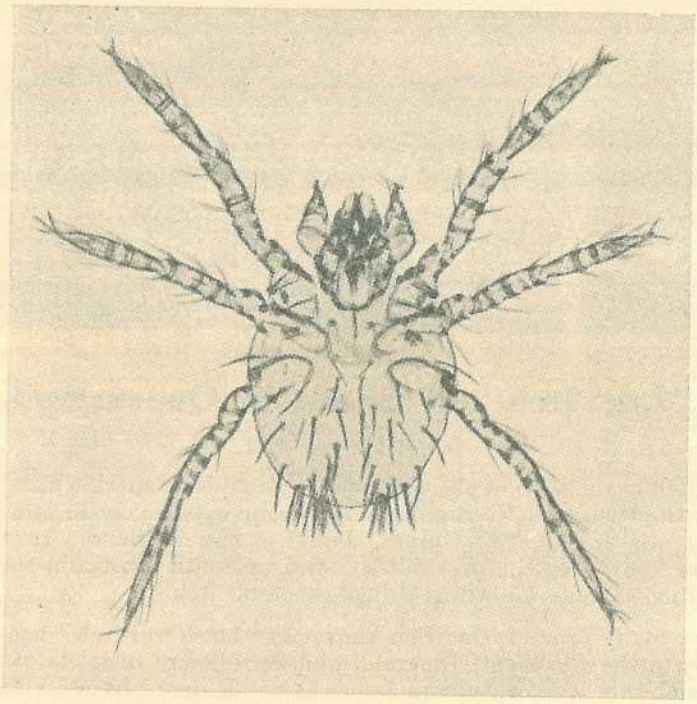


Plate 91.
A MUCH ENLARGED VIEW OF THE LEG MITE.

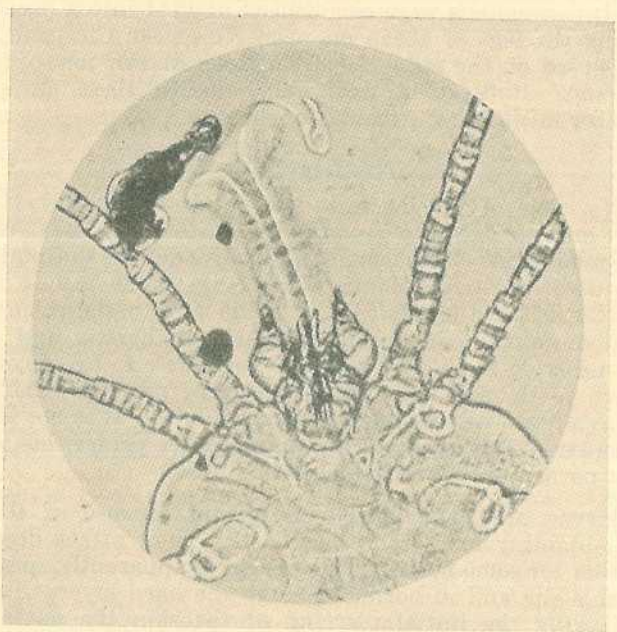


Plate 92.
SHOWING THE LEG MITE WITH THE FEEDING TUBE ATTACHED.

period of engorgement proceeds (Plate 92). The mechanism used in the development of this feeding tube is not clearly understood, but the irritation it causes can be intense, and after a mite has been feeding for some days the tube may be much longer than the mite itself.

After the mite has fed, it detaches itself from the feeding tube, which it leaves in its host, and wanders off till it reaches the earth, where it moults to form a nymph.

Seasonal Occurrence and Incidence.

All observations confirm the opinion that the mites are particularly active after the summer rains. The infestation of sheep which was noticed in the mid-summer of 1942 continued until April, 1943. Another outbreak appeared in December of that year and continued until May, 1944, when no new active cases were seen. By June, 1944, only old regressing lesions were found.

Observations made during the summer outbreak of 1943-44 suggested that the new cases occurred in waves. Search for mites in areas which appeared to be their most favoured habitats confirmed the occurrence of great numbers during the summer, particularly after rain, and a diminution in their numbers during early winter. In one well-known habitat which did not receive the August-September rain, larvae could not be found after prolonged search in mid-November, 1944.

Sheep depastured on affected areas appeared to develop leg itch irrespective of sex or age. The lesions became as advanced and were as numerous on ewes as on wethers, but no outbreaks in young lambs came under notice. This, however, may have been due to the fact that on many of the properties where the condition occurs the ewes lamb in autumn.

Inspection of flocks where infestation was occurring revealed that over 30 per cent. of animals showed lesions in some form or another. In one flock a detailed examination showed that 90 per cent. of the sheep had been affected within the last few months, and 10 per cent. showed acute lesions. A further 7 per cent. had been infested very recently and early lesions could be found.

Affected sheep usually take about six to eight weeks to recover completely, and as new infestations continue to appear in a flock during the mite season animals may be seen showing lesions in various stages of advancement and regression.

Symptoms and Lesions.

When sheep are first affected they stamp their feet repeatedly and bite their legs. This presumably results from the intense irritation caused by the attachment and feeding of the mites.

Inspection reveals the skin of the heels, coronet, and pastern, and sometimes of the shank, to be reddened and broken. At this stage engorging larvae can usually be found arranged in rosette-shaped clusters commonly about one-twenty-fifth of an inch in diameter. Should the period of engorgement of the mites be almost complete the cluster appears characteristically as a small yellow-golden centre of a small inflamed weal about one-eighth of an inch in diameter. The weal is slightly raised, and at the centre of the cluster of mites there is a small blanched glistening area of skin which sometimes exudes droplets of clear fluid.

Plate 93.
A CASE OF LEG MITE INFESTATION IN AN ADVANCED STAGE.

On completion of their engorgement in three to five days the mites depart from their host, leaving a small ulcerated area.

As a result of secondary infection of the ulcerated areas caused by the attachment of the mites, and of the broken skin which results from the sheep biting their legs, the skin over the whole of the shanks and fetlocks may become swollen and thickened. Under the scabs which form over the broken skin a greenish pus is commonly found. When this stage is reached the itchiness appears to have subsided, though affected shanks are warm to the touch and have an objectionable odour.

As the condition progresses the skin becomes markedly thickened and is thrown into folds—the affected shanks may become about twice their natural thickness. In advanced cases the lesions may be extensive (Plate 93). They have been seen covering the whole of the unwoolled portion of the leg; that is, from the coronet to the knee or hock. It appears to be rare for the infestation to involve parts covered with wool.

In the early stages of recovery the legs of severe cases are covered with wart-like overgrowths of the skin.

A section of the skin of advanced cases was seen to be of a greenish-yellow hue and markedly thickened. There were small channels containing a greenish, dry, crumbling pus, though there appeared to be no involvement of the underneath skin.

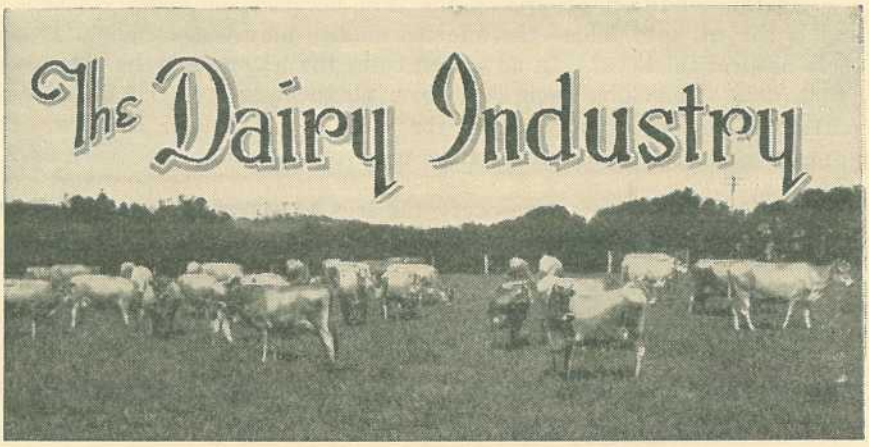
As the lesions regress the skin gradually returns to normal, but for several weeks, until the hair has grown again, the shanks present a typical "moth-eaten" appearance.

Control Measures.

Preliminary trials have been conducted with the more recently developed insecticides, including D.D.T. and di-butyl phthalate, but no definite results have been obtained. The value of dimethyl phthalate, which has similar properties to di-butyl phthalate, in protecting humans is, however, well known.

QUEENSLAND SHOW DATES, 1948.

Baralaba	June 4–5
Boonah Show	June 4–5
Bowen	June 30–July 1
Brisbane R.N.A.	August 7–14
Bundaberg	June 3–5
Cairns	July 20–22
Cooroy	August 28
Gatton	July 15–17
Gin Gin	June 7–8
Gladstone	June 10–12
Ingham	July 16–17
Innisfail	July 30–31
Laidley	June 25–26
Lawnton	July 30–31
Lowood	June 11–12, 14
Mackay	June 22–24
Malanda	September 3–4
Nambour	July 1–3
Proserpine	June 25–26
Rockhampton	June 16–19
Rosewood	July 9–10
Toogoolawah	June 18–19
Townsville	July 6–8



Dairying as a Business.

R. H. BARTLAM, Division of Dairying.

FARMING is a business and as in any other business careful planning and sound methods are essential to success. Haphazard methods on the farm will spell disaster as surely as they will in any other commercial enterprise. No farmer is in the business of dairying for his health alone, and while the successful farmer must have an inherent love of the soil and of animals, his primary reason for being on the land is to make money for himself and his family and possibly to build up a thriving concern for his children to carry on after him.

The main factors which influence success in dairy-farming are:—

(1) Security of tenure;

(2) The capital value of the property;

(3) Quality of dairy stock;

(4) Maintenance of a high standard of production.

Security of Tenure.

The outstanding factor which requires consideration in relation to a farming venture is security of tenure. The farmer must look well ahead and plan for the future. He cannot do this if his hold on the property is insecure. Consequently farming leases are unwise unless for a fairly long term and adequate safeguards are provided to ensure that the lessee receives recognition for improvements effected by him.

Capital Value of Property.

The folly of purchasing a property at too high a value cannot be over-emphasised. While good farms are never cheap, prices of land are frequently influenced by conditions which are only temporary, and this should be realised when a property is being valued. It is usually unwise to buy land when abnormally high prices are the rule. It should be remembered that the value of a property should bear a direct relationship to the amount of income which can be derived from it and in calculating this due allowance must be made

for the possibility that prices may drop and the likelihood of bad seasons must always be kept in view. If a purchase is made at an exorbitant price, the consequent heavy payments for interest and redemption may well be a millstone around the neck of the farmer for the greater part of his life. Even if the price of a property is reasonable the prospective dairy farmer must consider his own ability to work it with the labour and machinery available. No matter how good a farm is, its value to the purchaser depends on the degree of productivity which he can obtain from it. It is unwise to buy a very large farm unless the purchaser is in a position to work the whole of it efficiently.

Quality of Dairy Stock.

Whether milk or cream is sold, stock should be selected to suit the country. The foundation cows of a herd should be good. A few good cows are worth far more than a greater number of inferior ones and this point is worth serious consideration. Poor producers should be consistently culled from the herd and replaced with better quality stock and great care should be taken to see that the safe stocking limit of the property is not exceeded. When a property is overstocked the animals are underfed and their health is endangered, while maximum production is impossible. In addition overstocking will result in severe losses should a drought occur. It should be borne in mind that the total production figures of a herd do not necessarily indicate the degree of economic success which a farmer is achieving; the real criterion is the production per cow or per acre.

Maintenance of a High Standard of Production.

Once a high standard of production has been reached it is obviously necessary to maintain it. The herd should be production tested for no culling programme can be successfully carried out without a knowledge of the production of each individual cow.

It is better to buy a good bull and raise heifers on the farm than to purchase elsewhere, provided the bull is capable of raising the standard of the herd. If possible, it is advisable to purchase an older bull which has proven itself capable of transmitting to its progeny those factors which will result in an increase in production. Where this can be done, it is better than buying a young bull and relying on pedigree, conformation and colour. A young bull may come of a long line of high producers and may conform to the standards for his breed in colour and conformation, but it does not necessarily follow that he will sire heifers which will be higher producers than their dams, although of course it must be admitted that such a bull has a much greater chance of doing so than one of nondescript stock.

Feeding of Stock.

There is always a time during the year when it pays to hand feed dairy stock even if to only a minor degree. Most farmers agree that a balanced ration should be fed but in practice very few do anything about it. In connection with cows in production the matter is governed largely by the availablity and cost of fodder, but in a normal season if a cow is in good heart when she freshens the feeding of a supplementary ration is regulated by the nutritive value of the natural pasture available. In practice it pays to feed some concentrates and the practical farmer will soon determine from his own experience what is the economic level of

supplementary feeding in his own particular circumstances. By the economic level of supplementary feeding is meant the degree of additional feeding which will give the greatest return for the expenditure involved. It will be readily understood that while additional feed may mean increased production the process cannot be continued indefinitely. A point will be reached where the increase in production will taper off and further increases in the ration become uneconomic.

Calves and young stock need to have paddock feed supplemented with concentrate or lucerne hay if they are to be given every chance of becoming profitable when they enter the milking herd. The growth of young stock should never be checked and in particular the heifer in calf for the first time should be well fed and cared for.

The needs of the dry cows should not be lost sight of. Paddocks should if practicable be subdivided for grazing in turn and where the grass is scarce or too dry and fibrous to maintain the dry stock in good condition, supplementary feeding is necessary. The dry cows are next season's milkers and the feed they receive prior to calving has an important bearing on their production during the ensuing lactation. The practice of putting dry cows in the poorest paddock on the farm instead of seeing that they have adequate nutritive feed is probably a major factor in the low average production of dairy cows in Queensland.

During cold weather it pays to rug milking cows. An example can be cited of two adjoining farms in Southern Queensland, both of which carried the same breed of cows. Both were feeding a supplementary ration. On one farm the milking herd was rugged and on the other it was not. The production of the rugged herd was well in advance of the unrugged herd and the cows showed much better condition. Rugging conserves a considerable amount of bodily heat which would otherwise have to be replaced from the foods consumed by the animals and in addition it was found that the rugged herd did not spend as much time in shelter during the colder weather, but commenced feeding much earlier than the unrugged one.

General.

All diseased stock should be at once culled from the herd and high standards of hygiene should always be maintained on a dairy farm. The progressive farmer will not allow diseased stock to mix with healthy animals or even permit them to remain on his farm, nor will he allow his good stock or their produce to be maintained in unsanitary surroundings. Too much stress cannot be laid on right dairy shed practices, which always include effective cleansing and sterilization of machines and utensils.

The construction of all improvements should be carefully planned and when this is being done future needs should not be lost sight of. Layout should be such that unnecessary work is reduced to a minimum. The conservation of fodder and water should be given special attention and improvements once installed should be kept in good order.

Dams should be deep rather than wide and shallow as this reduces loss of water by surface evaporation. They should be fenced in and the stock watered from troughs. The reasons for this are readily apparent. Cows heavy in calf suffer greatly in dragging through boggy dams and in climbing up and down the banks and this unnecessary exertion can result in losses from abortion. The organism which causes ropiness in

cream is often present in dams and still water and can be picked up by cows standing in the water to drink while of course the water readily becomes contaminated by the animals. When the water is troughed, it is cleaner and of more value to the stock. The expense of the troughing and pump is well worth while. A further point is that the water in a fenced dam lasts longer and the dam requires cleaning less often than an unfenced one.

Dairy buildings should be planned so as to allow proper cleansing with a minimum of work and time. Plenty of light and air is essential and provision should be made for a supply of water to the milking shed and bails for washing down the concrete floors and for plenty of boiling water or steam for cleansing utensils. Greater cleanliness makes for more choice grade cream and the greater the production of choice grade cream the greater is the cream cheque. Plans and specifications of suitable dairy layouts are available free of cost from the Department of Agriculture and Stock, Brisbane, or from officers of the Dairying Division of the Department in country centres.

The conservation of fodder deserves much more attention than many farmers give it. It is better to spend money providing fodder for use in dry times than to save it in the hope that droughts will not occur or that if they do occur it will be possible to buy whatever feed is necessary. In drought time feed available for purchase is scarce and usually poor in quality and high in price. It is far better to grow the crops during the good seasons and store them in the form of silage. Silage may be made in stacks, in pits and in concrete silos built above ground. Advice on making it may be had from the Department of Agriculture and Stock and where it is proposed to build the tower type of reinforced concrete silo the Department can make available on loan power driven concrete mixers, moulds and other necessary equipment.

In connection with fodder conservation it must be stressed that when it is proposed to purchase a dairy farm it is essential that one be selected which has land suitable for cultivation. It is a safe rule to have one acre of cultivable land for each cow in the herd though somewhat less will suffice where the land is of exceptional quality or irrigation is available. On the subject of irrigation, however, it is as well to sound a word of warning. Considerable equipment is necessary and effective irrigation takes a great deal of time which cannot always be spared on a dairy farm. In most of the dairying districts of Queensland reasonable summer rains can be expected and it is sometimes better to practice methods of cultivation which conserve soil moisture and grow fodder crops during the summer months and store them in the form of silage.

Pig Feeding Trials on the Atherton Tableland.

A. L. CLAY, B.V.Sc., Divisional Veterinary Officer and C. J. McKEON, Q.D.A., Director of Agriculture.

SOME years ago pig feeding trials, using maize and skim milk and maize and meat meal, were carried out on the Atherton Tableland by the writers. Although these trials were designed only as preliminary experiments and have not so far been followed up, it is felt that the results obtained notwithstanding will be of interest at this time when the overall shortage of pig meats is so acute.

In the preliminary trials, the main points under investigation were—

1. *To determine whether a suitable type of bacon carcase could be produced with maize as the predominant constituent of the concentrate portion of the ration.*

It has been frequently stated that maize produces soft, oily, yellowish fat in pigs, and as a result, has been adjudged inferior to the other cereals to such an extent as to make it appear advisable, if not essential, to feed with it at least some wheat, barley, or other cereal. Maize, however, is the only cereal readily available on the Atherton Tabeland, and it therefore appeared essential to determine whether balanced rations using this grain as the only cereal could produce a carcase suitable for market requirements.

2. *To demonstrate whether the dairy farmer could purchase and/or produce maize and feed it profitably to pigs.*

Most dairy farmers appreciate the fact that maize can be fed profitably if it can be purchased at a satisfactory figure. Few of them, however, have any conception of its value in terms of pounds of bacon, or in other words, what live weight of pig a given quantity, say a ton, will produce. Without this information the farmer is not in a position to know at what price he can purchase maize profitably for the production of pork or bacon. It is generally accepted that maize is a useful supplement to skim milk, but it is not generally known what may be considered the correct quantities to feed at the various stages of growth. As a result quantities in excess of those actually required are sometimes fed: this is not only a wasteful practice, but has a very definite tendency to produce an inferior type of carcase.

Dairy farmers on the Atherton Tableland may purchase maize through two main avenues, viz., direct from the Atherton Tableland Maize Board, and through the North Queensland Co-operative Bacon Association. In this latter case it would be in the interests of producers, if the two organizations named could come to an agreement, whereby, given that a fixed minimum would be purchased during any one year, a fixed and reasonable rate would obtain throughout the year. Pig producers would then be assured of constant and more satisfactory rates for maize than have existed hitherto. Increased confidence would result, and the production of pigs be therefore stimulated.

3. *To demonstrate whether the maize farmer could feed maize, in the absence of skim. milk, more profitably to pigs than he could dispose of it through the usual channels.*

This is very far from being a matter of general acceptance. The question at issue here would be, of course, dependent in most cases on the ability of maize farmers to purchase additional weaner pigs from the dairy farming areas of the Tableland. On the other hand most maize farms could maintain a small number of cows, with the object of supplying milk to brood sows and thus become independent.

Plan of the Trials.

Five pigs were used in each trial and were fed and housed jointly throughout, from weaning until marketed. Actual farm conditions obtained, no special conditions being observed other than that known quantities of food material were given each day.

The pigs used in the trial could not by any stretch of the imagination be regarded as ideal; in fact in the case of one trial (maize and skim milk) they did not even approach the ideal. No attempt was made to select a type of pig which would be likely to give enhanced results. In order to reduce the special labour conditions involved in regularly weighing small quantities of food, suitable containers were designed and cut to hold the required amount of foodstuff, so that the farmer simply had to fill a tin each time the pigs were fed.

The rations used, together with their total digestible nutrients and nutritive ratio, were as follows:—

1. *Maize and Skim Milk* for each pig—

35-40 lb. pig:	Maize 1.2 lb. Skim Milk 5.5 lb.	T.D.N. 1.52 N.R. 1: 4.3
75 lb. pig:	Maize 2.3 lb. Skim Milk 6.5 lb.	T.D.N. 2.56 N.R. 1: 5.3
125 lb. pig:	Maize 3.5 lb. Skim Milk 8.0 lb.	T.D.N. 3.73 N.R. 1: 5.8

2. *Maize and Meat Meal* for each pig—

35-40 lb. pig:	Maize 1.5 lb. Meat Meal 0.3 lb.	T.D.N. 1.55 N.R. 1: 4.3
75 lb. pig:	Maize 2.6 lb. Meat Meal 0.3 lb.	T.D.N. 2.50 N.R. 1: 5.3
125 lb. pig:	Maize 4.0 lb. Meat Meal 0.4 lb.	T.D.N. 3.78 N.R. 1: 5.9

In each case as much green herbage (but no lucerne or other leguminous crop) as could be eaten comfortably was allowed daily.

Results of the Trials.

The results are as set out below and four different methods have been used to calculate a value for maize per ton. The farmer who does not rear pigs, and therefore has to purchase weaners in order to feed maize for the production of bacon, will naturally regard the figure obtained in Method 3 as the one most likely to be representative of the value of maize under his conditions. On the other hand the farmer who rears his own pigs would appear to be justified in accepting the figure arrived at in Method 4. Method 2 is of less practical interest, but is given in order to cover the results from additional angles.

A value of 10d. per lb. dressed weight for bacon carcases has been used in calculating the value of maize per ton, but, of course, the methods are applicable whether bacon be taken to be worth more or less than this figure.

MAIZE AND SKIM MILK.

Live weights as at:

1. 30th March, 1936—Total, 190·5 lb.; average, 38·1 lb.
2. 11th May, 1936—Total, 333·0 lb.; average, 66·6 lb.
3. 15th June, 1936—Total 523·0 lb.; average, 104·6 lb.
4. 3rd August, 1936—Total, 783·0 lb.; average, 156·6 lb.

NOTE: Age at commencement of trial (weaning) 9 weeks.

Gain in live weights from 30th March, 1936, to:

1. 11th May, 1936—Total, 142·5 lb.; average, 28·5 lb.
2. 15th June (77 days)—Maize, 654·5 lb.; skim milk, 2,292·5 lb.
   (11th May to 15th June—35 days—total, 190 lb.; average, 38·0 lb.)
3. 3rd August, 1936—Total, 598 lb.; average, 119·6 lb.
   (15th June to 3rd August—49 days—total 265·5 lb.; average, 53·1 lb.)

Feed consumed (5 pigs) from 30th March to:

1. 11th May (42 days)—Maize, 252·0 lb.; skim milk, 1,155 lb.
2. 15th June (77 days)—Maize, 654·5 lb.; skim milk, 2,292·5 lb.
   (11th May to 15th June—35 days—maize, 402·5 lb.; skim milk, 1,137·5 lb.)
3. 3rd August (126 days)—Maize, 1,512 lb.; skim milk, 4,552·5 lb.
   (15th June to 3rd August—49 days—maize, 857·5 lb.; skim milk, 1,960 lb.)

Daily live weight gain per lb. maize from 30th March to:

1. 11th May, 0·6 lb.
2. 15th June, 0·5 lb.
   (11th May to 15th June, 0·5 lb.)
3. 3rd August, 0·4 lb.
   (15th June to 3rd August, 0·3 lb.)

Value of maize per ton, calculated by four different methods—

METHOD 1.

1,512·0 lb. of maize and 4,252·5 lb. of skim milk produced 598·0 lb. of live pork (see above).

By simple proportion, 1 ton maize and 6,299 lb. of skim milk would produce 886 lb. of live pork or 620 lb. of bacon carcase (70 per cent. of live weight).

620 lb. at 10d. per lb. is worth £25 16s. 8d.

Value of 6,299 lb. of skim milk is £5 5s. 0d. (630 gals. at 2d. gal.); 1 ton of maize is worth £20 11s. 8d. (£25 16s. 8d. less £5 5s. 0d.).

METHOD 2.

1 lb. of maize produced 0·4 lb. of live weight pork.

By simple proportion, 1 ton of maize produced 896 lb. of live weight pork or 627 lb. of bacon carcase (70 per cent. of 896).

627 lb. at 10d. per lb. is worth £26 2s. 6d.; deduct £5 5s. 0d. for skim milk as in Method 1 and the value of 1 ton of maize is £20 17s. 6d.

METHOD 3.

Dressed weight totalled 589 lb.

589 lb. at 10d. per lb. is worth £24 10s. 10d.

Value of pigs at weaning, £10 (five at £2 each).

By difference, £14 10s. 10d.

1,512 lb. of maize and 4,252 lb. of skim milk are worth £14 10s. 10d. By simple proportion, 1 ton of maize and 6,299 lb. of skim milk are work £21 12s. 3d., from which has to be deducted £5 5s. 0d. for skim milk (as in Method 1).

The value of 1 ton maize is £16 7s. 3d.

METHOD 4.

Estimated total weight of dressed carcases of pigs in the group as at commencement of feeding trial—133 lb. (70 per cent. of 190·5 lb.); 133 lb. at 10d. per lb. is £5 10s. 10d.

By difference (£24 10s. 10d. and £5 10s. 10d.), 1,512 lb. of maize and 4,252 lb. skim milk are worth £19.

By simple proportion 1 ton of maize and 6,299 lb. of skim milk are worth £28 12s. 11d.

Deduct £5 for skim milk (as in Method 1) and 1 ton of maize is worth £23 7s. 11d.

The average of the above four figures for maize is £20 6s. 1d.

NOTE: Dressed weight totalled 589 lb. which at 10d. per lb. is £24 10s. 10d.

MAIZE AND MEAT MEAL.

Live weights as at:

1. 23rd March—Total, 164·5 lb.; average, 32·9 lb.
2. 11th May—Total, 318·5 lb.; average, 63·7 lb.
3. 15th June—Total, 501·5 lb.; average, 100·3 lb.
4. 27th July—Total, 764·0 lb.; average, 152.8 lb.

Gain in live weights as at:

1. 11th May—Total, 154·0 lb.; average, 30·8 lb.
2. 15th June—Total, 337·0 lb.; average, 67·4 lb.
   (11th May to 15th June—35 days—total 183·0 lb.; average, 36·6 lb.)
3. 27th July—Total, 599·0 lb.; average, 119·9 lb.
   (15th June to 27th July—49 days—total 262·5 lb.; average 52·5 lb.)

Feed consumed (5 pigs) from March 23rd to:

1. 11th May (49 days)—Maize, 367·5 lb.; meat meal, 73·5 lb.
2. 15th June (84 days)—Maize, 822·5 lb.; meat meal, 126·0 lb.
   (11th May to 15th June—35 days—maize 455 lb.; meat meal, 52·5 lb.)
3. 27th July (126 days)—Maize, 1,662·5 lb.; meat meal, 210·0 lb.
   (15th June to 27th July—42 days—maize, 840 lb.; meat meal, 84 lb.).

Live weight gain per lb. maize from 23rd March to:

1. 11th May, 0·4 lb.
2. 15th June, 0·4 lb.
   (11th May to 15th June, 0·4 lb.)
3. 27th July, 0·4 lb.
   (15th June to 27th July, 0·3 lb.)

Value of maize per ton, calculated by four different methods—

METHOD 1.

1,662 lb. of maize and 210 lb. meat meal produced 599 lb. of live pork (see above).

By simple proportion, 1 ton maize and 283 lb. meat meal produces 808 lb. of live pork or 566 lb. baconer carcase (70 per cent. of live weight).

566 lb. at 10d. per lb. is £23 11s. 8d.

Deduct £2 2s. 5d. for 283 lb. meat meal (£15 per short ton) and 1 ton of maize is worth £21 9s. 3d. (£23 11s. 8d. less £2 2s. 5d.).

METHOD 2.

1 lb. of maize produced 0·4 of live pork.

1 ton maize produces 896 lb. of live pork or 627 lb. bacon carcase (70 per cent. of 896 lb.).

627 lb. at 10d. per lb. is worth £26 2s. 6d. Deduce £2 2s. 5d. for meat meal as in Method 1, and the value of 1 ton maize is £24 0s. 1d.

METHOD 3.

Dressed weight totalled 552 lb.

552 lb. at 10d. per lb. is worth £23.

Value of pigs at weaning age, £10 (five at £2 each).

By difference, £13; 1,662 lb. maize and 210 lb. meat meal is worth £13.

By simple proportion, 1 ton of maize and 283 lb. meat meal are worth £17 10s. 6d.

Deduct £2 2s. 5d. for meat meal as in Method 1 and the value of 1 ton of maize is £15 8s. 0d.

METHOD 4.

Estimated total weight of dressed carcases of pigs in the group as at commencement of feeding trial—115 lb. (70 per cent. of 164·5 lb.).

115 at 10d. per lb. is £4 15s. 10d.

By difference (£23 and £4 15s. 10d.), 1,662 lb. maize and 210 lb. meat meal are worth £18 14s. 2d.

By simple proportion, 1 ton maize and 283 lb. of meat meal are worth £25 14s. 3d.

Deduct £2 2s. 5d. for meat meal (as in Method 1) and 1 ton maize is worth £23 1s. 10d.

Average of above four figures for maize is £20 19s. 9d.

NOTE: Dressed weight totalled 552 lb. which at 10d. per lb. equals £23.

Remarks.

For the first six or eight weeks of the trials it was very evident that the pigs were not getting as much foodstuffs as they required, and we were led to the belief that increased amounts could have been given during this period, and that these increased amounts would have been efficiently utilized—that is to say, that greater gains in live weights would have been obtained within the period stated. This in turn would have shortened the latter stages of growth in which the returns (in terms of live weight gains per lb. maize) were not so high as in earlier stages of growth. The returns over the whole of the growing period might conceivably therefore have been improved.

At the conclusion of the trials the pigs were slaughtered by the North Queensland Co-operative Bacon Association and a searching examination of the carcases made. The maize and meat meal fed pigs showed a faint yellowish discolouration of the fat, but the fat was quite firm and favourably proportioned as to lean, all five pigs being highly satisfactory in that respect. The general quality of the carcases was excellent.

The maize and skim milk fed pigs showed no discoloration of the fat, which was again quite firm and favourably proportioned as to lean, except in the case of one pig which included too much Berkshire in its make-up. The general quality of the carcases was very good but not quite up to the other group. In fairness to the maize and skim milk group, however, it must be stated that their rivals were a much better class of pig at the commencement of the trial, and any difference in the quality of the carcases would more properly be ascribed to this cause.

As a matter of general interest it can perhaps be mentioned that at the time the trials were carried out (1936) the average of the four figures for the value of maize in the maize and skim milk trial (using then current costs and prices) was £10 9s. 3d. per ton, and in the maize and meat meal trial £10 13s. 9d. per ton. At that time there was not the same big discrepancy in the figure obtained using method 3 as compared with the other methods. This indicates that the cost of weaners has risen out of all proportion to the price of pig meats and pig foods in general. This in turn underscores the shortage of breeding stock at the present time.

Conclusions.

1. A type of carcase suited to market requirements can be produced by feeding a balanced ration using maize as the only cereal, in conjunction with, or in the absence of, skim milk.

2. As regards the profits to be made by feeding maize as above, no conclusions are to be made at this stage, but it is suggested that sufficient information has been gained to lead to the belief that, given the appropriate class of pig to begin with, very considerable profit can be expected.

Acknowledgments.

It is desired to acknowledge the co-operation of Messrs. R. Stockman, Kairi, and H. Turner, Tarzali, in the conduct of these trials; also the Atherton Tableland Maize Board and the North Queensland Co-operative Bacon Association for supplying the necessary financial assistance. Thanks also are due to Messrs. W. H. Bechtel, formerly Instructor in Agriculture, Atherton, and S. Pegg, formerly Dairy Inspector at Atherton, for their co-operation at various times. To Mr. F. Bostock, Officer in Charge, Pig Branch, thanks also are due for bringing the figures quoted herein into line with current costs and prices.

Breeders' Baconer Competition.

The Royal National A. & I. Association has included a new class in its Pig Section Schedule to be known as "Breeders' Baconer Competition." Entries for the competition close on 1st June, 1948.

The new class will consist of an entry of one baconer pig either pure bred or sired by a pure bred boar, to weigh 120 lb. to 160 lb. dressed weight. The pig must be killed and cured by a recognized bacon factory. All exhibits will be judged in the form of a side of bacon on conformation and suitability to modern trade requirements in accordance with the Inspection and Measurement Standards of Great Britain. Processing, flavour, smoking and trimming will not be taken into account. Prizes, £50: viz. first, £10; second, £9; third, £8; fourth, £7; fifth, £6; sixth, £5; seventh, £3; eighth, £2.

Delivery of pigs must be made to any recognized bacon factory before 1st June. The factory will arrange to have exhibits forwarded to Brisbane so as to reach Showgrounds by Wednesday, 5th August.

All exhibits must be clearly branded on each side near the shoulder. Points will be deducted for bad branding.

Exhibits will be weighed in accordance with the usual factory practice and a margin of 5 lb. either over or under the specified weights will be allowed.

Factories concerned will purchase the pigs at ruling factory prices and they will become the property of the respective factory. The Royal National Association will pay ½d. per lb. of side above the ruling price to compensate for loss of value through mutilation.

In the past many breeders have complained that they cannot afford to have three high quality pigs slaughtered, but in this case producers are asked to submit only one. However, two may be entered if desired. A competitor may thus become his own judge when selecting what he considers his best baconer. The pig selected has to be delivered to a bacon factory on or before the 1st June, 1948, when it is to be slaughtered and its carcase put through the normal curing process.

At the Show it will be appraised in the form of a side of bacon on conformation and its suitability for trade requirements according to conditions as set out in the schedule. All bacon factories throughout the State have been asked to co-operate and are requested to keep a list of the carcase weights and identification marks of each pig entered for the competition. Factories also are asked to cure competitors' pigs as sides and leave the first rib and aitch bone intact when dressing for curing. The carcase weight, first rib and aitch bone are most important in the appraisal work.

A competition such as this provides breeders with an opportunity of completing the exhibition of their pigs. In the Pig Section they are able to show breeding stock and their progeny, while by an entry in this class are able to demonstrate the commercial quality of their pigs in the form of the finished product. In addition, each exhibitor is able to determine just how correct he was in his judgment when selecting the pig he thought was an ideal baconer. Therefore, breeders are urged to support this competition.

PLANT PROTECTION

Strawberry Planting Material.

INVESTIGATIONS made in 1947 revealed that virus diseases constitute a real problem in the strawberry industry in Queensland. The scheme for providing approved strawberry planting material was carried through successfully on a small scale last year and it is proposed to attempt a similar system for approval of runner beds during 1948. Nominated crops will be inspected by Departmental officers and at the end of the season the names of growers having an approved source of runners will be published in "The Queensland Agricultural Journal" and the "Fruitgrower's Gazette."

Any grower desirous of having his strawberry runner bed approved by the Department of Agriculture and Stock should prepare the information required under the following headings and forward this to the Department not later than the 14th May, 1948.

Particulars required:—

(1) Name in full.

(2) Address.

(3) The area of the plot from which it is intended to sell runners.

(4) Source of the runners used to plant the present crop.

The strawberry grower will have to be prepared to undertake the following matters relating to his side of the work:—

(1) To keep the plants reasonably clean at all times, including the period from the time the crop finishes to the digging of runners.

(2) To rogue out all virus infected plants at not greater than fortnightly intervals.

(3) To permit the roguing of virus infected plants by the inspecting officer.

(4) To apply such insecticides and fungicides as may be necessary or as the inspecting officer may suggest.

(5) To accept the standards laid down with respect to freedom from disease.

(6) If listed as an approved grower to sell only such runners as are approved.

(7) To make his own arrangements for the sale of his runners.

The Department of Agriculture and Stock will undertake to inspect strawberry crops for the purpose of determining whether they conform to the standards required for approval. The Department reserves the right to restrict these inspections to the number of crops which can be adequately handled and to those with a reasonable chance of being successful.

The following standards will apply:—

(1) At the first inspection (preferably during the month of June) a tolerance will be allowed of not more than
2% plants affected with virus
nil plants affected with root disease.

(2) At the time of subsequent inspections a tolerance of not more than
0.5% plants affected with virus
nil plants affected with root disease
5% plants affected with off type characters.

(3) The Department reserves the right to reject a crop where in the opinion of the inspector diseases or pests other than those mentioned above are in sufficient abundance to render the planting material of poor quality.

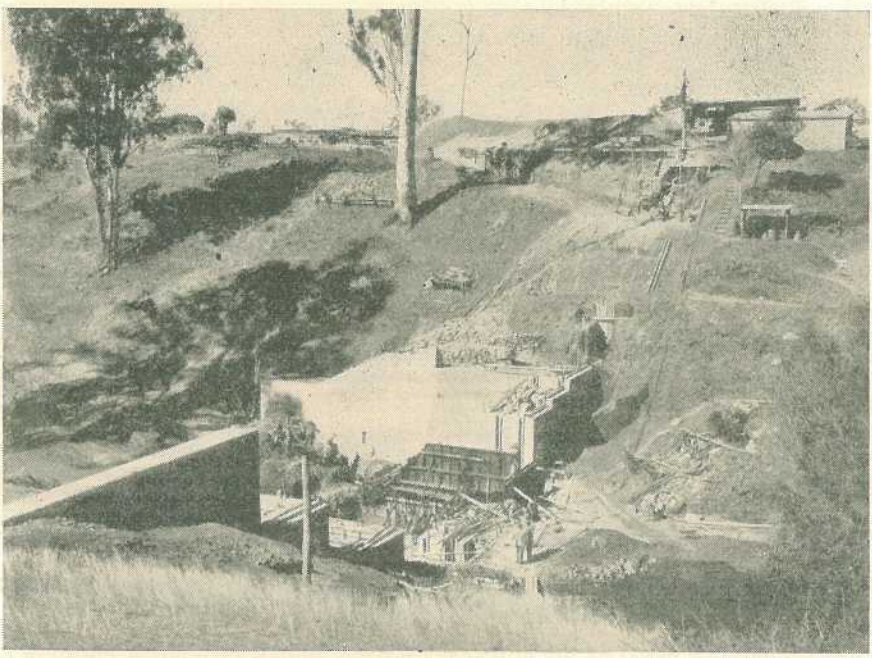


Plate 94.
WEIR UNDER CONSTRUCTION ACROSS THE LOCKYER.

MARKETING

World Fibre Survey.

The following is extracted from a world fibre survey published by the Food and Agriculture Organisation of the United Nations:—

"In 1946-47 world production of the five major clothing and household fibres —cotton, wool, silk, flax and rayon—was 24 per cent. below the 1934-38 average. Because the carry-over of cotton and wool at the beginning of the season was larger than normal, the total supply of those fibres was about the same in 1946-47 as in 1934-35. World production in 1947-48 should be a little higher than in 1946-47 but still considerably below pre-war figures. Taking account of world stocks in mid-1947, it is estimated that effective supply in 1947-48 will be slightly less than pre-war for cotton, though considerably higher than pre-war for wool."

Production Trends—March.

Dairy stock are approaching the winter in good condition. Some deterioration in milk and cream quality resulted from the hot humid weather, but prospects for April are good, and production should be well maintained.

Harvesting of early planted maize crops continued during March. Early crops in the Fassifern, Lockyer and Darling Downs are yielding fairly well, but it is expected that the yield from later crops will be lighter.

The bulk of the grain sorghum crop has been harvested. Total production is expected to be less than 1,000,000 bushels.

Harvesting of early planted peanuts continued throughout March. Yields generally are only fair.

Cotton picking operations commenced during March. The ginneries opened for receivals after Easter, and consignments are now being received.

Practically the whole of the pastoral areas, with the exception of the Central-Western Division, received useful rains during March. Generally speaking, stock are in excellent condition.

European Wheat Harvest.

The International Federation of Agricultural Producers estimates the 1947 European (excluding U.S.S.R.) wheat harvest at 15,190,000 bushels. This compares unfavourably with the 1946 harvest of 19,413,125 bushels, and is even less than the 1945 crop of 15,500,000 bushels. Average for the pre-war period 1935-39 was 25,363,125 bushels.

Dutch Flowers by Air to New York.

A short time ago a large consignment of lilacs arrived in New York by K.L.M. airlines from Holland. The flowers were on sale the following day in the New York florists. The total travelling time from Amsterdam to New York was only 15 hours thirty minutes. A spokesman of the airline company K.L.M. in New York stated that during the season weekly consignments of lilacs and tulips would be imported from Holland by plane.

The Barley Marketing Board.

The only nominations received in connection with the election of two growers' representatives on the Barley Marketing Board for a period of three years from 24th April, 1943, were those of the present sitting members, namely:—

Mr. Justus Heinrich Kessler, Bloomfield, Nobby.

Mr. Phillip David Fiechtner, jun., Greenmount.

No petition for a poll on the question of the extension of the Board's operations for a period of six years from 24th April, 1948, has been received.

Mill Peak Appeals.

Appeals by mills and growers under Section 12A of *The Regulation of Sugar Cane Prices Acts, 1915 to 1941*, for increased mill peaks were heard by the Central Sugar Cane Prices Board on the 24th March, when the Board dismissed the appeals and recommended to the Minister for Agriculture and Stock that the mill peaks for the 1948-49 season remain as at present and be not altered either in the case of any individual mill or in the aggregate peak of 737,000 tons. This recommendation has been approved by the Governor in Council.

GENERAL NOTES

Staff Changes and Appointments.

Mr. J. L. Clayton, M.Sc.App., Senior Mill Technologist in the Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, is on his way to Hawaii for a period of three months, where he will investigate, on behalf of the Bureau, methods of low-grade massecuite treatment in sugar manufacture, methods of bulk handling of raw sugar, and milling problems associated with the handling of mechanically harvested cane. It is anticipated that the results of Mr. Clayton's investigations will be available prior to the commencement of the crushing season.

Mr. J. Purcell (Toowoomba) has been appointed Chairman of The Dairy Products Stabilisation Board for a period of three years till 31st January, 1951.

Soil and Water Conservation—Taxation Deductions.

The Minister for Agriculture (Hon. H. H. Collins) has announced that, following representations by the Queensland Government, the Commonwealth Taxation Department had now conveyed formal advice regarding taxation deductions allowable to primary producers in respect of expenditure in combating erosion and the provision of water facilities.

The new schedule provides that expenditure incurred in the year of income by a taxpayer engaged in primary production *on any land in Australia* in:—

(*a*) preventing or combating soil erosion on the land, otherwise than by the erection of fences;

(*b*) the construction of dams, earth tanks, underground tanks, irrigation channels or similar structural improvements, or the sinking of bores or wells, for the purpose of conserving or conveying water for use in carrying on primary production on the land; and

(*c*) the construction on the land of levee banks or similar improvements having like uses,

shall be an allowable deduction.

Swing Towards Farming.

Most interesting feature of a survey of the labour position in Hawke's Bay made by Mr. A. J. Peterson, district officer of the Department of Labour and Employment at Hastings, was that there had been a surprising trend from secondary industries to primary industries recently. Town workers were realising that life on wages under the present high cost of living was not conducive to saving, and many of them were actually endeavouring to turn to farm work.

Finding that there was no shortage of farm labour in the Hastings district, Mr. Peterson concluded that a factor influencing this happy state of affairs was the existence in the area of some of the finest single and married accommodation in New Zealand. Most of the stations and farms throughout Hawke's Bay had splendid single quarters, while in many instances the homes provided for married workers and their familes were up to the standard of State houses in the town areas.

With meat, milk, firing and, in many instances, other items provided free or for a nominal charge, workers on farms to-day were in a far better position than their contemporaries in the urban areas, Mr. Peterson claimed. It was this state of affairs which had prompted a spate of inquiries for positions on farms where accommodation could be provided from workers in industrial jobs.—P.H., in *The New Zealand Farmer.*

Rural Topics

Greenfeed for Poultry.

With the rise in cost of poultry foodstuffs many poultrymen are inclined to seek methods by which the feeding costs of their flocks can be reduced it was stated at the Department of Agriculture and Stock to-day. The use of greenfeed helps materially in reducing feeding costs, and at the same time supplies many of the essential vitamins.

All greenfeeds are good in moderation, but with some there is a risk of affecting egg quality. Among these is rape, which if fed excessively causes discolouration of the yolk, referred to as "olive yolk." Rye also is credited with having a similar effect.

A recent case of over-feeding of rape came under notice. A farmer, with the object of reducing feed costs, turned his birds on to a luxurious crop of rape with the consequence that within a very short time a large percentage of eggs had olive yolks. The loss in quality cost this farmer from £4 to £5 a week for some weeks, as the trouble cannot be corrected immediately the birds are removed from the rape.

Yolk colour is an important feature in egg quality. Light yolks are undesirable, but on the other hand eggs with too dark a yolk are not classified as first quality. Greenfeed gives colour to the yolk, but it is necessary to exercise some control over the amount of greenfeed eaten to produce eggs with yolks of the right colour. All greenfeeds do not contain the same amount of colouring pigment. Eggs used for home consumption should be regarded by the farmer as a guide to yolk colour.

Quality in Cream.

Of the various defects which result in cream being graded other than "choicest," it is surprising how many are caused wholly or in part to uncleanliness in some connection. Absolute cleanliness is the first law in profitable dairying and a substantial proportion of the remedies for common cream faults come under this heading. Following are some hints on other aspects of prevention:—

Cool all cream promptly after separating.

Do not expose cream or cans to the direct rays of the sun.

Deliver to the factory frequently—not less than four times weekly. Deliver daily in summer time.

If possible, send all the cream in the dairy on days of delivery; any kept over should be kept as cool as possible.

Do not mix fresh cream with older cream until the former has been cooled. Give the whole an occasional stir to make the mass uniform, and stir at least four times daily.

Prevent cows from wading in stagnant water; udders of cows should be washed and wiped before milking.

At least once a day remove all cow droppings 100 feet from dairy, yards, and bails.

Never use milk from sick cows or from cows too soon after calving.

Use clean, sound brushware only in cleaning utensils—never use cloths.

Use only smooth, well-tinned tinware and cans, with all seams soldered flush.

If possible, keep cows away from rank or objectionable flavoured weeds. Feed cows at least two hours prior to milking—better still, feed just after milking.

Do not send a very small quantity of cream to the factory in a can of large capacity if any distance is to be travelled.

Have the engine outside the separating room, and extend the engine exhaust to blow clear of the building. Keep smoke away from the dairy, and all strong-smelling material out of the dairy. On no account use water that has been heated in the engine jacket for washing.

Do not use strong-smelling disinfectants in water for washing.

GADGETS AND WRINKLES

COMFORT FOR CATTLE.

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

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

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

NESTS FOR POULTRY.

It is difficult to design a standard nest suitable to the various types of poultry houses, but some poultry farmers could do more than they are doing to improve nesting facilities. Much of the wastage caused by dirty, cracked, broken, and heat affected eggs, and egg eating, is the result of poor nesting accommodation.

Nests should be arranged inside the pens on the partition walls and away from the weather. Place them about two feet from the ground so that they do not take up floor space. Gathering of eggs should be done several times a day. Cover the nests to keep them fairly dark and secluded, and make sure that the cover has sufficient slope to prevent the birds from roosting on it. The nests should be closed at night to prevent the fowls from roosting in them. One nest should be allowed for every six or seven birds if individual nests are used. If community nests are installed, allow 4 feet 6 inches by 2 feet for every 50 birds. Make the nests 10 to 12 inches deep, so that the litter cannot be scratched out. Clean, light litter, such as rice hulls, is suitable nesting material.

Clean, roomy, secluded nests ensure clean eggs. Small, dirty, open nests are the cause of many dirty and broken eggs.

Eggs are a valuable food and are needed urgently.

FENCE CORNER BRACING.

The most vital part of a permanent farm fence is the corner arrangement. A plan commonly in use on farms has a diagonal brace and a twisted wire truss, as shown on Plan A. With this plan the brace timber tends to push up on the top end of the corner post, and the wire truss pulls on it at the bottom. Where the fence wire is stretched it has the brace timber leverage as well as the twisted wire truss to raise post No. 2. Then a brace timber extends diagonally from one foot below the top of post No. 2 to post No. 1 at a point about one foot above the ground.

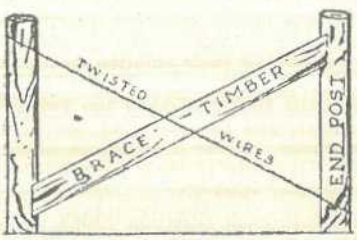
Twisted-wire stays are used for economising the number of posts and to strengthen the barbed-wire strands in support of woven wire between the posts. It is surprising what strength these little things can add to a fence.

Plan B shows a corner-post arrangement that is coming into quite general use, and is much better than Plan A. By using extra heavy posts in the ground it constitutes a very substantial corner. With light posts it is better to have two horizontal brace timbers instead of one as indicated. One brace timber should be located about a foot below the top of the two posts, and the other brace timber one foot above the ground line between the two posts. The only objection to this corner is that two posts have to take the whole strain of the fence, which is considerable when woven wire is used. Plan B is a very good corner for barbed wire, but hardly sufficient for woven-wire fence.

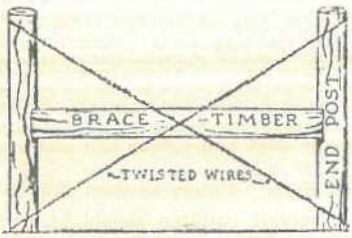
A three-post bracing system is shown in Plan C. This system avoids the tendency of the usual corner post to life when the fence is stretched, and distributes the pulling strain on three posts instead of two. The three posts are set in a straight line in order of 1, 2, 3, and can be numbered for explanation, with No. 2 as the corner post. Such posts should be eight feet in length. They can be spaced according to the length of bracing timbers available.

Use a horizontal brace timber between posts Nos. 2 and 3 about one foot from top. By using two truss wires to post No. 3 from post No. 2, extending diagonally between the two posts and crossing in the centre between these posts, the twisted-wire braces neutralise each other in bearing the fence strain or pull. For compact soil no horizontal timber near the ground is necessary, but for loose ground, when stretching woven wire, it may be advisable to place a second brace timber six inches above the ground.

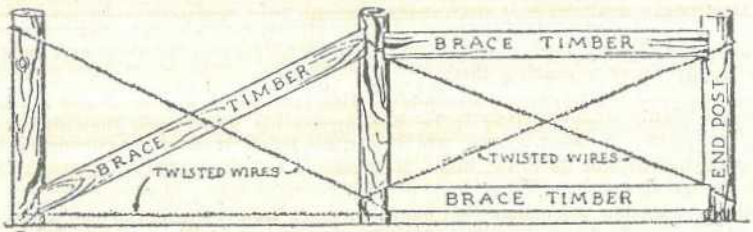
Post No. 1, located as first of the three posts, should be wired to post No. 2 with a horizontal twisted wire six inches above the ground to keep it from creeping. This No. 1 post is connected with post No. 2 by a twisted-wire brace from near its top to the bottom of regions. You can drive a split post easily, but it is difficult to drive a large round post. These small fence posts should be driven with the small end down, after being sharpened.



PLAN A

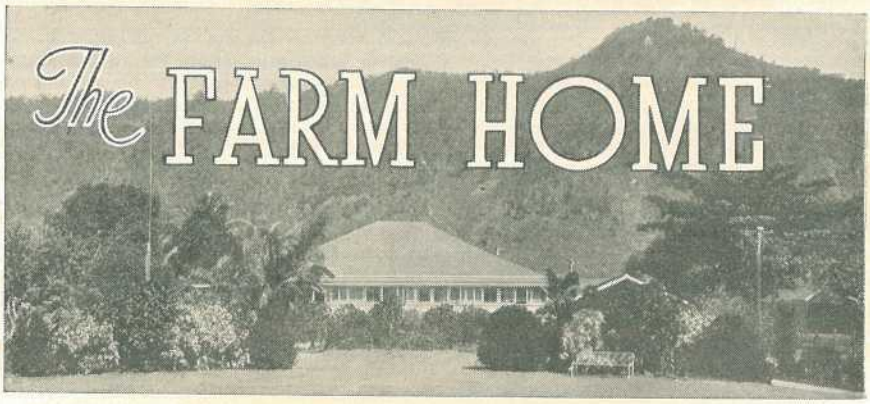


PLAN B



PLAN C

Three fence-corner arrangements. Plan C is new and carries well the strain of woven wire.



Care of Mother and Child.

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

TEACH YOUR CHILD TO BE INDEPENDENT.

THE time comes when every child must stand alone in the world. Therefore, he must be taught from an early age to face his own problems and turn them into stepping stones to success. Sound bodily health and good intellectual equipment are an excellent foundation for a happy, successful life, but even with these it is a great handicap if a young person is constantly fearing that he will fail and being always dependent upon other people for encouragement and reassurance and help.

In these days of small families and higher standards of living there is the danger that mothers and fathers will not only supply all their children's actual wants and therefore do for them many things which they are quite capable of doing for themselves, but will also create in them appetites and demands which would be better left to develop slowly and at a later date.

There are, of course, certain obvious pitfalls which confront parents in the task of training their children to be independent. Perhaps the greatest is the pleasure and satisfaction which they get out of serving their children and trying to make them happy. This satisfaction, unless intelligently controlled, will hold the child back in his development. Some parents fear that a child is too young to do this or that for himself or that he will get hurt, and later on they are afraid he may mix with bad people and pick up bad language. These are chances which must be taken and a child must be taught to accept his share of the responsibility as he grows older. Unless he does this he will become a shirker.

Certainly children should be carefully led into each situation which is strange and new whether it be the first attempt on his new slippery slide or his first paddle in the sea. We all tend to be cautious in facing new experiences and if this primary fear is wrongly dealt with it may carry through into adult life. In the same way, if we are wisely helped to adjust to new situations we get satisfaction and pleasure from feeling that we are strong enough to face up to them and so we tend to be happy about repeating them.

Success and praise are a wonderful stimulant to us all, so praise a child for each new achievement whether it be putting on his own socks, fastening his own braces or making a sand castle. On the other hand, if he fails encourage him to try again, but do not do it for him. Help should only be given when the difficulties prove too great.

Mothers should remember that children learn slowly by doing the same things themselves over and over again. It takes time and patience while the child is learning, but saves you both hours of time later.

Provide clothes that are simple and easy for the child to manage and do not be impatient if he makes a mess when he is learning to feed himself. Do not always decide for him—let him choose his own games, where he will go for a walk and so on. Let him say what *he* thinks sometimes instead of always telling him what *you* think. You can do a great deal for your child's future by starting him on the road to independence now.

Any further advice on this and other matters connected with children may be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's terrace, Brisbane*, or by addressing letters, *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

Savoury Suet Pudding.

Eight ounces flour, 4 oz. suet (or dripping), 4 oz. of finely chopped meat, 1 tablespoon finely chopped parsley, 2 good teaspoons baking powder, ½ teaspoon powdered herbs, salt and pepper, 2 oz. chopped onion. Mix all dry ingredients well, then add just enough water or milk to bind. The mixture should be stiff. Turn into a greased basin, cover with greased paper, place in boiling water and boil for 2½ hours. Serve with good rich gravy and green vegetables.

Cucumber, Tomato, Onion Salad.

Half pound cucumber, ½ lb. tomatoes, ¾ lb. onions, 1 rounded teaspoon sugar, 3 tablespoons vinegar, salt and pepper, 1 teaspoon chopped parsley. Peel the cucumber and slice thinly. Skin tomatoes and cut across in slices, and peel onion and slice to wafer thinness. Mix together the sugar, vinegar, a level teaspoon of salt and a shake of pepper. Arrange the sliced vegetables in layers in a salad bowl, pouring over the dressing as you go. Leave to stand for 20 minutes, and sprinkle with the parsley just before serving.

Stuffed Cabbage.

One young cabbage, 2 oz. breadcrumbs, 3 oz. grated cheese, 1 shallot, 1 dessertspoon Worcester sauce, salt, little beaten egg. Prepare the stuffing like this: Chop the shallot finely, and fry golden brown in a very little dripping. Place in a basin with the breadcrumbs, grated cheese, sauce and salt, and bind with a little egg. Well wash the cabbage, and with a sharp knife scoop out the hard centre stalk and fill with the stuffing. Tie in muslin and steam till tender. Place on a casserole or au gratin dish and coat with cheese sauce. Brown in a quick oven or under a grill.

Vegetable Pie.

Half ounce dripping, ¼ lb. onion, ½ lb. tomatoes, ½ lb. carrots, ½ lb. runner beans, ½ pint boiling water, ¼ lb. turnips, 1 lb. peas, or any other vegetables available, salt and pepper.

Green Tomatoes.

Tomatoes need not be ripe to be tasty. Firm and somewhat acid green tomatoes can even bring a touch of novelty to our cooking and should not be despised. They are excellent cut in slices and fried with the breakfast bacon, or served with a joint of mutton or other fat meat. Cut the green tomatoes in halves, sprinkle with a pinch of sugar and salt and bake round the joint.

Squash Pie.

Two cupfuls (breakfast cup) cooked marrow, 2 eggs (separated), 1 cupful brown sugar, ½ teaspoon grated nutmeg, ¼ teaspoon each ground cloves, allspice, cinnamon and salt, 3 cupfuls scalded milk. See that the marrow, after removing peel and seeds, is cut into large dice and well cooked (steaming is best). When tender, drain thoroughly, turn into a basin and add the egg yolks, sugar, salt, nutmeg, ground cloves, allspice and cinnamon. Beat all together. Next pour in the scalded milk and fold in the stiffly beaten egg whites; turn into a deep pie plate lined with a nice short crust pastry. Cook in a hot oven for 10 minutes, then in reduced heat for 25 to 30 minutes.

HANDY HOME HINTS.

Household Accidents.

Many grievous accidents in the home are caused by carelessness, explained afterwards in such statements as: "She slipped on the dustpan lying on the steps," or "Baby must have been able to reach the boiling saucepan." But mostly these accidents need not have happened.

Impose a strict rule not to leave brooms, buckets and the like lying about, but put them away directly when finished work.

The kitchen is a danger-trap, especially round the stove. Don't leave those saucepan handles sticking out at all angles, because children love playing with handles and you may even catch your apron string on them; a full saucepan is an easy thing to tilt, even if it be heavy to lift.

Trailing flex from a standard lamp is another cause for accidents. Run it under the carpet or coil it neatly on a wall hook.

If you move furniture round, don't forget to warn elderly relatives. Bad sight makes them creatures of habit and a low chair where they do not expect to find one may have fatal consequences.

Teaching children to be tidy is almost a life-work. But it must go on and the wise mother will cut out news items about accidents caused by carelessness and read or explain them to the children. Show how scattered toys might be death-traps. Children get real pleasure from packing their toys away tidily if shown how.

A great deal can be done by the housewife to prevent home accidents, if you remember to tidy up as you go along.

Stained Teapots.

The insides of teapots are often very difficult to keep clean of a dark brown stain which is unsightly and may effect the flavour of the tea, in spite of being regularly rinsed through when the teapot is washed. Try this way of removing the stain. Put a little powdered borax into the pot and then fill it up with cold water. Stand the filled pot in a pan of water and bring the whole slowly to the boil. Afterwards, rinse out in the usual way and the stains will have disappeared. Insides of spouts can be cleaned with a small brush. The same treatment is equally good for stained coffee pots.

How to Press a Suit.

There is an art in pressing, and one of the most important tips to remember is to press the steam into the garment. This is done by using a damp cloth and a hot iron. When you lift the iron, steam will be rising from the garment. Take a flat-backed clothes brush and knock it down hard on the part of the garment you have just pressed. Hold it there for a second or two, and then lift and hit sharply again. Continue in this way until not a vestige of steam can be seen.

Now for the pressing process. First, the jacket. Start at the left-hand front of the jacket, pressing from the bottom to the waistline. Move the part you have just pressed away from you, so that it lies, or hangs, flat and is not creased again. Continue right round the bottom part of the jacket. Then press the bust part of the jacket over a pad, then open the revers out flat and press from the underside, knocking the steam in specially well here to give a well-finished appearance. Never press the front of the revers into position; they must be just rolled back into place.

Never show a crease down the sleeve. Place the sleeve near the edge of the table or ironing-board so that the seam edge escapes the iron. Then turn the sleeve gradually round so that the whole area gets properly pressed. The shoulders should be pressed curved round the edge of the ironing-board, or table, or you can use the pad.

Now for the skirt. If your skirt has become baggy at the back, shrink it back to shape like this. Place the back of the skirt on the table and lay a damp cloth over it. Then glide the iron over the cloth in small circles, holding the whole weight of the iron in your hand. The object is to use moisture and heat to shrink the cloth before actually pressing it. When every trace of stretch has gone, press in the ordinary way.

Pleats should be tacked into position before pressing. If any shine appears after pressing lay the damp cloth on again and gently pat with the iron. This will take off the gloss.

QUEENSLAND WEATHER IN MARCH.

Only three districts received over average rains during March, the Upper West and South Coastal districts. Normal amounts were registered in the North Coast, Herbert, and Darling Downs East, with slight deficiencies in the Darling Downs West, Warrego, Upper West, and Lower Carpentaria. All other districts were substantially below normal, while in other better-served areas falls were patchy. Agricultural and pastoral prospects in Southern Queensland should range from average to good, as although there has been a deterioration in rainfall distribution since the end of 1947, the South-West got useful rains in February and the South Coast in March. Much less satisfactory conditions prevail in the tropical half of the State, which failed to receive an inland soaking distribution during the summer months. Some local heavy to flood falls in the first week of March were received north from Lucinda to Babinda and inland to adjacent tablelands, but patchier distribution in the Carpentaria districts has been insufficient, mostly below average. Following the protracted dry spell in many areas in the Lower West and Central Interior eastward to the Central Coast through the adjacent highlands, early soaking falls are required to establish reasonable wintering conditions.

Flooding.—During the first week of March heavy flood falls on the North Coast Herbert and adjacent parts of the North Coast Barron caused suspension of road and rail transport and flooding, particularly in the Cardwell, Tully, Innisfail areas, some of the heaviest 24-hourly falls being 985 Babinda and 734 Cardwell on 2nd, 1,387 Cardwell and 905 Carruchan on the 4th. Lighter amounts over the Burdekin watershed resulted in peak height of 22 ft. 3 in. at Gibson's Farm and 1 ft. 1 in. under the Inkerman Bridge on 8th. Resulting from rains at the end of February streams in the south-west of the State, Cooper's Creek and the Paroo maintained considerable run-off until the middle of the month. In the latter part of the month the cyclone operating off the Queensland coast resulted in flood amounts over the South Coast Moreton between the 22nd and 25th of several 3-in. to 5-in. 24-hourly falls; the heaviest were 539 Springbrook and 467 Burleigh Heads on 22nd, 525 Mapleton and 470 Palmwoods on 23rd. All streams from the Mary River to the southern border were affected, the Mary River reaching a peak height of 30 ft. 9 in. on the 26th.

Temperatures.—Most districts were 1 to 2 degrees above normal for both mean maximum and mean minimum temperatures. Western districts had slightly below average conditions. The south-west was well below normal, mean maximum being 4.5 degrees below and mean minimum 4.3 degrees below. Hottest parts of the State were Winton with a maximum of 104 degrees on the 13th, with 13 days 100 degrees or over, and Richmond, maximum 103 degrees on the 11th and 26th, 19 days being 100 degrees or over. Cooler minimum temperatures at the end of the month in southern districts gave the first frost for the season at Bybera on 30th. Screen minimum 35 degrees, grass minimum 27 degrees.

Brisbane.—Mean pressure $\frac{9 + 3}{2}$ 29.954 in.—Temperatures.—Mean maximum 82.7 degrees (normal 82.2 degrees); mean minimum 67.5 degrees (normal 66.4 degrees); mean temperature 75.1 degrees (normal 74.3 degrees); highest daily 91.5 degrees on 28th; lowest daily 61.7 degrees on 30th.

Rainfall.—613 points on 12 days; average, 571 points on 15 days.

Sunshine.—236.9 hours; average, 215.7 hours.

Rain position is summarised below:—

Division.	Normal Mean.	Mean March, 1948.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	1219	664	46 below
Peninsula South	687	553	20 ,,
Lower Carpentaria	398	335	16 ,,
Upper Carpentaria	344	140	58 ,,
North Coast, Barron	1379	904	34 ,,
North Coast, Herbert	1390	1387	0 ,,
Central Coast, East	603	277	54 ,,
Central Coast, West	345	205	41 ,,
Central Highlands	279	90	68 ,,
Central Lowlands	239	150	37 ,,
Upper Western	197	218	11 above
Lower Western	161	97	40 below
South Coast, Port Curtis	427	452	6 above
South Coast, Moreton	637	683	7 ,,
Darling Downs, East	277	275	0 below
Darling Downs, West	232	187	19 ,,
Maranoa	263	160	39 ,,
Warrego	193	171	11 ,,
Far South-West	133	37	72 ,,

Commonwealth of Australia, Meteorological Bureau, Brisbane

ASTRONOMICAL DATA FOR QUEENSLAND.

MAY.

Supplied by W. J. NEWELL, Hon. Secretary of the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Day.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.13	5.17	Cairns	12	46	Longreach	28	42
6	6.16	5.13	Charleville ..	25	29	Quilpie	36	34
11	6.19	5.9	Cloncurry	38	61	Rockhampton ..	2	18
16	6.21	5.6	Cunnamulla ..	30	28	Roma	16	18
21	6.24	5.4	Dirranbandi ..	21	17	Townsville ..	11	38
26	6.27	5.2	Emerald	13	26	Winton	31	50
31	6.29	5.0	Hughenden ..	23	47	Warwick	5	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	p.m.	p.m.
1	11.40	12.57
2	..	1.34
	a.m.	
3	12.35	2.06
4	1.29	2.36
5	2.22	3.05
6	3.16	3.34
7	4.11	4.04
8	5.08	4.36
9	6.08	5.12
10	7.10	5.55
11	8.15	6.44
12	9.21	7.40
13	10.23	8.43
14	11.20	9.50
	p.m.	
15	12.09	10.58
16	12.53	..
		a.m.
17	1.31	12.04
18	2.06	1.08
19	2.39	2.11
20	3.13	3.14
21	3.47	4.16
22	4.25	5.18
23	5.06	6.21
24	5.52	7.23
25	6.43	8.23
26	7.37	9.19
27	8.33	10.08
28	9.30	10.53
29	10.25	11.31
		p.m.
30	11.19	12.05
31	..	12.36

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

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

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Day.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	26	12	43	27	18	2	50	30
6	19	19	34	35	10	10	39	39
11	10	29	25	44	0	20	27	52
16	14	26	29	42	4	17	33	49
21	23	14	39	29	14	4	45	33
26	30	9	46	24	21	0	53	26
31	24	15	40	31	15	7	46	35

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Day.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	46	9	62	36	47	22	38	9
3	43	13	59	39	44	24	36	13
5	33	23	52	45	37	30	27	20
7	22	33	45	54	30	38	19	29
9	12	43	38	59	23	45	11	36
11	5	52	35	65	19	50	5	44
13	3	55	34	67	18	52	4	45
15	11	49	38	63	23	49	10	41
17	21	39	44	57	29	42	18	34
19	27	28	49	49	33	34	23	24
21	39	16	56	41	41	26	33	15
23	48	7	63	35	48	21	40	8
25	55	3	68	32	51	18	45	4
27	54	4	67	33	51	19	44	5
29	48	11	63	38	48	23	40	11
31	40	21	57	44	42	29	33	18

Phases of the Moon.—Last Quarter, May 1st, 2.48 p.m.; New Moon, May 9th, 12.30 p.m.; First Quarter, May 16th, 10.55 a.m.; Full Moon, May 23rd, 10.37 a.m.; Last Quarter, May 31st, 8.43 a.m.

About the middle of the month the Sun will rise and set 20 degrees north of true east and true west respectively, and on the 4th and 19th the Moon will rise and set approximately at true east and true west.

There will be an annular eclipse of the Sun on May 9th, but it will not be visible from Australia.

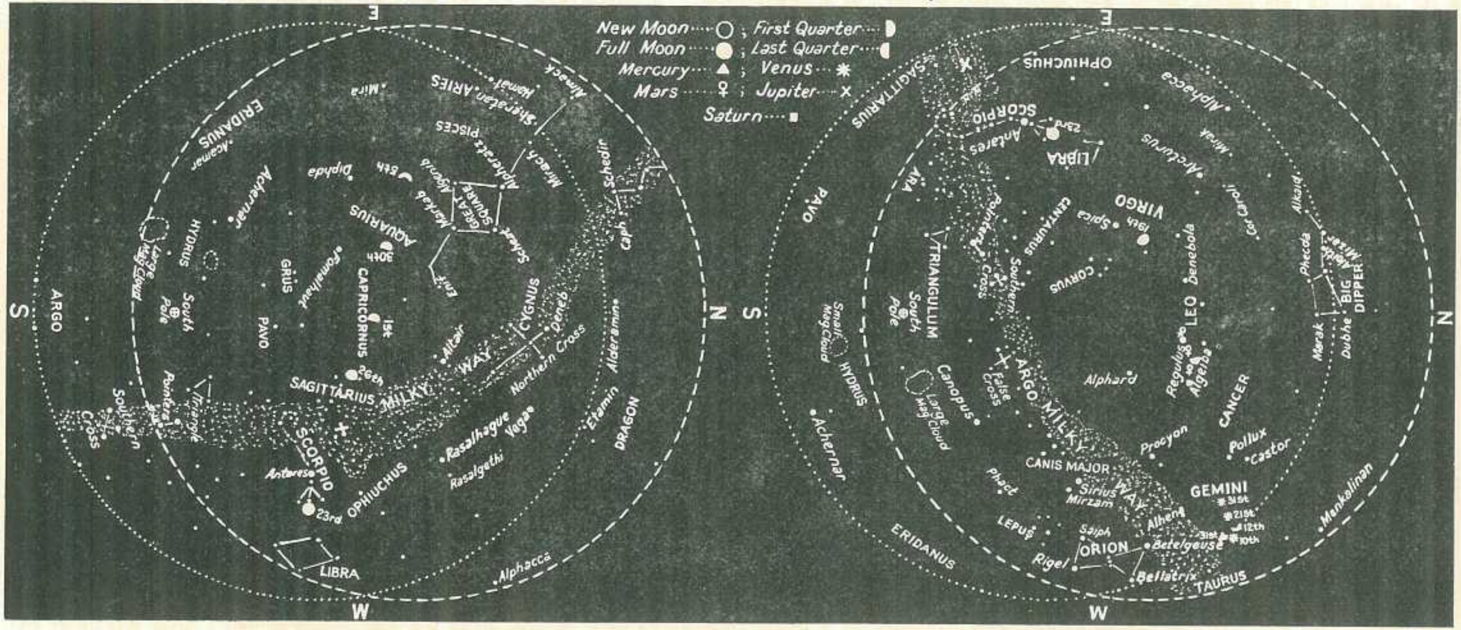
Mercury.—At the beginning of the month will set only a few minutes after the Sun and will reach greatest angle east of the Sun on the 29th, setting 1 hour 30 minutes after the Sun on the 31st.

Venus.—Will set 2¾ hours after the Sun at the beginning of May and on the 18th will reach greatest brilliancy. By the end of the month it will set about 2 hours after the Sun.

Mars.—This month, in the constellation of Leo, will set near midnight. On the 15th it will pass 1 degree to the north of Regulus.

Jupiter.—In the constellation of Sagittarius will rise between 8 p.m. and 9 p.m. at the beginning of the month and about 1 hour after sunset at the end of May.

Saturn.—At the beginning of the month, in the constellation of Cancer, will set near midnight, and by the end of the month it will set between 10 p.m. and 11 p.m.



Star Charts.—The chart on the right is for 7.15 p.m. in the south-east corner of Queensland to 8.15 p.m. along the Northern Territory border on the 15th May. (For every degree of longitude we go west the time increases 4 minutes.) The chart on the left is for 10 hours later. On each chart the dashed circle is the horizon as viewed from Cape York, and the dotted circle is the horizon for places along the New South Wales border. When facing north, hold "N" at the bottom; when facing south, hold "S" at the bottom, and similarly for the other directions. Only the brightest stars are included and the more conspicuous constellations named. The stars which do not change their relation to one another, moving east to west, arrive at any selected position about 4 minutes earlier each night. Thus, at the beginning of the month the stars will be in the positions shown, about 1 hour later than the time stated for the 15th and at the end of the month about 1 hour earlier than that time. The positions of the moon and planets, which are continually changing in relation to the stars, are shown for certain marked days. When no date is marked the position is for the middle of the month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

MARCH.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	March	No. of years' records.	March 1947.	March 1948.		March	No. of years' records.	March 1947.	March 1948.
North Coast.	In.		In.	In.	*South Coast—cont.*	In.		In.	In.
Atherton	9·08	42	10·89	11·07	Gatton College ..	3·33	44	4·98	..
Cairns	18·16	61	15·67	12·38	Gayndah	3·10	72	9·56	3·47
Cardwell	15·77	71	21·98	31·22	Gympie	6·13	73	9·21	6·37
Cooktown	15·28	67	12·78	7·99	Kilkivan	3·90	62	9·57	3·43
Herberton	7·93	57	4·83	6·75	Maryborough ..	5·90	72	9 39	7·70
Ingham	15·99	51	25·73	11·08	Nambour	9·41	47	21·17	14·32
Innisfail	26·81	62	32·44	18·73	Nanango	3·42	61	6·56	3·94
Mossman	18·75	19	16·44	12·11	Rockhampton ..	4·48	72	5·76	4·22
Townsville	7·11	72	11·75	2·29	Woodford	7·90	55	9·89	10·38
Central Coast.					*Central Highlands.*				
Ayr	6·37	56	19·11	3·89	Clermont	3·16	72	1·91	0·63
Bowen	5·74	72	8·51	1·31	Springsure	2·97	74	2·81	1·23
Charters Towers ..	3·71	61	3·89	1·74					
Mackay	12·09	72	5·57	2·40	*Darling Downs.*				
Proserpine	12·17	40	10·90	5·92	Dalby	2·74	73	5·14	1·95
St. Lawrence ..	5·41	72	5·55	3·05	Emu Vale	2·47	47	3·83	2·02
					Jimbour	2·43	64	7·15	2·11
South Coast.					Miles	2·74	58	3·53	1·12
Biggenden	3·98	44	11·47	5·52	Stanthorpe	2·59	70	6·08	3·89
Bundaberg	5·35	60	9·10	5·09	Toowoomba	3·78	71	8·48	3·76
Brisbane Bureau ..	5·71	96	11·24	6·13	Warwick	2·60	78	3·36	3·07
Caboolture	7·83	67	14·62	9·74					
Childers	4·84	48	16·66	9·14	*Maranoa.*				
Crohamhurst	11·12	50	17·69	..	Roma	2·72	69	1·93	2·11
Esk	4·72	56	6·51	3·76	St. George	2·15	62	5·88	1·64

CLIMATOLOGICAL DATA FOR MARCH.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	88	74	91	12, 14, 23	71	5, 15	1238	18
Herberton	..	80	64	86	15, 24	60	25	675	12
Townsville	..	88	74	93	23, 24	69	27	229	11
Rockhampton	29·91	87	70	93	15, 26, 28, 29	67	20, 31	422	14
Brisbane	29·99	83	67	91	28	62	30	613	12
Darling Downs.									
Dalby	..	85	63	91	28	50	30	195	3
Stanthorpe	..	76	57	86	8	36	29	389	16
Toowoomba	..	78	61	84	8, 27	50	28	376	14
Mid-Interior.									
Georgetown	29·83	93	72	99	25, 26	62	16	215	8
Longreach	29·92	97	66	100	11	58	15	114	8
Mitchell	29·97	84	64	94	9	47	30	105	7
Western.									
Burketown	..	92	74	99	24, 28	66	16, 17	433	9
Boulia	29·87	95	70	101	11	58	30	167	2
Thargomindah	29·95	87	64	94	10, 31	50	30, 31	12	2

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