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Contents

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Event and Comment.

The World Food Position.

A REVIEW of the world food situation, based on recent statements from the United Kingdom Food Mission to Australia and the United States Office of War Information at Sydney, shows that the estimated world production during 1945 will not enable all demands to be met; and that one of the most serious problems is how to apportion the available supplies amongst all the deserving claimants.

Because of the great wartime increase in requirements, most of the major foodstuffs have been in short supply since the war began. As the climax of the war approaches, discrepancies between supplies and requirements are becoming wider.

Food production in the United States has increased substantially above the pre-war level. Of particular significance, however, is the fact that world production of essential foods is expected to be smaller than it was in 1944. British Empire and United States stocks of scarce commodities will be reduced to the working minimum. United Kingdom stocks will be reduced to the extent made possible by the disappearance of the hazards and uncertainties against which these stocks were accumulated—threat of invasion, sinkings by submarines and other risks.

All military needs as well as liberated area requirements are higher than in 1944. The needs of the people of the liberated lands are increasing from day to day. Army requirements are affected by such factors as increase in troop strength; increase in the number of prisoners of war; increase in military relief requirements; and expansion of war activities in the Pacific after V Day in Europe.

Of these factors, relief needs are increasing with the progress of the war, and present indications are that relief feeding this year will become so great as to involve cuts in present food allocations, and that raises the question as to the desirability and feasibility of further reductions in civilian consumption in all the countries concerned.

Prospective world meat supplies in 1945 will be inadequate for all requirements, and discussions are continuing in an effort to reach an agreement on the utilization of supplies expected to become available. Production in the United States is expected to be 10 per cent. below 1944. In Australia and Argentine, drought has reduced prospective meat exports.

The summary and commodity statements under review deal primarily with those foods for which demands are outrunning prospective supplies. Supplies of many other foods are, however, of record or near-record size.

In respect of Australia's food production particularly, informed people in Britain are very appreciative of the great efforts which Australian farmers have made to maintain and, if possible, increase production in face of the many severe difficulties, including adverse seasonal circumstances, under which they have had to carry on. In Britain, however, it has been increasingly difficult even to maintain existing food rations on the skimpy scale which has had to be endured for six winters of blitz, blackout, blast and blockade. For most of the war years no one in Britain has had more than about a pound of meat a week on the average and there have been no exceptions to this rule, even for the Royal Family. With less meat from the United States and other meat exporting countries in prospect, the British people may have to do with even less this year. Other major foods are practically on a week to week supply with little, if any, reserve margins.

The people of Britain have put up cheerfully with food shortages and strict rationing throughout the war years. During all that time, the rations available to them have been far the lowest in quantity which any English speaking community has been called upon to accept.

During the war, Britain has already shown how by careful organisation farm production can be enormously increased. Without the good organisation and supreme effort of her farmers, Britain would not have survived to-day, because she could not have been fed. When the war broke out, her own farms produced only about 30 per cent. of her total food requirements. To-day, the farms of Britain produce about 70 per cent. of her food consumption, though it is realised that this consumption is not on anything like the generous pre-war scale. The people of Britain are now dependent on overseas supplies for only about 30 per cent. of their food, but that proportion is made up of essential items, such as meat and dairy products.

For the foregoing and other obvious reasons, Australian producers are urged to do everything within their means and within the scope of their opportunities to increase their output as a practical contribution to the stability of a hungry and war devastated world.

Choosing Wheat Varieties for Grain.*

R. E. SOUTTER, Senior Research Officer.

THE climatic and physical features of the Queensland wheatgrowing regions have resulted in an expansion of the industry in a north-south direction. In view of this, it has been necessary to evolve or

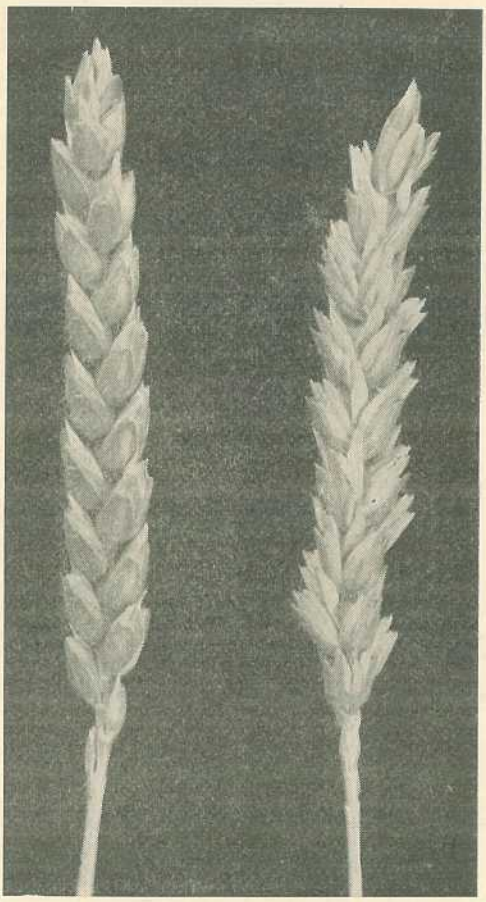


Plate 76.
Bunge No. 1.

* Reprinted, with additions and modifications, from Vol. I. of the *Queensland Agricultural and Pastoral Handbook*.

obtain varieties suited to the varying conditions, which are possibly of wider range in this State than in any other in Australia. Fortunately, the grower of to-day is much better off than the wheat farmer of some years ago, for the knowledge which he possesses of the requirements and merits of a variety or varieties enables him to select the best for his particular set of conditions. Ultimate success depends largely on a wise choice of varieties sown at the right season. No matter what time and skill have been successfully expended on the preparation of the seed-bed, the whole of that work can be rendered more or less valueless by selecting unsuitable varieties or by sowing out of season.

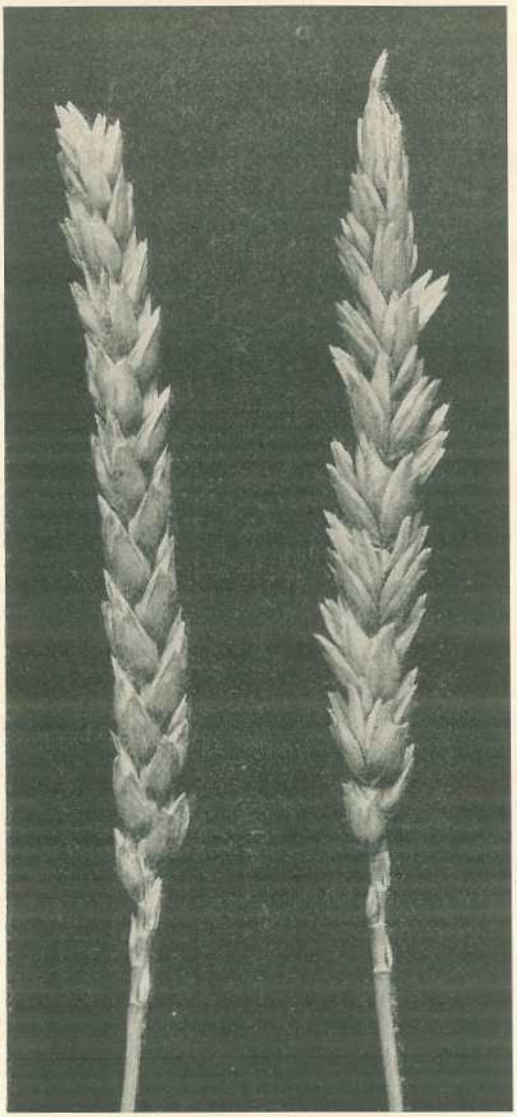


Plate 77.
CEDRIC.

Many of the new wheats introduced to or evolved in Queensland, which have come into general cultivation, are earlier in habit than their predecessors. This is due to the fact that the characteristic mentioned enables them to escape rust to some extent in seasons when it is prevalent, and in years of limited rainfall they produce grain under conditions fatal to slow-maturing varieties. This earliness, however, in conjunction with unseasonable sowing, is also a contributing factor to losses due to late frosts. Many growers interpret wrongly the terms "early" and "late" as applied to wheat. These expressions are used in relation to maturity, and not to sowing. A late wheat is one to be sown early; an early variety one to be sown late; and a medium late for sowing medium early. It would probably be far better if the terms "quick" and "slow" were adopted instead.

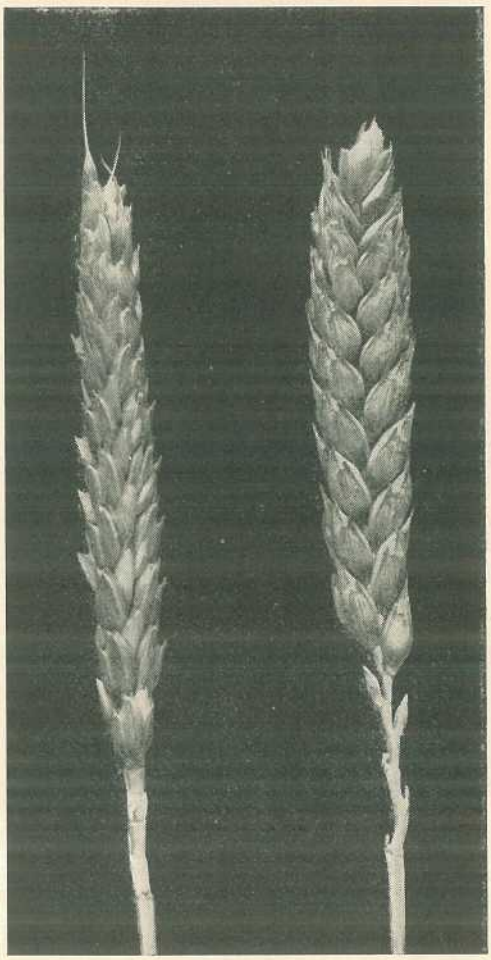


Plate 78.
Currawa.

A brief description of the varieties recommended, with their season of maturity and the soils whereon and the districts wherein it is considered they can be grown satisfactorily, is given in the following paragraphs.

Bunge No. 1.—A selection (Plate 76) made at the Hermitage State Farm, Queensland, which was, for some years, first favourite in the Maranoa for hay and grain. It is a medium early, tall, sparse-stooling variety, rust-escaping, but susceptible to bunt. Grain medium large, of fairly good milling quality, stores well, although inclined to deteriorate rapidly if wet conditions are experienced after ripening. Suitable for sowing on all classes of soil ranging from medium-heavy to light in any of the wheatgrowing districts.

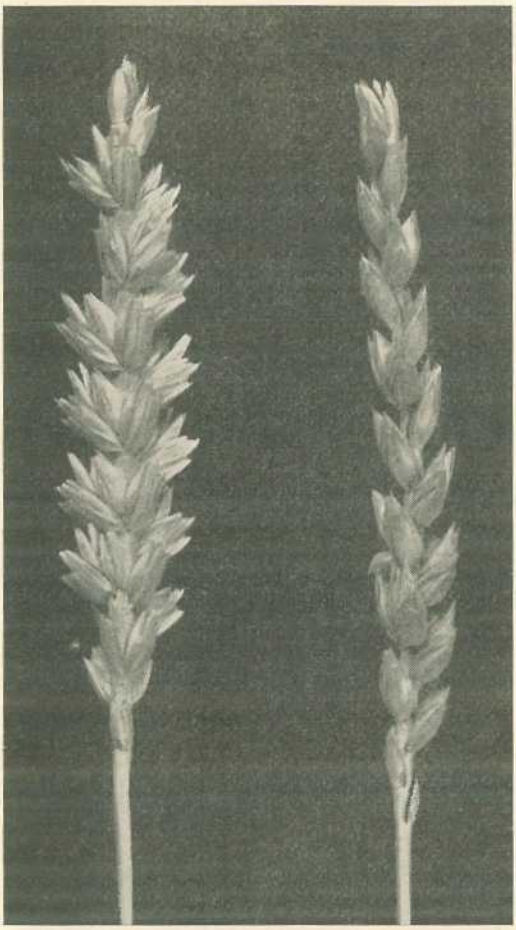


Plate 79.
PUORA.

Cleveland.—An introduced, slow-maturing variety from New South Wales, and, therefore, suitable for early sowing; grown extensively for green feed and grazing on the Eastern Downs, more particularly on the heavy black soils in the Pittsworth district. It is a vigorous grower and a good stooler, with a straw inclined to be stout; ears medium size, tapering, with white chaff. Fair rust-resister, and not very susceptible to bunt. Grain medium strong, white, plump, of medium size. Recommended for growing on the heavy and loamy soils in the cooler wheatgrowing regions.

Cedric.—A Queensland variety (Plate 77) resulting from the crossing of Bunge No. 1 and Cedar, a New South Wales variety. Cedric is a mid-season, medium-stooling, tall-growing wheat with a willowy straw. Head bald, medium long, tapering, drooping slightly, with creamy-white chaff. Grain medium large, red, with good milling and storing qualities. Fairly rust-resistant, but susceptible to bunt. Suitable for growing on medium heavy soils, loams, and sandy loams throughout the wheat belt.

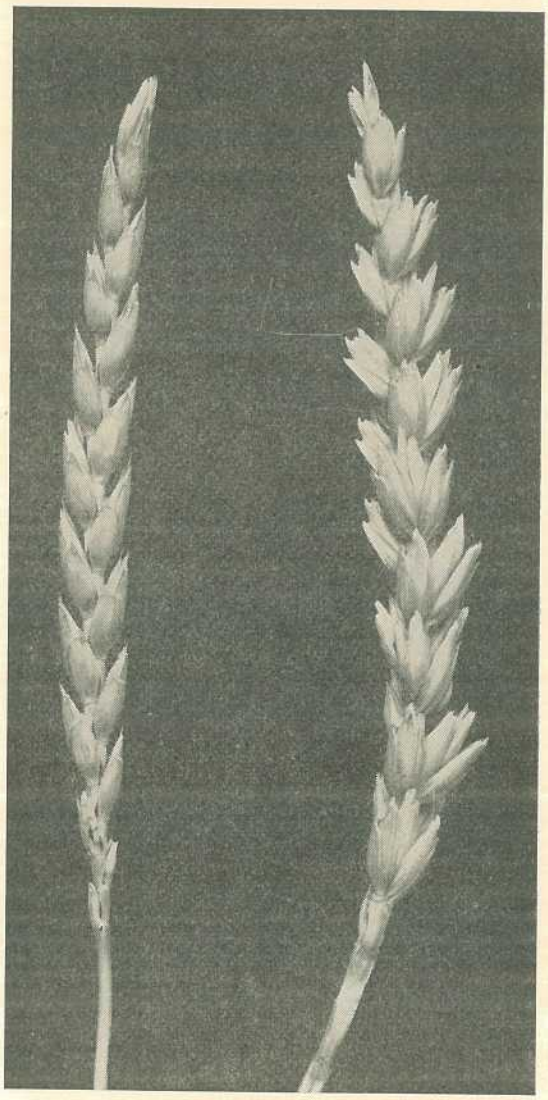


Plate 80.
Warput.

Currawa.—A slow Victorian variety (Plate 78) which must therefore be sown early to ensure success. It is grown extensively on all

classes of soil on the Downs as a dual-purpose crop—i.e., for grazing and grain, for which it excels easily all other varieties, providing as it does, under favourable conditions, plenty of feed; after which, if permitted, it will very often return a heavy yield of grain. For grazing purposes, it is sown, if conditions are favourable, in March. It tillers remarkably well and has a rather coarse, hollow straw. Ear clubbed, medium length, broad, with few tip awns. Grain yellow and opaque, is not favoured by millers; fairly rust-resisting. Suitable for sowing in those districts with the longest season and most generous rainfall. It is not recommended solely for grain production, however, as, owing to the quality, it is subject to dockage by the Wheat Board.

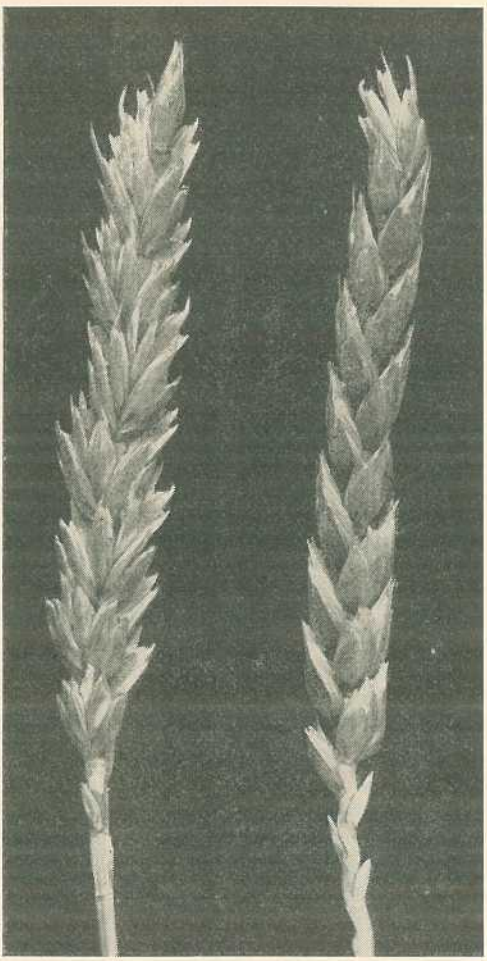


Plate 81.
GLUYAS.

Eureka.—A selection from the cross Kenya x Florence x Dundee made in New South Wales in 1932. An early mid-season variety of medium height, with strong straw. Head is brown-chaffed, of medium density, and carries few short awns on upper spikelets. Holds grain

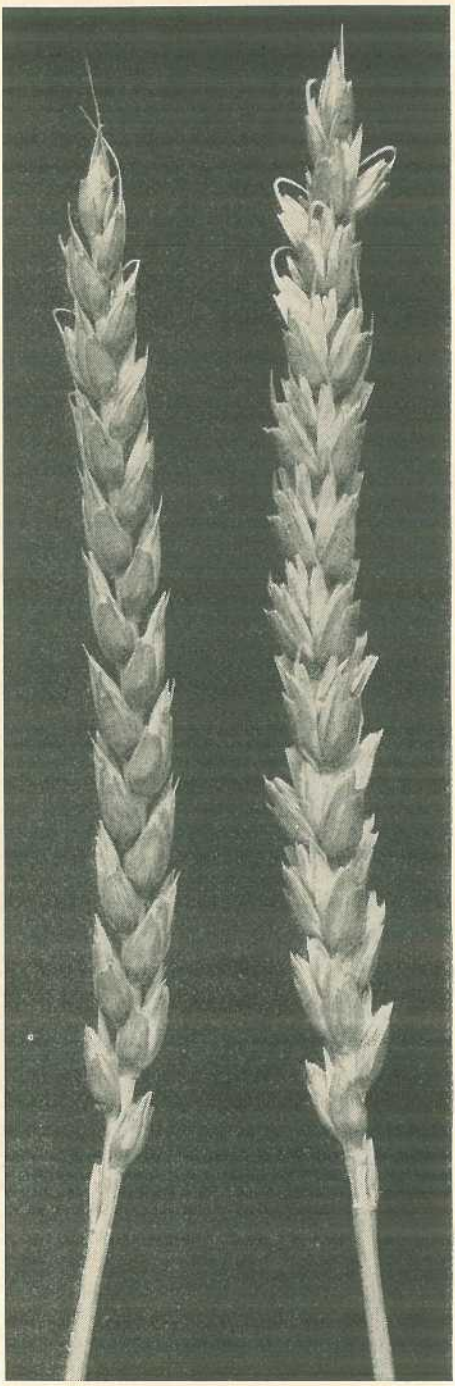


Plate 82.
Ford.

well. Milling and baking quality is satisfactory. Stem rust and bunt resistant. A promising variety for sowing on the near-heavy and heavy soils.

Florence.—Produced in New South Wales in an endeavour to evolve a bunt-resistant variety. How successful the effort was may be gathered from the fact that in the susceptibility trials in Queensland in which it was included for some years, it did not on any occasion show infection, whereas the varieties infected from the same source showed up to 70 per cent. Florence has long been a favourite with growers for late sowing. Fair stooler, with straw of medium height and fineness. Ear tips awned, white chaff and open glumes. Grain of good milling quality, which is inclined to shell out. Suitable for green feed, hay, or grain.

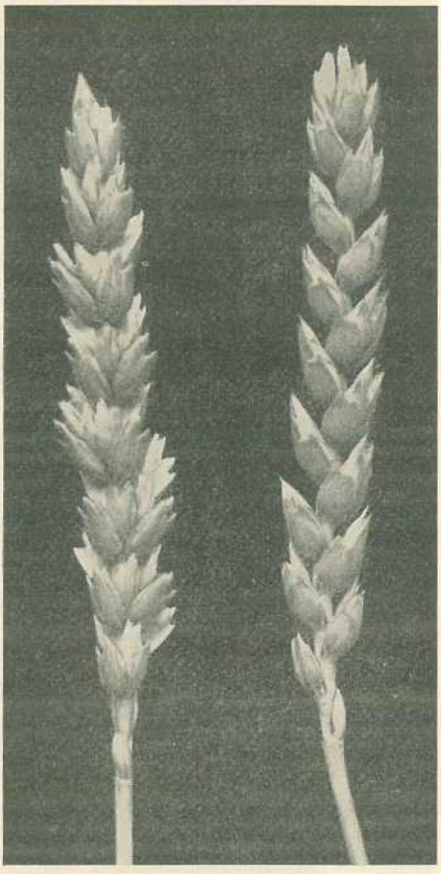


Plate 83.
FLORA.

Ford.—A South Australian variety (Plate 82) produced as a result of crossing (Fan × Comeback) and (Zealand × Tardent's Blue). Suitable for green feed, hay or grain. Medium late. Good stooler, tall. Ear white, long tapering, with divergent awns. Good dry-season wheat when sown early. Moderately resistant to stem rust. Grain soft, white, of medium strength. Suitable for medium early sowing over a wide range of districts.

Puno.—Of Queensland origin. Produced as a result of crossing Pusa and Novo. On account of its grain being of better quality and being somewhat similar in other essential characters, it was liberated in 1939 with a view to superseding Novo.

Puora.—A Queensland variety (Plate 79) produced as a result of crossing Pusa and Flora. Grain only. Mid-season, medium tall, erect, yellow-strawed, fair stooling wheat. Ear of medium length and flattened. Creamy smooth chaff well filled. Grain medium size, hard, translucent, of medium strength. Good dry-weather wheat, with slight rust-resistance. An excellent variety for the main crop sowing over a wide range of soil types throughout the Downs. Occupied premier position among the varieties grown during the last three seasons.

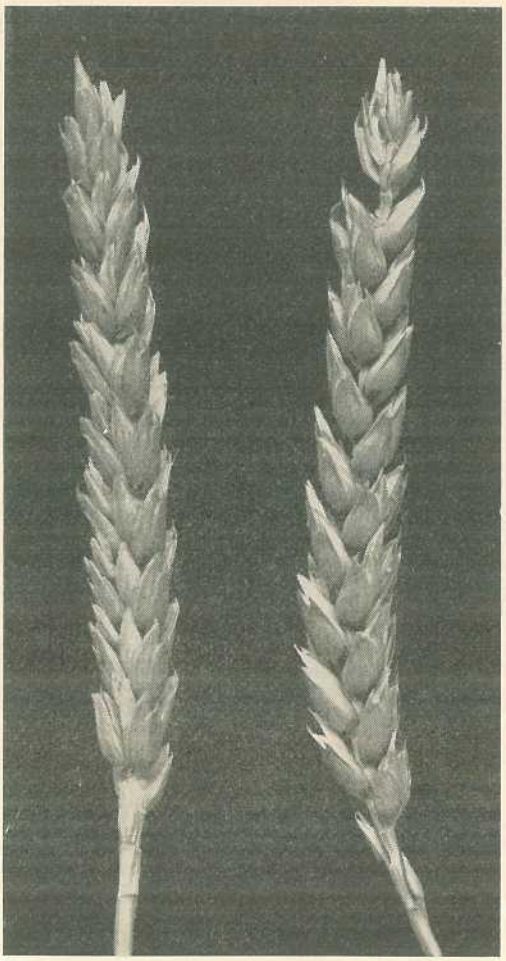


Plate 84.
Novo.

Warput.—A Queensland variety (Plate 80) produced as a result of crossing Pusa and Warren. Suitable for green feed, hay, or grain. Medium late, good stooling, tall, erect, yellow-strawed variety. Ear

long, tapering, smooth creamy chaff. Grain medium large, medium soft, of medium strength. Slightly earlier-maturing than Ford, but generally suitable for same localities as that variety.

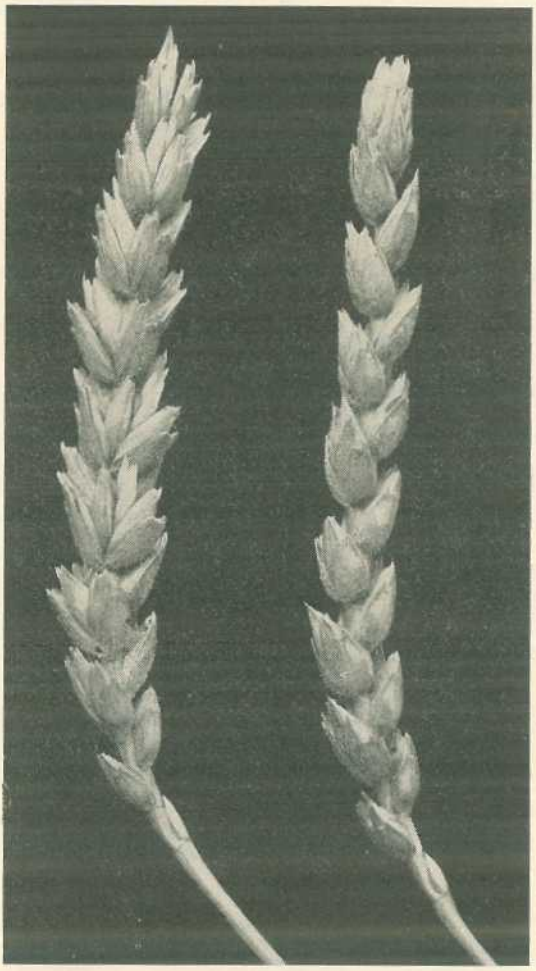


Plate 85.
PUSA.

Gluyas.—Selected originally from a crop of Ward's Prolific wheat at Telowie, South Australia. Has been a firm favourite in Queensland for over a quarter of a century. Its liability to lodge under adverse weather conditions caused the area devoted to it to recede, more particularly in those districts where the stripper was used to harvest the crop. With the coming of the header-harvester, with which it is possible to harvest badly-laid crops with little loss and extra cost, the area under it (Plate 81) has increased again. It is pointed out, however, that its inherent gluten quality is so low that this variety is not favoured by millers.

Flora.—A mid-season, erect, fair-stooling variety (Plate 83) of medium height, which has come into favour. The ear is bald, of medium

Plate 86.
THREE SEAS.

size, with white smooth chaff. Shotty grain, medium size, of pleasing appearance, of medium strong class. Fairly drought-resistant, but susceptible to rust. A Queensland production, the result of crossing Bobs with Florence. Flora was the most extensively grown variety for a number of years, but receded to fifth place in 1944.

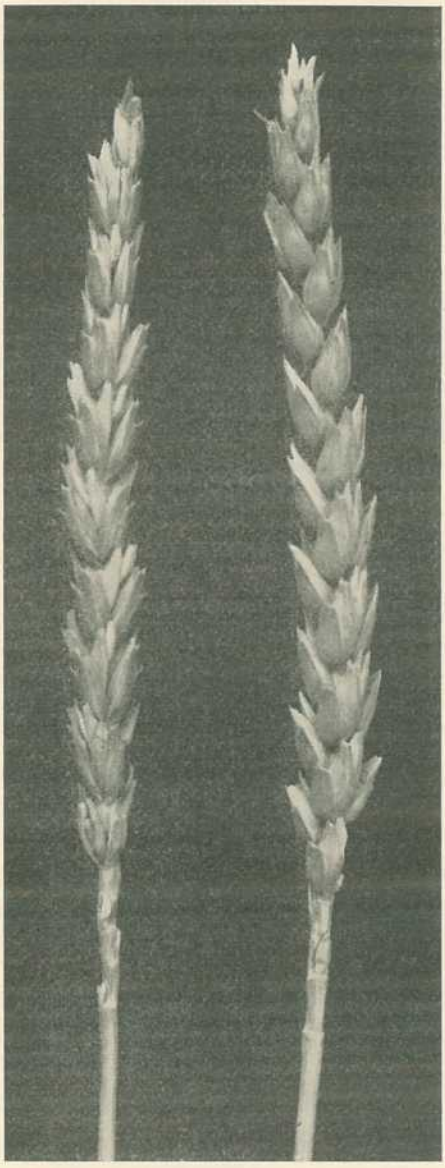


Plate 87.
WARCHIEF.

Novo.—A Queensland variety (Plate 84) produced by crossing Bunge No. 1 with Indian Pearl. A medium quick variety, ear short and

compact, glumes hooked, willowy, medium length straw, good stooler. Grain medium large, hard, tapered, translucent, of poor gluten quality. Fairly drought-resistant, but susceptible to rust and bunt. Is grown most successfully on the light loams.

Pusa.—This variety (Plate 85) was introduced to Queensland from Pusa, India, many years ago. A quick, medium tall variety, erect, ear medium length, brownish pubescent glumes, bald, tapering. Although susceptible to frost, it generally escapes rust in normal seasons. Grain hard, translucent, of strong class. It has proved to be one of the best quality wheats in general cultivation throughout the State, for which reason it has been used most extensively as a parent in breeding operations.

Seafoam.—A Queensland variety of the same parentage as Three Seas. A quick, medium, tall, bearded variety; white, smooth chaff. Stools fairly well. Rust-resistant, but susceptible to frost and bunt. Good dry-season variety, prolific. Grain medium soft, of the medium strong class. A wheat suitable for the medium to medium heavy soils of the Downs.

Three Seas.—Of Queensland origin, being the result of back-crossing Comeback x Cretan with Comeback. A variety (Plate 86) which has come into favour for late sowing, especially on the Downs soils, on account of its rust-resistance. A medium, short-strawed, white, smooth-chaffed, bearded wheat; medium quick and prolific yielder; susceptible to frost. Grain large, medium soft, of the medium strong class.

Warchief.—Mid-season Queensland variety (Plate 87), tall, good stooler, ear medium long, bald, tapering, white-chaffed; fairly resistant to leaf rust and bunt, but susceptible to loose smut. Suitable for green feed, hay, or grain, although a weakness in the straw is sometimes noticeable on rich soils in a good season. Grain white, flat on crease side, belongs to the weak class. Mostly grown in the Downs area.

Warren.—A New South Wales variety. This is an old, well-tried wheat, mid-season to slow, good stooler, medium tall, with bald, white, tapering ear. Grain, which belongs to the weak flour class, is of fair size and appearance. Is susceptible to bunt and loose smut, but fairly rust-resistant. Can be grown for green feed, hay, or grain, although in good seasons on strong soils the straw is inclined to become weak.

Sowing the Wheat Crop.

R. E. SOUTTER, Senior Research Officer.

GRAIN drilled in has a far better chance of germinating satisfactorily than grain sown broadcast, for it can be placed in the soil at the desired depth and it is protected from predatory birds and animals through being well covered. Drilling where the soil is in a favourable condition not only ensures germination, but also results in a saving of up to 50 per cent. of seed as compared with broadcasting.

Drills.

Two types of drill are at present in general use—the disc and the cultivator-drill; although the former is the older and more widely distributed, the latter is fast superseding it. Being practically two implements in one, it is possible with the cultivator type to give the final working and to sow the seed at one operation, with the soil in a favourable condition to ensure good germination. The cultivator-drill, with its variety of teeth, has been a great boon to wheatgrowers and has filled a long-felt want, especially on holdings where the soils are of a clayey nature and are inclined to run together after rain; it is also a very valuable implement when fields have become foul with winter weed seeds. On soils which tend to cake after rain, a grower working a cultivator-drill can afford to wait until enough rain has fallen to make them sufficiently moist to bring about germination, before sowing. On such soil types, if sown dry, there is always a likelihood, after rain, of the surface setting to a hard crust, tight enough to prevent the young wheat from breaking through the surface, more especially if only pinched seed has been available for sowing. On weedy soils, as on all others, sowing after rain with a cultivator-drill means also a final cultivation which restores the mulch and ensures the destruction of innumerable germinating weed seeds. Furthermore, if the following rains are long delayed, the young wheat plants can still become well established and so able to compete successfully with any later weed growth.

With the removal of the grain tubes and attachments, the cultivator-drill can be used continually as a spring-toothed or rigid tine cultivator for the summer working of fallows.

Both the disc and cultivator-drill can also be utilised for the sowing of seeds from the size of linseed to peas, and can be purchased with a fertilizer attachment capable of distributing any kind of commercial fertilizer.

Though not advocated as a general practice, it is sometimes advisable to sow dry where it is the intention to have a large acreage and the main sowing period has passed. The justification for doing so is that there is always a possibility, when the weather does break, that it will continue to be showery and it might be weeks before the sodden condition of the field permits the completion of sowing. Of course, the soil wherein the seed is placed must be sufficiently dry not to induce sprouting.

A word of warning must be given at this juncture. Grain left in drills overnight and in drills driven from one field to another is liable to consolidate to such an extent that when the implement is thrown into gear and started up so much strain is thrown on it that a serious breakdown may be the result. More particularly does this apply to grain

which has been treated with dry powder for disease control. Such a happening can be avoided by giving the grain shaft a turn or two backwards and forwards with the testing handle before starting the machine again on its work.

Depth of Sowing.

The depth of sowing is controlled by many factors, the chief of which are the type of soil, the condition of the surface, the moisture content, and the season; from 2 to 2¼ inches, however, is considered to be the most favourable depth at which to sow.

Occasionally on light soils grain is planted deeper to ensure germination, while on clayey soils, which set down hard, many seedlings would fail to reach the surface if sown 2¼ inches deep should heavy rain fall immediately after the seeding. Evaporation becomes slow and germination is tardy as the season advances; so the depth of sowing should then be reduced sufficiently to ensure that the seed is buried just deep enough to be protected from birds and other animal pests.

Rate of Sowing.

The amount of seed to sow per acre is governed by the size of the grain, the condition of the seed, the variety, and the time of sowing. As a general rule, however, 30 to 35 lb. per acre will suffice in the Maranoa for early and mid-season planting—i.e., from April to the third week in May; whereas on the Downs 40 to 50 lb. are necessary. On areas sown later in the former district 40 to 45 lb. are recommended; whereas on the Downs 50 to 60 lb. are planted. These rates are for drilling, but for broadcasting they should be increased by as much as 100 per cent. in some cases.

Weathered grain and that treated for the prevention of disease will not run as freely as a nice, bright sample of untreated seed; consequently, it is advisable, before commencing sowing operations, to weigh out a few pounds of the grain to be sown, and put it in the drill, the grain then being sown and the area covered by it calculated. From this calculation the machine can be set to sow at the desired rate.

Weathered or other grain about the vitality of which there is even the slightest doubt should be submitted to a germination test so that the correct rate of seeding may be determined.

Direction of Sowing.

With the disc drill it is desirable, if at all possible, to plant at right angles to the last working to ensure that all the seed is well covered and germinates evenly; otherwise, where the drill travels in the same direction as, say, a plough finish, some of the seed is only just covered, and in some instances even left lying on the surface, with the result that it may not germinate until later than the bulk of the sowing, thus resulting in uneven ripening. With the cultivator-drill there is no necessity for such a procedure and, if the field is level, it can be sown round and round. In the event of the field being on a slope, it is, however, advisable to follow the level contour in the same manner when drilling as when ploughing. This will enable the rows of plants to retard the run-off of storm waters and thus obtain a greater penetration of moisture, with a consequent beneficial effect on the crop and a marked reduction in soil loss.

William Farrer Centenary.

THE 3rd April, 1945, is the 100th anniversary of the birth of one who has been described as Australia's greatest benefactor—William James Farrer. Certainly no one in Australia has contributed more and so directly to the wealth of the nation, and it is probable that we do not yet recognise the extent of the debt we owe to him.

Farrer commenced his wheat breeding researches in New South Wales in 1885, at a time when wheat varieties were of inferior quality and when yields were so erratic as a result of the ravages of rust and drought that wheat had to be imported to meet local requirements.

The phenomenal increase in the yield per acre and on the total yields for wheat produced in Australia for several decades from 1910 onwards was a direct result of Farrer's pioneering work. Farrer's wheats over a period of years averaged up to 6 bushels an acre more than the old varieties.

Plate 88.
WILLIAM JAMES FARRER, Australian Wheat Breeder.
Born 1845—Died 1906.

Farrer commenced his work in a new and uncharted field. He was neither trained nor experienced as an agriculturist, yet by his painstaking work, his careful observations and, above all, his intelligent interpretation of those observations, he gave this country wheats which

resulted in an extension of the wheat belt, wheats of better yielding capacity and wheats which permitted development of an export trade on the world's markets.

Not only did Farrer work on the problem of drought and disease resistance, and on such special qualities as in the case of Federation which would permit the use of the stripper, but he was specially concerned also with the development of quality in wheat.

He had as one of his objectives the production of a wheat which would provide a flour for making the loaf of bread of higher food value because of its increased protein content. Such an achievement, he considered, would be a direct contribution to a higher standard of living for the community.

Farrer was a member of the New South Wales Department of Agriculture from 1898 until his death on 16th April, 1906. He was a pioneer investigator in wheat breeding research. Although a graduate of the University of Cambridge and trained as a surveyor, he had little in the way of experience or training for the work to which he devoted his life. His mind, however, was one of exceptional vigor and originality, although the casual observer was inclined to regard him as an unpractical theorist.

His methods, nevertheless, were eminently successful. His ideals and his objectives were clearly and constantly before him. His most spectacular result was the production of the wheat variety Federation, a variety which even 25 years after his death was widely cultivated in Australia.

Soon after his death in 1906, a public meeting resulted in the formation of the Farrer Memorial Trust. Funds were collected and are now administered by the Trust in the award of scholarships for research on wheat problems.

A bronze bust of Farrer was erected in Monaro street, Queanbeyan, in 1935. It bears an inscription in Farrer's own words, "I want to think that when the end comes, my life has not been wasted."

A few miles away at Lambrigg, overlooking the scene of his early labours, the Commonwealth Government has erected a memorial to his memory as "an enduring token of the gratitude of a nation to a great man of science."

Farrer's work still goes on. During the last 40 years other plant breeders and other investigators have made their contributions to the national welfare, but Farrer's life and work should be a constant source of inspiration to us all. Truly may he be regarded as a great Australian.

Cotton Harvesting.

W. G. STEELE, Instructor in Agriculture.

MANY cotton crops are now approaching the harvesting stage, and it is emphasised that care and thought expended on the harvesting operation will be well repaid. With the present shortage of labour, many growers will probably find it necessary for their families and themselves to pick more of the crop than in normal times. It will be advisable, therefore, in such cases to commence harvesting as soon as reasonable tallies can be obtained. Usually this would be when there is approximately 200-300 lb. per acre of open cotton or an average of four to six well-developed open bolls per plant in a field with a normal stand of plants. By starting then, the picking can be completed before there is a large number of open bolls per plant, thus reducing the possibility of storms damaging much of the crop.

Hand Picking.

Cotton, when it first matures, has a brightness or "bloom" which must be preserved if top grades are to be realised; hence, it is advisable to harvest the cotton before rain and sunlight have dulled its colour. Prolonged exposure to the weather may badly stain cotton and also cause it to lose weight; furthermore, strong winds tease out the locks so that dust and trash are impregnated in the fibres, thus increasing the difficulty of cleaning at the ginnery and thereby lowering the grade of the resultant lint cotton (Plate 89). In addition, loss of crop is often brought about by the locks being blown on to the ground, where they become so dirty and discoloured that they should not be harvested.

On the other hand, care should be taken not to harvest any cotton which has not had time to dry out properly after opening. This "green" cotton, as it is called, has a characteristic shiny, matted appearance, which is easily recognised amongst the more mature cotton in the bale. The fibres of green cotton are usually cut considerably during the ginning operations and the resultant lint is of a type unsuitable for many spinning requirements, which necessitates it being sold at a reduced price. Moist, green seed cotton also tends to sweat and thus stain any cotton with which it is packed in a container. This also applies to seed cotton which has been wet by rain or heavy dew. Cotton which has been wet by rain should be allowed to dry out for two or three days before it is picked. This also gives the sun and wind a chance to fluff out the matted fibres, thus making picking easier and also improving the appearance of the cotton owing to the bleaching action of the sun.

Where pickers are employed, drying is especially important as the added moisture can cause a considerable increase in weight, for which the grower has to pay. Where heavy dews are experienced and the cotton contains an excess of moisture for the first few hours in the morning, it is necessary to spread the contents of the picking bag on to suitable containers—such as spare bales at the end of the rows. If this cotton is turned once or twice during the morning it will be dry enough to bale up with the remainder of the day's pick.

Particular care should be taken to see that no hard, dirty, or diseased locks are picked (Plate 90). Such locks, although forming

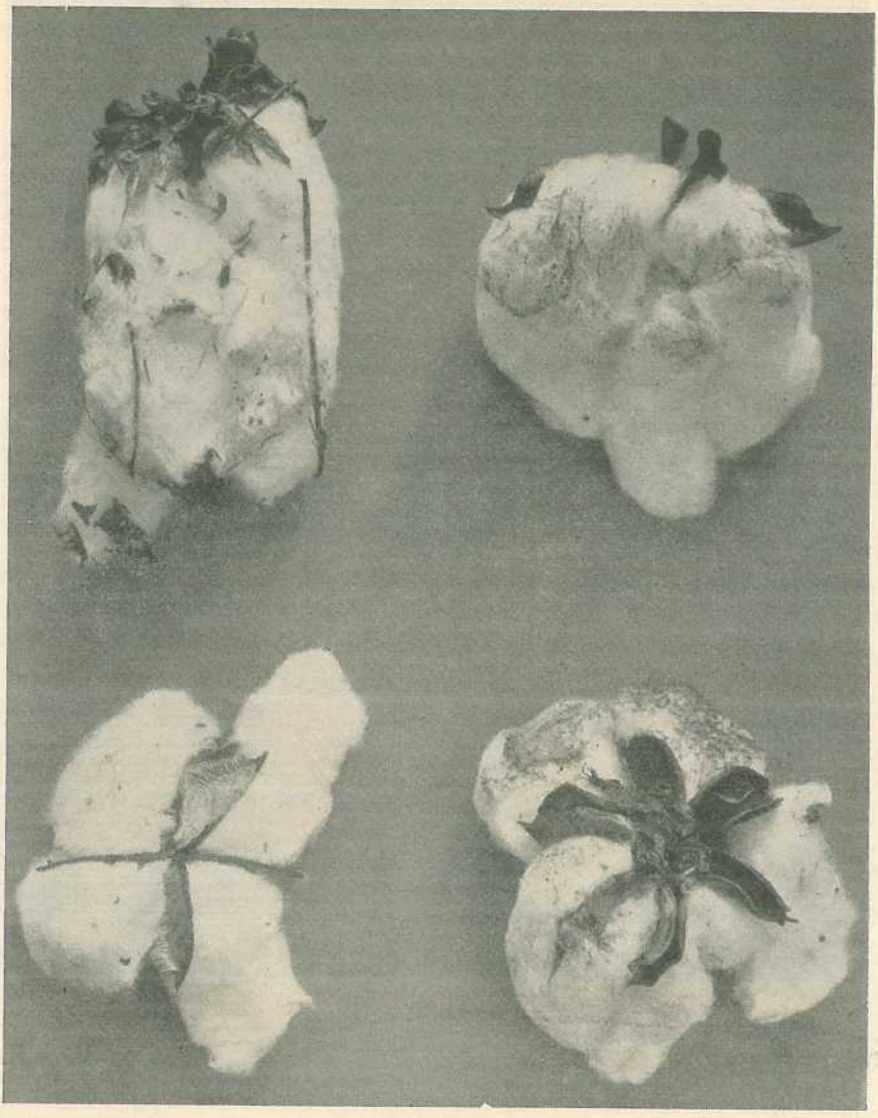


Plate 89.

Illustrating Cotton which has been left Unharvested too Long.

only a small proportion of the total cotton picked, when scattered throughout a bale will greatly reduce its value. A fairly safe rule is to pick only cotton which is fluffed out, as in this way diseased, immature locks—which are usually composed of matted fibres—are eliminated. A fair amount of leaf in the sample is not highly detrimental provided it is not too fine. Large pieces of leaf can be removed by the cleaning processes at the ginneries, but the finely crushed up particles become

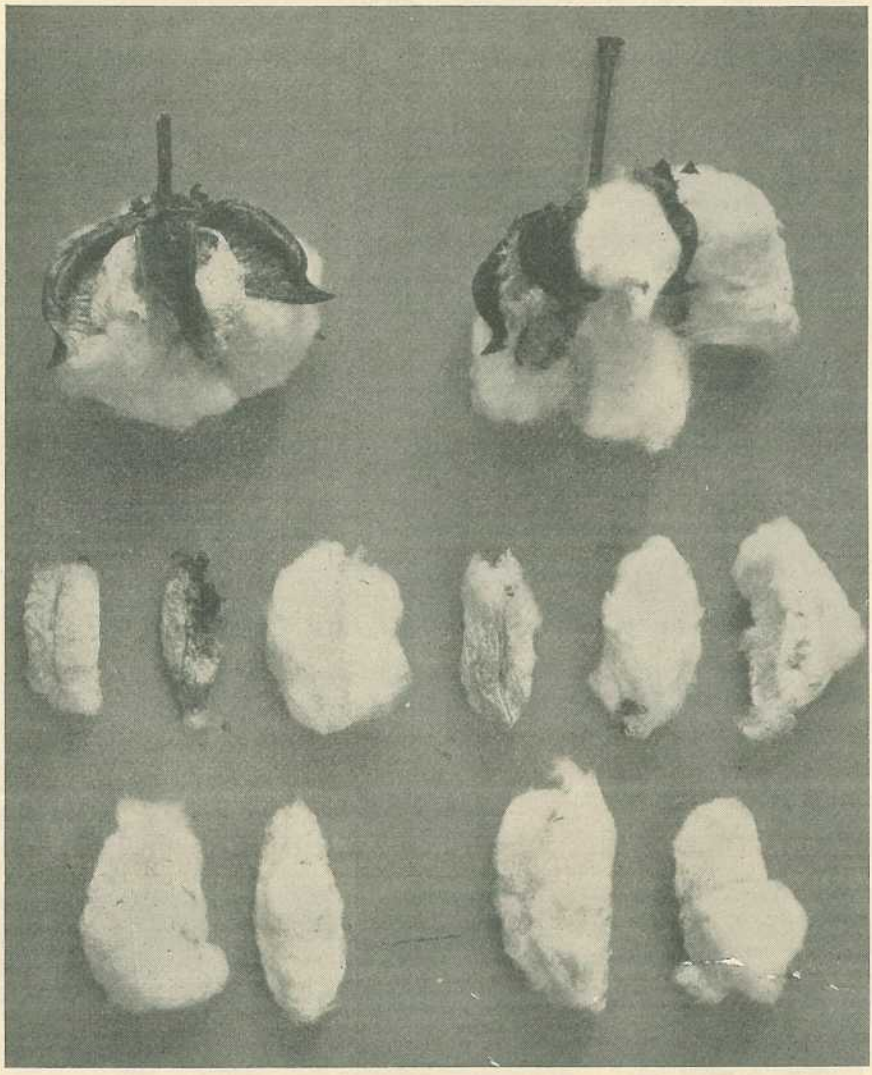


Plate 90.

ILLUSTRATING LOCKS OF COTTON THAT SHOULD NOT BE PICKED.—The locks arranged below the bolls are comparable with those contained in the bolls. None of these locks should be included in mature hand-picked cotton, as they are so much waste and the fibres of the fluffed-out locks are soft. During the ginning operations they would be cut and mixed with other fibres, thus giving the rest of the cotton a wasty appearance which will reduce the value of the whole bale of cotton.

entangled in the fibres and are difficult to remove. Some pickers have the habit of squeezing the cotton between the hands to make a smaller bundle before placing it in the bag—this crushes the leaf or dried bract into smaller pieces and is, therefore, not advisable. Green leaves should never be included in the picking bags, as the natural oils present in the plant tissues will badly stain cotton with which they come in contact.

Every effort should be made to pack only a uniform grade of seed cotton in the container forwarded to the ginnery. This will not only enable a high standard of efficiency of grading to be maintained but will also expedite the carrying out of the grading operations, which is an important factor—especially during rush periods in the ginneries. In addition, the grower is ensured of receiving the full value of the cotton in each container. Where mixed lots of cotton are packed in a container payment is made on the basis of the lowest grade and staple length contained therein. The grower has to exercise care, therefore, in not only segregating the pickings of his crop into the different grades of cotton but also into the different staple lengths and qualities.

Unfortunately, on most farms considerable variation may exist in the quality and length of staple of cotton grown in various parts of a field. For instance, plants growing on deep, sandy spots or on hard clay patches, where most of the rain runs off, will in dry seasons produce cotton with a weaker fibre and probably shorter staple than will the more moisture-retaining portions of a field. Also, the lower parts of slopes, where the gradient lessens and the rains have a better chance of penetrating, will normally produce cotton of better quality and length than further up the slope, where run-off is greater and consequently the plants receive less moisture. Differences of up to 1/16 of an inch have been observed in the staple length of cotton under these circumstances. In some seasons, where the crop has been growing on a restricted water supply in portions of a field, the bolls will be forced open earlier than in the rest of the field. These patches should be picked as soon as sufficient cotton is available, as this cotton may be sufficiently weak and short to make it advisable to segregate it from the remainder of the crop.

It is advisable, therefore, to pick and bulk together the cotton from portions of a field where the crop has developed under similar conditions and bale this cotton separately from that harvested from other parts of the area. It is not feasible, of course, to take note of all small irregularities which exist in a field, but in the course of the season's cultivating the grower is able to form a fairly good idea of where his best cotton is likely to be produced and can accordingly mark off these areas. Where the field contains very long rows it may be awkward to harvest these areas separately under the usual methods of baling the cotton, but the use of a portable baling press will greatly facilitate the baling of cotton from these separate areas.

Snapping.

Under normal circumstances this method of harvesting cotton should not be used until the plants have been killed by frosts. Prior to this, the moisture present in the plant toughens the stems of the bolls, thus necessitating a very strong pull to remove the boll, thereby slowing up the snapping, and, in addition, the plant is often badly damaged through whole branches being torn off. The moisture present in the partially dried out boll is also a handicap in that the grower pays for the picking

of a large amount of unprofitable material. An additional disadvantage of moisture in the snapped material is that it causes "sweating" in the packed container, which greatly increases the difficulty of properly cleaning the cotton at the ginneries.

In general, snapping cotton lowers the grade, so that any saving which may be obtained by using this cheaper method of harvesting is offset by the lower values received for snapped cotton. The lowering of the grade of snapped cotton is also accentuated by the fact that immature and diseased bolls are usually included in the snapped material, as the picker as a rule does not discriminate between sound and partially diseased bolls (Plate 91). Snapping may result, therefore, in considerable unprofitable expenditure being incurred by the grower. Firstly, he pays for picking material for which he receives no return, as the cleaning machinery at the ginnery rejects all the waste and the grower is paid on the weight of seed cotton which is produced from his snapped material. In addition, he sends away a greater bulk of material than if the cotton had been hand picked, which entails additional expense for carting to the railway station, more wear and tear on his bales, and also heavier treatment costs at the ginnery.

Under certain circumstances, such as where only a very light top crop has been produced or where the main crop has been unavoidably left unpicked so long as to become badly weathered, it may, however, be found more economical to snap than to hand pick. When the bolls have been exposed to the weather for any extensive length of time the stems become brittle and the whole burr is likely to come away in the hand when an attempt is made to pick the cotton in the ordinary way; this slows the picking to such an extent that payable tallies cannot be obtained and either higher rates must be paid for a clean pick or the crop must be snap picked. In this case, it is probably preferable to snap as even if a clean pick at the increased rate were considered payable the amount of burr which would still get into the picking bags would cause a reduction of the grade of the cotton.

Unless there is a good reason for snapping the main crop, clean picking is preferable; but the top crop of bolls, which as a rule contain cotton of a poorer quality, may be snapped. This top crop would normally have to be picked at the rate ruling for a clean-up pick and the difference between this price and that for snapping makes it advisable to snap such cotton.

Baling.

Reference has been made earlier in this article to the need for packing a uniform grade of seed cotton in each container, so that this point needs no further emphasis. An important point to observe, however, is to make sure that all stray locks of cotton are cleaned out of the container before it is refilled so as to prevent any possible seed admixture from this source.

There is a tendency among some growers to stamp as much cotton as possible into each container so as to reduce the number of them required to forward the crop and thereby cut down cartage costs. This is not advisable, however, for the continued tramping and compressing of the cotton forces the pieces of trash and dirt more deeply into the locks, with the result that cleaning of the cotton both prior to ginning and spinning is rendered more difficult than if the seed cotton had been

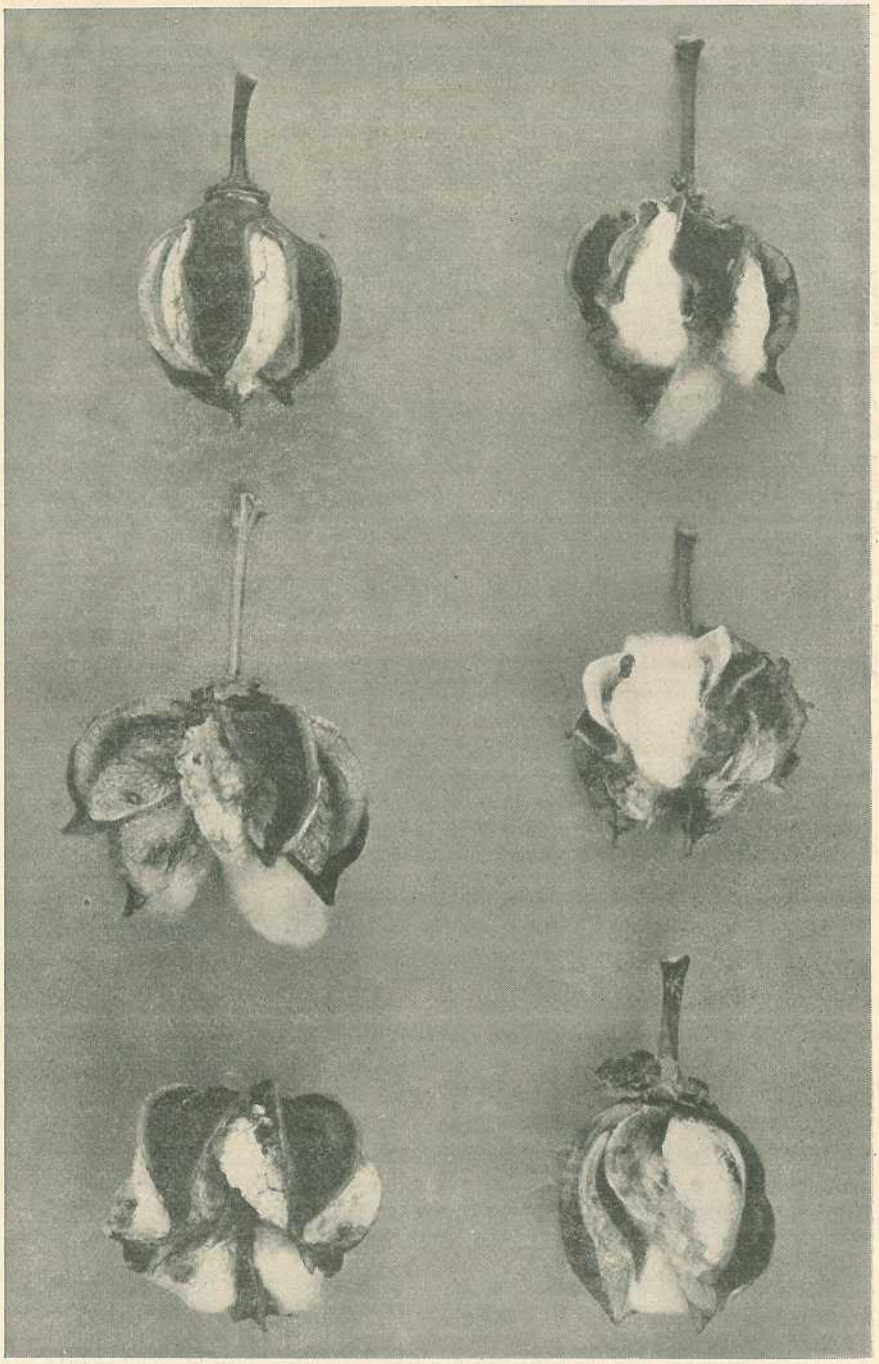


Plate 91.

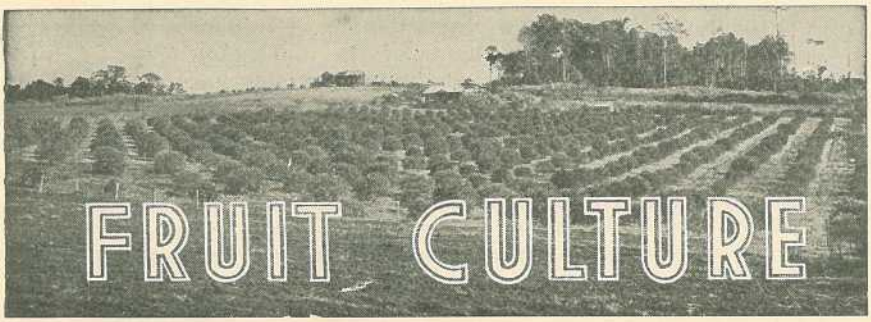
Bolls that should not be Snapped.—The fibres of the few locks they contain are so soft that the ginning operations would twist and cut them so badly that they would seriously lower the quality of any good cotton ginned with them. Much snapped cotton is ruined each season by the inclusion of such bolls, and the sending of such rubbish to the ginnery should definitely cease.

loosely packed to weigh roughly 470 lb. per bale. This weight also assists in the ginning operations in that three bales or wool packs of seed cotton will contain the equivalent of one bale of ginned cotton, thereby enabling the changing from one grade of cotton to another to be made more efficiently.

The usual type of baling stand, where a frame is erected and the wool pack is suspended by four pieces of wire, works satisfactorily, but as picking progresses and the scene of operations is removed further and further from the baling centre long hauls may be involved in large fields. A simple type of press mounted on a slide has many advantages, as it can be moved along the headland and thus reduce the carrying of the bags of cotton to a minimum. If the rows are very long the press can be located half-way down them and then moved across the rows in the same manner. A press of this type can be easily constructed with 4 by 1 or 6 by 1 hardwood for the sides and 4 by 2 or 4 by $1\frac{3}{4}$ for the rails. It is made on the gate principle so that it may be taken down and stored flat if desired. A big advantage of a press is that the sides of the press take the strain when the bale is being packed so that bales last longer and retain their shape. A firm, square bale is more easily handled and stacking on trucks and railway waggons is greatly facilitated.

It is recommended that the grower's name, address, and registered number be branded on one side of the bale only and in such a position that it can be easily read when standing on its end. When the grader cuts the seam of the bale at the ginnery he makes the cut as he stands facing the brand and always on the same side. If the brand is placed on only one side of the bale the cut will thus be made down the same seam. When this seam has become too worn the brand can be obliterated and another face branded. The grader will then commence on another seam, which will be used as long as possible. In this way, more of the seams are kept intact and the bale remains in good shape, even if it is subjected to extensive usage.

The life of the bale will also be prolonged if the cut seams are resewn with a loose stitch that will allow the seams to separate slightly when the bale is repacked. This will enable the grader to cut the sewing string each time without damaging the bale.



Tomato Growing in the Bowen District.

W. G. HANCOCK.

THE Bowen district, North Queensland, may be taken as typical of a low-rainfall area within the tropics, producing tomatoes and other small farm crops under irrigation. The average rainfall is 39 inches, most of which falls during late January, February, and March, with, usually, a useful fall in June. After June, the rainfall may be too light for vegetable growing. Water for irrigation is obtained from spear pumps in the sand bed of the Don River, and from shallow wells and spear pumps in the Delta lands. The ample supplies obtained compensate for the sparse rainfall.

For the tropics, the climate is mild; frost is practically unknown on the Burdekin Delta and Lower Don, and a steady sea breeze tempers the heat of summer. This accident of climate, with irrigation and fertile soil, has made it practicable for Bowen growers to specialise on the raising of tomatoes and other crops during the period from July to October, when southern areas generally are not producing. Shipments commence in May, but it is in the former period that Bowen growers usually have the market largely to themselves. Joined for convenience of description are the areas along Euri Creek, and around Guthalungra and Gumlu. Light frosts sometimes occur in these localities, as well as higher up the Don Valley, but rarely are they severe enough to cause damage.

Soils.

The soils of the Burdekin Delta and along the Don are a silt loam type, ranging from fairly heavy to light, and all are easily worked. There are scattered areas of sandy soil which are inferior to the silt loams. The soils along Euri Creek and around Guthalungra and Gumlu are mostly heavier and of excellent quality and easy to work. Drainage is generally good and the soils are very suitable for irrigation.

Varieties.

The locally developed Buckeye-Globe is the variety chiefly grown. It is a strong grower and makes a large bush. It crops heavily and has fairly long cropping period. The fruit is crimson-pink, and it packs and carries well. Mahio and a few other varieties are grown to a very small extent, but the local variety is by far the most popular. Particular attention has been paid for years to selection for seed purposes and almost all farmers select their own for future planting. This single variety production and careful selection of seed has resulted over the

years in the development of a uniform tomato. Fruit for seed extraction is usually taken from mature plants of the mid-season crop. A very good commercial variety has accordingly been developed, which suits the local conditions under which it was raised.

With the extension of the cropping period, however, it may well be that although one variety may be reasonably good throughout the year, it may not be equally suitable for both early, mid and also late, and that for one or the other of these periods another variety could be better. For this purpose it is considered desirable to try out some of the newer varieties and note their behaviour. With the introduction of mechanical row-crop cultivation equipment, power dusters and sprayers, it may be advantageous or necessary to grow a smaller bush and plant narrower rows. While one would not change a proved variety without very good reason, some of the heavy bearing small sorts are worthy of trial for purposes of comparison.

Cultivation.

In the Bowen District, a short wet season coinciding with the time for preparing the land for planting, and, that occurring at the hottest part of the year, provides some interesting management problems. Although some extra-early tomatoes may be set out in February, March is the usual time to plant out for the early crop. Seed beds must of course be set out earlier. Successive plantings-out are made up to about the last week in July, and picking finishes about October. The time from planting out in the field to cropping is thus ten to thirteen weeks.

Usually land has been left fallow from the finish of the crops in September and October until the first rains enable ploughing to be started. This really is not the most desirable practice, because towards the end of a crop weeds are commencing to grow and nut-grass, if present, to flourish. This results in very foul land to be ploughed after the early rains. Also, it is being realised that old land deteriorates after years of cropping and that annual renovation with a green manure crop is necessary.

Light ploughing or discing as soon as the season's cropping is over, and an occasional harrowing during the hot months will destroy the weeds and considerably reduce the nut-grass. Also, it will trap the storm rains usually occurring in December and make it easier to plant cowpeas. One of the problems has always been how to work the land with horses at this period, because of shortage of feed and the heat, but with tractors now becoming available it will be possible, and will no doubt become the standard practice, to work at this time. This may be taken as common to tropical districts with similar climate and rainfall distribution. To leave bare broken-up land during an average wet season invites erosion; while to leave it unbroken and fallow after the late spring crops aggravates weed infestation and largely rules out the chance of planting green manure crops for soil renovation, and during a summer of below-average rainfall moisture is not trapped to the same extent. Agriculture under these conditions must be based on mechanical equipment instead of horses in combination with efficient irrigation.

Firing of seed beds is favoured, and some use boxes of sterilized soil for the early plantings, as these can be placed under cover during heavy rain. Three to five weeks is the usual time in the seed bed. Generally about this time of the year grasshoppers are numerous, and

some growers protect the beds with gauze-covered frames, or a fair protection is given by sacks hung vertically around the bed.

Having prepared the land in accordance with usual cultural methods, the young plants may be set out on the flat and watered in, or furrows run, filled with water and the young plants dibbled into the moist soil bordering the furrow.

Planting and Spacing.

Spacing varies with the type of soil; the most fertile soil growing very large bushes of the local variety; 8 ft. x 8 ft. to 12 ft. x 12 ft. spacing is the usual. It may well be, however, that over-much regard is paid to producing vegetative growth, and that with the best fertilizer practice found by experiment, bushes will tend towards the lower measurement and higher production per acre will result.

Wind Breaks.

The need for wind protection to ground crops is not always realised. The steady south-east wind which blows so often for days or weeks at a time considerably damages or reduces the yield of tomatoes and other crops. In such cases, the establishment of wind breaks should be just as much a part of farm economy as the more obvious ones of fertilizing and cultivation. Suitably situated trees on the windward side of cultivations will often be of far more value in protecting crops than would be the small area of land obtained by felling them.

Many farms in the Bowen District would benefit from suitable varieties of quick-growing trees planted on their windward boundaries; perhaps it could be a joint project of near neighbours. A very effective wind break, quick, cheap and easy to plant and maintain, is obtained by planting strips of cane or cow-cane. An added merit is that it provides a reserve of fodder when the crops are finished and stock feed is becoming scarce.

Irrigation.

Because of the high evaporation and the well-drained nature of the soil around Bowen, water requirements are high, especially towards the end of the season when subsoil supply is depleted and the temperature is increasing. Centrifugal pumps 2½ in. to 4 in. bore are used, and up to the present the water supply has not failed. Pumps may be run full bore all day without any apparent diminution of flow.

Furrow irrigation is the method almost invariably in use, but spray systems are now receiving some attention. The respective merits of the two systems require careful assessing before a definite opinion as to which is better for tomatoes at Bowen is formed. Furrow irrigation maintains a drier atmosphere, which at face value would appear to conduce to less fungous trouble, of which Bowen is fairly free; on the other hand, it complicates cultivation, and in some cases it is doubtful if it always gives sufficient lateral spread of water in the lighter soils. Whether because of the comparatively dry climate the moister conditions occasioned by spray irrigation, as sometimes urged, will be so detrimental in this district, can only be proved by trial; as will also any effect on the insect pest problem.

One thing is almost certain: if spray irrigation is generally adopted it will at the same time necessitate a change in many of the pest control, cultural and fertilizing methods now in use.

Trellising.

Growing on the ground is the standard and trellising the exception. Unless it is entirely traditional, any local method is usually the result of

a balance of factors, and growing on the ground should not be condemned outright just because trellising has proved the best elsewhere. With the dry climate and furrow irrigation unstaked tomatoes may not suffer the same incidence of disease as they do in other places. Bowen is a very windy district, which would necessitate a particularly strong type of trellis. On the other hand, and other conditions being equal, trellised tomatoes contract less foliage disease, pest control is easier, a higher percentage of first grade fruit is obtained and picking is considerably quicker. The continued turning over of bushes grown on the ground while picking does them considerable harm.

Picking is definitely the "bottle-neck" with tomato growing. With any unit of labour it is easier to grow more tomatoes than can be picked. Therefore, although trellising would require more labour during the growing of the crop, more fruit could be picked. Another factor in favour of trellising is that towards the end of the season the surface temperature of the soil becomes very high, and, as a matter of fact, this does shorten the life of late tomatoes grown on the ground.

Fertilizing.

Spray irrigation or frequent showers of rain allows more scope in fertilizing crops than does furrow irrigation in a dry climate. Under conditions similar to those of Bowen, one is limited to either mixing the fertilizer in the soil before planting out, or to dissolving a water-soluble type in the irrigation water. It is plain that, under Bowen methods, fertilizer worked into the surface soil after planting-out can never be available to the plants in the absence of descending water, either as rain or as spray irrigation. Acting on local observations the amount of fertilizer required to bring the crop to maturity should be in the soil prior to planting, and if a subsequent dressing should be necessary the only way to get it to the plants is to place it in the irrigation furrows as soon as they are blocked off, and the water is stationary.

The practice of applying fertilizer to growing plants by placing it in a furrow ploughed close to them appears to have little to recommend it. The root system of a plant is large, and this practice results in cutting of a considerable proportion.

Diseases and Pests.

Most of the common diseases and pests are represented at Bowen, but in general it can be said that fungous diseases of the foliage do not cause much trouble in normal years, the chief ones being black spot and target spot in the seed beds and young plants during the summer months. Insects, on the contrary, require close attention. The jassid (green fly) is particularly severe, and lessens the vitality of plants, and when very hot weather, inadequate moisture and soil of low fertility combine with it, the bearing of plants is considerably reduced.

Grasshoppers are usually a nuisance during the early part of the year; and caterpillars of different species, chiefly the corn ear worm, require constant attention.

In general, light but frequent dusting or spraying is essential if a worth-while crop is to be obtained, a combined spray or dust being used. In the drier part of the year, it may be possible to omit the copper, and when caterpillars are very numerous it is wise to increase the proportion of arsenate of lead.

Because of the normal windy conditions prevailing during the daytime, sprays seem more effective while the plants are small, and up to the time when too frequent refillings of the container become necessary.

APPLIED BOTANY

The Wild Oat Pest.

R. E. SOUTTER, Senior Research Officer.

THE wild oat has been known to infest wheatfields from time immemorial and is found throughout the cereal-growing countries of the world, being as adaptable as wheat to varying conditions. Its importance as a pest varies according to the extent of infestation, which is determined largely by climatic conditions and the cultural methods in vogue in any particular country.

Not only does the wild oat compete successfully with wheat for plant food, but it necessitates extra cultivation, causing loss of soil moisture and the deferring of sowing until late in the season. The risk of loss through drought, storms, or rust is thereby seriously increased. Some success in controlling the wild oat has been obtained in the drier districts by sowing medium to long season varieties of wheat early in April. The early establishment of the wheat plants enables them to develop sufficiently to compete with the later germinating wild oat to such an extent as to suppress the latter's growth.

In some seasons the climatic conditions may delay the germination of the wild oat, and in such circumstances the seed of that plant may be green when the wheat is ready for harvesting. If the wheat is then harvested, the inclusion of the green wild oat seed in a bag of grain may cause heating, with a resultant impairment of the quality of the wheat. If, on the other hand, the crop is permitted to remain until the wild oats are ripe, unfavourable weather may ensue and cause loss through the bleaching and sprouting of the wheat.

With the wild oat, as with other weed pests, prevention is better than cure; therefore the greatest care should be exercised in seeing that clean and new areas are not infested through the entry of wild oats with seed wheat or horse-feed.

The chief difficulties encountered in the work of wild oat eradication are due to peculiarities associated with the seed, in conjunction with the fact that the soil, in a heavily-infested field, contains wild oat seed from the surface to the maximum depth to which it has been worked.

The peculiarities of the wild oat seed are the hard, heavy protective covering of the germ and the fact that it normally germinates at a lower temperature than other cereals. This means that, in order to start into growth, it must lie in close contact with the soil at the correct temperature for a much longer period than is essential to promote germination of a grain of wheat. The wild oat has a shorter growing period than wheat, and, even although it does not commence growth till some time after the wheat has germinated, it nevertheless normally matures and

scatters its seed before the wheat crop is ready to harvest. It is thus a very difficult matter to eradicate the wild oat from an infested wheat paddock, and it is evident that any system devised for its eradication will result in missing one wheat crop, except in cases where the long-fallow system is practised for, in the latter event, the crop is grown in alternate seasons only.

Where the land has become heavily infested with the wild oat, the following procedure in connection with its eradication can be practised where the long-fallow system is in vogue, and will be found more lasting in its effects than growing hay crops for a couple of years or keeping the field out of cultivation for a similar period.

All operations should be planned to produce the optimum conditions for the germination of the wild oat seed, which means that the soil must be brought to as fine a tilth as possible so that when rain does fall, and the soil temperature is right, the bulk of the seed will start into growth. After this has taken place, the land should be ploughed to the maximum depth to which it is intended to go for the next crop of wheat, and should then be harrowed. All subsequent growth of wild oat, seedlings should be dealt with by cultivating to a depth of not more than 3 inches, which should, in every instance, be followed by a harrowing in order to retain the desired tilth. Rolling after harrowing has been recommended, for the reason that the seeds will not germinate in the loosely-packed soil because of its drying out too quickly. Rolling would doubtless prove beneficial on "self-mulching" soils, but the consolidating action of the tractors or horses when passing to and fro should prove sufficient on soils that are inclined to run together. Obviously, the operations discussed in this paragraph will have to be carried out during the cooler months of the year, when the conditions are favourable to the germination of the wild oat.

Shade and Shelter Plants for the Pig Farm.

C. T. WHITE and E. J. SHELTON.

THE provision of shade and shelter trees and shrubs is a necessity on very many pig farms, and early attention should be given to this matter where pigs are exposed to the hot sun and to cold winds. Shade and shelter plants in pig yards should, of course, be protected from damage by means of stout guards, and plants bearing poisonous parts—*e.g.*, the black bean—should not be used.

There are several trees available which are useful not only for the shade and shelter they provide but also for their edible fruits. Such are the mango, mulberry, olive, honey locust and carob bean.

The carob bean is suitable for growing in the cooler portions of the State and seed is usually obtainable. It is an attractive tree which provides abundant shade. The thick, fleshy pods have a high feeding value and are suitable for pig food.

The honey locust is another attractive, shady tree, but it is best used as a shelter as a well-trimmed, tall hedge. In favourable years and if suitably pruned the tree yields an abundance of pods which are relished by stock. The pods contain a honey-like substance with a sweet, nutty flavour.

Buddleia is perhaps the best of the shrubs available for shade for pigs, for it is free-growing, carries abundant foliage and is practically evergreen. The most suitable species is *madagascariensis* which has attractive silvery leaves and yellow blossoms. The purple-flowered-type is not as shady as the yellow-flowered. Buddleia is readily grown from cuttings, and rooted plants are usually available from nurserymen.

The phytolacca, bella sombra or elephant tree is another useful shade plant. It is propagated by seeds, and the male and female trees are distinct. Fowls are very fond of the dried berries of this tree. Other useful trees for shade and shelter purposes are the myall and the native holly, the latter of which is common in softwood scrubs. The pepper tree also is readily grown and provides excellent shade in summer.

ANSWERS.

(Selections from the outward mail of the Government Botanist.)

Hexham Scent.

M.A.McL. (Blackbutt)—

The specimen is the Hexham Scent (*Melilotus indica*), a native of Europe, now a very common naturalised weed in Australia. It was boomed some years ago under the name of King Island Melilot, but never came very much into favour. It mostly comes up in winter, grows through the spring and early summer, and dies off on the approach of hot weather about November. It is quite a good fodder, but stock seem to have to acquire a taste for it. It taints milk badly. The seeds sometimes get into wheat and cause an unpleasant flavour to go through the flour.

Small Burr Trefoil.

Inquirer (Warwick)—

The specimen is the Small Burr Trefoil (*Medicago minima*), abundant on the Darling Downs and providing a wealth of herbage during the winter and spring months. The only objectionable feature of it is that, as with the common Burr Trefoil, the pods cause some nuisance in the belly wool of sheep. However, the nutritive qualities of the plant probably outweigh any disadvantages it might possess. The pods are freely eaten by sheep and are nutritious. As with other legumes, it may cause bloat at times.

Panic Grass.

W.D.D. (Innisfail)—

The specimen is a species of Panic Grass. Two-spiked Panic Grass is the accepted vernacular, though this seems rather cumbersome for general usage. Its botanical name is *Brachiaria subquadriparia*. It has a very wide distribution through Southern Asia, the Malayan Archipelago, and Australia. It is very abundant in Queensland, but unlike most native grasses favours ground that has been broken such as old cultivation areas and railway embankments. It is not a common constituent of the ordinary pasture though fairly frequent in sandy forest lands. It is very palatable and nutritious and unless propagated soon disappears under stocking. It is a frequent weed of cultivation, but not in any way aggressive. It comes in with the early summer rains and dies off on the approach of autumn or early winter.

Black Pigweed.

L.B. (Miriam Vale)—

The specimen is the Black Pigweed (*Trianthema portulacastrum*). In some of the agricultural districts, particularly in places such as the Callide Valley, this plant becomes rather a serious pest in cultivation, but does not spread very much into the ordinary pasture. It is eaten by stock but not very heavily. It is probably liked better when it is drying off somewhat, as in the case of some other succulent plants. It is not known to possess any poisonous or harmful properties at any stage of its growth.

PLANT PROTECTION

The Citrus Bud Mite.

N. E. H. CALDWELL, Assistant Research Officer.

CERTAIN types of malformation on citrus trees which have attracted an increasing amount of attention in recent years are caused by a very small mite. This mite is probably identical with a pest known in other citrus-growing countries as the citrus bud mite.* It has undoubtedly been present in Queensland for some considerable time, as it has been recorded from such widely-scattered districts as Mareeba, Ayr, and Charters Towers in the north, and Gayndah, Maroochy, and Maleny in the south.

Description and Habits.

All stages of the mite are extremely small and cannot be detected by the unaided eye. The adult mites are about 1/200 of an inch in length, elongate-oval in shape, and creamy white in colour, while the minute spherical eggs are pearly-white. Though normally most numerous in the unopened flower and leaf-buds, they have been observed occasionally on the outside of the buds or on other parts of the trees. At times they occur in considerable numbers beneath the "buttons" of the fruit.

Injury.

Injury (Plate 92) takes the form of a distortion of the growing points, leaves, flowers, and fruit. Growing points are often twisted, and they may also be thickened and flattened into a strap-like structure. The terminal shoot may be suppressed and replaced by several new ones, which arise from a series of multiple buds behind the original growing point. Young growth thus tends to have a characteristic, bunched appearance. Leaves may be reduced in size and take on a number of grotesque forms. The flowers may be malformed and frequently fail to open properly. A number of common fruit malformations, particularly in lemons, are probably due to this pest. The scales of infested leaf buds show a black or brown discolouration when examined microscopically; on mature wood, the buds are frequently dead.

Bud mite infestation seems most widespread on lemons, and the injury sustained in this variety of citrus is often greater than in others. Injury is prevalent also on oranges and grapefruit. Mandarins appear to be considerably less susceptible to the citrus bud mite than lemons, oranges, and grapefruit, but severe damage has been observed on young Solid Scarlet trees. However, in any district, occasional examples of fairly severe malformation may be seen on almost all the varieties grown.

Damage is most noticeable during the spring. Flower distortion will, of course, be evident at the main blossoming time and fruit malformation

* *Eriophyes sheldoni* Ewing.

is detectable soon after the petals have fallen. In addition, injury to the leaves and twigs seems more prevalent during the spring flush of growth than it is later in the season.

The citrus bud mite has so far been most important in young orchards during the first year or two after the trees are planted. The young trees may then suffer a severe check and, unless pruning receives detailed attention, they assume undesirable shapes. In any case, the additional pruning required in thinning out terminal growth is tedious and time-consuming. If control measures and correct pruning are not undertaken, several seasons' growth may be represented by a stunted tree consisting of a bunched top of distorted leaves and twigs surmounting the main stem.

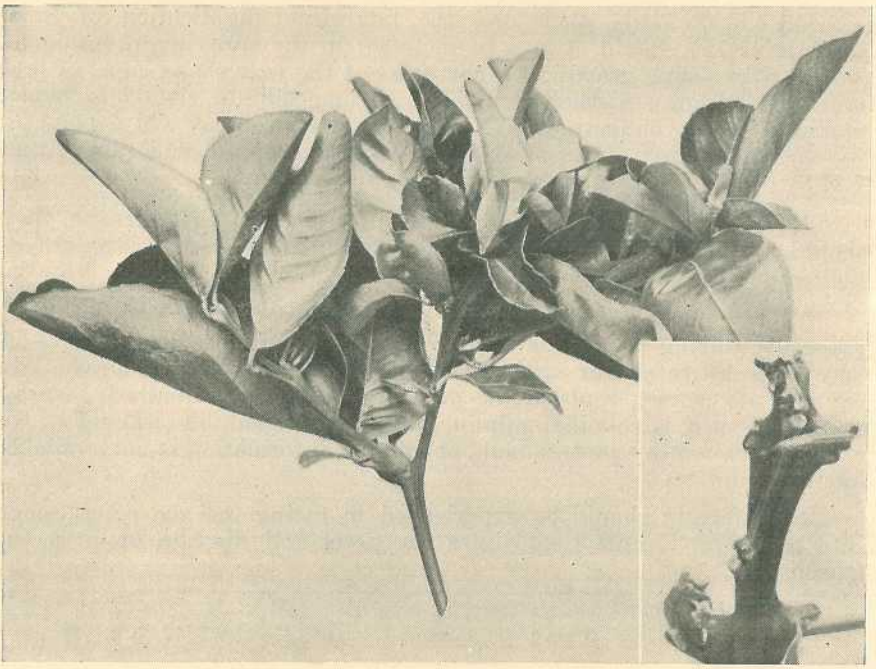


Plate 92.

Bud Mite Infestation on Citrus.—Note the bunched growth and the excessive development of axillary buds.

On older, bearing trees, the mite injury is not so marked. Leader development is checked to some extent on all branches and pruning operations are, of course, complicated by the need to remove surplus shoots. Fruit malformation does not usually appear on more than a small proportion of the crop.

Infestation of young trees in the nursery has not yet been observed, but may occur. Its consequences obviously would be serious, for infested young trees will suffer a considerable handicap when planted in a new orchard.

Control.

Observations indicate that the late-winter application of strong lime-sulphur, which forms the basis of Maori mite* and white louse† control,

* *Phyllocoptes oleivorus* Ashm.

† *Prontaspis citri* Comst.

lessens the importance of the citrus bud mite in the following spring and summer. As yet, the last-mentioned pest has not been troublesome in orchards where this spray is applied as a routine practice. Maori mite development on the fruit frequently necessitates the application of further lime-sulphur sprays or sulphur dusts during the summer, and such treatments may also play a part in reducing the bud mite population. Full-strength fumigation is presumed to afford another check on the pest, but the available evidence suggests that the low-dosage fumigation applied in the Gayndah district to combat the larger horned citrus bug‡ during summer, exercises little control over the bud mite. Oil and other sprays used against scale insects also appear to be ineffective in controlling this pest.

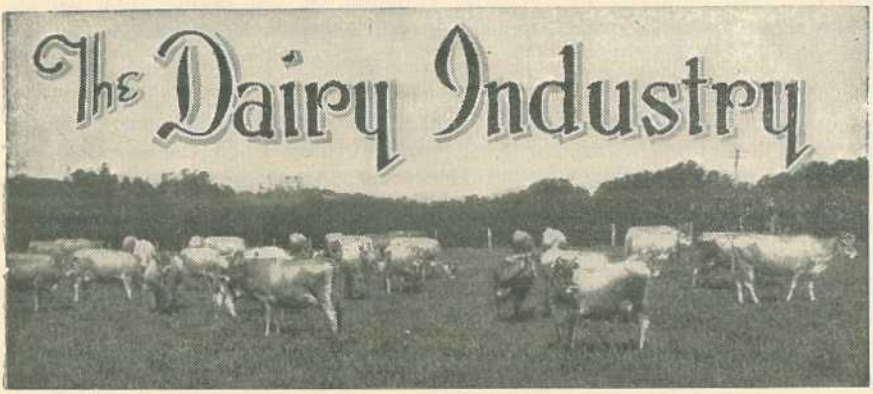
On all orchards, therefore, the late-winter application of lime-sulphur (1-15) should always be included in the spraying programme. Then, if the young growth at other times of the year shows signs of bud mite infestation, a further application of lime-sulphur should be made, particularly on young trees. The strength of this spray will depend on the seasonal temperatures at the time of spraying, and will range from 1-20 to 1-35, the weaker spray being used in summer.

If bud mite damage is seen on young trees in the nursery, they should be sprayed liberally with lime-sulphur at as great a strength as the temperature conditions will permit.

There is some evidence that sulphur dust will check this pest, especially during warm weather. Therefore, a sulphur-lime dust (1-1) may be substituted for spring and summer lime-sulphur sprays. It cannot, of course, replace the late-winter spray. Similarly, spray materials, such as colloidal sulphur and wettable sulphur, should prove effective against this pest, though, at present, information is not available on this point.

No difficulty should be experienced in fitting the above treatment into the normal control schedules for pests and diseases of citrus in Queensland.

‡ *Biprorulus bibax* Bred.



An Improvement Plan for Dairy Farms.

S. E. PEGG, Dairy Inspector.

TO encourage dairymen to maintain and, if possible, increase production, the Commonwealth Government is at present subsidising the dairying industry to the extent of millions of pounds annually. Many dairymen claim that, even with this subsidy, the price received for their produce is below the cost of production. There is no desire to start a controversy on this subject, but, in order to meet post-war eventualities, dairy farmers should endeavour to put their farms on an economic footing. In other words, they should try to lower their cost of production so that they will be able to compete on the open markets of the world with their exportable surplus. To do this, the farmer should improve the efficiency of his methods and plant and despite manpower and material shortages should set a programme of work with this end in view.

Improving the Herd.

On many farms there is much room for herd improvement. Suggestions by which this improvement might be effected are:—

1. Test the individual cows, and cull all which do not reach a certain standard of butter-fat for the lactation period, and rear replacement heifers from the highest producers only.

2. Use a pure-bred sire, preferably one whose progeny are high producers, but whose parents at least have good production records. Under the *Dairy Cattle Improvement Scheme*, the Department of Agriculture and Stock refunds the freight on a registered pure-bred bull whose dam has qualified for entry into the advanced register of her breed.

3. Practise better management of pastures by subdivision of paddocks, and, as far as practicable, rotational grazing. By these means the cows get the greatest benefit from the pastures, and the pastures can be attended to more easily. In normal times, rotational grazing

will help to increase the carrying capacity of the farm. The use of pasture harrows to break up and spread manure should be a routine job on the farm.

4. Provide adequate fodder for the herd; this may be in the form of ensilage, hay, or green fodder crops. In most districts, there should be enough fodder to last the herd from autumn until the usual storm rains commence in November or December. On most dairy farms, the time available for cultivation work between milkings is limited, and many cultural operations have to be done within that time. Farm horses often have not sufficient work, and are not fed enough to keep them in good working condition. Thus most dairymen will find that a tractor is desirable if they intend growing feed for their cattle in large quantity.

5. Provide plenty of water for the herd. Inadequate supply of water is one of the major disabilities on a large number of dairy farms, particularly in Central Queensland. If a good supply of water is available, every endeavour should be made to reticulate it to as many paddocks as possible. A water trough should be situated near the milking yard, for the cows can and will drink before entering it. This means an increased supply of milk. A cow in milk needs from 12 to 15 gallons of water a day. A water supply at the piggery also is necessary. If a dam or dams must be relied on for the water supply, they should be fenced off from the cattle, the water being pumped into a storage tank. In many cases the water can then be gravitated from the dam to the tank or trough. Keeping the cattle from the dam saves a lot of silting and contamination, and prevents them from bogging during the drier weather.

Other Improvements.

Time and labour saving machinery should be increasingly used on dairy farms.

By the use of milking machines, particularly in herds of over 40 head, time and labour can be saved. When installing machines the farmer should provide an engine with ample power. Besides operating the machines and the separator, the power can then be used for other purposes, such as:—

(1) To drive a skim milk pump to deliver the separated milk to the piggery and/or the calf-feeding pens. This saves a lot of unnecessary time and labour in carrying the skim milk to the calves and piggery.

(2) To operate an electric generator for the purpose of charging radio batteries and to supply the home with electric light.

(3) To operate a refrigerator. In the future mass-produced refrigerator units, which can use the milking machine engine as motive power, will probably be sold at a reasonable cost.

Many farmers may also save a lot of time by the construction of suitable gates to replace the much-used wire gate. The building of grids for motor traffic also is recommended.

These are only some of the many ways in which a farm may be made more efficient and production costs lowered.

Hints on Calf Feeding.

C. R. TUMMON, Dairy Inspector.

CALF feeding on many dairy farms is often done in a very haphazard manner; more often than not the calves are fed at the door of the separator room. Whether this practice is a time-saving one or not is very doubtful. It certainly is a most undesirable method for several reasons—such as:—

(*a*) The crowding of calves in one particular spot makes individual feeding difficult;

(*b*) Boggy conditions and odours are caused in the vicinity of the dairy, particularly in wet weather.

Calf-Feeding Bails.

It is suggested that a sound practice is to establish a number of small bails for the calves about 30 feet from the dairy buildings. A concrete strip for the calves to stand on is recommended. A rack may also be built along the head of the calf bails, with a suitable opening in front of each bail in which to stand the feeding buckets. The advantages of calf bails are:—

(1) Calves can drink in comfort, without interference from others, and each calf gets its share of food;

(2) Calves become accustomed to bails, the benefit of which will be manifest later on when "breaking in" to milking bails.

(3) If necessary, calves may be groomed, drenched, inoculated, and handled with ease.

(4) By keeping calves in the bails a short time after feeding, the tendency to form a habit of sucking each other can be curbed.

(5) Hand-feeding of grains and other fodder can be facilitated if desired.

(6) Boggy conditions and undesirable odours are kept away from the dairy.

(7) A number of calves can be fed at the same time, with little likelihood of the buckets being knocked over.

Clean Feeding Utensils.

Although milking buckets should not be used for feeding calves, it does not necessarily follow that any old bucket may be used for this purpose. Badly soldered or cracked buckets are too difficult to keep completely clean. The calf buckets should be washed as thoroughly as milking buckets, scalded or steamed, and then properly dried after each time they are used. This is important because scours in calves often originate from unclean feeding utensils.

Obstinate Calves.

Some calves are obstinate and difficult to teach to drink from the bucket. Much time is thus wasted by farmers allowing calves to suck their fingers held in the milk. In such cases, if a piece of ordinary rubber hose—say ½ inch in diameter and 3 inches to 4 inches long—be held in the milk and the calf allowed to suck milk through it, the finger method may be dispensed with.

The feeding and care of calves is as important in dairying as milking or separating, and it should be evident that it pays to spend a little time and money in providing suitable facilities. After all, the calves of to-day become the herds of to-morrow, and the beneficial results of good feeding and management of young calves and heifers will be shown in these same animals when they come into profit.

A Cream Temperature Fallacy.

F. G. FEW, Dairy Engineer.

IN the course of a recent visit to the country on an investigation of charcoal coolers for cream holding purposes, the opinion was commonly expressed by farmers that cream in the cooling cabinet rises in temperature during the night. This deduction is due to a personal deception, easily apparent if actual cream temperatures are taken.

On one farm, equipped with an efficient charcoal cooler, exhaustive tests were carried out in connection with the cooler, and some of the temperatures recorded during this work will demonstrate the fallacy of the popularly held theory. One can of cream placed in the cooler at 9 a.m. had fallen in temperature to 75 deg. F. by 8 o'clock in the evening. The atmospheric temperature at 8 p.m. was 79 deg. F. and had been as high as 93 deg. F. (shade temperature) during the course of the day. Under such circumstances the can of cream had felt cool to the touch during the afternoon and evening. Early the next morning the can of cream in the cooler had a temperature of 79 deg. F., the air having fallen to slightly under 60 deg. F. during the night. The can of cream was then judged to be relatively warm to the touch, although actually it was 1 deg. F. lower in temperature than at 8 p.m. the previous evening.

Observations of actual temperatures show that the air temperature is subject to much variation between night and morning, whereas cream temperatures (even if no charcoal cooler is in use) are likely to vary little, and in no case would a rise in temperature at night time be normal.

Proof of self-deception is afforded by the simple experiment of placing three cans of water together on a table, the middle can containing lukewarm water, while the other two contain chilled water (preferably using an ice and water mix), and relatively hot water, respectively. One hand is placed in the iced water for a few minutes and then immediately into the luke-warm water when this latter can of water will be judged as definitely warm. Following this the other hand should be immersed in the hot water for a short time, when placed in the middle can, this water will feel cool, although obviously it is the same water as considered warm following the first test. Similarly a can of cream kept in a cooler and with a temperature of 70 deg. F. feels cool when the daily temperature is around 90 deg. F., while if the night or early morning temperature is only 50 deg. F. the same can of cream (although still at 70 deg. F.) would appear to be definitely warm.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock, which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn and Jersey Cattle Societies, production records for which have been compiled during the month of February, 1945 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Senior, 3 Years (Standard 290 Lb.).				
Happy Valley Honey	R. R. Radel, Coalstoun Lakes	9,118·87	385·621	Sunnyview Artist
Trevor Hill Neta (212 days)	G. Gwynne, Umbiram	7,309·87	309·195	Rosenthal Musketeer
Junior, 2 Years (Standard, 230 Lb.).				
Glen Idol Fairy 8th	P. Doherty (Estate), Gympie	6,906·4	279·365	Blacklands Banker
Happy Valley Buddy 2nd	R. R. Radel, Coalstoun Lakes	6,273·4	269·514	Sunnyview Warden
Happy Valley Sister	R. R. Radel, Coalstoun Lakes	6,504·09	264·095	Sunnyview Warden
JERSEY.				
Senior, 3 Years (Standard 290 Lb.).				
Trecarne Success 3rd	T. Petherick, Lockyer	6,098·1	336·817	Jerseylea Golden Duke
Junior, 2 Years (Standard 230 Lb.).				
Hocknell Bravo Girl	N. C. Webb, Beaudesert	7,569·2	366·041	Nauva Victoire Lad
GUERNSEY.				
Junior, 3 Years (Standard 270 Lb.).				
Laureldale Dolly	W. Cooke, Maleny	6,433·35	314·433	Laureldale President
AYRSHIRE.				
Junior, 2 Years (Standard 230 Lb.).				
Leafmore Pearl 2nd	J. P. Ruhle, Motley	6,853·05	301·027	Myola Jellico

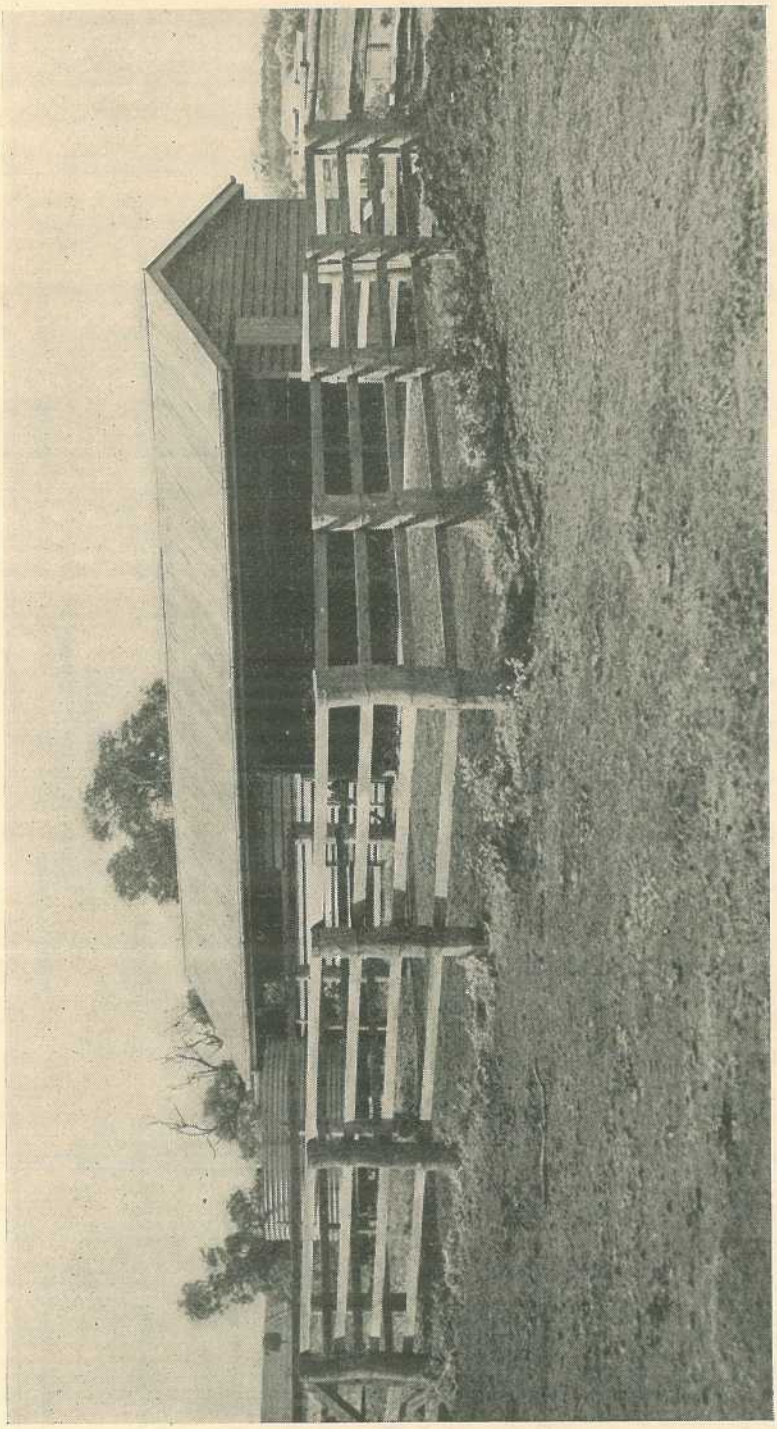
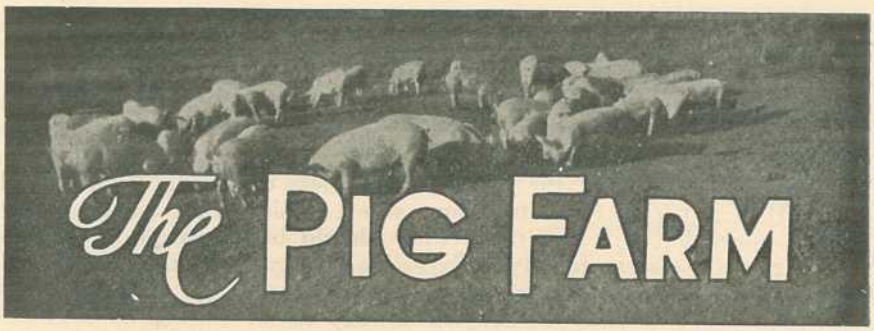


Plate 93.
MILKING SHED AND YARD ON MR. W. G. MURPHY'S FARM, CRAWFORD, NEAR KINGAROY.



Whey as a Food for Pigs.

E. J. SHELTON, Instructor in Pig-raising.

SHORTAGE of almost all classes of pig foods focusses additional attention upon those that are available without need for permit or quota allocation. In this list of pig food whey has an important place, for it is a useful food for pigs and calves, and if used in proper balance with other foods gives results which justify its inclusion in any list of foods suitable for this class of stock.

As is well known, whey is a by-product of a cheese factory, and as it must be disposed of largely as stock food its economic utilisation is a matter of considerable importance to the cheese industry. The total food value of whey is approximately half that of separated milk or buttermilk. This, however, does not necessarily mean that twice the volume of whey must be fed to obtain similar results in pig feeding, for animals overfed on whey give disappointing results, and there is the additional risk of scour and bloating.

As with skim milk, whey may be fed to all classes of pigs from weaners to sows suckling litters, provided that the recommendations given later are followed closely.

The following table sets out typical analyses of whole milk, skim or separated milk, and whey. The variation in the food constituents of milk and its by-products is clearly reflected in this table, in that separated milk differs markedly from whole milk only in its content of butterfat, whereas whey is deficient in protein as well as butterfat, both of which are extracted from the milk in the cheese-making process.

COMPOSITION OF WHOLE MILK, SEPARATED MILK, AND WHEY.

Constituent.	Whole Milk.	Separated Milk.	Whey.
	Per cent.	Per cent.	Per cent.
Water	87·00	90·55	93·60
Fat	4·00	0·11	0·35
Protein	3·25	3·39	0·80
Milk Sugar	5·00	5·20	4·60
Ash (mineral matter)	0·75	0·76	0·65

Feeding Whey.

Whether fed fresh or sour the whey must always be kept as clean as possible and be collected regularly daily. The containers used should be cleaned before each lot of whey is placed in them. Fresh whey should not be placed in containers with stale whey. The drums should not be left out in the sun, and when in use should be covered with bags or board lids to keep out flies and birds. Dirty and stale whey is responsible for most of the digestive disorders occurring in whey-fed pigs. If it is necessary to feed sour whey, it should be fed regularly in that form, but for preference whey should be fed while sweet and fresh from the cheese factory. Excessive acidity not only reduces the sugar content but will increase digestive disorders. The use of a small handful of lime to every 40 gallons of whey to control acidity is sometimes advised, and it will be useful as a mineral addition if so desired. In Queensland, regulations under Dairy Produce Acts make the pasteurisation of all whey pumped into whey tanks compulsory.

For very young pigs the quantity of whey given should be small in order to accustom them to this class of food, and while receiving this they should have some meal and protein-rich concentrate like meatmeal. If when pigs are, say, six weeks old they receive one pint of whey per day and from ¼ to ½ lb. of meal, their allowance could be increased at eight weeks to one gallon whey and 1½ lb. of meal. Meatmeal and/or cotton-seed meal should be introduced into the ration before weaning to supply the added protein when the sow's milk is no longer available. Thereafter it is advisable to follow instructions given for older pigs. An interesting experiment was carried out in Canada which amply demonstrated the value of whey. Two pens of twelve pigs were selected and fed for 120 days, one pen on whey and meal, and one on water and meal. The weight of the pigs and the quantity of food consumed were noted, with the following result:—

Pen 1.—169 lb. meal and 747 lb. of whey to produce 100 lb. weight increase and daily gain of 1.16 lb.

Pen 2.—430 lb. meal and water to produce 100 lb. weight increase and daily gain of 0.7 lb. Taking meal at 1d. per lb. there is a gross saving of £1 1s. 9d. per 100 lb. weight increase, and a much faster rate of maturity as well! Other than meal of course, cartage costs would have to be considered.

Where possible, all whey-fed pigs should have access to pasture. If grazing is not available, they should have green food cut and fed by hand, or receive a small amount of lucerne hay or chaff daily; this is to make good any vitamin deficiency.

Minerals are also important in whey feeding; therefore, if the pigs are receiving cotton-seed meal instead of meatmeal, and pasture or legume hay is scarce, a mineral mixture should be fed in small amounts. Two parts of sterilized bone meal to one each of salt and ground limestone make an excellent mixture.

For pigs receiving wheat, barley, or grain sorghum as the grain portion of the ration, the meatmeal or cotton-seed meal may be slightly reduced by the time they reach 120 lb. live weight provided they are receiving succulent pasture or lucerne hay. Pigs receiving maize, however, should continue to receive the protein-rich concentrate.

Dry sows will do well on pasture or lucerne hay, as much whey as they can handle comfortably, and from 3 to 4 lb. of grain daily. Sows nursing litters will require much more food. They should be fed very sparingly for the first two days—on about 1 gallon of whey and 2 to 3 lb. of grain. The whey and grain should be increased gradually until at the end of about ten days the sow is receiving as much whey as she can drink comfortably and 8 to 10 lb. of grain. The addition of ¼ lb. of meatmeal is recommended if pasture or lucerne hay is scarce. Boars may be fed similarly to dry sows. If cotton-seed meal is used instead of meatmeal, it should be fed at the rate of 3 parts for every 2 parts of meatmeal it replaces—*e.g.*, to replace 4 oz. of meatmeal, feed 6 oz. of cotton-seed meal.

Briefly, clean whey, fed in conjunction with grain and other farm crops, together with pasture and a protein-rich concentrate, will give excellent results in pig feeding.

Green Food, Pumpkins and Root Crops as Food for Pigs.

E. J. SHELTON, Instructor in Pig-raising.

IN view of the reduced quantities of concentrates and grains likely to be available to pig-raisers, the question arises as to what foodstuffs can be used in lieu thereof, or to supplement a reduced diet; further, there is always the question, on dairy farms, as to whether it is more economical and satisfactory to feed bulky roughages like grass, hay, saccharine sorghum, Sudan grass, etc., to dairy cows first, with a view to procuring a more liberal supply of milk, than it is to feed these foodstuffs direct to pigs in whatever form they can be made available and to carry on with a reduced supply of milk, if any at all.

Actually, pigs, once they pass the store stage, will thrive on reduced quantities of milk used in combination with grain (in coarse meal form) and other foodstuffs like pumpkins, sweet potatoes, artichokes, mangels, plus greenstuff, but in this case the milk supplies only a portion of the animal protein, the balance being made up by protein of vegetable origin and other constituents. Pigs thrive on a mixture of milk and meatmeal, but economically the quantities used should not at any time exceed say two gallons of milk plus 1 lb. of meatmeal per day, although brood sows with thrifty litters need more.

With conditions as they are in the early autumn of 1945, and with reduced quantities of concentrates, it would be wise to realise that the only alternative to reducing pig numbers (and that in itself is undesirable and in most cases uneconomical) is to fall back on more bulky roughages and on root crops.

Pumpkins.

As the pumpkin crop ripens it is certain there will be large quantities of "unmarketables," which would make excellent stock food, and comparatively few farmers grow pumpkins for sale as such. Pumpkins, both the domestic varieties (including bugle pumpkins) and cattle pumpkins, are popular stock foods, are appetising and readily

digestible, and can be fed to pigs of all ages; but as they contain only 10.4 per cent dry matter their feeding value, per ton, is comparatively low.

In some American experiments pigs required 376 lb. of pumpkins plus 273 lb. of grain for 100 lb. gain in weight. That it does not pay to feed pumpkins alone is proved by a Washington experiment in which well-grown pigs fed pumpkins alone gained only 0.55 lb. daily and required 5,719 lbs. pumpkins per 100 lb. gain, whereas in two other experiments in which grain and pumpkins were used the pigs gained 1.38 lbs. daily on the average and required 400 lbs. grain and 1,396 lbs. pumpkins per 100 lb. gain. From these trials it was concluded that it would take 10 tons or over of pumpkins to equal 1 ton of grain for pigs. Here it should be stated that it is not necessary to cook pumpkins before feeding to pigs, and there is no necessity to remove the seeds, as they are a valuable vermifuge (worm expeller) and are not indigestible in the quantity usually eaten.

Decaying pumpkins should not be fed, and great care should be taken in storage to avoid bruising and damage, which lead to early onset of decay. As with other foodstuffs, every effort should be made to feed under cleanly conditions. Throwing pumpkin down on to a muddy, slushy floor and expecting the pigs to do well invites digestive and other disorders, and certainly reduces the already low value of this crop.

Green Cornstalks with cobs in Milky Stage and such foodstuffs as saccharine sorghums (after flower seedhead has set), Sudan grass, millets, barley and field peas, barley and vetches, oats (when available), wheat (as greenstuff), rape and barley, plus succulent grass, also sweet potato vines (except short, sappy second growths), are all useful additions to a depleted grain, meatmeal and/or milk diet.

In sugar growing areas, soft varieties of sugar cane and cow cane are a great standby, just as arrowroot and Jerusalem artichokes are where soil and climate are suitable to their growth. At Seaforth, near Mackay, one farmer has had great success by extracting sugar cane juice and feeding it to his pigs, the partly crushed and chopped stalks then being fed to dairy cows. Waste fruit—in one case damaged papaws—is also fed, and certainly can be used, just as can vegetable matter in limited quantity.

Advice on these several matters can readily be obtained from the Department of Agriculture and Stock, Brisbane.

It is of additional interest to note that in England, under similar circumstances to these now existent in Queensland, interest in the above questions has been roused by the recent investigations of Dr. Crowther who, in the course of feeding trials extending over three seasons, found that by feeding young pigs a very much restricted ration of meal supplemented with young mown grass of high quality (*e.g.*, lawn clippings) a satisfactory rate of live weight increases was obtained and an average saving of 35 per cent. in the use of meal effected as compared with pigs fed an all-meal ration. In one case, with a fixed allowance of 1½ lb. of meal, a saving of the order of 65 per cent. was secured without measurably increasing the length of the fattening period. The importance of these findings, in relation to war-time pig production, needs no emphasis.

Grain Sorghum as a Pig Food.

Economic conditions in recent years have focussed considerable attention upon fodder crops which are above the average in their drought-resisting qualities, and amongst such foodstuffs suited for admixture in rations fed to pigs grain sorghum now occupies an important place.

Sorghum grain is used extensively in the United States for the feeding and fattening of cattle, sheep, pigs, horses, and poultry. Its main use in Queensland is for pig and poultry feeding, while a portion of the crop is in demand for cattle-fattening and drought feeding of sheep in the western districts.

It is regarded as slightly inferior to maize for general feeding, but is still a very satisfactory grain, particularly when ground to a coarse meal and fed with skim milk or some protein-rich concentrate. Its value as a feed and the method of using the grain are better known now than formerly, hence there should be no great difficulty in introducing this grain into pig feeding systems.

Young pigs which have had access to grain such as whole maize, which they have to chew and masticate, make better use of sorghum grain than those previously accustomed to slop feeding or feeding on food like pollard. A sudden change to grain sorghum in all such cases results in appreciable waste, the grain appearing undigested in the dung. Thus grinding the grain to a coarse meal is preferable to feeding it whole. It should be noted that the low vitamin content of grain sorghum makes it essential to provide pigs (young pigs particularly) with green food or in its absence a good sample of green lucerne chaff.

Another point to be remembered is that the protein of grain sorghum is insufficient and also incomplete biologically in that it is lacking some of the protein-building "bricks" so necessary for young stock or high-producing grown-up stock. These missing bricks, so called, should be obtained from other sources—*e.g.*, milk, meatmeal, or bloodmeal, seed cake preparations like linseed meal, cotton-seed meal, and for very young pigs only, peanut meal.

The importance of feeding pigs good quality, protein-rich foods cannot be stressed too much.

Grinding versus Feeding Whole or Soaked.

It is a safe rule to crush to a coarse meal all grain fed to pigs, particularly small grain like sorghum, wheat, barley, oats and peas. Where grinding is impracticable because of lack of machinery (co-operative effort in the use of such machines as food grinders is important and worth enquiry) the grain may be soaked, and it should be noted that soaking is probably cleaner and less laborious than boiling or steaming to a jelly-like consistency.

A useful method in soaking grain is to arrange for half-bags of grain to be tied with stout cord and suspended from a ridge pole arrangement in water. For this purpose an old bath tub is suitable. By having short chains or "S" hooks hanging from the ridge pole the soaking may be done without swelling the tie cord and difficulty of untying the knot; also, the sack is easily lifted higher up for draining.

It is advisable to have one feed soaking and one draining. When the drained lot is taken away, the soaking lot is raised and a fresh lot put in to soak. In this way a routine is developed on a night and morning basis. It is necessary to drain out the liquid every few days, otherwise it develops an unpleasant smell.

Advice should be sought from the Agricultural Instructors as to the best variety to grow in any particular district. Varieties with a sweet, sappy stalk that provides excellent stubble after the grain is removed are increasingly popular. Dwarf varieties are to be prefered and "pure" seed is particularly important. It is preferable for all farmers in the district to use the same variety to prevent cross-pollination of seed.

—E.J.S.

TRANSPORT OF PIGS TO SALEYARDS.

In some of the larger centres throughout Queensland transport of pigs and calves from farms to saleyards, trucking station, and/or to factories is arranged for by contractors operating a fleet of transport trucks, some single deck and others double-deckers. One such conveyance, here illustrated, is operating in the Bell-Dalby district. Single deck trucks do most of the "picking up" of stock from farms, and at the principal loading centre the animals are transferred to the double-deckers, which then transport them to the main selling or trucking yard. A load would be made up of calves and fat and store pigs numbering up to 130 head in the double-decker vehicle. Calves only are loaded on the top deck of the truck.

The distance travelled varies from 25 to 45 miles, and for this distance the cost ranges from 1s. to 1s. 6d. per head for calves and 1s. 6d. to 2s. per head for pigs. Such a transport service is a great convenience to farmers with a limited petrol allowance and whose motor tyres have to be conserved as much as is possible.

—E.J.S.

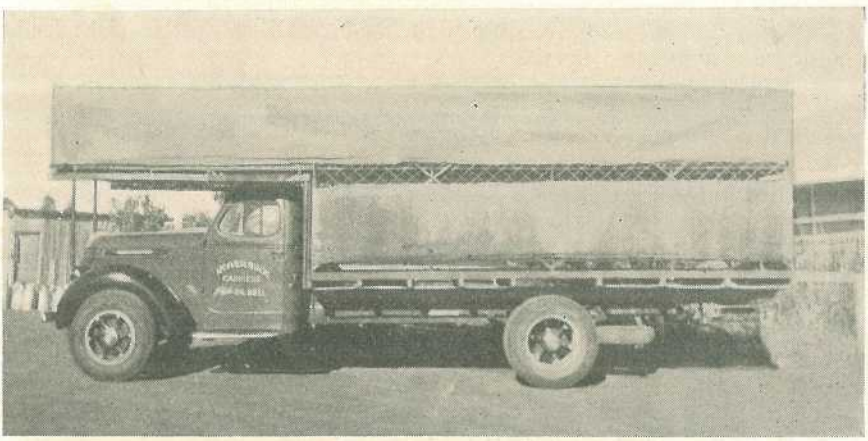


Plate 94.
A DOUBLE-DECKER PIG AND CALF MOTOR TRANSPORT.

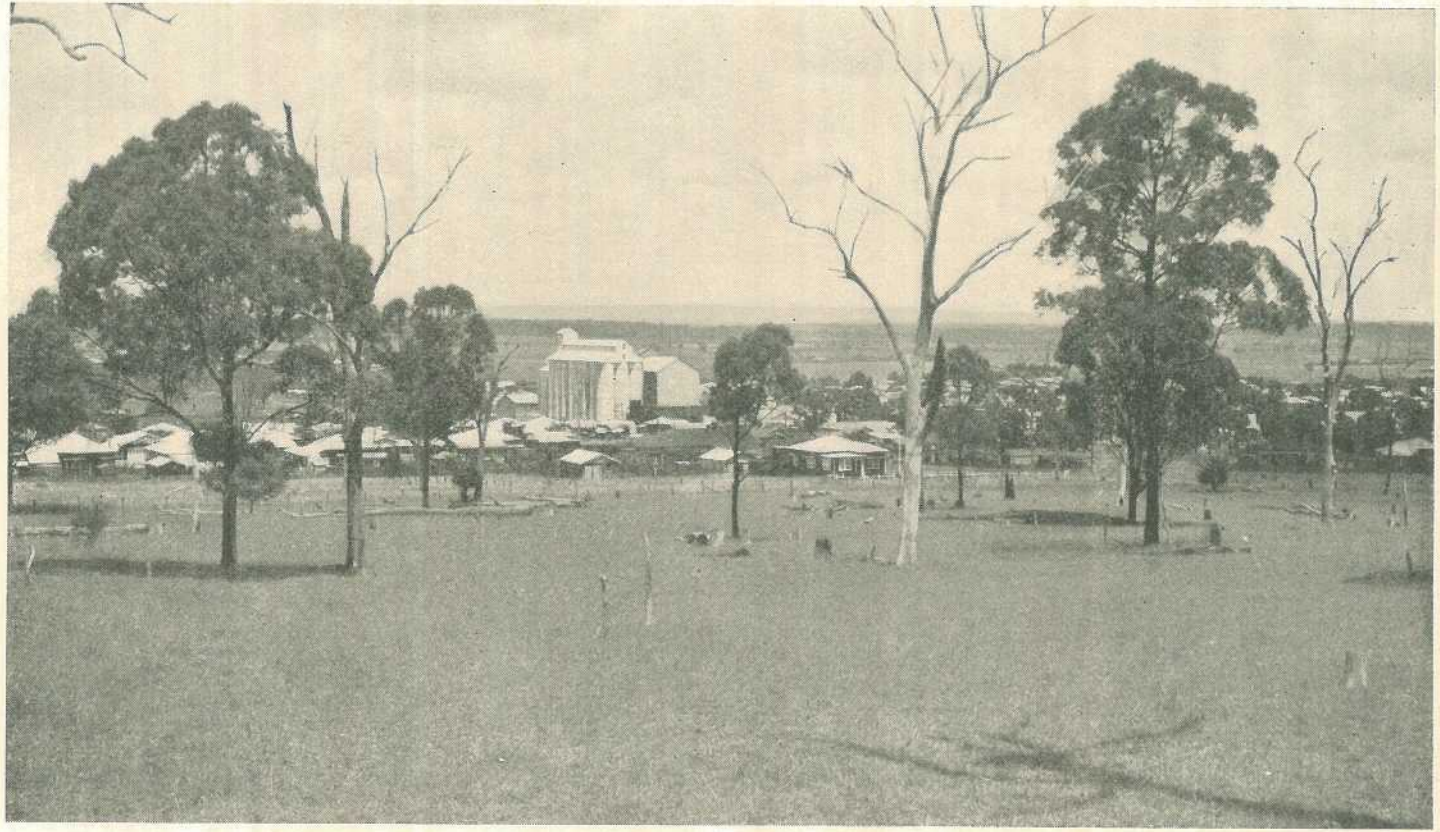


Plate 95.

OVERLOOKING THE TOWN OF KINGAROY, SHOWING PEANUT SILOS IN THE CENTRE.

What Sheep-raisers are Asking.

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

THE following cross-section of enquiries of and replies by the Sheep and Wool Branch of the Department will be of general interest to the grazier:—

Question.—At what age should merino ewes be mated?

Answer.—If the owner has in view the development of his ewes, their value as wool producers, and the prospects of a decent lambing, ewes should not be mated before attaining the age of 18 months. The period of gestation being five months, the ewes at the earliest lambing would thus be 23 months old. Proper feeding, too, is very necessary at this early age. Earlier mating tends to hinder proper development, and greatly decreases the normal cut throughout the life of the ewe.

Question.—What breed of sheep would you recommend for the North Coast areas?

Answer.—The Romney Marsh, and its crosses. The natural habitat of this breed is on the marshy, heavy-rainfall lands of Kent, and through all the generations the breed has retained the quality of doing far better than other breeds in heavy rainfall areas.

Question.—At what age should fat lambs be marketed?

Answer.—Presuming the lambs are crossbreds and that the feed has been adequate, fat sucker lambs should be fit for market at 4 months or a little older. At this age they should dress 33 lb. and possibly better. With the meat shortage in view, growers are advised to hold their lambs for heavier weights. Up to 40 lb. is acceptable without any decrease per lb. to the grower provided lambs are truly fat. Lambs should, even at a little inconvenience, be marketed as they become fit. It is a mistake to hold the tops pending the growth and development of the later dropped lambs.

Question.—Do you recommend shearing merino rams twice a year?

Answer.—From all points of view it is a practice to be encouraged. With the ravages of blowfly as serious as they are, rams in short wool are far less susceptible to fly strike in the head. A great proportion of strikes in rams occurs in the head. With the shorter wool, treatment is much simplified and the chances of saving a ram, after strike, are much better. Another point of importance in connection with twice-a-year shearing is the fact that rams are in condition to join at a time to suit

seasonal conditions. Joining rams with any considerable fleece is not to be recommended.

Question.—The lambing has been unsatisfactory. Can you suggest anything to improve matters?

Answer.—Presuming a correct proportion of rams was joined, the meagre lambing may be put down to seasonal conditions, or the wrong time for mating. Dependent on feed and locality, mating should take place so that lambs will be dropping at a time proved to be correct for that particular locality. If practicable on your property, you are advised, at lamb-marking time, to take out the dry ewes and join rams again. Proved barren ewes should find their way to the fat-stock market.

Question.—At what age should I wean my Merino lambs?

Answer.—If the season is adverse, the ewes will attend to this matter themselves. If the season is good, the lambs should be taken off at 4 to 5 months. Be careful of the paddock into which weaners are put. Grass seed country should be rigidly avoided. A flock of weaners may easily become "lost" in a paddock with high grass, so country of this description should also be regarded as unsuitable for this particular flock. It is a good idea to run a proportion of old sheep with weaners.

Question.—About what is the average cut of a Border Leicester Merino cross sheep?

Answer.—The sex of the sheep is not mentioned, and with regard to weight this is important, as a wether may be expected to cut a good deal more than a breeding ewe. However, the word "average" comes into it. A well-nourished fleece from such a cross should scale 9 lbs. This wool, at present, if bright and of pleasing length, is selling particularly well, and may be quoted at 13d. per lb. average. This gives you 9s. 9d. Out of this would come relevant expenses. The above-mentioned figures are regarded as safe. It is quite possible that, under present conditions, the figure may be well exceeded if the sheep come from pure-bred stock on both sides.

Question.—What is the difference between a "pack" and a "bale" as applied to the wool industry? What is the average weight of a bale of wool?

Answer.—There is no real difference, but generally the word "pack" is used when the container is empty, and the term "bale" is used when once it is filled with wool. Last season the average weight of a bale of wool was 308 lb. This season, on account of droughty conditions, it is anticipated that the weight will be slightly less.

Question.—Is the Farmers' Wool Scheme in connection with the Department still functioning?

Answer.—This valuable service to the smaller grower is still in operation. The service applies principally to owners with 1,500 sheep or less. An advance representing 60 per cent. of the estimated value of the consignment is made to growers, without interest. Every pound of wool is handled by expert hands and the grower is sure of full market values. The advance is sent only when a letter of advice is received. To facilitate correct valuation a grower should mention in his letter

the contents of the various bales or packages. No skirting of fleeces is necessary. Stains should be removed and packed separately. This also applies to bellies and locks. Consign all wool to Department of Agriculture and Stock, Roma street.

Question.—Weaners in the wool are not doing well. Should they be shorn?

Answer.—Shear the weaners as soon as possible, see they are free of worms, and place on the best feed available. The improvement and growth of young sheep so treated is out of all proportion to that of weaners kept in the wool.

Question.—Sheep with 9 to 10 months' wool are showing distinct signs of lice. Should they be dipped?

Answer.—It would pay you far better to shear the flock as soon as practicable and then dip off shears. The writer does not like the idea of dipping sheep with more than 6 months' wool if it can possibly be avoided.

Question.—How do I find the contents of a dip?

Answer.—Add together the length of the dip line and the length of the bottom in inches and divide by two. This gives the average length. Obtain the average width in a similar manner and multiply the average length by the average width, in inches, and the product by the depth. Divide this by 231 and the result will be approximately the number of gallons.

Question.—Is it correct to refer to the ages of sheep as 2-tooth, 4-tooth, and so on?

Answer.—It is not strictly correct to refer to the dentition of sheep in giving the age. However, the practice is so universal that the industry will continue to use it. Properly speaking, sheep should be described as one year old, and so on. The dentition of sheep varies so on different pastures that there is a comparatively wide margin of error in describing the age by the teeth. The flock book, on the other hand, cannot lie, and if the period of the drop is given the exact age in years and months is ascertainable. The age earmark on station sheep is a sure guide.

Question.—I am told that tar is injurious to wool. Is this so?

Answer.—Tar and its derivatives are certainly most harmful in wool. In Queensland the use of these substances as a brand is illegal. When wool carrying tar brands goes into the scour the washed product is dingy; furthermore, it is not wise to put other wools through the same liquor, with the result that the liquor is wasted. This makes the business of scouring far more costly than it should be. There are two essentials in a sheep brand. Firstly, the material used should remain reasonably legible for the period of the fleeces growth; and, secondly, the brand should scour out without any deleterious effect on the wool.

GENERAL NOTES

Red Cross Parcels Received in Japan.

Two Australians, Corporal A. G. Boyne, NX55009, of Sydney, and Corporal E. J. Rice, VX41377, of Glen Iris, Melbourne, who are prisoners of war in Osaka Camps, Japan, state they have received Red Cross parcels. In a broadcast message received in Australia on 3rd January, 1945, Corporal Rice states: "I have just received a Red Cross parcel and expect another one on Christmas Day." Corporal Boyne in a message received the same day, says: "Received American Red Cross parcel which was a pleasant surprise."

Red Cross Needs Old Linen.

Clean old linen which includes sheets, counterpanes, mosquito nets, pillow slips, white clothing and any coloured cotton material that has been boiled, is urgently needed by the Hospital Dressing Section of the Red Cross Society. Supplies may be sent to a local branch or direct to the Hospital Dressing Section, Horsham House, Adelaide street, Brisbane.

Butter, Cheese, and Cotton Boards.

Orders in Council have been issued under *The Primary Producers' Organisation and Marketing Acts* extending the operations of the Butter and Cheese Boards for the period from 1st January, 1945, to 31st December, 1947, and the Cotton Board from 1st January, 1947, to 31st December, 1950.

Biloela Show.

This year's show of the Callide Valley Agricultural and Pastoral Society will be held at Biloela on the 24th and 25th May.

Plate 96.
A Tamarind Tree, near Hughenden.

Rural Topics

Plenty of Butter-fat in Good Feed.

Efficient production is the only form of economic production and this, probably, applies to dairying more than to any other primary industry. Efficiency is gained by ensuring that cows get the right food in the right quantities. But that implies, of course, the right kind of dairy cows. And to make sure of having the right sort of herd it is necessary to test and cull, so that only the right sort of cows are retained in the herd.

Nowadays, the value of dairy land is not judged by merely the number of cows it will carry but by the butter-fat produced from every acre stocked. Once this idea is accepted, it becomes as plain as a rate notice that the higher a cow yields the better she is as an economic unit. Low producers eat just as much grass and cost just as much to look after as the high producers in the herd. That is where herd testing and culling come in, so that the boarders can be sacked and the profitable producers kept on.

A Dehydrated Dinner.

In Sydney some time ago the Commonwealth Food Control conducted an interesting series of lectures and demonstrations on and with dehydrated foods. Among the demonstrations was a very appetising dehydrated dinner of meat, vegetables, eggs, salad, and fruit—all dehydrated products. The butter used was "tropical spread" and the ham was tropical-cured. At the dinner the assistance given by American experts in revolutionising food processing in Australia was acknowledged. Without dehydration, it was said that it would have been impossible to keep up supplies to the Services. Included in the dehydrated products now available for the Forces are meat, potatoes, cabbage, carrots, beetroot, onions, and tree fruits. The tonnage of potatoes being treated is enough to provide for the whole of the civilian population in normal times.

That's all very interesting, but if he still survives in the western country it means, perhaps, the end of the spud and onion hawker who, in other days, was one of the most welcome travellers along the western stock routes. Anyone who has done a bit of droving with a packhorse outfit will agree with that. Dried potatoes and onions would certainly provide a welcome variant to dried apricots.

Nothing New Under the Sun.

"Of the other leguminous plants the bean best reinvigorates the ground . . . Beans are not a burdensome crop; they even seem to manure it; wherefore the people of Macedonia and Thessaly turn over the ground when it is in flower."—Theophrastus, 370 B.C.

The Ancient Romans Had Them!

In every circle, and truly at every table, there are people who lead armies into Macedonia; who know where the camp ought to be placed; what posts ought to be occupied by troops; when and through what pass that territory should be entered; where magazines should be formed; how provisions should be conserved by land and sea, and when it is proper to engage the enemy; when to lie quiet.

If, therefore, anyone thinks himself qualified to give advice respecting the war which I am to conduct, which may prove advantageous to the public, let him not refuse his assistance to the State, but let him come with me into Macedonia. He shall be furnished with a ship; a horse; a tent; even his travelling charges will be defrayed.

But if he thinks this too much trouble, and prefers the repose of a city life to the toils of war, let him not, on land, assume the office of a pilot. The city, in itself, furnishes abundance of topics of conversation; let it confine its passion for talking within its own precincts, and rest assured that we shall pay no attention to any councils but such as shall be framed within our camp.—Lucius Aemilius Paulus, 165 B.C.

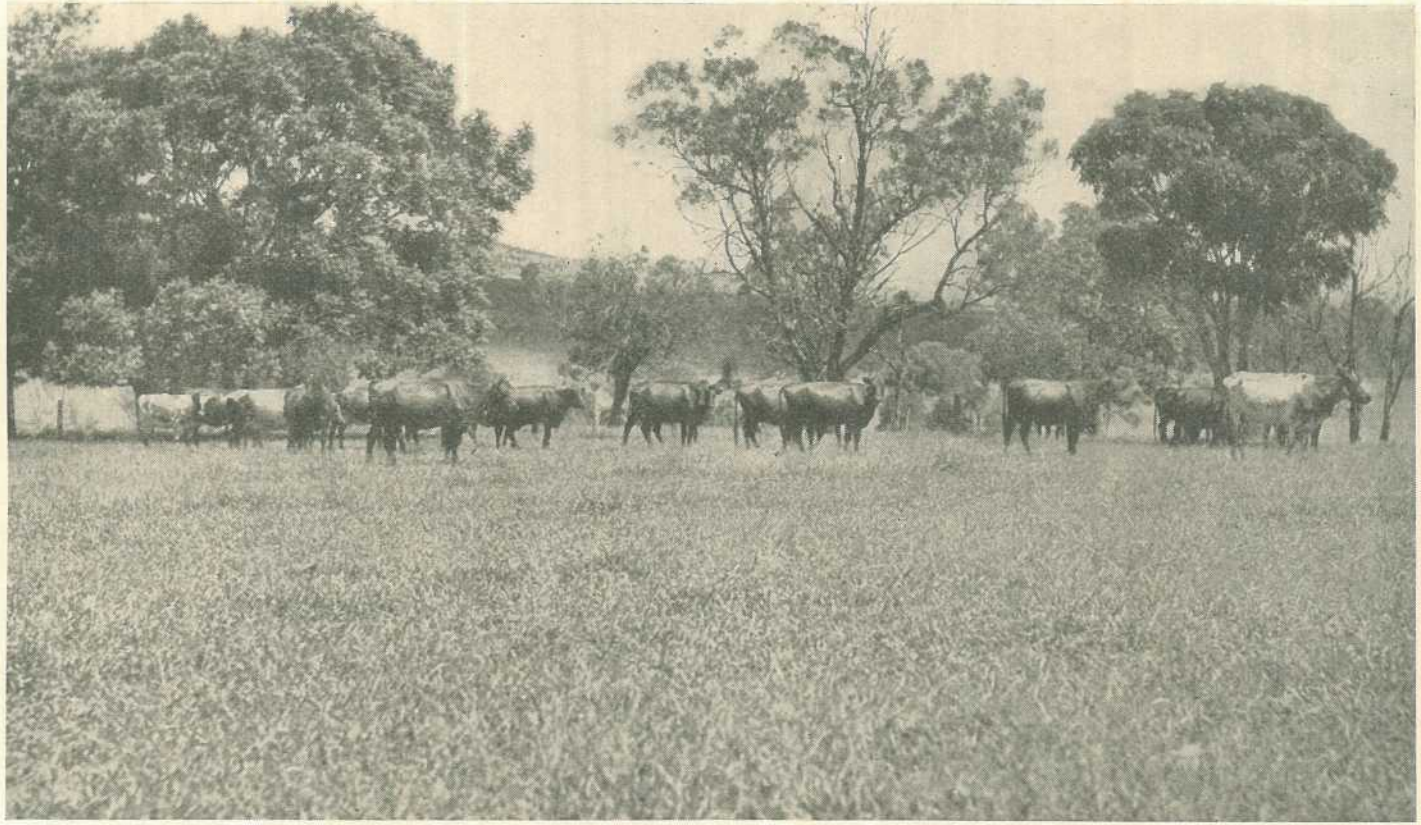


Plate 97.
ILLAWARRA CATTLE ON MR. W. SCHMIDT'S FARM, NEAR KINGAROY.

GADGETS AND WRINKLES

WEIGHTS AND MEASUREMENTS OF STOCK FOODS.

As a guide for those without scales for weighing foodstuffs, the following particulars of approximate weights for the measures shown will be helpful:—

1 kerosene tin full of pollard weighs 18 lb.
1 kerosene tin full of bran weighs 12 lb.
1 kerosene tin full of wheat meal weighs 25 lb.
1 kerosene tin full of lucerne meal weighs 12 lb.
1 kerosene tin full of wheat (whole) weighs 30 lb.
1 kerosene tin full of maize (whole) weighs 28 lb.
1 kerosene tin full of maize (crushed) weighs 25 lb.

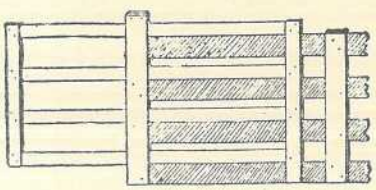
The weight of a quart measure of the various ingredients used in poultry rations are shown hereunder:—

1 quart of pollard weighs 1 lb.
1 quart of bran weighs 8 oz.
1 quart of wheat meal weighs 1 lb. 8 oz.
1 quart of lucerne meal weighs 8 oz.
1 quart of maize meal weighs 1 lb. 8 oz.
1 quart of linseed meal weighs 1 lb.
1 quart of cocoanut meal weighs 1 lb.
1 quart of meat meal weighs 1 lb. 8 oz.
1 quart of bone meal weighs 1 lb. 12 oz.
1 quart of common salt (fine) weighs 2 lb.
1 quart of wheat (whole) weighs 2 lb.
1 quart of maize (whole) weighs 2 lb.
1 quart of maize (cracked) weighs 1 lb. 9 oz.

These weights are based on the measures being level full, but not pressed down; and will, of course, vary according to the quality and texture of the materials.

VARIABLE GATE LENGTH.

A handy piece of equipment on the farm is a variable length wooden gate that swings to close either of two openings of different width. Such a gate is easy to make. If unplaned 1 x 6 in. boards are used in the main gate, which closes the smaller opening the slide extension illustrated in the drawing may be made of planed boards four inches wide and seven-eights inch thick. Pieces of lath laid under one of the cross members at the back of the extension will give slots between the cross members that will clear the main gate boards and make the extension slide easily.



USE GOOD PAINT.

Since two-thirds of a paint job on buildings is the labour cost, it is time and money wasted to use a low grade, short-lived paint. Cheap paints may cause cracking, peeling, or scaling, and result in such a surface that the old paint will have to be completely removed before repainting can be done. "This removing of paint costs almost as much as a two-coat paint job," says one authority. "If cracking or peeling paint has to be removed, a good three-coat paint job will usually have to be put on instead of the two coats necessary for an average paint job."

Mother and Child.

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

THE EXPECTANT MOTHER.

LAST month the necessity for suitable exercise during pregnancy, in order that the muscles will be firm and elastic for the time when baby comes along, was discussed. The mother who treats herself as an invalid and lies about all day cannot expect to be physically fit for such an important task as the birth of a baby.

This month the discussion is particularly for the busy housewife who has too much to do—perhaps several other children to care for, all her own work to do, and that never-ending daily task of planning the family's meals.

"How can I rest?" she will ask when told that some rest with her feet up every day is important. Let us think how it may be done. Most women stand far too much over tasks which could be done equally well sitting down. A high stool, such as are still used in offices, should be a necessary part of the equipment of every kitchen, and on it the over-worked mother can sit to iron all except very bulky articles, also to prepare vegetables, and even to wash up. In these days when clothing and house linen must be made to last as long as possible and some mending has to be done, why not sit on the verandah or in the garden with feet up on a stool or low chair and darn the socks or the holes in junior's pants, instead of staying indoors. If a radio is near, an interesting talk or some attractive music would make the work seem less tiresome.

Eight or nine hours sleep at night is the ideal—it is a good plan to go to bed between 9 and 10 o'clock, because the sleep before midnight is usually sounder and therefore more refreshing. Of course, the windows must be open even in the winter, because fresh air is another important essential for physical fitness.

Baby Clothes.—As mothers know, they can obtain extra coupons for these, and if they have not a good pattern, the sister in charge of the ante-natal section has some simple patterns which can be supplied to city mothers at the welfare centres, and to country mothers by writing to the ante-natal correspondence section. It is unnecessary to make elaborate and over-trimmed baby clothes—choose the best material obtainable and ornament the garments with just a little dainty hand work. Do this sitting on the lounge or on a bed, so that the feet are level with the body. Machining should be avoided in the later months of pregnancy.

If mothers are fortunate enough to be living in a district where good neighbour groups are operating, one of these kind people may offer to do the machining or take over some of the shopping, so that heavy loads will not have to be carried long distances.

Reading.—For the mother who is expecting her first baby and who may therefore have more spare time, an interesting occupation could be the reading of suitable books on baby and child care and management, or the attending of practical talks on such

subjects which are given periodically by this service. A girl studies for any other career, how much more important to learn as much as she can beforehand about that most important career of all—motherhood.

The Father's Duty.—Whether he is at home or away, a father has his duty to the coming child as well as the mother. Every father is naturally anxious to have his children healthy and happy, and to do this he must see that the greatest care is taken of the mother. He should see that his wife receives all the ante-natal care and advice which is available for her. The Child Welfare Service is ready to assist with any problems.

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

IN THE FARM KITCHEN.

Variety Meats.

Sweetbread Timbales.

1 cup cooked sweetbreads, cut fine
1 tablespoon butter
1 tablespoon onion juice
¾ cup bread crumbs
2 cups stock
2 eggs, beaten
Salt and pepper
1 tablespoon parsley, minced

Mix the bread crumbs, butter, meat, onion juice and stock then heat to the boiling point. Remove from the fire and add the beaten eggs, parsley, salt and pepper to taste. Pour the mixture into buttered moulds (custard cups), set in a pan of hot water and bake in a moderately hot oven (375 degrees F.) until they are set. When ready to serve turn out on a hot platter, garnish with parsley and serve with mushroom sauce.

Baked Stuffed Heart.

1 beef heart or
2 pork hearts
Flour
Salt
Pepper
2 tablespoons drippings
1 cup hot water

Dressing:
2 cups soft bread crumbs
¼ cup hot water
2 tablespoons fat
¼ cup celery leaves, minced
1 teaspoon onion, minced
Salt and pepper

Wash heart well in cold water removing any loose membrane. Stuff with the well seasoned dressing and sew edges together. Dredge with flour and brown in hot fat in same pan in which it is to be baked. Season well, add water, cover closely and bake in a slow oven (300 degrees F.) two to three hours.
Variations:

1. Creole Heart:
2 cups canned tomatoes
2 onions, sliced
½ teaspoon salt
1 green pepper, minced
1 cup celery, diced

2. Heart with Onions and Carrots:
6 medium sized onions
6 medium sized carrots

Arrange onions and carrots around heart and bake 2 to 3 hours. Serve with gravy. Potatoes may be added if desired.

3. Hearts with Apricots:
2 to 3 tablespoons brown sugar
1 cup dried apricots
1 cup hot water
4 slices lemon
1 inch stick cinnamon

After browning heart in hot fat, sprinkle with brown sugar, surround with dried washed apricots, lemon slices and stick cinnamon. Add water and bake slowly 2 to 3 hours.

Prunes or quartered apples may be used in place of apricots.

Sliced Heart with Horseradish Sauce.

Wash the heart thoroughly in warm water, remove veins and arteries. Simmer until tender in salted water (2 teaspoons salt for each quart of water) 1½ to 2 hours. Cut in thin slices and serve hot with horseradish sauce. Serves 4.

Plate 98.
The Road to Memerambi, Kingaroy District, Q.

ASTRONOMICAL DATA FOR QUEENSLAND.

MAY.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.13	5.17	Cairns	11	46	Longreach ..	28	42
6	6.16	5.13	Charleville ..	25	29	Quilpie	37	33
11	6.19	5.09	Cloncurry ..	38	61	Rockhampton ..	2	18
16	6.21	5.06	Cunnamulla ..	31	28	Roma	15	19
21	6.24	5.04	Dirranbandi ..	21	17	Townsville.. ..	11	38
26	6.27	5.02	Emerald	13	26	Winton	31	50
31	6.29	5.00	Hughenden ..	23	47	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	p.m.	a.m.
1	8.03	9.15
2	8.52	10.10
3	9.46	11.03
4	10.44	11.55
		p.m.
5	11.46	12.43
6	..	1.28
	a.m.	
7	12.49	2.10
8	1.53	2.50
9	2.58	3.30
10	4.04	4.11
11	5.12	4.53
12	6.20	5.39
13	7.28	6.28
14	8.35	7.22
15	9.37	8.19
16	10.34	9.17
17	11.25	10.15
	p.m.	
18	12.09	11.12
19	12.49	..
		a.m.
20	1.24	12.07
21	1.57	1.00
22	2.28	1.52
23	2.59	2.44
24	3.30	3.35
25	4.03	4.27
26	4.38	5.20
27	5.17	6·14
28	6.01	7.10
29	6.49	8·06
30	7.42	9.00
31	8.39	9.52

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

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

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICT).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	28	12	44	27	19	2	51	30
6	24	13	41	29	16	3	47	32
11	15	23	31	39	7	14	35	45
16	11	28	26	43	1	19	29	51
21	16	23	32	39	8	14	36	44
26	25	14	42	29	16	4	48	33
31	28	11	44	26	19	1	52	29

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	50	8	64	36	48	22	41	9
3	51	6	65	35	49	21	42	8
5	46	9	61	37	46	23	37	10
7	42	17	58	43	43	27	35	17
9	31	29	52	50	36	35	26	25
11	20	39	44	57	29	42	18	33
13	12	47	39	62	24	47	12	39
15	7	50	36	63	21	49	8	42
17	9	47	37	62	22	47	9	39
19	14	41	41	58	26	43	14	34
21	22	37	46	56	30	41	20	32
23	26	29	48	50	33	35	22	25
25	40	19	57	44	42	29	33	18
27	47	11	62	38	47	24	38	12
29	51	7	65	36	49	21	42	8
31	51	6	65	35	49	21	42	8

PHASES OF THE MOON.

Last Quarter May 5th, 4.2 p.m.; New Moon May 12th, 6.21 a.m.; First Quarter May 19th, 8.12 a.m.; Full Moon May 27th, 10.49 a.m.

DISCUSSION.

On 15th May the Sun rises 20 degrees north of true east and sets 20 degrees north of true west.

On 9th and 23rd May the Moon sets true west.

Venus.—This planet, now a morning object in the constellation of Pisces, at the beginning of the month rises between 4.30 and 5 a.m., 10 degrees north of true east. On the 21st, it again reaches greatest brilliancy with a stellar magnitude of —4.2. At the end of the month it rises between 3 and 3.30 a.m. 9 degrees north of true east.

Mars.—Mars, also in the constellation of Pisces, at the beginning of the month rises between 3 and 3.30 a.m. 2 degrees south of true east. At the end of the month it is very close to Venus, rising approximately 25 minutes before that planet 8 degrees north of true east.

Jupiter.—At the beginning of the month, Jupiter will be well up in the sky when darkness sets in. It will sink below the western horizon about 2.30 am., 6 degrees north of true west. By the end of the month, it will set about midnight 5 degrees north of true west.

Saturn.—This planet in the constellation of Gemini at the beginning of the month sets about 9 p.m. about 24 degrees north of west. At the end of the month, it sets between 7 and 7.30 p.m., 24 degrees north of west.

The Zodiac.—It has been mentioned in previous discussions that although the Sun remains relatively stationary, because of the small distance of the Sun from the Earth, compared with the distance of the stars, and of the revolution of the Earth round the Sun,

the Sun appears to move along a regular path among fixed stars, this path being called the ecliptic. Now, the planes of the orbits of the Moon and planets are very slightly inclined to the plane of the Earth's orbit and this causes these bodies to appear, sometimes a little above the ecliptic and sometimes a little below it. The position of the Moon ranges from about 5 degrees above the ecliptic to about 5 degrees below. Thus the angle of the moon from the equator varies from about 28 degrees north to about 28 degrees south. Mercury appears from 7 degrees above to 7 degrees below the ecliptic, and Venus from 3½ degrees above to 3½ degrees below it. The range of Mars is 2 degrees on either side, and of Jupiter, 1¼ degrees on either side. Saturn, Uranus, and Neptune range 2½ degrees, 1 degree, and 2 degrees respectively on either side of this imaginary path. This narrow belt in the sky—about 8 or 9 degrees on either side of the ecliptic, within which the moon and planets keep—was defined by the ancients by constellations covering equal intervals along the ecliptic, which acted as various stations of the Sun during the solar year. Summer, autumn, winter, and spring, each had their corresponding stations at which the Sun appeared during the season. There appears to have been two separate systems of zones or stations, one of 6 constellations, or signs each of 60 degrees interval, and the other of 12 signs, each of 30 degrees interval. After each system had served for many years a compromise was made with the result that the belt was divided into 12 unequal divisions which now make up the constellations along this path in the sky, but which, of course, no longer serve as a means of identifying the seasons, as was their original purpose.

QUEENSLAND WEATHER IN MARCH.

District average rainfall figures in the Peninsula, Carpentaria, North and Central Coast Divisions showed well over normal to heavy flood totals. The Lower Carpentaria, 454 points, was 14 per cent. above normal, the Central Coast West, 675 points, 90 per cent. above, and the North Coast (Barron and Herbert), 3,114 and 3,481 points, were 126 per cent. and 150 per cent. above, respectively. This superabundant distribution was in marked contrast to general deficiencies over the rest of the State. The South Coast Moreton with 258 points, from variable thunderstorms, was the best served but still 59 per cent. below normal. Other districts ranged from 71 per cent. below in the Upper West to 98 per cent. below in the Maranoa. The district average for the Port Curtis was 76 points, the next best was 51 points in the Warrego, and the lowest 6 points in the Maranoa. In December, 1944, a fair percentage of the tropical interior received over average early season monsoonal rains, and in February, from the East Warrego to the Moreton Divisions, thunderstorms and good rains gave much relief. During this season, however, apart from the tropical interior distribution of December there has been a complete lack of monsoonal penetrations and their resultant one or two soaking rain periods.

With the approach of normally dry and cold winter conditions an early general rain would do much to relieve pastoral industry anxiety in many Upper West and Central areas and particularly in the southern interior where yearly rain totals during 1943 and 1944 were consistently below normal. In the far North Coast and adjacent inland areas heavy daily totals included Ingham 1,464 points (2nd), Mossman 1,549 (13th) record, and many others from 7 to 10 inches. Record or near record monthly totals were Mount Surprise, 1,559 points; Atherton, 2,332; Babinda, 7,094; Millaa Millaa 4,288; Innisfail and Tully, 6,606 and 7,509 points, respectively. Aggregate totals three months:—Cairns, 9,874 points; Tully, 14,022; Innisfail, 13,708; and Babinda, 15,997 (second highest, record 16,701 in 1939). In the Central Coast East many stations ranged between 10 and 15 inches up to 2,078 points at Proserpine.

Flooding.—Widespread damage with persistent and heavy local and stream flooding, especially first two weeks, coastal districts Mackay to Cooktown and across the highlands to the eastern Carpentaria. Much traffic delay. Burdekin Railway Bridge (8th), heavy damage, goods train washed away, two lives lost. Height of water at bridge, 9 a.m., 8th, 9 feet 2 inches over rails and rising 8 inches per hour. Burdekin, at Sellheim (7th), 46 feet stationary and (13th), 47 feet stationary. Railway bridge (14th), 13 feet 1 inch over rails, rising 3 inches. Mount McConnel (Suttor River), 19 feet on 15th and further North Coast flood rains 17th to 19th. Early in the month (Mount Surprise), spans of Elizabeth Creek Bridge washed away and on the 12th (Einasleigh), the Copperfield River was 14 feet over the rail bridge. The Balonne River (Darling Downs) was also carrying considerable run-off from February rains.

Brisbane.—Pressure 9 + 3, 29.935 inches (normal, 29.966 inches), lowest since 29.917 inches in 1942.

The rain position is summarised below:—

Division.	Normal Mean.	Mean March 1945.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	1,219	2,017	65 above
Peninsula South	687	947	38 ,,
Lower Carpentaria	398	454	14 ,,
Upper Carpentaria	344	829	141 ,,
North Coast, Barron	1,379	3,114	126 ,,
North Coast, Herbert	1,390	3,481	150 ,,
Central Coast, East	603	824	37 ,,
Central Coast, West	345	657	90 ,,
Central Highlands	279	47	83 below
Central Lowlands	239	65	73 ,,
Upper Western	197	57	71 ,,
Lower Western	161	11	93 ,,
South Coast, Port Curtis	427	76	82 ,,
South Coast, Moreton	637	258	59 ,,
Darling Downs East	277	45	84 ,,
Darling Downs West	232	31	87 ,,
Maranoa	263	6	98 ,,
Warrego	193	51	74 ,,
Far South-West	133	19	86 ,,

Commonwealth Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

FEBRUARY RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of years' records.	Feb. 1944.	Feb. 1945.		Feb.	No. of years' records.	Feb. 1944.	Feb. 1945.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	11·44	42	13·52	25·24	Gatton College	3·52	44	2·35	..
Cairns	16·30	61	25·57	27·52	Gayndah	4·20	72	4·02	4·61
Cardwell	17·00	71	16·19	21·93	Gympie	6·58	73	4·70	6·28
Cooktown	13·71	67	24·94	14·60	Kilkivan	4·91	62	4 58	7·46
Herberton	8·63	57	10·44	17·03	Maryborough	6·65	72	4·37	6·95
Ingham	17·12	51	26·84	33·06	Nambour	9·57	47	3·16	9·34
Innisfail	23·07	62	34·12	44·88	Nanango	3·93	61	3·22	7·65
Mossman	20·86	19	32·00	17·91	Rockhampton	7·74	72	5·49	3·36
Townsville	11·33	72	17·88	12·09	Woodford	8·05	55	4·06	7·53
Central Coast.					*Central Highlands.*				
Ayr	9·62	56	9·36	16·59	Clermont	4·27	72	10·25	1·73
Bowen	8·96	72	4·71	7·49	Springsure	3·78	74	4·74	0·93
Charters Towers	4·63	61	12·07	2·55					
Mackay	12·41	72	18·09	3·23	*Darling Downs.*				
Proserpine	13·85	40	18·40	6·55	Dalby	2·85	73	1·86	6·02
St. Lawrence	7·67	72	9·96	2·64	Emu Vale	2·59	47	1·78	5·07
					Jimbour	2·75	64	2·91	4·66
South Coast.					Miles	2·72	58	3·97	8·14
Biggenden	4·18	44	4·08	7·49	Stanthorpe	3·18	70	2·79	5·27
Bundaberg	6·39	60	6·37	7·42	Toowoomba	4·53	71	2·06	4·44
Brisbane Bureau	6·18	93	1·09	10·77	Warwick	3·10	78	3·69	2·51
Caboolture	7·82	67	4·77	16·74					
Childers	6·42	48	4·47	12·21	*Maranoa.*				
Crohamhurst	12·48	50	3·80	9·74	Roma	2·87	69	2·40	3·51
Esk	5·24	56	5·27	6·26	St. George	2·39	62	0·48	2·76

CLIMATOLOGICAL TABLE FOR FEBRUARY.

Compiled from Telegraphic Reports.

Divisions and Stations.	Atmospheric Pressure, Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cairns	..	88	74	94	18	71	13	2,752	19
Herberton	..	81	65	91	19	58	16, 17, 18	1,703	18
Townsville	..	88	75	93	28	71	2	1,209	11
Brisbane	29·91	86	70	93	19	65	12, 5	1,077	15
Darling Downs.									
Dalby	..	89	66	97	16	60	28	602	10
Stanthorpe	..	84	59	94	16	50	1	527	12
Toowoomba	..	83	63	92	15	55	14	444	12
Mid-Interior.									
Georgetown	29·80	94	73	101	5	68	2, 7	320	7
Longreach	29·84	103	75	108	12	69	15	30	3
Mitchell	29·83	97	70	104	16	57	16	358	8
Western.									
Burketown	..	92	76	99	19, 21	73	6	802	12
Boulia	29·78	98	77	106	11, 12	63	1	117	4
Thargomindah	29·84	99	74	107	11	58	15	117	1

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