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QUEENSLAND AGRICULTURAL JOURNAL

Vol. LV. 1 MAY, 1941 Part 5

Event and Comment

Anzac.

THROUGHOUT the Commonwealth the 26th anniversary of the Gallipoli Landing was commemorated on 25th April with more than customary solemnity, because of the fact that Australian and New Zealand troops were again fighting shoulder to shoulder on classic ground only a few miles across the Aegean Sea from Anzac Cove, where the old Diggers of the expeditionary forces of both dominions established a great tradition and set for all time a standard for succeeding generations—a standard maintained with added lustre by the Diggers of to-day, true chips off the old block, who are fighting in the same great cause of human freedom. Between the Old A.I.F. and the New it would be idle to make comparisons, for each is complementary to the other; each a purely voluntary force imbued with the same motives, impelled by the same urge to do a tough job because it has to be done and done well; and each inspired by those things of which our nation has been built. To the Old A.I.F. has been allotted a definite place in military history as "the army of the world's most democratic nation," and the New A.I.F. is living up to a splendid tradition in a splendid way.

Whatever may have been said of Gallipoli as the grave of a great hope, it remains a lasting memorial of British grit. Cruttwell, the eminent military historian who is not given to the use of superlatives, describes 25th April, 1915, as "the most dramatic day in the whole world

war." "That landing at Anzac Cove—the Australians' and New Zealanders' first military stroke in the war—was," says the historian, "an operation so brilliant in character that, no matter the honours gained in later battles this one could not be dimmed by comparison. Anzac proved the Australians and New Zealanders as front line soldiers." To the name of Anzac the Diggers of another generation have already added fresh laurels and, perhaps, carried its fame to even loftier heights. Every day of last month brought its thrilling story and "even the ranks of Tuscany could scare forbear a cheer."

By observers of other countries, the new Anzac Army has already been designated the finest fighting force that has ever faced a ruthless enemy of overwhelming numbers.

So on Anzac Day, while remembering, with reverence, the sacrifice and the service and, with pride, the achievements of the Old Battalions, Australia again rang with cheers for the New Battalions fighting in the old, the Australian way to which the records of friend and foe alike bear glowing tribute.

Irrigation Plants for Cotton.

THERE is now an increasing necessity of producing more cotton and to do this the Queensland Government is making available very liberal assistance for the purchase of irrigation plants for the growing of cotton and other crops.

It has been demonstrated that cotton can be grown successfully by irrigation. The principal difficulty to be overcome is late planting which is caused by the absence of sufficient winter rains to ensure enough moisture for germination of the seed. If cotton is planted between mid-September and mid-October it has been found to produce a better crop than if planted later in the year. By irrigation a pre-planting watering can, if necessary, be given and early planting then gone on with, irrespective of the rainfall. Thunderstorms usually provide sufficient rain during the growing period, but the use of irrigation may be necessary in mid-summer to offset any lack of moisture when the weather is becoming hot. The crop is then well on the way to maturity.

The Bureau of Rural Development is, therefore, desirous of greatly increasing the cotton yield and, with this end in view, is prepared to make available irrigation plants to those landholders who have suitable cotton lands and enough water for irrigation.

The irrigation plant is bought and installed by the Department of Irrigation and Water Supply. Every attention is given to ensure efficiency. Any prospective cotton irrigationist is required to have his own motive power, either a tractor or a stationary engine.

The irrigation plants are bought at cost price and an applicant is only required to repay to the Bureau the actual cost of plant, together with railage, cartage, and erection costs. The total cost price of the plant is regarded as a loan repayable to the Bureau, by annual instalments on the 30th June each year over a period of ten (10) years, without interest. No interest is charged, but the farmer has to undertake to grow and irrigate annually an acreage of cotton, generally round about 10 acres.

No security over a farmer's land or any other assets is required, except, of course, an agreement to repay the loan, with the usual requirements of such an agreement. Any interested landholder is asked to get in touch with the Bureau of Rural Development, Brisbane, when full particulars will be sent to him, also an application form.

Early applications are desired so that a good number of irrigation plants can be put in before the cotton planting season commences.

Drought Compensation for Wheatgrowers.

REFERRING to the £20,000 grant which has been made by the Commonwealth Government under *The States Grants (Drought Relief) Act,* 1940, for the purpose of alleviating any hardship suffered by Queensland wheatgrowers in consequence of the effects of drought upon their wheatgrowing activities during 1940, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, has announced that application forms are available on application to the State Wheat Board, Toowoomba. Application for assistance may be made by any wheatgrower who considers that he suffered hardship in the year 1940 because of drought on his grain crop, and who considers that, as a consequence, he is entitled to receive assistance.

Applications for assistance will not be considered unless the applicant signs an authority, embodied in the application form, authorising the Minister to depute an officer of the Department of Agriculture and Stock to examine the applicant's agricultural returns for the year 1940, rendered under *The Statistical Returns Acts,* for the purpose of verifying statements contained in the application. Applications for assistance must be forwarded to reach the Manager, State Wheat Board, Margaret street, Toowoomba, by not later than 9th June, 1941.

The Future of Agriculture.

FROM the very beginning of things, agriculture has been man's one big permanent job. With balanced agricultural resources, a nation can exist on its own. Without balanced agricultural resources, no nation can be strong. From that standpoint, Australians are particularly fortunate. Our civilization is an agricultural civilization. Our prosperity, our security are based on the products of the soil. Our welfare to-day and our whole future depends on our intelligent use of the land, on our intelligent observance of the principles of the science and practice of agriculture, and on our intelligent development of a real rural economy—an economy not only covering production, marketing, and distribution, but also social conditions.

One big thing that may come out of the present war, is the decentralisation of our population. It is easily conceivable that the use of new and more terrible methods of warfare will bring about the end of the One Big City, which can so easily be the most vulnerable place in any country as current events have proved. Modern transport on land and in the air already looks like sounding the death knell of the one big city idea. The necessity of decentralising war industries is already becoming a factor in the more rational distribution of our population. With all these readjustments of industrial and social economy, the land industries are bound to benefit. And during the period of readjustment agricultural co-operation must be developed to the advantage of all and the disadvantage of none. Changes occur no less in agriculture than in industry, and we must be prepared to change with the times and the needs.

Haymaking.

L. M. HODGE, Manager, Biloela Research Station.

THE objective to be achieved in converting a green crop into hay is to obtain the greatest possible weight of cured material of high nutritive value and attractive aroma, without undue loss of colour or palatability. To attain that objective the crop must be of a suitable variety or varieties, free from deleterious weeds, well grown, cut at the right stage, and properly cured.

The stage at which a crop should be cut for hay is shortly after the commencement of flowering, for if in the early flowering stage the crop yields the maximum amount of dry matter of high nutritive value. If the crop is cut too early the maximum yield will not be obtained, although the nutritive value is particularly high. On the other hand, if cutting is delayed until the ripening of the seed has advanced, the nutritive value of the resultant hay will be appreciably lowered as a result of increase in woody materials at the expense of proteins, and a decline in digestibility. It may be noted here that oats provide an exception to the general rule in that they are best cut when a proportion of the seed at the top of the seedhead has ripened and the bulk of the seed is still in the late dough stage.

The method of curing depends upon whether the material is coarse or fine, whether it is cut with the reaper and binder or with the mower, and upon the time of the year at which the crop is harvested. Binding the crop and stooking the sheaves protects the material from damage by rain, preserves the colour by avoiding excessive exposure to sunlight, and reduces losses due to rough handling. The winter-grown cereals are readily cured in this fashion, but the summer crops, when so treated, require careful watching because of the danger of mould development in the centre of tightly-bound sheaves in warm, humid weather.

In curing loose hay, rough handling and too frequent manipulation should be avoided, as they tend to cause serious loss through the breaking up and powdering of the more nutritious portions of the plant, such as the small leaves and fine terminal parts generally. Losses of this kind are also caused by allowing the hay to become dry and brittle before being put into cocks. These losses are particularly heavy when leguminous crops, such as lucerne, are being handled.

Naturally, the weather at haymaking time is of vital importance to the quality of the product. While it is impossible to avoid risks, the average farmer acquires a degree of weather sense from experience of his own locality, and he should endeavour to arrange his haymaking to coincide with fine weather. Wet weather will rapidly spoil a crop cut for hay, as the material contains nutrients that are easily dissolved by water and so readily washed out during rain. Excessive drying and exposure to the sun should also be avoided, as they cause loss of green colour and shattering and loss of the valuable leafier parts of the plants.

The best cured hay results from a fairly rapid drying. Evaporation of moisture is facilitated by high air temperatures, sunshine, and wind, whereas high atmospheric humidity retards loss of moisture from the cut crop. If the weather is mild and windy, curing of loose hay in the

windrows may be sufficiently thorough to reduce the moisture content to the desired level, and at the same time yield a fragrant, green hay in the stack. On the other hand, if the weather is hot and the atmosphere dry, or if rain threatens, the swaths should be raked and put into cocks as soon as possible.

The hay should be stacked or baled before it becomes brittle, otherwise serious losses will occur due to shattering and powdering and, in addition, the chaff made from dry hay contains an undue amount of irritating dust. If stacked or baled when too damp, however, the hay will heat, develop moulds, and spoil. In cereal or other grassy hays, the upper nodes or joints of the straw should be dry before the hay is put into stacks or bales. Where the hay is stooked, a sample for examination prior to stacking or baling should be drawn from the inside of a central sheaf, and, where the hay is loose, from the inside bottom of a cock.

Coarse salt may be sprinkled over the layers as they are built into the stack. This increases the palatability of the hay.

Haystacks should be well-built according to the directions given later in this article; they should be situated above flood-level, and securely protected against rain, fires, and vermin. While hay will keep for several years if properly stacked, it deteriorates with age, and it is a good plan to feed or otherwise dispose of stacks when they are three years old, replacing them with new hay.

Hay may be baled as an alternative to stacking, and in this form it is easily handled, transported, and stored. Baled hay is the only form of hay for which a large demand exists in the produce market. Care must be taken that hay baled direct from the field is sufficiently cured, otherwise heating may occur under high pressure and the product be ruined.

CROPS SUITABLE FOR HAYMAKING.

The crops which are utilised for hay purposes in Queensland may be divided for convenience into summer-grown and winter-grown crops. The former comprises Sudan grass, saccharine sorghums, Japanese millet, white panicum, giant setaria, lucerne, and cowpea, while the main winter-grown crops are wheat, oats, barley, canary seed grass, field pea, and vetches or tares. In addition, native and cultivated pastures are at times harvested for hay purposes, and occasionally the peanut is used for the same purpose. The most valuable hay crop is lucerne, which persists for a number of years, produces several cuttings each season, and yields a hay of high nutritive value. Of the annual hay crops, Sudan grass and wheat are the most important. Japanese millet, white panicum, and giant setaria do not yield as heavily as Sudan grass, but are better dual-purpose crops in that they may be grazed at any stage of growth without danger to stock.

The sowing of either summer-grown or winter-grown hay crops should always be preceded by a period of bare fallow, during which weeds are eliminated, moisture is conserved, and soil fertility is improved by decomposition of organic matter. A gradual working down of the land to a fine tilth should be aimed at, but care must be taken not to expose the land unduly to the erosive action of water. Finally, the preparation of a fine, firm seed-bed to assure a rapid, even germination of the seed is essential.

In the drier inland agricultural areas, where soil moisture is the principal limiting factor to crop growth, ploughing should be completed several months in advance of sowing. In districts where the rainfall is more regular and abundant, later ploughing and consequently a shorter fallow period may be adopted. The fallow period, however, should always be sufficiently long to assure that a proper tilth is achieved by sowing time.

Summer-grown Crops.

The time of sowing of annual summer hay crops should, if possible, be so arranged that these crops, which are usually ready for cutting in six to nine weeks, do not reach that stage during the height of the summer rains. Lucerne should be sown in April or May.

Sudan Grass.

Sudan grass is normally a hardy annual, although it may persist for two or even three seasons under frost-free conditions; nevertheless it is generally unprofitable to persist with a crop of Sudan grass beyond a single season. Thick-stemmed plants of Sudan grass are difficult to cure, and it is advisable, therefore, to make a heavy sowing of seed in order to induce the production of a fine-stemmed crop. The seed is preferably drilled, using every grain run, at the rate of between 10 lb. and 12 lb. to the acre, but it may be broadcast at the rate of 20 lb. to the acre and covered by harrowing.

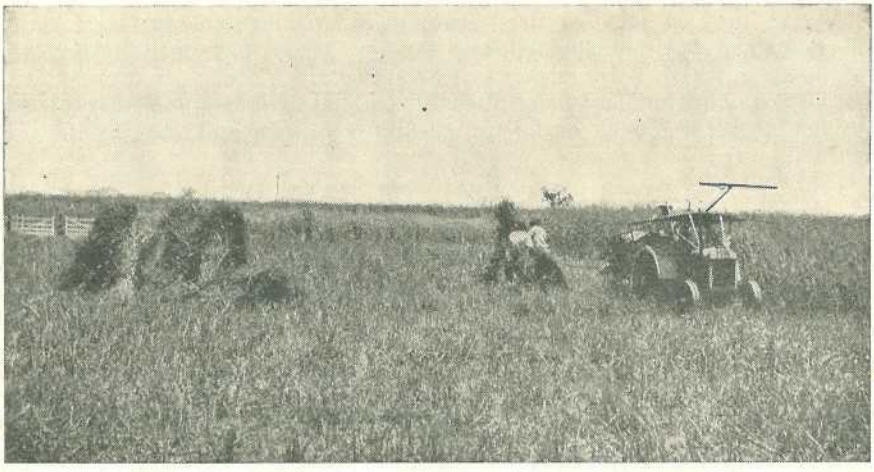

Plate 72.

HARVESTING A CROP OF SUDAN GRASS IN CENTRAL QUEENSLAND.

The crop (Plate 72) may be cut with the reaper and binder, in which case the sheaves should immediately be put into small stooks permitting free circulation of air around the sheaves. A very succulent crop tied by the binder may spoil in the sheaves, no matter how carefully it is cured, and such a crop is best harvested with a mower or with a reaper, the bundles in the latter case being tied by hand after wilting has occurred. If cut with the mower, the crop should be wilted in the swath and in the windrow and further cured in cocks, which should be of small size if the weather is cool or cloudy.

Sudan grass at all stages prior to flowering is regarded as potentially dangerous to stock, but the cured hay, made from a crop that has just flowered, is generally considered to be safe as a stock food. The regrowth should not be cut for haymaking purposes until the crop has once more flowered.

Saccharine Sorghums.

The saccharine sorghums are grown almost entirely for green feed or for silage, since they are difficult to handle and to cure as a hay crop. If sown for hay, broadcasting of the seed is preferable to sowing in drills, since a more slender type of plant will be developed. The sowing rate should be between 15 and 20 lb. to the acre. They are best cured in bundles in the field and subsequently stacked on end in a slanting position. They make a very coarse hay, which should be chaffed before being fed to stock; even when chaffed, however, the hay is very hard on the mouths of the stock to which it is fed and has little to recommend it.

Millets.

The millets, including white panicum, and giant setaria are quick-growing, hardy annuals which are able to make satisfactory development under fairly dry conditions. The seed should be drilled or broadcast at the rate of 10 lb. to 15 lb. to the acre. On account of their succulent nature the millets take longer to cure than giant setaria, but they make excellent hay when they are cured. White panicum makes a particularly fine hay. All of the group have a free-seeding habit and, if allowed to mature their seed before being cut, may cause a good deal of trouble in succeeding crops. If they are cut in the flowering stage, however, no trouble is experienced. A crop cut before maturity will usually make a second growth useful for grazing.

Lucerne.

The culture of lucerne for hay purposes is described in another article which will appear at an early date, and only a general outline of the haymaking process is given here. Probably no other hay crop requires such skill and attention to detail during the curing processes as does lucerne. Lucerne hay, to command the highest price on the market or to be of greatest value to the grower as a form of conserved fodder, should be bright green in colour, fragrant, and contain a large proportion of leaf. It should be free from weeds and rubbish and contain a minimum of dust or other irritating matter. The principal mistakes causing losses in yield or in quality are cutting too early or too late, not curing sufficiently, and over-curing.

The crop should be cut in the early flowering stage. If cut earlier, the maximum tonnage is not obtained, and if cut too late much of the lower leaf is lost, the stems become woody, and the quality of the hay suffers accordingly. In addition, late cutting delays the growth of the succeeding crop and may result in the loss of one cutting during the season. Lucerne should be cut with a mower, as it is too succulent to admit of being bound and stooked. If the crop is wet from dew or rain, cutting should be delayed until the surface moisture has evaporated.

In fine weather the swath may be raked into windrows two or three hours after cutting. The operation should not be delayed until the plants have become dry and brittle, as they may then lose sufficient

leaves to lower seriously the quality of the hay. The windrowed material, further, should be put into cocks before the leaf is dry enough to shatter. In order to obtain the maximum shading with the freest circulation of air and to protect the cocked material from rain damage, the cocks should be built tall and narrow. It is advisable to inspect the cocks each day while curing proceeds and to open them if mould development threatens. Sometimes the top half of the cock is lifted off, placed on the ground, and the bottom portion inverted on it. In fine, hot weather two days in the cock should be sufficient, but this period may be extended to four days if the weather retards moisture evaporation.

The cocks should not be stacked until the moisture content of the lucerne is reduced sufficiently to prevent spoilage in the stack. The lucerne hay should be stored in a shed, but if it is necessary to stack it in the open the stack should be protected from rain; otherwise some wastage will occur.

Cowpea.

The hay made from cowpea is rather difficult to cure satisfactorily because of the different rate of drying of leaf and stem. If allowed full exposure to sun and wind, the leaves dry progressively from brittle green to brown and finally drop off while the coarser stems are still moderately succulent. In order to counteract this it is necessary to select a fine-stemmed variety and to sow broadcast, at the rate of 30 to 50 lb. per acre, with the object of inducing the development of fine stems. The sowing rate will, of course, depend on the size of the seed of the selected variety. Victor and Poona are the most suitable varieties for haymaking purposes, both being relatively fine-textured and capable of producing heavily.

The art of curing the crop lies in inducing the leaves to retain their normal function sufficiently long after cutting to drain the moisture from the stems. The crop should be cut with the mower when the pods have become fully developed but before they commence to ripen. It should be turned frequently, if the hay is being made on the coast, before being put into cocks which should be tall and narrow to permit as free circulation of air as is possible. In drier inland districts, such as the Callide Valley and on the Darling Downs, however, during hot sunny weather the crop may be put direct into very small cocks from the swath after a few hours of wilting. As drying proceeds, the cocks should be made larger by inverting one on top of another, repeating the process until each cock consists of three or four of the originals. They should be as tall and as narrow as possible. Before stacking the cocks, the stems should be carefully examined for excessive moisture. Under good growing conditions a yield of 2 tons to 4 tons of hay per acre may be expected.

Winter-grown Crops.

The cereals—wheat, oats, barley, and canary seed grass—may be planted over a wide period, but mainly from March to June, although canary seed grass sowings may be made satisfactorily as late as August. The best harvesting months for cereal hay crops, however, are August and September, and it is advantageous to arrange the main sowings to mature for hay during those months. Varieties differ a good deal as regards the time required to reach the early-flowering stage. Early, i.e., quick maturing, varieties may be ready to cut in three

months, while late, i.e., slow maturing, varieties may require about four and a-half months; so that an early wheat should be sown in June for harvesting in September, while a late variety would need to be sown in April or May. May is the best month for general sowings to be made.

The winter-grown leguminous hay crops should be sown in early autumn, as it is desirable that they be harvested before they suffer a setback due to dry conditions during the spring months.

Wheat.

Wheaten hay is usually converted into chaff before being marketed or fed on the farm, and the aim in haymaking is to produce a hay which will yield a good quality chaff. The principal factors controlling the character of the hay are season, soil, husbandry, curing practices, and variety.

To be of good quality, wheaten hay must be made from a well-grown crop, and it is advisable, therefore, to cut the main hay supplies in good seasons rather than in poor seasons. Loamy soils of high fertility produce a hay of good body and of high nutritive value, whereas poor, light soils often develop a crop curing into a light, inferior hay. Cultural practices should aim at the provision of favourable soil conditions and the elimination of weeds.

The ideal variety of hay wheat should possess certain characters which are not of primary importance in a grain crop. It should be capable of heavy production of green material, possess a stout-walled straw which will cut into a clean, heavy chaff, have straw and flag of a bright green colour, and be devoid of awns and dark-brown coloration of the ears. Further, the variety should possess a high degree of resistance to stem and leaf diseases. The main hay varieties in use in Queensland are Clarendon, Warren, Florence, and Warchief.

The general rule in regard to rate of sowing is that a lighter rate should be employed where soil moisture is likely to be deficient at some stage of the growth of the crop than where ample soil moisture is available. The sowing rate for a hay crop is heavier than that for a crop sown for grain, since a longer straw is desired. The available moisture usually will support the denser plant population, because the hay crop occupies the land for a considerably shorter period than does a grain crop. The average sowing rates recommended for sowing from April to mid-May are 45 to 55 lb. per acre, and for later sowings, 55 lb. to 65 lb. per acre.

The period required for germination of the seed in a warm moist soil is five or six days, and the depth of planting should be sufficient to ensure that the seed is in contact with moist soil for that period. In most soils from 2 inches to 2¼ inches is a suitable depth, but the seed should be planted deeper if the soil is likely to dry out to a depth of 2 inches in a short time.

The grazing of wheaten hay crops in Queensland is not recommended, except where a rank, sappy growth is developed by the young crop. Grazing may safely be carried out only when the crop is in the grassy stage and before the seedheads commence to form inside the leafy

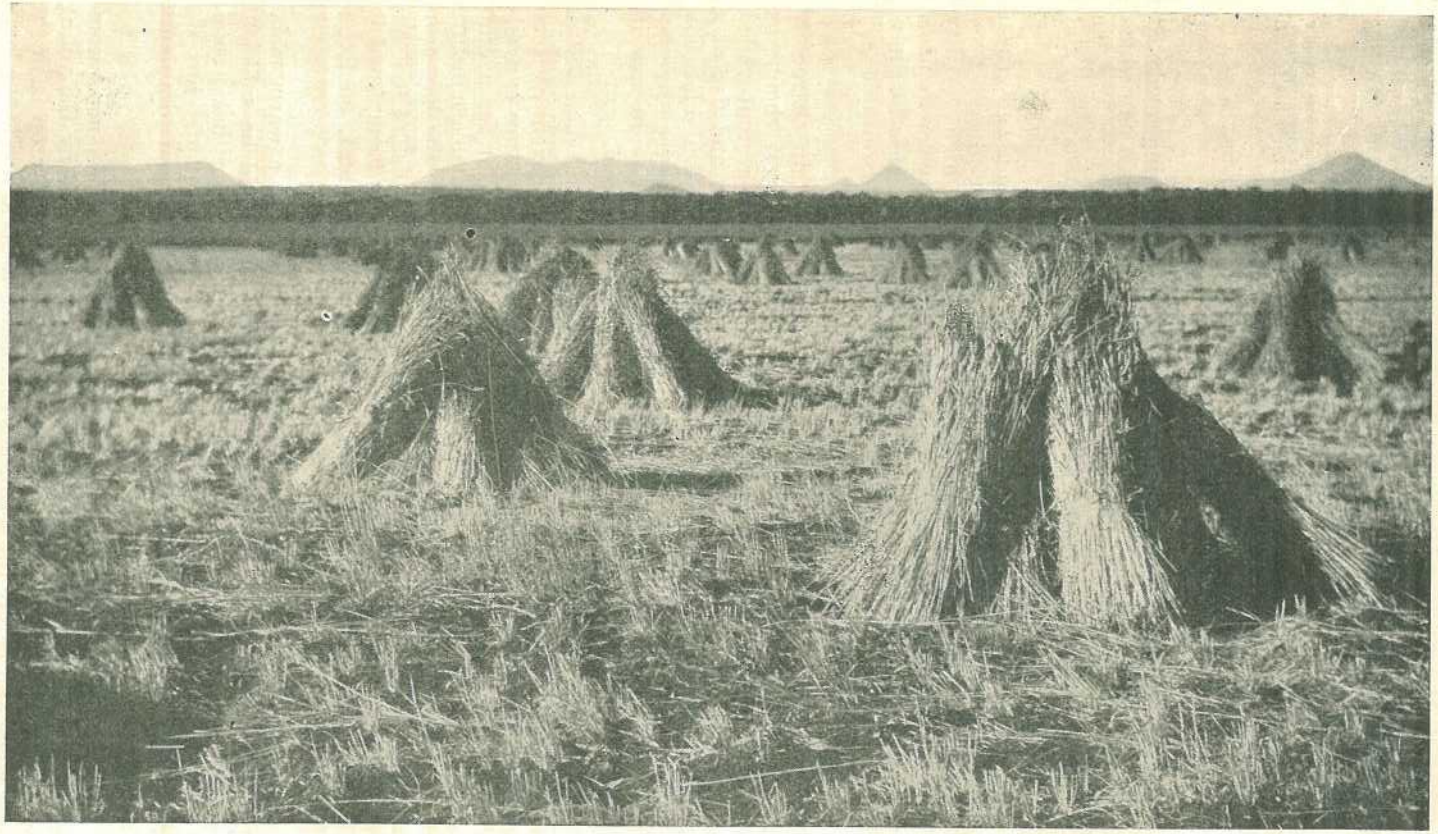

Plate 73.
WHEATEN HAY IN THE STOOK.

shoots. If the shoots containing the developing seedheads are grazed off, subsequent growth of the plant is mainly from less advanced shoots, and a good hay crop is not formed. The presence or absence of the miniature seedhead may be ascertained by splitting open some of the most advanced leafy shoots.

The correct time to cut wheat for hay in order to secure the maximum yield, consistent with high nutritive value, is not later than eight days after the wheat crop has flowered. Cutting with the reaper and binder not only effects a saving of labour but also favours the production of a hay of good quality. At least two rounds should be cut before the outside of the crop, which has been trodden by the horses, is harvested. If portions of the crop are to be left for grain, firebreaks may be formed by a judicious choice of the areas harvested for hay purposes.

The sheaves usually should be large and firmly bound, as this ensures that a large proportion of the hay is protected from the bleaching action of the sun. If the crop is sappy, small sheaves are advisable in order to guard against mould development. The sheaves should be stooked as soon as possible after cutting, and it is a good practice to have the stooking gang keep pace with the binder. For this purpose, one man per ton of hay per acre is necessary if the reaper and binder is in operation all the time. The average number of sheaves which should be placed in a stook is twenty, but a lesser number is desirable if drying conditions are not good. The long, narrow type of stook is considered preferable to the round stook in the wetter districts.

Sheaved hay cured in stooks is usually ready for stacking in about fourteen days, but this time is only approximate, and the hay should be stacked as soon as the upper joints of straws drawn from the middle of the sheaves are dry. Over-exposure of the sheaves in the stooks tends to make the hay hard and brittle, with a lowering of the quality of the chaff.

When hay is being chaffed for marketing purposes, all mouldy or inferior sheaves should be discarded, and the chaff placed in clean, sound bags neatly branded. If chaffed in very hot, dry weather, wheaten hay tends to shatter and powder. It is advisable, therefore, to cut the chaff in humid weather or when practicable to apply high-pressure dry steam to the hay as it is being chaffed. The blades of the cutter should be kept sharp and should run close against the face plate, otherwise the chaff will be broken, uneven, and unattractive.

Oats.

Although oats are widely grown for grazing and green fodder purposes in Queensland, the amount of oaten hay produced is small and very little local hay is marketed. The crop tends to be somewhat coarse and rank in Queensland and is liable to lodge during wet weather, but its main disability is the susceptibility of the varieties in use to rust.

Oats may be sown from February to June, but it is usually desirable to sow during the March rains in order to secure a cutting for hay purposes in late August or during September, when the weather is favourable for haymaking. In the southern districts, a long-season variety, such as Algerian, if sown early, will usually give a winter

grazing and a hay cut in the spring. Early maturing varieties, such as Sunrise, Mulga, Belar, Buddah, Fulghum, and Palestine, are preferable in the central district, where the spring is usually extremely dry.

The rate of sowing varies between 40 and 80 lb. per acre when drilled, with somewhat heavier sowings when broadcast. Lighter sowings give a greater margin of safety under dry conditions. Coarse-stemmed varieties should be sown at a heavier rate than fine-stemmed varieties in order to reduce the thickness of the stems.

As with wheat, grazing should not be permitted except on rank-growing crops, and then only during the tillering stage. Less vigorous crops should not be grazed, and the reader is reminded that stock may destroy an undue proportion of plants on loose, open soils by pulling them out of the ground.

The proper stage at which oats should be cut for hay is when the bulk of the seed is in the late dough stage. This is indicated by the top seeds on the seedhead turning white. The chief reason for delaying the cutting of oats for hay until after flowering has ceased is that chaff buyers prefer oaten chaff containing grain. The purplish-green colour of chaff prepared from oaten hay cut in the late dough stage is taken by buyers as an indication that harvesting was carried out before the seed ripened and shattered.

The curing of oaten hay and its conversion into chaff follow the practices adopted in the case of wheaten hay and chaff.

Field Pea.

The field pea gives best results as a hay crop when grown on fertile, well-drained soils in districts where ample winter rainfall and mild spring conditions usually prevail.

If sown alone, about 60 lb. of seed to the acre is generally used, care being taken to plant fairly deeply, between 2½ inches and 3 inches being the best depth at which to sow.

Although the field pea is a hollow-stemmed plant, the hay is rather difficult to cure. In general, the directions given for the curing of lucerne hay should be followed. The field pea is more easily harvested and cured when sown in admixture with oats or wheat than when sown alone. Because the pea seed germinates better at a slightly greater depth than is usual for the cereals, the former should be sown first. An average planting rate is 20 lb. of field pea to 40 lb. of wheat or oats. Lighter sowings than these are preferable where growing conditions are likely to be unfavourable.

Vetches or Tares.

The climatic range of vetches or tares is similar to that of field pea. They make an excellent hay and are more easily cured than is field pea; nevertheless they are but little used in Queensland. As a hay crop they are best sown with a strong-stemmed wheat which serves to keep the vetches or tares off the ground and also facilitates harvesting. The legume and cereal seed are best sown separately, at the rate of 20 lb. of vetches or tares to 40 lb. of wheat per acre. When vetches or tares are grown with wheat, the usual practice is to cut the mixture when the wheat has reached the correct hay stage, although at this time the legume generally has not commenced to flower.

Plate 74.
WHEAT AND VETCHES OR TARES.

Pasture Hay.

Conservation in the form of hay of excess growth produced by pastures during the summer growing season is practised to some extent, and occasionally after a good winter, hay is made from certain winter-growing pasture plants, such as prairie grass and ryegrasses. The most productive of the pasture grasses utilised for hay purposes is Rhodes

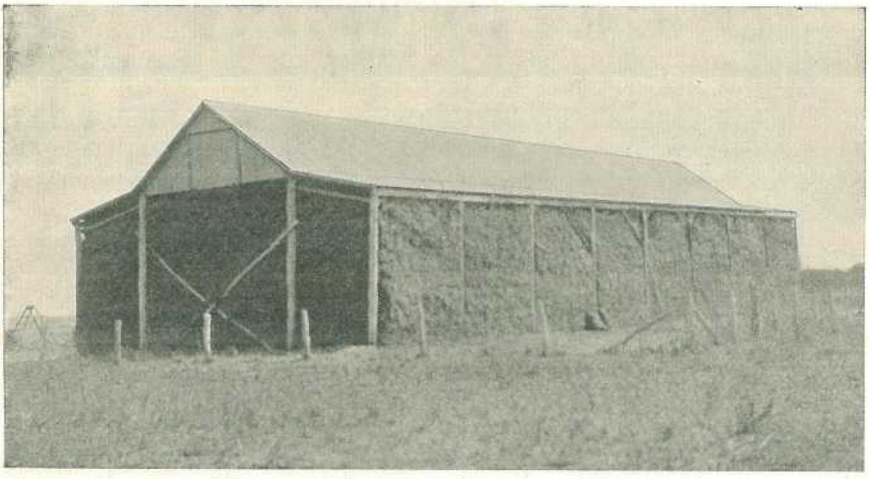

Plate 75.
A WELL-FILLED HAY SHED.

grass, a native of Africa, widely used in Queensland for pasture purposes. Many of the native grasses make a satisfactory class of hay if cut at the proper time, correctly cured, and securely stacked. The chief of these are the various blue grasses, star grasses, Mitchell grasses, and Flinders grasses, most of which often occur in almost pure stands. It is advisable to utilise for hay only pastures growing on good soils, as these may be expected to comprise the more valuable grasses, to yield well enough to repay the cost of haymaking, and to be of satisfactory nutritive value.

The correct time for cutting pastures for hay is during the flowering period, and as this stage may not occur more than once during a year and is then very brief, only a very short space of time is available for harvesting. Native grasses outside the wet tropics usually possess much fine leaf matter, from which nutrients may easily be lost by improper curing. The swaths should be raked into windrows immediately after cutting. If the weather is sunny and windy, the hay may be stacked direct from the windrow, but in very hot, dry weather the period of curing in the windrow should be materially reduced and the hay put into cocks in order to prevent excessive drying and powdering. It is essential to stack the hay as soon as it is ready, otherwise deterioration through over-exposure will occur. A liberal sprinkling of coarse salt on each successive layer when stacking will improve the palatability of the hay. Stacks should be protected from rain by a galvanised iron roof.

HAYSTACKS.

The frequency with which heavy rains are experienced in Queensland renders it necessary that haystacks be built on a site above flood level, well floored, soundly constructed, and securely roofed. A suitable base may be constructed from bush timber by laying stout saplings about 8 inches apart across bedding logs of 10-inch diameter spaced 6 feet apart on the site of the stack. Alternatively, a permanent floor may be made with loose stones built into a level platform about 1 foot high.

The shape and the size of the stack should be determined before building is commenced. Round stacks are convenient for small quantities of hay, but require more skill in topping off than do square or rectangular ones. As a rule, the best type of stack is that which exposes the least possible amount of hay to the weather, and the rectangular stack satisfies this requirement.

In determining the size of the stack to be built, the tonnage of hay to be stacked has first to be estimated. Working on this estimate, and using the following table, the amount of space to be provided may be calculated:—

TABLE 1.

CUBIC FEET PER TON OF HAY.

Period.	Oats.		Wheat.		Lucerne.
	Sheaf.	Loose.	Sheaf.	Loose.	
Freshly stacked	350	400	400	500	400–450
One month after stacking..	300	350	350	400	350–400
One year after stacking ..	300	325	325	350	300–350

The required size of stack for an estimated amount of hay may be ascertained by reference to the following table, which shows the length of stacks of various sectional dimensions required to store 1 ton of average hay:—

TABLE 2.

Average Width.	Height to Eaves.	Height of Pitch.	Length for One Ton.
Feet.	Feet.	Feet.	Feet.
10	8	4	4·0
10	10	5	3·2
12	10	8	2·4
12	12	8	2·1
13	10	8	2·2
13	10	10	2·0
14	10	10	1·9
14	12	10	1·7
14	14	10	1·5
15	12	10	1·6
15	14	10	1·4
16	12	10	1·5
16	14	10	1·3
18	12	10	1·3
18	14	10	1·2
20	14	10	1·0

Where large amounts of hay are being conserved it is advisable, in order to lessen the risk of total loss by fire, to build separate stacks suitably spaced and each containing no more than 50 tons of hay.

Building Haystacks.

It is important in constructing haystacks, whether of loose or of sheaved material, that the centre be higher than the edges upon the completion of each layer. The straws throughout the stack should tend downwards and outwards, in order to prevent beating rain making its way into the stack from the sides and to divert to the outside any water which may penetrate the roof.

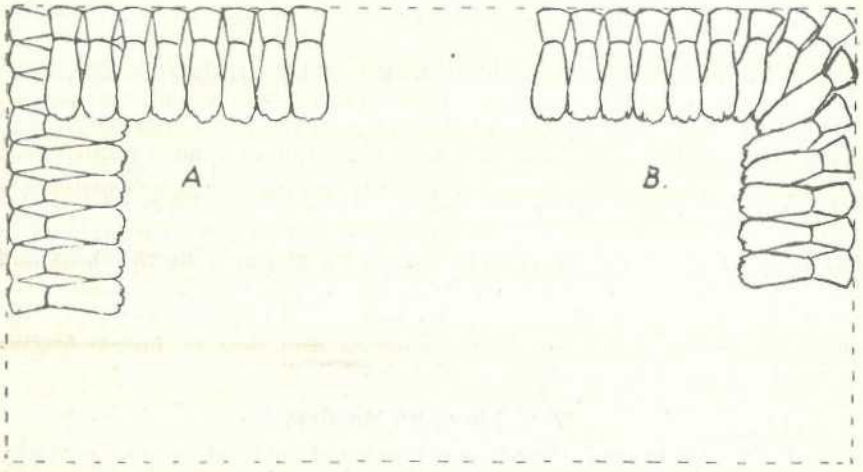

Plate 76.
COMMENCING A STACK OF SHEAVED HAY.

When stacking sheaved hay, a bed of loose material, such as straw or loose hay, should be laid on the floor so as to give a rise of about 18 inches from the edges to the centre. Stacking of the sheaves is usually commenced at the edge of the stack. The outside layer consists of sheaves laid side by side as closely as possible with butts outward and their line accurately defining the ground area of the stack. The corners may be turned in either of two ways, both of which are illustrated in Plate 76. The method shown at B makes the stronger corner, unless the sheaves are very short. The longest sheaves should always be used for the outside lines, and particularly for the corners, as they lock more securely than short sheaves.

The second row is placed shinglewise upon the first, butts outward, leaving about 1 foot of the first line exposed. This is a binding row and follows the outside row right round the stack. Successive lines of sheaves, each one nearer the centre, follow until the centre is reached, where a line of sheaves laid lengthwise makes the centre line solid.

The stack is built in this way to the eaves, which are formed by projecting the two topmost outside lines of sheaves 4 inches to 6 inches beyond the edge of the stack. The pitch of the roof is then made by laying each successive outside line of sheaves inside instead of directly above the last, the floor of the stack thus becoming smaller with each successive layer of material, until the final layer is only as wide as a sheaf is long (Plate 77, fig. AA), and the sheaves, placed head to butt, overlap each other completely.

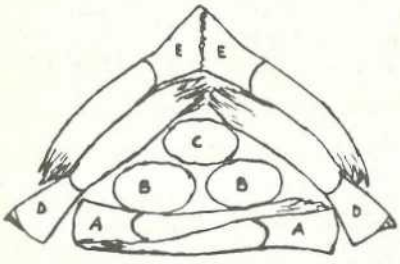

Plate 77.
RIDGING AND CAPPING A STACK OF SHEAVED HAY.

The first layer of the ridging sheaves (Plate 77, fig. BB) consists of solid, well-bound sheaves laid lengthwise and fastened together in pairs with a hayband to prevent them from spreading. Upon these are laid a single line, butts overlapping heads, to form the ridge (Plate 77, fig. C).

The capping sheaves consist of a line (Plate 77, fig DD) laid butts down against the ridge so that their heads overlap on the ridge line C. These should, for security, be held in place with stakes pushed through them at several places and connected with a line of binder twine. The final capping sheaves (Plate 77, fig. EE) are placed astride the lines DD, butts upward. These are fastened together with a hayband in order to make them firm and secure at the peak. To make the hayband, a handful of hay is bent out on each side of the string tying the sheaf and twisted to form a hayrope attached to the string band of the sheaf. The end of this hayrope is then twisted into the string of the companionate sheaf and the two are firmly tied together and may be placed astride the ridge. When completed, the whole capping should be made secure with stakes and twine.

Thatching and Roofing.

However soundly it may be constructed, a haystack may be partially or wholly ruined unless it is secured against entry of rain water. A straw thatch may provide insufficient protection against heavy rains,

unless the work is done by a highly skilled thatcher, and it may therefore be advisable for all stacks built in the open to be provided with a galvanised iron roof, more particularly if the hay is not to be used for some considerable time. For a gable-roofed stack, such as has been described, the iron may be nailed to 3-inch by 2-inch hardwood battens and capped with ridge-capping. A 10-feet sheet of iron on each side will cover a stack 15 feet in width, provided the pitch of the roof does not exceed 7 feet.

A turtle-backed roof has given good results in Queensland. It consists of curved 24-gauge corrugated galvanised iron, the curve being formed by bolting two 10-feet sheets, each machine-curved to a 12-inch spring, end to end. This union forms an arch having a span of approximately 15 feet, with a height of 42 inches. The advantages of this roof are ease of construction and handling and security from both wind and rain. The cost of a turtle-back roof to cover a 50-ton stack is about £20.

It is necessary to punch and assemble this type of roof on the ground. A convenient stand for this purpose may be made by fixing a stout rail parallel to a level piece of ground and at a height of 42 inches above it. The rail should be about 12 feet long, in order to carry three pairs of sheets of iron and to leave sufficient working room. The pairs are bolted together, as shown in Plate 78. When three pairs have been joined, the rear or first pair is unbolted and the sheets numbered 1 and 1A, care being taken that the lettered number is always on the same side. Another pair is then fitted to the working edge and the procedure repeated until the whole roof has been assembled, numbered, and taken apart ready for building on top of the stack.

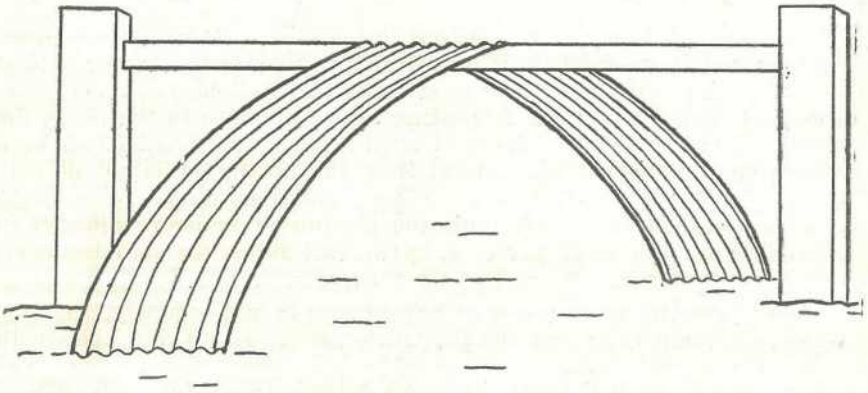

Plate 78.
BOLTING OF IRON SHEETS.

When punching the bolt holes it is advisable to avoid making them too neat for the ¼-inch bolts, as some play is necessary to permit the bolts to be passed through the several sheets of iron when working on the yielding stack. The sheets are joined at the top of the arch by three bolts, the outside bolts also holding the overlap of the neighbouring pairs, an overlap of 6 inches being given. Two bolts are inserted down each side of each 10-feet sheet, so that each complete arch is joined to its neighbour by five bolts.

The prepared sheets are hauled on to the stack in a suitable rope sling, and the builder bolts the first pair together, with the outside and centre bolts at the top of the arch. The next pair is joined by the centre bolt only, before the set is joined to its neighbour. Two men are required for this work.

Care must be taken to secure the turtle-back roof against sudden winds while it is being fixed. Cables of strong galvanised fencing wire should be passed over the roof at intervals of 4 feet and sufficient weight suspended from each end. The wires and weights should be left on the stack in order to hold the roof securely, but the weights must not be permitted to reach the ground as the stack settles.

Protection from Vermin.

Haystacks may be protected from mice by surrounding them with a fence constructed of 6 feet by 3 feet plain galvanised iron sheets running lengthwise with the edges let into the ground to a depth of 6 inches. The fence is generally built with a lean outwards of not less than 6 inches from the perpendicular. It is advisable to solder "eyebrows" at the tops of the corners. While galvanised iron fencing is expensive, it is extremely durable.

BALING HAY.

For marketing purposes hay must be put into bales, unless it is chaffed and bagged. In Queensland, the market demand normally is for chaff rather than hay, but for drought-feeding of sheep baled hay is widely used. Where hay is conserved on the farm or pastoral holding, stacking in the baled condition is preferable to storage as loose hay, since baled hay is more conveniently handled, transported, stored, and fed to stock in the paddock.

Baling of hay may be carried out in the field from windrows, cocks, or stooks, but in cases where it is desirable to remove the hay to shelter as rapidly as possible, baling is most conveniently done from the stack. In order to avoid losses due to heating under pressure in the bales, the hay should not be baled in the field until the moisture content has been reduced to a somewhat lower level than the maximum permissible in loose hay at the time of stacking. The regulations under "*The Stock Foods Acts*, 1919 *to* 1935," limit the amount of moisture allowed in hay offered for sale to 12 per cent. by weight, unless the actual amount is declared on the invoice and at the time of sale.

There are two main types of hay presses in use—namely, the box, derrick, or dump baler and the perpetual press. In making bales with the former type of press, the hay is fed into the press in several portions or charges, and each portion is compressed separately by a plunger or ram. Unless special care is exercised in filling, the hay tends to become somewhat tangled in the bale and cannot be easily separated into portions when being fed to stock. For this reason the hand-pressed bale, which results from continuous pressure in a perpetual press on a heap of hay in a frame, is favoured by purchasers intending to feed the commodity in the form of hay.

In preparing hay for the market, the farmer should bear in mind the regulations under "*The Stock Foods Acts*, 1919 *to* 1935," dealing with weight of battens on bales and with foreign ingredients. The total weight of battens on each bale must not exceed 10 per cent. of the gross weight of the bale. In order to achieve this and to provide for a

uniform pack, no more than eight battens should be used on each bale. The battens should not be longer than the bale itself and they should not exceed 3 inches in width nor half an inch in thickness. The presence in hay offered for sale of plants, parts of plants, and seeds of Bathurst burr[1], Noogoora burr[2], castor oil plant[3], thorn apple[4] (also known as datura or stramonium), dodder[5], corn cockle[6], khaki weed[7], poppy[8], and prickly poppy[9] is prohibited.

[1] *Xanthium spinosum.*
[2] *Xanthium pungens.*
[3] *Ricinus communis.*
[4] *Datura* spp.
[5] *Cuscuta* spp.
[6] *Agrostemma githago.*
[7] *Alternanthera repens.*
[8] *Papaver* spp.
[9] *Argemone mexicana.*

LUCERNE HAY.

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

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

Wherever possible, lucerne hay should be stored in sheds, but if it becomes necessary to stack it in the field, a framework of logs should be laid down, care being taken to keep the centre of the stack high during building. Large stacks which are likely to be held for some years may be protected by thatching or by a temporary galvanised iron roof.

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

Pineapples in the Queensland Tropics.

W. G. HANCOCK, Plants Inspector, Townsville.

THE improvement in pineapple culture developed during recent years is generally well known; in fact, it is doubtful if there is any fruit industry which has made so much progress in so short a time. Average crops per acre have been increased, the crop can be timed to mature within close limits, and the effective life of a planting has been lengthened. That bane of the farmer—"wilt"—nowadays causes little trouble. However, while the large amount of experimental work which has been done, mostly in the South, is equally applicable in principle in North Queensland, certain modifications in detail are indicated owing to different climatic conditions and growing for market rather than for the cannery.

As elaborated later, the climatic extremes of North Queensland, its torrential rains, its periods of hot dry weather, together with the high soil temperature during periods, all constitute special problems.

The Pineapple Plant.

The pineapple is a Monocotyledon, and belongs to the natural order Bromeliaceae. Many related plants are grown in bush houses. It has also in close relationship a number of plants leading a semi-aerial life on trees and rocks, such as orchids. Another of the Bromeliaceæ, the "Spanish Moss" of Florida is entirely air dwelling. The pineapple bears no relationship to the cactus family, as popularly supposed.

In accord with this family relationship the pineapple's roots are intolerant of poorly-aerated soil conditions. It is a shallow-rooted plant thriving in a loose, moist medium.

It gives another indication of its ancestry in its habit of forming new roots from its ageing leaf axils. Under natural conditions these would be continually covered by accumulating layers of leaf debris. In cultivation it is often of benefit to shovel soil in amongst the butts of plants as they become older.

The leaves are specialised to make the most effective use of a sparse rainfall, and at the same time, by shading the soil, to keep it cool and moist and hinder evaporation. Even a heavy dew will provide an appreciable quantity of water to the roots.

Soil and Site.

The above brief examination of some points in the plant's status suggest that it will do best in a loose, open soil, well drained but moisture-retaining, and with a high humus content. In practice this description exactly fits those soils growing the best plants. A good crumbly sandy loam overlaying a moisture-retaining but well-drained subsoil is probably the ideal.

The plant is strongly influenced by the amount of available iron in the soil. The availability may depend on the degree of acidity of the soil. Broadly, in an acid soil the iron is available, while in the contrary case it is not.

However, it is often noticed that plants make very satisfactory growth in a newly-cleared soil. In this case the soil will be found to be rich in humus left by the recently cleared vegetation. While the humus lasts it will itself supply the plant with iron, but, after several years of exposure, the supply will be exhausted. This shows readily enough the necessity of humus.

Very heavy compact soils are not suitable, for reasons already advanced, and very sandy soils are usually deficient in nutrients and highly leached of iron and other elements; furthermore, they dry out too quickly.

In brief, the points to look for in choosing a pineapple soil are—perfect drainage, moisture, loose open texture, and a high humus content. In addition, a suitably acid reaction or one capable of being rendered so.

In choosing a site one naturally ignores any situation subject to flood, and, conversely, any site, such as a narrow ridge, which will become unduly dry during protracted dry weather. Land, either flat or with a gentle slope, is best in the tropics, where torrential rain will cause severe erosion on cultivated land with a pronounced slope. The aspect does not have such a pronounced effect as in the south.

Preparation.

Although the pineapple is a shallow-rooted plant, land should be carefully prepared. According to the nature of the soil, it should be broken up to a fair depth and worked to a good tilth. Some soils of a very sandy nature are often badly leached on the surface, while just below the usual plow depth there is a strata of similar texture but darker in colour and rather heavier. In such cases it is often advisable to turn up this heavier layer and incorporate it with the sandy top, thus enriching the latter with materials previously leached from it.

When sulphur is to be used (see later), it is evenly broadcasted over the prepared surface and lightly harrowed under. Old land will in all probability be deficient in humus, and every effort to rectify this will repay. In the drier districts this is not always a simple matter without irrigation. The summer is, of course, the normal period of growth of a green crop and is also the usual period for planting pineapples. If, however, a summer cover crop could be established early, and, as soon as this is ploughed under, a winter crop set, it should be possible to obtain a fair cover for the winter months and the land prepared for planting the following summer.

When it is intended to replant an old block of pineapples the old plants will provide a valuable source of humus if they can be cut up with a heavy rotary cultivator and allowed to rot. The late spring is a suitable time. The rotting process will be hastened and additional humus provided if a crop of cowpeas is sown amongst the rubbish and the whole lot plowed under together. A dressing of superphosphate will augment the growth of the cowpeas, and, through that, become available to the pineapples.

Planting.

A factor of major importance in tropical agriculture is high soil temperature. This is a problem peculiar to the North Queensland latitude. Of course some plants will tolerate far higher temperatures

than others, but few will thrive when the bare stem and the roots are subjected to soil temperature of between 130 degrees F. to 140 degrees F. on the surface. Optimum growth is probably made when with adequate moisture the surface is about 90 degrees F. A typical reading taken at 2 p.m. on a December afternoon when with a shade temperature of 84 degrees F. the bulb showed 90 degrees F. just buried in the shaded surface under thickly-growing pineapples, while it was 132 degrees F. just buried in the unshaded soil.

This shows what widely different conditions are enforced on plants growing as individuals under cultivated conditions as distinct from those growing in their natural state. For instance, in a tropical rain forest scores of plants are revelling in warm, moist conditions produced by the mutual shading. When the forest is cleared, however, not many of them, other than a few of the dominant large trees, would flourish when planted in rows on the same ground. Even those which clamber out into the sunshine require their roots to be in a moist shaded soil. In a flower garden, also, if plants are set closely enough for the foliage to touch they will stand up to heat which would quickly wither them had they been set wider apart.

The principle is the same with pineapples. For practical considerations room must be left to work amongst them, but from the point of view of vegetative growth the closer, within reason, they are planted the better. It should also be remembered that in the tropics bare cultivated ground deteriorates very rapidly through the loss of the humus.

The standard planting in South Queensland is to plant Smoothleafs in double rows set 2 feet apart and Roughleafs in single rows. In each case the plants are 12 inches apart in the rows. The inter-row space in each case is 4 feet. The number of plants per acre in each case will be 14,520 and 10,890 respectively. In the tropics it would seem better to put the plants 12 to 14 inches apart in the rows and have the inter-rows space 5 feet. The number of plants per acre, therefore, would be approximately 10.500 and 7,280 respectively.

Comment is sometimes heard that with this spacing it will not be possible, after the third crop, to get between the rows. This is answered by the fact that after three crops the fruit usually deteriorates in size and it becomes time to eradicate, renovate the soil, and replant, however it was planted, and it is poor business to deliberately set out to get two small crops when the fruit should be at its best, solely to be able to pick the third in comfort.

When laying out the rows consideration must be given to erosion and ease of working. In the tropics steep slopes are not advised. On a slight fall it is usually best to plant in short rows up and down the slope so as to shed the water quickly into cross drains. A lot however will depend on the soil type. Short rows and sufficient tracks will assist in handling the crop. While in South Queensland a north-south alignment is best so as to allow even illumination to each side of the row, in the tropics east-west is preferable since a better shade effect is obtained in early forenoon and late afternoon.

The actual planting is fairly simple, but care should be taken to lay out and plant evenly. The obvious way is to first lay out any tracks and then peg out the land at 7 feet or 5 feet intervals. A planting wire is stretched between pegs and the plants set out at the correct

intervals. A piece of iron rod beaten out flat at one end to a spear shape is a suitable planting tool. The work is much speeded up if the suckers are roughly laid out first. Deep planting should be avoided.

Planting Material.

Tops from cannery fruit are often used in the South. In North Queensland, however, even if available, they would probably be unsuitable by reason of the higher soil temperatures, unless weather conditions at planting time were very favourable.

Slips, which are the growths from the fruit stalk, can be used if well developed, otherwise they may not stand up to the heat.

Suckers are the favoured planting material. They are best when of medium size. Very large suckers which are near to flowering are unsatisfactory, since they will flower and fruit before being properly established. The fruit will be too small to be of any value, and, furthermore, they seldom make strong plants; their suckers sprout from high up and usually wilt when bearing a fruit. It is obvious that a fair percentage of these will seriously reduce the yield from a plot. If through shortage of material they must be used they should be planted separately and set deep. But they are seldom satisfactory.

The best size of suckers are those which will flower about six to seven months after planting. A quicker rooting will ensue if a few of the base leaves are stripped off. If it is necessary to keep suckers for any length of time before planting, they should be spread out in shallow layers in the shade. If heaped up they will sweat and rot. Always sort into two lots, large and small, and plant separately. To have sections of the farm cropping evenly will facilitate later operations, and, furthermore, large plants tend to shade and smother small plants, to their detriment.

Sucker Selection.

If any new plantation is closely examined at the time of the first crop, a wide range of variation between the plants will usually be noticed. The most obvious difference may be that some plants have already matured fruit, while others have not flowered. If this cannot be attributed to having planted suckers of unequal development, then there is a high probability of early and late maturing strains being present.

Another variation is that some plants are sturdy and squat, and are already growing several low-set suckers in addition to the fruit. Others have no suckers, but instead have a dozen or more slips around the fruit—a "collar of slips," as it is called. Between these two types—a good type and a most undesirable type—there may be many grades. Obviously the former plant is a profitable plant to grow, because it is a quick bearer and free-suckering, whereas the second type gives one good pine, but too often that is the first and last it will bear, since it has no suckers to bear subsequent crops.

Certain types of misshapen fruit are also hereditary, particularly "cripples" in Roughs. The sign of this is a thin, corky hairline throughout the length of the leaf.

Many variations will be found; some like the above are hereditary; others may be the result of variations in nutrition, but in general it is wise to propagate only desirable types and to reject all others. It is to

labour the obvious to point out that the returns of a plantation are reduced by a proportion of unprofitable plants. The danger is that when the " collar of slips " type, for example, is present, and selection is not practised, a vicious circle sets in, since there is considerably more planting material available from this type than from the suckering type, and eventually the bad type predominates and ousts the good type.

At first growers must be content to make the main planting from good average suckers, discarding all definitely bad types. Then, if at thinning out after the first crop a selection is made from the finest plants, and these are planted separately, a pedigree stock will soon be built up.

Time of Planting.

From the purely horticultural aspect, time of planting is largely governed by suitable weather, both at the time of planting and for the few months immediately following. To plant during times of torrential rain risks having young plants washed out, buried in silt, or rotting. To plant during the months of low rainfall would result in plants being very slow in taking root, and the effects of the consequent setback may be visible during the whole life of the plantation. The most important period in the life of a plantation is the first few months after planting. The plants must be brought on quickly so that in as brief a period as possible they become large enough to shade the soil under them. This is touched upon under "Fertilizing" from a different angle. The point stressed here is that it is best to plant when the longest period of good growing weather to immediately follow can be anticipated, and if necessary to later adjust the time of cropping by the use of acetylene.

The following table gives the months of the year when on an average the rainfall exceeds evaporation, and, therefore, gives some guide as to suitable planting months for the different divisions. In planning ahead, however, reliance cannot be placed absolutely on getting the average rainfall. At Townsville, for instance, the average on seventy years is 45 inches, but actual figures range from 9 to 97 inches.

Cairns	From Dec. to April-May
Innisfail, Coast ..	,, Nov. to Sept.
Innisfail, further inland	,, Dec. to June
Cardwell	,, Dec. to May
Ingham	,, Dec. to April-May
Townsville	,, Jan. to March
Ayr	,, Jan. to March
Bowen	,, Jan. to March
Mackay	,, Dec. to June

A general recommendation would be to plant in the drier districts between the end of December and end of February, and in the wetter districts just after the period of heaviest rain, which would usually mean planting about April.

Cultivation.

The golden rule is to cultivate as lightly as circumstances will permit. To keep down weed growth and break the soil surface is sufficient. Deeper cultivation than this only breaks roots and results in the deeper drying of the soil. To deal with the luxuriant growth of weeds during the period of the summer rains may justify or necessitate greater disturbance of the soil, but since there is more moisture

present not so much harm is done. The roots of plants maturing fruit, however, must not be broken. In particular, the time of transition between the period of the heavy summer rains and the dry months following is a critical one to plants maturing fruit, since their water requirements are high in order to continue to support the development of fruit, suckers, and growth produced during very favourable growing conditions. To damage their roots at this time gives them a severe setback. Nothing but the hoe should be used within a foot of them.

The aim should be to so utilise the means available—sucker grading, time of planting, fertilizing, acetylene, and, if available, irrigation—that each section of the farm will be fruiting separately and in succession. This is quite attainable and makes operations much easier, since picking can be concentrated in a limited area. Fertilizer can be more efficiently applied to suit the growth status, and cultivation facilitated. For instance, in the case of plants mauring fruit one would withhold fertilizer until it was picked, and cultivation, if necessary, could be done extra carefully.

Fertilizing—Special Treatments.

This is a subject which at the moment it is easier to generalise upon. Modifications in detail are likely to be made to suit the wide variations in North Queensland soils. Also, war conditions have already resulted in some ingredients becoming scarce and expensive.

However, it does not seem that the method of fertilizing with a water-soluble mixture in the leaf bases will be displaced in principle, as there appears no better way of applying fertilizer to established pineapples. Each plant receives a small quantity which gradually dissolves and becomes immediately available to the plant. By this method the fertilizer is not spread amongst the plants, as this has been proved less effective and to entail considerable waste. The rate of application is calculated at so much per thousand plants and not at so much per acre. Of course, size of hands will vary between individuals, but on an average one handful to four plants will work out at 40 to 50 lb. per thousand, and one to six plants at about 30 lb. per thousand. If a few amounts are weighed out the rate of application can be checked and consistency very quickly attained. The aim is to place the fertilizer exactly into the lowest leaf bases. It may be said that irregularity in plant development can often be traced to unequal dosage. Light 2-gallon buckets have been found by experience to be the most convenient fertilizer containers.

The nutrition of a plant such as the pineapple has been the subject of much study. The indications are that the number of fruitlets is irrevocably determined by the nutrition of the plant up to the time the embryo inflorescence is formed at the growing point. Thus when the plant has been adequately nourished and the growth status is good, there will be a large number of fruitlets. Subsequent nutrition can only affect the development of the fruitlets. This explains why the fruit produced by planting an over-large sucker is so small, since its nutrition was arrested and the inflorescence formed before it could properly establish itself. Therefore, the importance of early fertilizing is evident.

The first application should be given shortly after planting, so as to encourage as quickly as possible a wide spreading leaf growth. From 30 to 40 lb. of a complete mixture per thousand plants is the usual

dressing. One or two more applications of about 40 lb. per thousand will generally be necessary before the crop is picked. For December-planted pines in the Townsville area, one about March after the rains and another in early spring would usually be correct.

Acetylene gas will force young plants into flower. If it is used with judgment and a knowledge of local conditions it can be of considerable value to the farmer. By a skilful manipulation of time of planting, acetylene, and fertilizer, the crop can be harvested at a predetermined time; also, stand-over fruit can be largely eliminated by treating all plants which have not flowered with the majority. With irrigation in addition even greater control can be established. For tropical conditions the acetylene solution is prepared by dropping a piece of carbide as large as a hen's egg into a kerosene tin of water. As soon as the effervescence has finished it is ready. Approximately 2 oz. is poured into the heart of each plant. If rain falls within twenty-four hours of application, the result may be uncertain and the application should be repeated. This treatment has no adverse effect on the plant or its progeny. The only proviso is that the plant shall be of sufficient development; otherwise the fruit will be small. As a general guide, it will take six to seven weeks from treatment to flowering in the case of Smoothleafs and four to five weeks for Roughleafs, and sixteen to seventeen weeks from thence to picking.

When the soil is not sufficiently acid, sulphur will usually make it so. Some heavy soils will not respond to any reasonable amount of sulphur, but with sandy loams 3 to 4 cwt. per acre is generally sufficient. Advice should always be obtained before a soil is sulphured. Here it should be remarked that the use of ordinary agricultural lime is, in general, harmful to pineapples.

In those cases where sulphur cannot be used and it is obvious that pineapples are lacking iron, it will suffice to spray with a weak solution of iron sulphate at the strength of 6 lb. to 25 gallons, this quantity being sufficient for 1 acre. A very fine mist jet must be used and only a light spray given.

Picking and Marketing.

Picking and handling a big crop requires good organisation to enable it to be done quickly and without damage to the fruit. Short rows and well-spaced tracks help a lot. A good packing place that can be kept clean and tidy speeds up work.

Colour by itself is not a true guide to maturity; climatic conditions render the colour of a mature pineapple very variable. Development of the fruitlets is more reliable, and should vary a little according to the distance of the market. Unless fruit is to be consumed at once, there is a definite advantage in cutting it instead of breaking it off the plant.

Fruit for market must look good as well as be good, and naturally every care is taken not to bruise it, to grade it well, and to pack it neatly in clean cases. A little woodwool is the best packing and looks well.

It is important also to pack the fruit when it is cool and to keep the packed cases as cool as possible during transit.

Diseases.

Pineapples in Queensland are little troubled with diseases and pests in the field. "Wilt" formerly was a serious trouble, but this has been almost entirely eliminated by a suitable acid reaction in the soil and adequate fertilizing. The few scattered cases of wilt in an otherwise healthy plantation are almost invariably due to planting a sucker which was too old.

Black Heart affects the fruit picked about May in North Queensland. This at present is believed to be due to cutting off the plants' water supply by too drastic cultivations at a time when it is maturing a fruit which was formed during the extremely favourable growing conditions of the summer rains.

Sunburn can cause the loss of much fruit. An effective preventive is either a paper sleeve or a tuft of woodwool placed on the fruit, particularly where it is exposed to the western sun.

The fruit rots which become noticeable in transit and in the market are due to organisms entering the fruit tissue through scratches or bruises, and the elimination of all sources of minor damage and clean hygienic conditions in packing operations will reduce them to a minimum.

These are the chief troubles met with; more detailed information on these and others can be obtained from the Department of Agriculture and Stock.

QUEENSLAND SHOW DATES FOR 1941.

May.

Murgon	15th to 17th
Beaudesert Show	14th and 15th
Beaudesert Campdraft	16th and 17th
Warrill View	17th
Mitchell	21st and 22nd
Barcaldine	21st and 22nd
Biggenden	22nd and 23rd
Blackbutt	23rd and 24th
St. George	23rd and 24th
Charleville	27th to 29th
Ipswich	27th to 30th
Kalbar	31st

June.

Wowan Bushman's Carnival	6th
Maryborough	Postponed
Lowood	6th and 7th
Childers Patriotic Carnival	9th and 10th
Boonah	11th and 12th
Bundaberg	12th to 14th
Gin Gin Horse Show and Carnival	16th and 17th
Gladstone	18th and 19th
Rockhampton	24th to 28th
Toogoolawah	27th and 28th

July.

Mackay	1st to 3rd
Proserpine	4th and 5th
Bowen	9th and 10th
Charters Towers	10th to 12th
Nambour	10th to 12th
Ayr	11th and 12th
Townsville	15th to 17th
Laidley	16th and 17th
Rosewood	18th and 19th
Ingham	18th and 19th
Cleveland	18th and 19th
Cairns	22nd to 24th
Gatton	23rd and 24th
Innisfail	25th and 26th
Atherton	29th and 30th
Crow's Nest	30th and 31st

August.

Pine Rivers	1st and 2nd
Home Hill	1st and 2nd
Royal National, Brisbane	11th to 16th

September.

Imbil	5th and 6th
Canungra	6th
Pomona	12th and 13th
Rocklea	13th
Beenleigh	19th and 20th

A Simple Farm Level.*

MANY jobs on the farm call for the use of a level; for drainage and soil erosion jobs this is essential. A simple piece of equipment which is most useful in this respect is described by H. B. Roe of the University of Minnesota and is illustrated below. It can be made by any handyman on the farm.

The material required is—

A carpenter's 24-inch wooden level of good grade.

Two peep sights.

A pine table 10 inches square with tripod legs.

Several thin pine wedges.

A rod of clear white pipe 1½ inches to 2 inches wide and 10 feet to 12 feet long, and marked in feet, half feet and quarter feet, with blue or black crayon.

Three 3-inch heavy tee hinges with screws and table.

The accompanying figures and table illustrate how the unit is built and operated. The following points are *absolutely essential* and should be kept constantly in mind:—

For each position of the levelling instrument at least two readings must be taken—a backward sight, or "backsight," on the last point read at the last preceding position of the level; and a forward sight, or "foresight," on the new and unknown point. Bear in mind that a backsight is a reading on an old point the relative elevation of which is already known, while a foresight is a reading on a new point of which it is wished to know the relative elevation. The names backsight and foresight, therefore, have nothing to do with the actual direction in which one may be looking, as, after the backsight has been read for any given position of the level, foresights may be read on any number of new points lying in any direction from the levelling instrument.

One should never try to take shots over 6 rods or 100 feet long in any direction with this type of level, and a shorter maximum distance is desirable.

If the bubble is not at centre, bring it there just before taking each reading. The wedges are for this purpose. Set the table in such a position that you do not need to use more than one wedge at a time.

The method of levelling shown in Table 1 and Plates 79 and 80 is applicable to any type of levelling instrument with which readings are obtained by sighting at a graduated rod.

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* Adapted from *New Guinea Agricultural Gazette*, August, 1940, and reprinted from *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, Queensland), April, 1941.

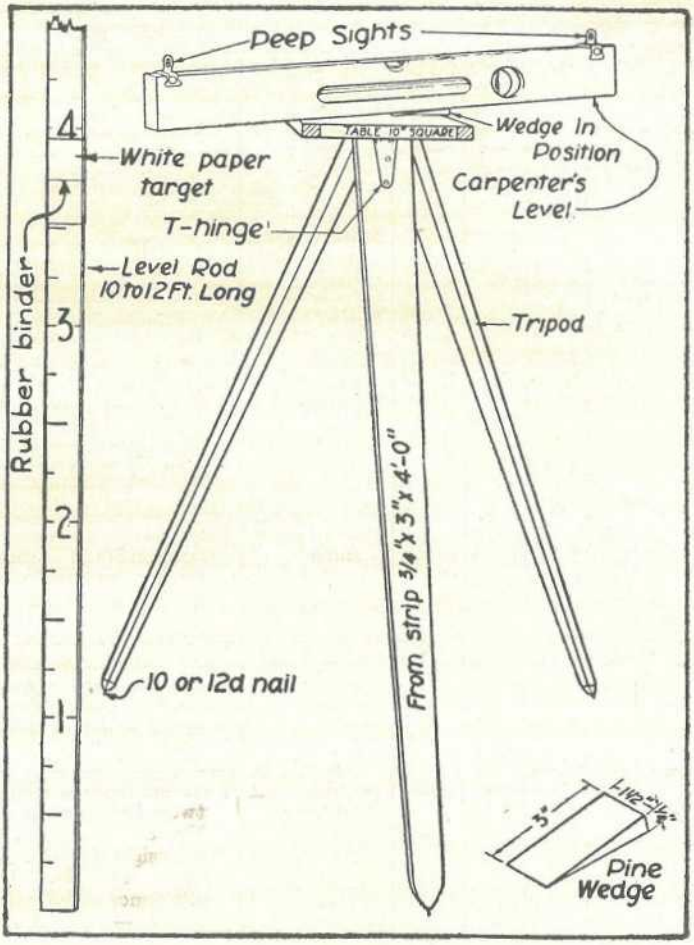

Plate 79.

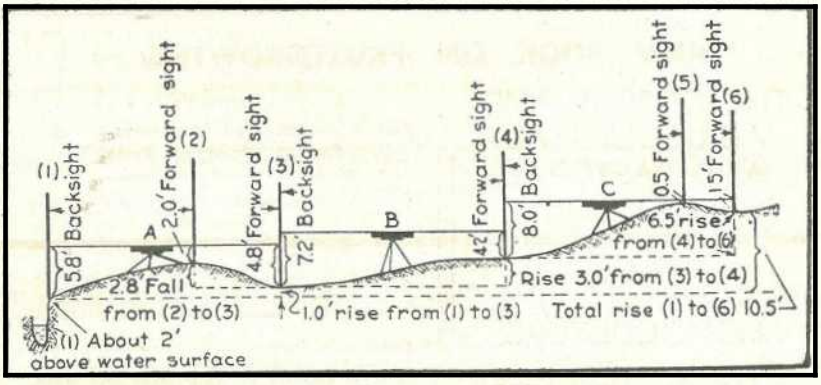

Plate 80.
Illustrating the construction of the level described on page 382.

TABLE 1.

SYSTEM OF LEVEL NOTES FOR DIFFERENTIAL LEVELLING.

Point No.	Position of level.	Backsight.	Foresight.	Difference of Level.			Description of Points.	Explanation of Computations.
				From last point.	From last Backsight.	Total from Point No. 1.		
1	A	5·8					Starting point on ditch bank	
2			2·0	+3·8	+3·8	+ 3·8	Top of knoll	All differences = backsight on No. 1 — foresight on No. 2
3			4·8	−2·8	+1·0	+ 1·0	Bottom of pocket	First difference = difference between foresights on No. 1 and No. 2. Other differences = backsight on No. 1 — foresight on No. 3
3	B	7·2						
4			4·2	+3·0	+3·0	+ 4·0	Foot of steep slope	First two differences = backsight on No. 3 — foresight on No. 4. Total difference =5·8 +7·2 — 4·8 — 4·2
4	C	8·0						
5			0·5	+7·5	+7·5	+11·5	Top of knoll	First two differences = backsight on No. 4 — foresight on No. 5. Total difference = 5·8 + 7.2 + 8·0 — 4·8 —4·2 — 0.5
6			1·5	−1·0	+6·5	+10·5	Bottom of pocket	First difference = difference between foresights on No. 5 and No. 6. Second difference = backsight on No. 4 — foresight on No. 6. Total difference = 5·8 + 7·2 + 8·0 — 4·8 — 4·2 — 1·5 = 10·5

H.W.K.

Grow More Sudan Grass!

BY N. J. KING.*

IN Southern Queensland—for which district these notes are primarily written—the normal dry spring is accompanied by bare paddocks and insufficient grass for farm stock. In consequence the old standby, cane-tops, is the bulk and basis of the horse ration during the harvesting season. Even after the season is finished many growers utilize old ratoons for horse feed. Such old ratoons are volunteer, unfertilized and generally neglected—producing only poor feed in small amount, but occupying high priced, assigned land which should surely be producing more valuable crops.

Sudan grass is one of these valuable crops which will ensure a better return to the grower than any volunteer ratoons and which will also put farm horses in finer working condition than will the cane top. Sudan grass (*Sorghum sudanense*) is a hardy, annual, summer-growing grass, its natural habitat being in tropical North Africa. It is, as its botanical name implies, related to the common sorghums, but is quite different in appearance and habit. It is a free-stooling plant; the stems sometimes reach a height of 10 feet, but are only from one-eighth to one-quarter of an inch in diameter. Leaves are approximately half an inch wide. There are no underground root stocks such as characterise the Johnson grass and it never becomes a pest in cultivation.

Sudan grass is quite drought-resistant and is capable of producing large crops in areas of light rainfall. It must be remembered, however, that a closely seeded crop of Sudan grass requires a considerable amount of plant food, and a grower cannot expect a successful crop on poor land unless the crop is fed in the same way as sugar cane. The crop is generally sown broadcast at the rate of 12 lb. of seed per acre. Lighter seeding will result in a coarser stemmed grass, less attractive to stock. It makes a remarkably good quality hay, very palatable to stock, and cures easily over a period of four to five days after cutting. It is generally harvested when in full flower.

It is found that Sudan grass hay at the Sugar Experiment Station at Bundaberg has kept its quality excellently in the stack for up to two years. The hay does not become dusty or in any way deteriorate in value; it chaffs well and is highly relished by the horses. American authorities publish results of mixed seedings such as Sudan grass and soybeans; the latter, being a legume, improves the feed value of the resultant hay crop. Such a mixed seeding was tried here this summer but with indifferent success. Sudan grass grows so vigorously during the hot humid weather in Bundaberg that it appears to crowd out the soybean. Well developed soybean plants were found all around the edges of the field where they obtained sufficient light, but inside the field they were stunted and choked out.

It would be rather enlightening—as an exercise in farm costing—to calculate what cane tops cost the grower during the harvesting season. Cane tops do not keep well, so are normally collected daily and chaffed up each evening. This means that every day labour is employed in picking up cane tops, carting to the barn, chaffing up and placing in feed boxes. What an expenditure of valuable time!

* In *The Cane Growers' Quarterly Bulletin*, April, 1941.

To illustrate how such time can be saved the writer sets out below the practice in vogue at the Experiment Station and the system of stock feeding employed. Every harvesting season certain cane blocks are ploughed out in their normal rotation. Some of these blocks are required for February planting, so they are seeded with Poona pea. Others are required for spring planting the following year. One such block—usually about two acres—is seeded with Sudan grass; the seed is harrowed in and the block rolled to flatten down cane stools which may afterwards interfere with the mowing of the crop. As the Sudan grass follows a final ratoon cane crop the soil is generally deficient in nitrogen, and an application of 100 lb. of sulphate of ammonia per acre is made when the grass is about nine inches high. No other fertilizer is used. Seeding is carried out in December. During the following two months good rains can normally be expected. The first crop is usually seven to eight feet high in about eight weeks from seeding and is cut when in full flower. This is cured and carted to the barn. Cost of hay from the *two* acres is calculated as follows (on the basis of one unit of labour) :—

	£	*s.*	*d.*
24 lb. of Sudan grass seed	0	10	0
Sowing and harrowing (4 hours)	0	7	8
Rolling (4 hours)	0	7	8
Sulphate of ammonia (200 lb.)	1	9	0
Mowing (4 hours)	0	7	8
Raking and cocking (10 hours)	0	19	1
Carting and stacking (28 hours)	2	13	4
Total	£6	14	5

It is conservatively estimated that at least six tons of cured hay were obtained from this cut, so that the cost per ton of hay was £1 2s. 5d. But we must not forget that Sudan grass ratoons and the ratoon crop will be much cheaper since it eliminates the cost of seed, sowing, harrowing and rolling, which amount collectively to £1 5s. 4d. or 4s. 3d. per ton. So, assuming that the ratoon crop is as heavy as the plant crop, the hay from it will cost only 18s. 2d. per ton.

The hay is now in the barn, and the grower can look forward to a few wet days during March and April when he will be unable to do any field work. During such days the hay can be chaffed, and when the harvesting season arrives the stock food is all ready to place in the feed boxes—no picking up tops and carting and chaffing them at a time when every farmer is busy and when every hour lost is money lost.

The above scheme is not a theoretical layout; it is a practical plan which has been in operation on the Experiment Station for some considerable time, and during that period we have not bothered to collect a single cane top for farm animals. On the Experiment Station we also have a small lucerne block which is valuable in supplementing the ration, but this is not a prime essential. During 1939 the lucerne block was out of production and the stock carried on with the Sudan grass hay, molasses and a small ration of grain, and were never in better condition.

It will be readily appreciated what a valuable adjunct to farm economy the above scheme provides. Fallow cane land is used instead of allowing it to remain idle until the following spring, the heavy growth of Sudan grass keeps it weed free, and the cost of the excellent hay is ridiculously low when compared with market prices. Sudan grass is also an excellent silage crop, either chaffed or stacked.

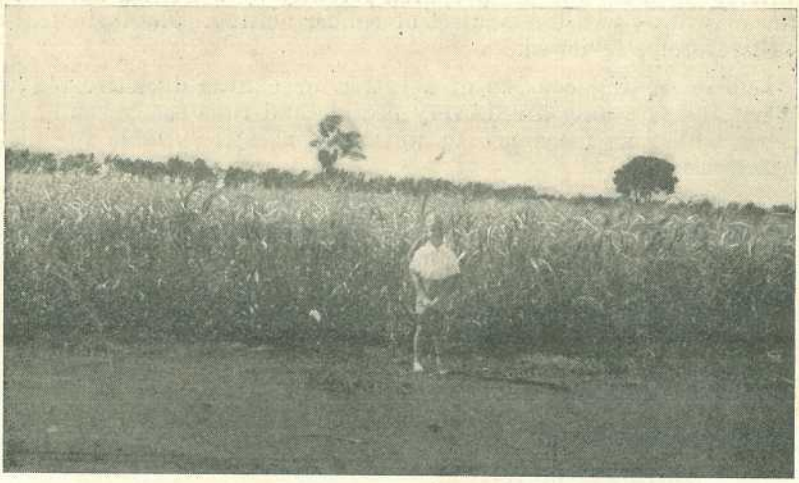

Plate 81.
A YOUNG CROP OF SUDAN GRASS, BUNDABERG SUGAR EXPERIMENT STATION, 1941.

It should be pointed out that the yields given above are for growth under natural rainfall conditions. No irrigation water is used on this crop. At least three crops can be obtained if the field is sown in December; the Sudan grass ratoons strongly, but may need sulphate of ammonia on each cut. The need for this plant food is made evident by the yellowing of the crop.

(NOTE.—Certain precautions should be observed in the planting and utilization of Sudan grass crops. At certain stages of growth Sudan grass occasionally contains traces of hydrocyanic acid and care should always be exercised when feeding it to stock green. Since it hybridises very readily with other varieties of sorghum (including Johnson grass) seed should only be obtained from a dependable source; incidentally, such hybrids are much more likely to contain hydrocyanic acid than true Sudan grass. Finally, Sudan grass acts as a host plant for the corn aphis and therefore its cultivation near cane will tend to increase the rate of spread of mosaic disease in susceptible varieties such as Q.25.—Ed.)

PASTURES UNDER IRRIGATION.

Much important work is being done at Leeton, in New South Wales, to find out the best temporary and permanent pastures for irrigation areas. No fewer than 265 rows of species of grasses and legumes are under test at Leeton, and most of the world's improved types are included. So successful have many of the pasture experiments and larger demonstration areas on the Murrumbidgee Irrigation Settlement proved that many farmers now possess fairly big acreages of watered paddocks carrying sheep and cattle throughout the year. As to the palatability of these pastures, the stock make their own choice. Sheep grazed canary grass (*Phalaris tuberosa*) and lucerne greedily, and then ate in order of preference the clovers, perennial rye, and cocksfoot.

Rubber Belting on the Farm.

ON cane farms there is a substantial amount of belting used, notably where irrigation is practised, but also wherever the tractor is used as a source of power to drive stationary units. Cane growers should be interested in a bulletin* prepared recently by a British agricultural engineer dealing with the subject of rubber belting. The main features will therefore be reviewed.

Rubber belting consists of a cotton or canvas duck treated with rubber. It has a long life, is very flexible and runs easily round small pulleys, whilst its resistance to weather makes it suitable for use in exposed positions.

Correct Size.—It is important that belts be the correct size for the job in hand. It is better to be too large than too small, but an excessive margin in this respect means a waste of money and power. Generally speaking, belts should be broad and light, rather than narrow and heavy, but the following factors have to be considered:—

1. Power to be transmitted.
2. Speed of belt in feet per minute.
3. Width of pulleys and diameter of the driven pulley.
4. Length of drive and whether belts are crossed or open, horizontal or vertical.
5. Weight, width and number of plies of the belt.

As many of these factors interact, it is not possible to give a simple rule for use in all cases, but the following will be a useful guide:—To find the width of the belt required, multiply the horse power by 1,100 and divide by the speed of the belt in feet per minute. To calculate the belt speed approximately, multiply the r.p.m. by three times the diameter of the pulley in *feet*.

To obtain an approximate idea of the horse power which a fairly heavy rubber belt should be able to transmit, multiply the number of plies in the belt by its width. The answer will be fairly accurate when the belt is running at the rate of 2,400 feet per minute. For other speeds, the horse power is nearly in direct proportion. With a light belt, the safe horse power will be three-quarters of the width multiplied by the number of plies. The horse power transmitted is decreased 10 to 15 per cent. by small pulleys, while it would be reduced one-third to one-half if the drive were vertical. With irregular loads, the *maximum* and not the average load must be considered.

Speed of Belts.—Generally speaking the slower the speed of the belt the wider and heavier it should be than if run fast on large-diameter pulleys. It is not necessarily true that slower speeds prolong the life of the belt. Generally speaking, speeds of 2,000 to 3,000 feet per minute give best results. The higher belt speeds can be used to advantage on large-diameter pulleys, as with a smaller pulley centrifugal force tends to reduce the grip and cause slip. For most power units on the farm it is necessary to have a small pulley: in that event, then, the employment of a comparatively wide belt is recommended.

* "Rubber Belting on the Farm," by J. E. Newman, R.P.A. Bulletin No. 13, June, 1940.

Drives.—Long horizontal drives are most efficient, but very long drives are costly. The drive or "tight" side of the belt should be on the bottom wherever possible. This is most important with substantial differences in pulley size and short drives.

Vertical drives, which should be avoided wherever possible, are better short, as the weight of the belt increases the tendency to slip on the bottom pulley. A belt as thin and wide as possible should be used and top drives are best. Tight belts waste power and increase belt and bearing wear. Jumping off the pulleys or slipping from side to side are signs of overloading, though they may also be caused by faulty alignment of pulleys. Crossed belts grip better than open belts, and can be used for shorter centres.

Number of Plies.—There may be a few or many, but most agricultural work can be done with the medium-class belt. The strength and weight of the belt depend on the number of plies, but this should be related also to the width of the belt and the diameter of the pulleys. Belts up to 3-inch widths should have two or three plies; 3- to 5-inch, four plies; and 5- to 8-inch, five plies. Bending of a belt around a pulley stretches the outside more than the inside, and this sets up strains in the material, but so long as the belt is not overstrained no harm results. The thinner the belt and the larger the pulleys the less is the strain. Thin, wide belts running at high speeds tend to run in waves on the slack side; this can generally be cured by using a thicker belt. Satisfactory results usually follow if the number of plies is half the diameter of the pulley. However, a 2-ply belt may be run on an 8-inch pulley, but running a 4-ply belt on a pulley less than 8-inch diameter should be avoided, unless the belt is of special construction for small pulleys; there will, of course, exist differences between belts of different manufacture, in respect of both strength and flexibility.

Belt Fasteners.—In agricultural work the Alligator type and Jackson plate fastener are most common. The former can be used on all types, but the latter should not be employed if the belt has to travel around small pulleys, and cannot be used with a jockey pulley. A square should always be used when cutting a belt, and a punch employed for making the holes for plate fasteners.

Belts can be made endless by the makers, or it can be done by cutting the belt in steps, allowing 3 to 4 inches for each ply, and cementing with rubber cement. Three coats of cement should be used, each being allowed to become tacky before the next is applied, and the two ends must be fitted closely and kept pressed together under weights until well set. Finally, small rivets should be inserted, using a belt punch to make the holes.

Endless belts are preferable wherever possible. They cannot be used where the length of the drive is fixed, or on pulleys running between bearings. Belts should be cut 1 per cent., or $\frac{1}{8}$ inch per foot, shorter than their length measured over the pulleys. For vertical drives this allowance should be increased by one-half, while for very long horizontal drives the allowance should be decreased by nearly one-half.

Pulleys.—These must be wider than the belts which run on them. Allow $\frac{1}{2}$ inch or more with narrow pulleys, and 10 per cent. with wide belts. A crowned wheel is bigger in diameter at the centre than at the sides, and this tends to keep the belt on the pulley. Too much camber

is harmful to the belt, except at low speeds. Flanged pulleys are useful in special cases, but flanges or guides should not be used to retain the belt on pulleys that are out of alignment. A belt should run truly if the pulleys are lined up correctly, both horizontally and vertically. If it does not the belt may not have been cut squarely or the fasteners may be fitted incorrectly.

The ratio of the diameters of two pulleys working together should not exceed six to one. A long drive is advantageous if this cannot be arranged; if not, the use of an extra wide belt or the use of V belts should be considered. Pulleys should be kept clean, as lumps of dirt or belt dressing injure the belt.

Persistent slip on the pulley may be caused by bolting or rivetting a piece of rubber belting to the face of the pulley. The holes should be countersunk on the pulley face, and great care taken that the bolt or rivet heads do not project.

V Belts.—These are very successful for short drives, and may be used with centres which would be impracticable with ordinary belts. They are run in grooved pulleys, the sides of which are 40 degrees. The groove must be deep enough to make it impossible for the belts to "bottom," which would quickly wear them out. They may be run off the flat of a flywheel or large pulley to drive a small grooved pulley. A working rule for belts running on grooved pulleys is 3 horse power per belt at speeds in the neighbourhood of 3,000 r.p.m. They are made in standard lengths, and can only be used where an endless belt can be utilized.

Maintenance.—New belts often slip due to the surface bloom or dusting powder they retain. This usually disappears quickly. Rubber belting is permanently flexible and does not, as a rule, need dressing. Stockholm tar and resin are harmful and should not be used. If the surface becomes glazed and hard, a light dressing of castor oil or washing with soap and water or methylated spirits will prove beneficial. Too much oil will damage the rubber, and it should be applied sparingly by using a soaked cloth or waste against the belt. Direct sunlight is harmful to rubber and belts thus exposed should be removed when not in use.

—H.W.K. in *The Cane Growers' Quarterly Bulletin* for April, 1941.

Silage from Sugar Cane Tops.

BY P. J. SKERMAN.*

A DROUGHT occurs in Queensland on the average once every six or seven years and shorter dry spells occur frequently between these periods. There has been a growing fodder consciousness over the past few years and its conservation has been sponsored by the Department of Agriculture and Stock, the Agricultural College, the Royal National Association, the "Queensland Country Life," and the local newspapers. In spite of this, there is a terrific amount of potential fodder destroyed or otherwise lost in Queensland each year.

A case in point is the almost universal practice of burning off sugar-cane tops and trash each year after the harvest to facilitate ratooning operations or preparation for the next crop. This material is made up largely of the sugar-cane top which is still in the green state at the time of cutting. Quite apart from the loss of potential humus this represents a loss of animal fodder which would be a valuable accessory in time of shortage of natural grazing.

From weighings carried out at the Agricultural College during 1940, it was found that the green weight of the cane top at the time of cutting was from one-third to one-half that of the cane cut from the same stem. Possibly the figure would be somewhat lower as a Queensland average. From the cane tonnages issued by the Director of the Bureau of Sugar Experiment Stations for the 1939 crop, it is noted that 6,000,000 tons of cane were harvested. This then represents possibly 1,500,000 tons of cane tops. Taking the cane grown in the Central and Southern dairying areas, viz., Mackay, Bundaberg, Maryborough, and Nambour as 3,000,000 tons, there are 750,000 tons of cane tops available. Admittedly, quite a good deal of the cane is burned before harvest and there is a labour shortage during the crushing season, but it still cannot be denied that there is a considerable wastage of potential fodder.

A perusal of the rainfall incidence of the dairying districts in the cane areas will show that there is a general scarcity of rain during the winter months from June until October, when supplementary feeding may be necessary.

From the above consideration it was thought desirable that an attempt should be made to make cane-top silage and examine its feeding value. A small area of cane at the College, comprising the varieties P.O.J.2878, Co.290, P.O.J.213, Oramboo, and P.O.J.2725 was consequently harvested and the tops ensiled in July, 1939, in a shallow pit silo, 6 feet deep and 12 feet in diameter, excavated in the bank of the Lockyer Creek. A composite sample was chaffed and forwarded to the Agricultural Chemist of the Department of Agriculture and Stock, who kindly agreed to carry out an analysis. The tops were packed as uniformly as possible in the silo and built 3 feet above the ground. After a few days of settling, more were added and 18 inches of soil placed on top to seal the silo. Considerable sinking took place as the silage settled down and fermentation set in and additional earth had to be placed on top. The temperature taken from the middle of the silo at no time exceeded 95° F.

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* Agriculturist, Queensland Agricultural College, in *The Cane Growers' Quarterly Bulletin* for April, 1941.

The silo was opened in May, 1940. It was found that there was a wastage of 18 inches around the sides and on top of the silo, but the silage in the middle of the mass was of excellent colour and slightly acid in flavour. Owing to the small size of the silo, the waste represented nearly 50 per cent. loss, but with a normal trench silo of 60 to 100 tons capacity the proportionate loss would be much less.

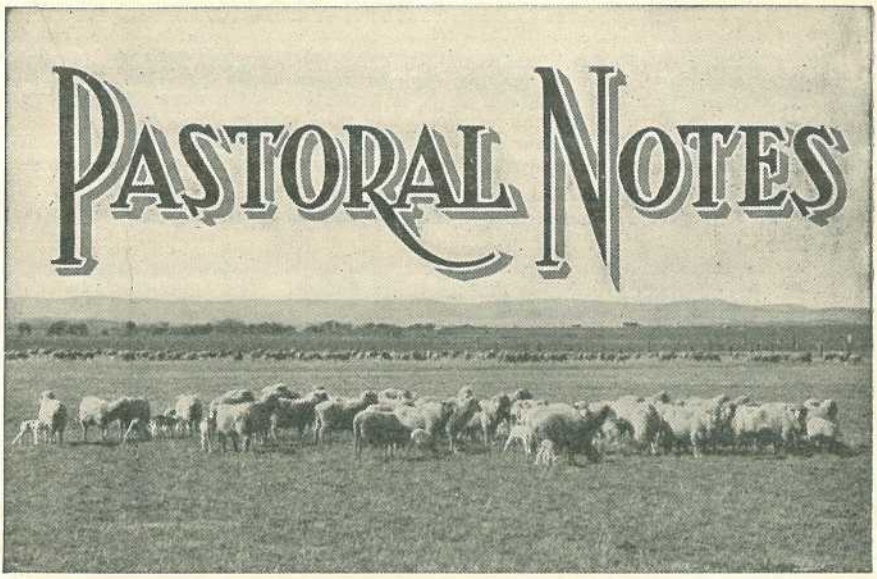
The silage was fed to the dairy cattle and they ate it readily with no harmful effects. A sample was also chaffed and forwarded to the Agricultural Chemist for analysis; he supplied the following figures:—

—	Green Tops.	Ensilage.
	Per Cent.	Per Cent.
Moisture	76·1	76·3
Crude Protein	1·8	1·4
Crude Fat	0·30	0·26
Crude Ash	3·10	3·66
Crude Fibre	7·60	8·55
Crude Carbohydrate	11·10	9·86
Lime	0·15	0·09
Phosphoric Acid	0·12	0·10

Unfortunately, no legume was available at the time for ensiling in conjunction with the sugar-cane tops. This would undoubtedly have provided a better feeding mixture. However, it was sufficiently demonstrated that cane-top ensilage can be easily made and that the tops should be utilized whenever it is possible to find the time and labour for doing the work.

Plate 82.

A HOME-MADE TRACTOR.—An ingenious orchardist's ploughing plant in action on a near North Coast farm.



The Horse's Mouth.

THE horse has two dentitions—a milk dentition, and a permanent dentition. The incisors and premolars are milk teeth, and are replaced in due course by permanent teeth.

The centre permanent incisors appear from two and a-half to three years old, the lateral from three and a-half to four years old, and the corner ones from four and a-half to five years old, when the animal is said to have a full mouth. The tushes seldom appear before the age of four years, are well up at four and a-half years, and are level with the corner incisors at five years. In mares, these canines seldom appear.

Occasionally the milk teeth are not shed before the appearance of the permanent ones, and they may interfere with their normal growth, pushing them out of position. Removal of these milk teeth sometimes is necessary, and this is done with small forceps, or even by levering them sideways with a strong knife blade. Never break them off. After their removal the permanent teeth soon straighten up.

Many horses, particularly aged horses, lose condition because of pinnacles and sharp edges on the molars, and which may prevent the proper mastication of food. These irregular projections are found on the outside of the upper and the inside of the lower molars, sometimes cutting into the cheeks and tongue, causing painful sores; or one molar may be found to have grown too long through decay of the opposite one and consequent lack of wear, that it prevents the other molars from meeting, and the horse is unable to grind its food.

An affected animal shows distress in chewing by holding its head on one side to chew, and eventually dropping the half-masticated bolus from its mouth.

Other evidences of distress are an objection to the bit being put into its mouth by tossing the head, or by "running away from the bit" when pressure is applied to the reins.

Indigestion and colic are usually the consequence of this condition.

The remedy lies in the careful and patient use of the tooth rasp, which is used in conjunction with a mouth gag, care being taken not to destroy the natural bevel of the teeth, for it must be remembered that mastication is performed by movement of the bottom jaw, the bevel of the teeth providing the resistance, so that food may be properly ground. After the teeth have been levelled, the mouth should be swabbed out with a solution of borax and water, and a suitable tonic given with feed such as—gentian root powdered, four parts; sulphate of iron powdered, two parts; nux vomica powdered, one part. Two heaped teaspoons of the mixture should be given twice daily in a small quantity of dry feed.

CLASSING THE EWE FLOCK.

Many grazing properties in Queensland are usually stocked well up to their carrying capacity and, with the coming crop of lambs to be provided for, some reduction in numbers may be necessary. It is better to own a flock of good ewes than a flock containing a mixture of good and bad stock. Besides being more profitable, it should give the owner far more satisfaction to have a flock as near as possible to uniformity in type and which will cut a heavy fleece of good quality wool.

On most large holdings classing the ewe flock forms part of the station routine, and there is no reason why smaller flocks should not be classed in the same way.

Just before shearing is the most suitable time to do the classing and, usually, the flock can be classed in three groups to advantage. The tops should consist of all the large-framed, deep-bodied ewes carrying a covering of even type, well grown, and showing the character and colour typical of the breed. Ewes selected for the main flock should be as free from fault as possible, but need not be so even or up to the standard of the tops. The third class will be the culls, including light cutters, ewes producing inferior wools in quality or colour, and ewes rejected for defective frames, weak constitution, or objectionable folds or wrinkles. The rams to be mated with them should be classed in the same way, the best being selected for the top line. All culled ewes should be fattened and sold as soon as possible; likewise, those cast for age.

CARE OF THE DIP.

Cattle owners in ticky country often neglect their dipping vats. Consequently, they lose money without realising it, for cattle dipped recently in a dirty vat lose their bright, clean appearance, which helps the seller when the bidding in the sale ring is brisk.

In the course of time a dipping vat will accumulate a considerable quantity of filth, which settles slowly on the bottom as a deposit of sludge. It may become so bad that an owner is forced to empty the vat and is then put to the expense of recharging.

This can be avoided by cleaning the vat periodically. For this purpose, a kerosene tin is cut in half diagonally to make a scoop, which is attached to a handle with wire. Small holes are cut in the bottom and sides. After dipping cattle the surface of the fluid may be skimmed with the scoop and floating hair and dirt removed. This helps to keep the vat clean for a long time.

After dipping the sump should also be cleaned and dirt prevented from accumulating.

A white mark should be placed on the side of the vat to show the height of the fluid. It will be noticed, particularly in hot weather, that evaporation is very rapid, and the surface of the fluid will fall far below this mark. Before next dipping, water may be added until the dipping fluid is again at the correct level. It is only the water that evaporates—not the concentrates.

THE SMALL FLOCKOWNER'S WOOL.

The wool-marketing scheme conducted by the Department of Agriculture and Stock in the interest of the small flockowner continues to grow steadily in usefulness and popularity. The scheme is open to graziers with 1,500 sheep or less, who may send their whole clip for classification and sale. In addition, bags, butts, fadges, and odd lots are accepted from any holding.

Wool produced from British breeds of sheep is also accepted from any holding.

An advance of 60 per cent., without interest, of the estimated value of the wool is forwarded to growers of under 1,500 sheep, on receipt of the wool into store. The financial benefits to farmers with small lots of sheep are undoubted. No matter how small the quantity of wool, the farmer is assured of receiving its full market value.

The charge for classing is 10s. a bale. Other charges are the usual brokers' charges, such as insurance, commission, and handling.

HYDATIDS.

The cause and far-reaching effects of hydatid disease in both man and domesticated animals does not appear to be recognised as widely as its importance warrants. It is caused by the larval stage of a tapeworm which, in the adult stage, is found in the dog, and affects human beings, cattle, sheep, and pigs. This larva or hydatid consists of a fine enveloping membrane, enclosing a watery fluid, and containing numerous tapeworm heads. It is usually found encysted in the liver or lungs of affected animals, although it may infect any of the organs or tissues of the body cavities.

Dogs become infected with tapeworms through eating animal organs or tissues containing hydatids. When these are swallowed, the worm heads are liberated and, attaching to the bowel wall, eventually become a fully developed tapeworm. At various intervals, mature segments containing eggs break off from the tapeworm and pass out of the dog's body with the faeces and foul the pastures, water, or green vegetables, as the case may be. Should the eggs be swallowed by a suitable host, they hatch in its intestines, and, boring into the intestine wall, enter the blood stream to be carried to the various organs and tissues of the body cavities, where they develop into hydatids.

Human beings are infested chiefly through careless handling of dogs. The risk of infection certainly is not as great as in the case of the lower animals; but where there are infected dogs, it is an ever present possibility, through eating uncooked vegetables (lettuce, celery, &c.), or through the drinking of polluted creek water. Hydatid infection in human beings usually has serious and sometimes fatal consequences. This may be caused either by the destruction of healthy tissues in the affected organ or through continued pressure on the affected organ or adjacent vital organs, thus seriously interfering with their functions.

In cattle, sheep, and pigs, fatalities resulting from hydatid infection are not common; but they, nevertheless, are a source of economic loss, arising from the condemnation at the meatworks of affected parts; and, to a lesser extent, from the additional time taken to grow and fatten affected stock.

Tapeworm infestation in dogs may not only seriously affect their health, but may also lower their resistance to other diseases and their value as workers.

To control the spread of hydatids, it is necessary to prevent the tapeworm infestation of dogs. It is essential, therefore, that all organs or parts of animals slaughtered for food, and found to be hydatid-infested, should be destroyed either by burning or boiling down. This is provided for in the Slaughtering Act and Regulations; also the exclusion of dogs from slaughter-yards and butcher shops.

In large towns where all slaughtering operations are under the regular supervision of meat inspectors, legislative provisions are observed more rigidly, and that is the reason for the usually low incidence of tapeworms in town dogs. In the country, however, it is not uncommon for dogs to be allowed access to the offal of slaughtered animals, both on farms and stations. Instances are known where owners have fed infected livers to their dogs. They knew that the livers were not suitable for table use, but thought that they would do the dogs no harm. This practice, obviously, cannot be too strongly condemned.

ROTATIONAL GRAZING.

In the minds of many selectors, rotational grazing seems to be restricted to improved pasture land, or land which has been cropped. That is not so entirely, for much benefit, both to ordinary grassland and to the sheep running on it, may be derived from the periodical spelling of the country and proper flock management.

It is not uncommon to see wethers turned into a paddock off shears, to stay there, possibly, until next shearing to the detriment of the sheep and the pastures.

Sheep benefit greatly by a change of paddock, even when the country is, apparently, in a worse state than that from which they have been removed. Too little is done, generally, on grazing lands to see that, each year, some portion of the country is spelled with the idea of allowing the grasses to seed. Rotational spelling is just as important as rotational feeding. Soil erosion, caused by continuous stocking and overstocking, also should be considered.

Regarded generally, more money is to be made over a period of average seasons by running three sheep and properly looking after and adequately feeding them, than four sheep more or less neglected, either in management or nourishment.

CASTRATION OF COLTS.

The best time of the year to perform this important operation is the spring, when rain has fallen and green feed is available, and before the hot weather has set in.

The colts to be gelded having been yarded over night. it is desirable before proceeding with the operation, to take precautions against losses through infection of wounds. Crude carbolic acid or phenol in a solution of 7 oz. to 1 gallon is a suitable disinfectant, and should be sprayed over the ground and rails of the yard.

All instruments used should be sterilized by boiling for at least ten minutes, and should be wrapped in a sterile towel and kept in a box at the yard until required.

After each colt is done the instruments and hands of the operator should be washed in a weak solution of carbolic acid, this solution being kept in a separate vessel, and only sufficient for each disinfection being poured into a dish for the purpose, and then thrown away. The practice of using a petrol or kerosene tin filled with disinfectant to wash instruments and hands time after time is risky.

For unbroken colts, the rough and ready methods of roping, choking, and throwing as practised on many stations may cause the loss of valuable animals. These losses may be minimised if a crush with side gates is available, so that the colt can be haltered and side lines used on him before the gate is opened to cast him.

The colt, having been cast on his left side, the hind legs drawn up to the shoulders and made fast with half hitches, the fore legs can now be secured with the knees bent to the hind feet.

The scrotum, sheath, and penis should be washed with warm water and soap, care being taken to remove any suety deposit from the penis and the cavity at the end of the penis. The left or lower testicle (the colt being on his left side) is seized in the left hand, and pressed until the skin is tight over it; a bold incision from front to back, parallel with the median line is now made, penetrating the outer skin and the tunica, laying the testicle bare. As the incision is made, the cord should be grasped firmly in the left hand to prevent the retraction of the testicle upwards through the canal. When this happens it is sometimes difficult to recover, and the subsequent manipulation in an attempt to bring it down delays the operation, and causes unnecessary shock to the patient. The knife is now slipped between the anterior and posterior portions of the cord, and the latter (posterior), which the muscle retracts, is cut completely through.

The testicle now lies inert, connected by the anterior portion of the cord, which is composed of blood vessels, and should be drawn out until it is taut, without using force, when the emasculator (if that method is being used) should be used close to the belly, with a slow squeezing movement, taking care that the crushing part is nearest to the belly, and the cutting part to the testicle. The cord should be severed as short as possible, so that it may not hang below the wound, and so cause complications.

The other testicle may now be removed in a similar way.

It is advisable to swab the wound with a solution—1 to 2,000—of chloride of mercury. The ropes may now be removed, and the colt allowed to rise and walk out the yard, so as to be away from dust.

If the operation has been performed carefully, and all antiseptic precautions taken, recovery should be rapid and no further treatment is necessary, but if undue swelling is noted, the wound should be opened with the fingers, after washing the hands with carbolic solution, so that there may be free drainage, and the wound swabbed with disinfectant.

Some bleeding always occurs, but rarely lasts for more than half an hour, but if copious bleeding persists after that time—as is the case when emasculators have been used carelessly—the cord must be found, and the artery tied with silk thread. If the stump of the cord cannot be found, the canal should be plugged with pledgets of tow or wool soaked in muriate of iron of the same strength as obtained from the chemist, which helps to form clots, and so closes the artery.

BELLY WOOL.

It is well worth the trouble of removing fatty ends from belly wools. The skirtings can then go with stained pieces or locks, according to the quality of the wools removed. All stains should, of course, be removed from wether bellies. The difference in the price received from a line of bellies so treated would soon convince any sheepman of the advantage to be derived from a little extra work.

CARE OF FAT LAMBS.

Careful handling of fat lambs pays. Everyone concerned with the marketing of fat lambs, whether in the yard or in transit, can co-operate in the prevention of bruises, abrasions, and other injuries to the animals. Some of the causes of avoidable injuries to fat lambs are—

Over-driving.
Using dogs that bite.
Grabbing the lambs by the wool.
Prodding with sticks, or ill-usage in any other way.
Overcrowding in trucks.
Allowing lambs to fall off the gang-planks during loading and unloading.

CARE OF SHEEP SKINS.

In the aggregate, a heavy loss is caused by carelessness in the treatment of sheep skins on many grazing properties. Butchers' skins are, usually, delivered for sale in good condition.

All skins should be carefully stretched. In hanging, neck and tail should be on the rail. Immediately after the skins are removed they should be thoroughly painted with a disinfectant or poison as a preventive of weevil attack.

In packing skins for market, they should be placed skin to skin and wool to wool.

More care of the skins on the property and a more attractive bundle when sent to market would benefit growers financially; the lump sum thus saved would be a substantial amount.

HOSPITAL PADDOCK FOR FLY-STRUCK SHEEP.

During a bad blowfly infestation graziers are advised, where at all practicable, to supply a hospital paddock for fly-struck sheep. This should be done for two reasons:—(1) The affected sheep may be inspected and dressed when necessary, thus saving many a sheep which would be otherwise lost; and (2) to a very great extent lessening the chances of extra strikes in the flock. A fly-struck sheep is always a menace to others, inasmuch as it is an attraction to flies.

A further precaution in the way of saving the lives of sheep is to shear them. Admittedly there will be some loss, and a considerable one, in the value of the fleece, but a live sheep is better than a fly-blown carcass.

Where the necessary small paddock for a hospital flock does not exist, graziers are advised to consider the cost of providing one as a paying investment.

TAR BRANDING CONDEMNED.

Some stockowners still continue to use a tar brand on sheep, apparently without realising the loss which this practice entails. Wool from tar branded sheep is often sold at a lower price than wool marked with one or other of the several recognised branding fluids, which are harmless and easily emulsifiable. Tar spoils the wool, from which it is very difficult to remove during the process of manufacture.

The grazier who uses tar for branding should, obviously in his own interest, discontinue the harmful and costly practice.

SKIRTING THE FLEECE.

Probably the greatest defect in the get-up of small clips for market is faulty skirting. The usual mistake is to take too much off the fleece. Every pound skirted off the fleece unnecessarily means a loss in money equivalent to the difference between the prices received for fleece wool and for pieces and broken wool. On the other hand, a loss is sustained if a clip is not skirted properly. If it is payable to "free" a wool it should be done. This consists of removing all burr and other vegetable matter from the fleece. If, however, the fleece is so matted with burr or grass seed that it is impossible to "free" the wool, skirting should be very light, and the wool put up and offered for sale as a "burry" or "seedy" line.

An appreciation of these points may mean substantially enhanced returns to the farmer.

WINTER PASTURES.

Several factors should govern the choice of a pasture mixture for winter grazing, including the average winter rainfall of the district, the soil types, the cultivation treatment the land has received, the length of time the pasture is expected to remain, and the aggressiveness of weeds. Once a suitable mixture has been established it must not be considered "fool-proof," but should be managed with due regard to the pasture itself.

Only relatively small areas of winter pasturage will be available on any property, and the temptation to stock these paddocks heavily during the winter months when the "broad acres" are unproductive must be resisted. Such pastures should as far as possible be reserved for cows in milk, for breeding ewes or for fattening stock. The pasture should not be stocked too early in the growing season but must be allowed to make good growth before grazing. When a paddock is ready for grazing the animals should be permitted to graze on it for about an hour each day and they should be removed sooner if they begin to lie down. Camping on the area should be avoided, as the pasture becomes fouled and distasteful to the stock. Sufficient stock should be put on to eat a paddock down within 10 days or so, but the pasture must not be too closely grazed. "Flogging" a pasture of winter grasses and clovers will certainly be harmful. After the completion of a grazing, the harrows or wooden drag should be run over the paddock to scatter the droppings. The pasture must be given ample time to recover and produce good growth before being grazed again. Sufficient paddocks of winter pasture should be provided to permit rotational grazing and to supply green, nutritious feed continuously throughout the cooler months of the year.

Some of the annual winter pasture plants—e.g., Italian ryegrass, Wimmera ryegrass, and prairie grass—are self-seeding, and towards the end of the growing season, pastures of these grasses must be left unstocked in order to permit the seed to be matured and shed. Areas which have been so treated should be lightly harrowed in early autumn to make a seedbed for the establishment of seedlings produced by the self-sown seed.

LATE SOWING OF WINTER PASTURES.

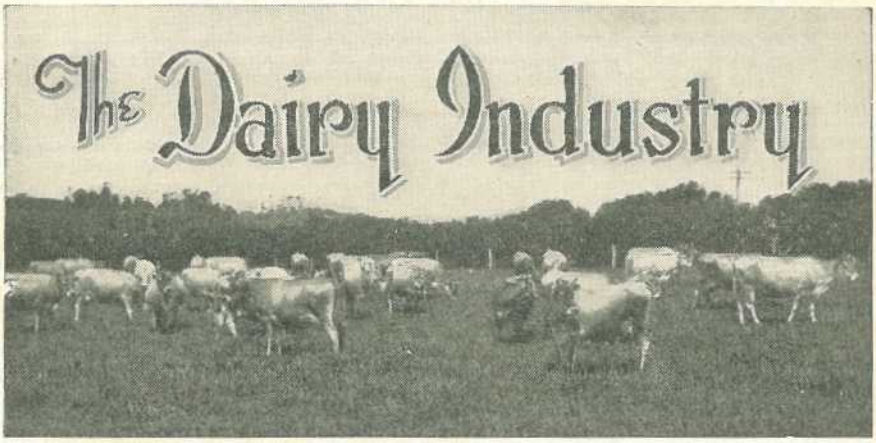
In normal circumstances, winter pastures should be sown at the end of March or during April. The annual species, particularly, require a long growing season if they are to prove a better proposition than the winter cereals. Late May and June sowings of annuals such as Italian ryegrass, Wimmera ryegrass, prairie grass, and berseem clover almost invariably give poor results during mid-winter; although, if ample soil moisture is available, they may provide useful spring feed.

The perennial grasses and clovers usually are slower in developing than are the annuals; and, if sown in late May or June, cannot be expected to provide any great bulk of winter or spring grazing during the year of sowing. However, if the establishment of the pasture is of more importance than the provision of early grazing, late sowings may be done with some prospect of success.

FAT LAMB TRANSPORT.

Complaints of the bruising of lambs consigned to market are not uncommon, but to a great extent the remedy lies in the hands of growers.

The tenderness of sucker lambs is often not appreciated sufficiently, and in many cases they are handled like fat sheep. Sheep, too, may be bruised by bad handling, although not so badly as sucker lambs. It should be remembered that true sucker lambs have never been off the mothers. It is advised, therefore, that if a road journey has to be undertaken, some of the ewes should accompany the lambs to the trucking yards. Untrained dogs should not be used for yarding the lambs. A lamb should never be lifted by the skin. Prodding sticks should never be used. Overcrowding in the trucks should be avoided entirely. In all cases every endeavour should be made to deliver the lambs at the market with the bloom on them. A certain loss in weight and appearance is unavoidable on a long journey, but if the foregoing rules were observed strictly, complaints of bruising would be rare.



Pigments in Milk.

MILK contains two kinds of colouring substances, one of which is soluble in water, and the other soluble in butterfat. The water soluble pigment is called lactochrome and its greenish-yellow colour may always be seen in whey during cheese manufacture. The pigment soluble in fat is yellow in colour, and is more interesting and important on account of its presence in butter. It is called carotin, and belongs to a group of colouring substances called carotinoids, which are widely distributed in plants and are also found in many animals. Carotin, for example, is also responsible for the yellowish colour of the fatty tissue and skin secretion of dairy cattle, especially Jerseys and Guernseys. Another carotinoid, which is very closely related to carotin and which is called lycopin, causes the red colour of tomatoes, watermelons, and other fruits, but has not been found to occur in animals or milk.

Carotin is found in all green plants, being manufactured by the plants themselves, but it is not manufactured in the bodies of animals. The presence of carotin in milk fat is therefore due to a direct transfer of this colouring substance from the food eaten by the cow.

This has been proved quite definitely by feeding experiments, which have shown that the amount of carotin in the fat increases or decreases, according to the amount of carotin present in the food. When cows are fed on such foods as cottonseed meal, timothy hay, white corn and yellow corn, the amount of carotin found in milk fat is very low compared with that obtained from cows fed on green lucerne hay, green crops, fresh pasture grass, and similar foods.

This offers an explanation of the seasonal variation in the natural colour of butter, and also indicates why butter from some districts is more yellow than butter from other districts. In those areas with a good annual rainfall and consequently a plentiful supply of green pasture, the colour of butter is always brighter than that produced in the drier parts of the State.

The various breeds of dairy cattle differ with respect to the amount of this yellow colouring substance in butter fat. Guernseys and Jerseys rank first in this respect, with Ayrshires, Shorthorns, and Friesians lower down on the scale. Another interesting feature about this pigment is that, of all the animals whose milk is commonly used for human food, cows alone give milk which has a pronounced yellow colouration of the fat. Milk fat from the goat, ewe, camel, and water buffalo is almost entirely devoid of yellow colouring matter. The fat of human milk, however, is at times distinctly tinted by carotinoids. The reason why such differences occur is not known.

A point of great interest and importance also is the relationship between carotin and vitamins in milk and butter. It has been shown that carotin can be transformed into vitamin A by the cow itself. The yellow colour of butter, such as is often seen in spring and summer-time, is therefore suggestive of richness in vitamins, and vitamin content is one of the best arguments for butter as a fatty food for children and grown-up people.

BACTERIA IN THE BUCKET.

Milk as it comes from the average healthy cow contains comparatively few micro-organisms, and these are for the most part inactive in milk. There are many sources from which the bacteria responsible for souring, bad flavours, and other forms of deterioration may gain entrance to milk. Premature souring is very often caused by the use of milk vessels—pails, strainers, coolers, or cans —which, for some reason, are in a state of disrepair. A single utensil which has become worn or bent with continued use, and has developed cracks or crevices, may harbour undesirable bacteria capable of spoiling milk which has been otherwise very carefully produced.

With the cooler weather, summer troubles are apt to be forgotten; but, if the cause is not removed, they will crop up again with the first hot spell. A thorough inspection of all milk vessels and equipment is, therefore, desirable, repairs or renewals being made where necessary. The seams of cans and pails should be resoldered if they have opened at all, and dents should be straightened out. Where the defect is more serious, there should be no hesitation in discarding the vessel, as it is only false economy to keep it in use.

No ordinary method of cleaning can dislodge bacteria established in very small crevices, for they are well protected, and subsist on the small amount of milk solids left behind whenever the vessel is used. Even steam treatment will not destroy them completely.

Off-flavours, such as tallowy and cardboard taint in both milk and cream, are due to the presence of small amounts of copper and iron, which often come from coolers with defective tinning, or from rusty utensils. These flavours develop rapidly under favourable conditions, such as the exposure of the milk or cream to direct sunlight. They cannot be removed, and it is, therefore, necessary to have any worn surfaces retinned as a preventative. Provided no abrasive is used in the preliminary cleaning—a stiff brush will usually remove milk solids—and no strong chemicals are applied, the tinning should have a reasonably long life.

EFFECT OF DISEASE ON MILK.

The effect of disease on milk from cows is variable. Usually there is an alteration in composition, accompanied by a decrease in yield. Generally speaking, the milk-sugar (lactose) is considerably decreased, while the chloride and ash content increase. Fat may either increase or diminish. Casein is likely to be lowered and albumin increased, whilst the total protein may remain constant. A consideration of one or two important diseases will illustrate the changes that may occur.

Mastitis is one of the commonest diseases in this country, and analyses show that the casein, fat, and lactose are markedly reduced and the chlorides increased, in milk from affected cows. Casein and fat are the all-important substances in the manufacture of cheese, and a deficiency of these constituents in milk means a lowered cheese yield at the factory. The importance of this disease in relation to cheese making is therefore very evident, and only serves to emphasise the need for greater care and vigilance on the part of all concerned in the dairying industry.

Foot and mouth disease is fortunately unknown in Australia, but analyses of milk in countries where it does occur show that drastic changes take place in the composition and yield of milk. One of the most noticeable effects of this disease is a very marked reduction in the volume of the milk secreted often to one-quarter of its normal quantity. The changes in composition depend very much on whether the udder is inflamed or not. If the udder is inflamed, the changes in composition are very similar to those that occur in cases of mastitis. When the udder is not inflamed the fat, protein, and ash are increased and the lactose diminished. The fat may rise to as high as 10 to 15 per cent. (normally about 4.5), the protein to 5 per cent. (normally 3), and the lactose diminishes to 3 or 4 per cent. (normally 5).

It is interesting to find that the composition of milk when a cow dries off is very similar to that from a cow suffering from foot and mouth disease, without inflammation of the udder. Drying a cow off is usually accompanied by a considerable reduction in her feed, together with less frequent milking, and it is suggested that there is a similarity between these conditions and those that occur in some diseases. In sick cows there is a marked decrease in the food intake, and the milkings are apt to become less frequent.

The abnormality of milk and the decrease in yield brought about by these two diseases alone indicate the economic importance of disease in regard to the dairying industry. Anything that the individual farmer may do towards improving the health of his herd will not only be of benefit to himself but to the industry at large.

DOUBTFUL CREAM.

Every factory manager must formulate a policy in regard to the lowest quality cream that can be manufactured into choice quality butter at his particular factory. Modern methods of manufacture and factory equipment have done much to enable the utilisation of cream, which a few years ago would have been discarded. Nevertheless, the dairying industry still offers no exemption to the general rule that the quality of raw materials directly influences the character of the manufactured product. The addition of a few faulty cans of cream to a vat may thus cause the spoilage of otherwise choice quality butter. Only a thorough knowledge of the origin and nature of a given defect can help in determining the fate of doubtful cream.

There is a limit to the capability of machinery and manufacturing technique to offset defects in cream quality, and no factory can afford to slur over defects in the cream received. Any laxity in this respect is really doing the farmer a disservice, for he may remain unaware that better quality cream is required, and take less, instead of more, care on the farm.

First quality butter can only be obtained when the farmer realises that the remedy for cream defects is essentially his responsibility.

EFFECT OF POONA PEA ON CREAM QUALITY.

During a recent visit to a butter factory an offensive odour and flavour was manifest in the cream from some suppliers. One supplier, whose dairying methods were known to be sound, but whose cream was badly affected by the taint on certain days, although of good flavour on other days, was visited with a view to finding out the cause of the taint in his cream. It was discovered that the second-grade cream coincided with the dates on which the stock were allowed to graze in a paddock of Poona pea. Suspecting the legume to be causing the taint, some foliage was boiled with water and a quantity of the extract added to cream. After a while, an odour and flavour similar to that noted in the affected cream at the factory, but in a milder form, were detected.

With the cessation of the feeding of the cattle on Poona pea, the cream supplies have been graded choice at the factory thus affording additional evidence that the Poona pea was the cause of the previous de-grading.

Poona pea is apparently disregarded in other countries as a serious, cream-tainting fodder, but the experience in the district in which the butter factory is situated seems to indicate that dairy farmers should be cautious feeding their milking stock on this crop.

Poona pea, being a member of the legume family of plants, is valuable for dairy stock, as it provides protein to balance the rich carbonaceous, but low protein-content sugar-cane or cow-cane so much used for cow-feeding among the canegrowers, who also are engaged in dairying in the district.

The incidence of fodder taints in dairy produce can often be controlled by herd management. Although no specific feeding tests have been carried out to ascertain whether the taint in milk and cream is decreased according to the periods for which cattle are grazed on Poona pea, it has been observed that, where cattle are not fed exclusively, nor for any considerable time, on this legume, the cream appears to be unaffected. It would appear, therefore, that the taint can be controlled by exercising care in the feeding-off of this crop, and it is recommended to arrange, if practicable, for cattle to be grazed on Poona pea immediately after milking and withdrawn from the paddocks in which this plant is growing at least three hours before the next milking.

FEEDING OF CONCENTRATES.

Farmers are often adverse from feeding concentrates, which impart a flavour or "taint" to the butterfat. Peanut products are a typical example. In many cases the difficulty may be overcome by feeding the material immediately after milking. The animal then is assured of sufficient time, before the next milking, in which it can utilise the constituents liable to give the off flavours.

FAT LOSSES IN SEPARATED MILK.

When milk is passed through a separator there is always a certain proportion of the fat left with the separated milk. The extent of this loss depends on the condition of the milk and the efficiency of the separator. Cold milk is more difficult to separate than warm milk, because the latter is more fluid and the fat globules reach the centre of the bowl quicker.

The separator is a delicately balanced machine which is likely to lose its efficiency without any significant outward indication. Roughening or denting of the discs, vibration of the machine because of insecure foundations, and an over supply of milk to the bowl as a result of a damaged float are among the causes of increased fat losses.

The matters with which the farmer is mainly concerned are the percentage of fat in separated milk, and the proportion of the total fat thus lost.

Some farmers may be amazed to learn that separated milk from an efficient separator seldom contains less than 0·06 per cent. of fat. Results of separator trials carried out by a well-known separator manufacturing firm show fat percentages ranging from 0·06 to 0·07, and accurate analyses in other countries indicate that under normal working conditions, a percentage of 0·12 is quite common. Numerous analyses have shown an average of 0·08 per cent. of fat. The reasons for this loss is that all milks contain a certain proportion of very minute fat globules and only a comparatively small proportion of these are separated with the cream, the major portion being lost in the separated milk. This loss is unavoidable and cannot be appreciably reduced by adjustments to the separator.

Reports of analyses showing percentages of 0·01 to 0·03 should be discounted as worthless, as in all probability such tests were obtained by using the ordinary Babcock test. When applied to such products as separated milk and buttermilk the Babcock test is unreliable. Regulations under the Dairy Produce Acts require that separated milk shall be tested by the normal butyl alcohol modification of the Babcock test. This method gives results comparing favourably with standard analytical methods.

An efficient separator removes about 98 per cent. of the total fat in the milk as cream, the remaining 2 per cent. of the fat being lost in the separated milk. A loss of 1·5 per cent. of the total fat is about the lowest that can be expected under normal working conditions.

DEPARTMENTAL ASSISTANCE TO FARMERS.

When they have trouble with their cows—such as failure to breed, vaginitis, abortion, mammitis—many farmers say nothing about it. Others ask their neighbours, and generally end up by doing nothing, or else buy expensive remedies. When the disease has become serious and the financial loss is heavy, some then decide to seek the advice of the dairy inspector or the Government veterinary surgeon; and when the officer arrives at the farm he is expected to perform a miracle and remedy the trouble immediately.

Officers of the Department are in the district for the farmers' benefit, and farmers are advised to communicate with them at the first sign of trouble.

Contagious abortion and mammitis are notifiable diseases under "*The Dairy Produce Acts*, 1920 *to* 1935."

GRAIN SORGHUM FOR DAIRY COWS.

There is a rather widespread idea that grain sorghum (seed) is much inferior to maize as a feed for dairy cattle. This is far from true. Most of the disappointments from sorghum grain feeding arise from the seed being fed whole. When ground—in the same way that maize is fed as a meal—the value of sorghum grain falls very little short of that of maize grain. Crushing reduces the amount of indigestible material excreted, but fine milling enables the dairy cow to make best use of this valuable concentrate.

For all practical purposes, direct substitution of crushed sorghum for maize meal may be made, and 5 lb. of it may replace 6 lb. of pollard.

The PIG FARM

Rearing Motherless Pigs.

NEWLY-BORN pigs are frequently deprived of the sow's care through death or sickness, or because the litter is too large. If taken in hand as soon as they are deprived of the sow's milk, there is a very good chance of the pigs being reared successfully by artificial feeding. If they are left too long without sufficient food, however, they become weakened and difficult to rear.

Sometimes a large litter is divided into two lots, and each lot is put with the sow separately for a drink at frequent regular intervals. Although this entails a lot of attention, it gives satisfactory results. Foster mothers are sometimes available, and a sow with a small litter may be given some pigs from another sow, provided they are about the same age as her own.

When hand feeding is resorted to, the pigs should be given a warm, dry camping place, and have access to clean pasture. A movable shed in the run is very convenient. In the absence of the sow's milk, which helps to build up a natural resistance to disease, every possible precaution should be taken to prevent infection in the young pigs. A clean and comfortable pen should be a first consideration. Access to pasture assures a supply of vitamins and minerals, which are essential to a complete diet.

A method of feeding which has given very good results with pigs taken from the sow when a day or two old is as follows:—Start the pigs on whole cow's milk fed warm and as fresh as possible, six times daily. After three weeks the whole milk may be gradually replaced by separated milk, and the six feeds daily may be gradually reduced to three feeds daily. When the change from whole to separated milk is being made, a trough of a dry meal containing 90 per cent. of pollard, bran, maizemeal or wheatmeal, and about 10 per cent. of meatmeal should be kept in the pen with food always available to the pigs. This trough must be sheltered and kept dry. A constant supply of drinking water should also be kept before the pigs when they are given the dry food.

In teaching the young pigs to drink, the bottle and teat are neither necessary nor desirable—a shallow dish serves the purpose well. The warm milk should be placed in the dish about ½ inch deep and the pigs taken one at a time and stood in the dish. Then, if the pig is held firmly over the top of the neck, its head can be placed down into the milk, and held there long enough for it to get a taste of milk, but not long enough to allow it to inhale the milk. This operation may be repeated a few times at each feeding. After two or three such lessons the piglets will usually drink readily without assistance and afterwards will give little trouble.

When the piglets are drinking well, the dish may be replaced by a shallow trough. Both the dish and the trough used for holding the milk should be made of metal or earthenware and free of cracks so that they can be cleansed and scalded after each meal. This is most important for the prevention of digestive disorders.

ROUNDWORM IN PIGS.

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

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

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

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

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

MATURITY IN PIGS.

The question as to the difference between early and late maturing pigs—and, incidentally, whether early maturity means fast growth—often arises.

The following extract from the pamphlet "The Overfat Pig," issued by the Australian Meat Board will help to explain:—

> "During their growth from weaner stage to maturity, pigs pass through three more or less distinct phases. In the first, their bony framework is growing very rapidly. Then there is the phase when the muscular system (lean meat) is being rapidly developed around the bones. The third stage is when fat is deposited rapidly on and between the muscles, and the pig becomes thick and plump in conformation.
>
> "When it is remembered that a high percentage of lean meat is desired in pig carcases, it will be apparent that the pigs should be slaughtered just as they commence on the rapid fattening stage. The required degree of finish is not reached at the same weight by all pigs, some reaching it at porker weights and some at baconer weights—this difference usually being referred to as difference of type, which is inherited, but is also influenced by environment, including feeding and management."

The early maturing type of pig then is that which reaches the rapid fattening stage at an early age, say 4 to 5 months. The late maturing type takes longer to reach the same stage, being ready for market, under the same conditions, at from 6½ to 7½ months of age.

Most farmers know that pigs suitable for pork are ready for market at a much earlier age than those suitable for bacon; that is to say, the porker type pig is an early maturer and the baconer type matures late.

It should also be noted that early maturing pigs in general grow more slowly than late maturing pigs. This does not mean that the slower growers require more feed per lb. of carcase gain. Provided they are kept steadily moving along, there will be no noticeable difference in the average food requirements per lb. of carcase produced.

PIG-FEEDING.

Grain enters largely into successful pig-raising. Vine fruits and tubers are also used extensively. The phenomenal rise in the price of maize makes feeding problems difficult for the pig farmer. On the mixed farm, every effort should be made to conserve the carbohydrate-rich crops—Swede turnips, arrowroot, pumpkins, &c.—for the pigs. Molasses can be substituted for half the maize in a ration, but great care must be exercised in getting the pigs accustomed to this quantity. It should be done gradually.

Open grazing should be practised as extensively as possible; and, when porkers show a lean, unthrifty appearance, it will probably pay to carry them on to bacon weight. The farmer with a good stock of feed should be wary of buying more weaners than he can feed. If the separated milk supply is not sufficient, producers are strongly advised to use the meat meal now on the market. It is an excellent substitute.

While curdled separated milk has a slightly higher feeding value than fresh milk in pig-feeding, the use of the former is not recommended as a general practice.

The usual method of souring milk on the farm is by holding it for a period in a vat or drum which usually has an inside lining of decaying milk. This decomposing milk may contain not only the bacteria which cause normal souring of the milk, but also bacteria which are capable of decomposing the milk and turning it into a condition which is harmful to the pig. Further, when souring is practised under uncontrolled conditions, the feeding value of the milk may be greatly reduced by excessive souring.

Considering the very slight advantage of good soured milk over good fresh milk and the grave risk of an injurious decomposition of the milk when it is soured under the usual farm conditions, it is better to feed the milk fresh from the separator after the froth has been removed.

Milk should not be allowed to remain in the trough after pigs have had their meal. Any milk held over between one separating and the next should be kept in clean drums or cans, which are washed and scalded daily.

The sudden changing from sour milk to sweet milk, or from sweet milk to sour milk, in a pig's diet may readily cause digestive disorder.

COMFORTS FOR PIGS.

Adequate shade for pigs should be provided. The ordinary sty, particularly if it has an iron roof, is very hot, and some other shade is necessary in the heat of the day. If there are no trees nearby, a wooden shed will do.

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

Comfortable and hygienic conditions are most important in maintaining the health and well-being of pigs.

CORN COBS IN THE PIG PEN.

A good use for the corn cobs (cores) that accumulate on most farms, and around piggeries, is to make charcoal of them. The cores are of little value as a food for pigs because of their coarse, dry fibre content, and even if the whole cob (grain and core) were ground, it is doubtful whether it would be worth the trouble.

After the pigs have chewed all the corn from the cob, the waste cores and husks may be raked together into a pile and burned. When the heap is a mass of red hot coals, water may be poured over the pile. The partially charred cores, when cold, may be gathered for the pigs. Bones should also be gathered and burned, and added to the charcoal made from the cores. This cleaning up serves a double purpose; it gets rid of matter that would otherwise accumulate and become a nuisance, and provides charcoal and mineral matter for the pigs.

CARE OF LARGE WHITE PIGS.

Recent inspection of a number of Large White pigs bred on the Downs under normal and abnormal weather conditions indicates that, provided they are given proper care and attention, there need be no fear of any trouble arising, especially if care is taken, in the first instance, to select carefully from strains or families acclimatised to Queensland conditions and carrying a liberal coat of long silky hair on a fine white skin free from wrinkles.

When oil is applied to the skin for treatment of lice, it should be done in the late afternoon, or, preferably, during a cool spell in the weather.

The provision of abundant shade and protection from the weather should be regarded as a commercial proposition and will pay well on the cost involved.

If a concrete hog wallow can be provided in which the animals can "cool off" during hot weather so much the better, provided there is abundant shade, but it is preferable not to allow the pigs to wallow in a mud bath during extremes of heat. Regular treatment for lice or worms, is regarded as necessary with all pigs, and, while very young, the animals should gradually become accustomed to open air conditions in a paddock in which they can graze.

If animals are penned during the finishing stages of conditioning for market, they should be allowed out in the sun for some time daily.

CORN AND COB MEAL IN PIG FEEDING.

The grinding of the core of maize cobs and its inclusion with ground corn is like adding sawdust to porridge, for the corn is composed almost entirely of fibrous matter which is largely indigestible. The pig's digestive tract can at best but poorly utilise hard fibrous materials, such as the maize core and husks, even when they are finely ground. The fact that they do not attempt to eat these materials naturally is proof that instinct warns them of the severe digestive disorder that will surely follow. Even for brood sows, for which a bulky ration is desirable, it is much preferable to supply the bulk by feeding green lucerne or hay; or, if self-feeders are being used, good quality leafy lucerne chaff in proportion of 10 to 12 per cent. or more. The latter is rich in protein and minerals and is appetising once the pigs become accustomed to it. At the start it may be moistened.

The only time corn and cob meals would be of use is during long periods of dry weather when there is no green food available and concentrates are being fed. These periods of shortage can be provided against with hay, chaff and, in some cases, silage. In most of the pig-raising districts any lengthy period of green food shortage should obviously be overcome by practising some form of fodder conservation.

THE BREEDING SOW.

Some farmers when disposing of light weight breeding sows have been disappointed because they do not receive baconer prices for them. It should be understood that sows which have had a litter, even though they may be of bacon weights, are not suitable for manufacture into bacon. Their only use is as small goods. Perhaps, the most remarkable thing is that there should ever be sows available for sale at such weights. Obviously they are very small and stunted, and farmers who habitually breed from undersized stock cannot expect to make profits. Such sows have neither the constitution nor the conformation required for the production and sustenance of a large, thrifty litter, besides being more susceptible to disease. As pigs, to-day, are usually marketed before they attain their maximum size, the breeding stock used should be considerably larger than the progeny it is hoped to produce for market. Thus owners who have such undersized sows in their breeding herd, as referred to, cannot reasonably expect to produce good quality bacon pigs from their progeny.

FEEDING VALUE OF SKIM MILK.

Skim milk and butter milk—they should not be mixed with wash water—are of equal feeding value. These products supply all the proteins necessary to balance the carbohydrate content of the grain portion of the pig's ration. Together with lucerne, rape, barley, or other green feed—which may be either grazed or fed in the pig pen—they form an excellent ration.

Name and Address.	Name of Hatchery.	Breeds Kept.
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	Australorps
W. Brown, Waterworks road, The Gap, Ashgrove	Strathleven ..	White Leghorns
W. T. Burden, 44 Drayton road, Toowoomba	Harristown ..	White Leghorns, Australorps, and Rhode Island Reds
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca	White Leghorns and Australorps
J. L. Carrick and Son, Manly road, Tingalpa	Craigard ..	White Leghorns and Australorps
J. E. Caspaney, Kalamia Estate, Ayr	Evlinton ..	White Leghorns
W. Chataway, Cleveland ..	Wilona ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. M. M. Cousner, The Gap, Ashgrove	Progressive Poultry Farm	Australorps and White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, Rhode Island Reds and Whites
O. M. Dart, Brookfield	Woodville ..	White Leghorns, Australorps, Langshans, and Rhode Island Reds
Dixon Bros., Wondecla	Dixon Bros. ..	White Leghorns
T. Duval, Home Hill	Athalie ..	White Leghorns and Rhode Island Reds
E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner ..	Australorps
B. E. W. Frederich, Oxley road, Corinda	Glenalbyn ..	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
J. W. Grice, Loch Lomond, via Warwick	Quarrington ..	White Leghorns
C. and C. E. Gustafson, Tannymorel	Bellevue ..	White Leghorns, Australorps, and Rhode Island Reds
C. Hodges, Kuraby	Kuraby ..	White Leghorns and Anconas
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensington ..	Australorps and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
H. Hufschmid, Ellison road, Geebung	Meadowbank ..	White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds
S. W. Kay, Cemetery road, Mackay	Kay's Poultry Stud	White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns
W. A. Lehfeldt, Kalapa ..	Lehfeldt's ..	Australorps
F. W. R. Longwill, Birkdale ..	Nuventure ..	Australorps, White Leghorns, and Light Sussex
J. McCulloch, Whites road, Manly	Hinde's Stud Poultry Farm	White and Brown Leghorns and Australorps
W. S. McDonald, Babinda ..	Redbird ..	Rhode Island Reds and Anconas
F. W. McNamara, Vogel road, Brassall, Ipswich	Franmara ..	White Leghorns and Australorps
A. Malvine, Junr., Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White and Black Leghorns
A. E. Mengel, 181 Campbell street West Toowoomba	Glenmore ..	White Leghorns, Black Leghorns, Brown Leghorns, Anconas, Australorps and Rhode Island Reds
C. Mengel, New Lindum road, Wynnum West	Mengel's ..	Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	White and Brown Leghorns and Australorps
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric	White Leghorns
J. W. Moule, Kureen	Kureen ..	Australorps and White Leghorns
D. J. Murphy, Marmor	Ferndale ..	White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex
S. V. Norup, Beaudesert Road, Coopers Plains	Norups	White Leghorns and Australorps
A. C. Pearce, Marlborough ..	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans
E. K. Pennefather, Douglas street, Oxley Central	Pennefather's ..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
G. R. Rawson, Upper Mount Gravatt	Rawson's ..	Australorps
J. Richards, P.O., Atherton ..	Mountain View	Leghorns and Australorps
W. G. Robertson, Bilsen road, Nundah	Ellerslie ..	Australorps, Light Sussex, and Plymouth Rocks
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa	Tingalpa Stud Poultry Farm	White Leghorns and Australorps
W. B. Slawson, Camp Mountain	Kupidabin ..	White Leghorns, Australorps, and Light Sussex
Mrs. A. Smith, Beerwah	Endcliffe ..	Australorps and White Leghorns
A. T. Smith, Waterworks road, Ashgrove	Smith's ..	Australorps and White Leghorns
T. Smith, Isis Junction	Fairview ..	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
A. G. Teitzel, West street, Aitkenvale, Townsville	Teitzel's ..	White Leghorns and Australorps
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's ..	White Leghorns, Australorps, and Rhode Island Reds

Name and Address.	Name of Hatchery.	Breeds Kept.
P. and K. Walsh, Pinklands, via Cleveland	Pinklands ..	White Leghorns
W. A. Watson, Box 365 P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's ..	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams
H. M. Witty, Boundary road, Kuraby	Witty's ..	White Leghorns and Anconas
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

POULTRY FARM ECONOMY.

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

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

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

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

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

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

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

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

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

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

MOULD IN EGGS.

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

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

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

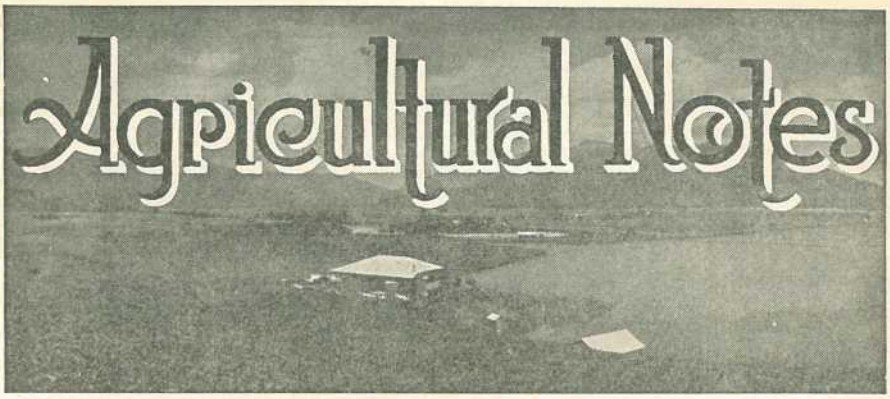
Two recent examples of how easily the quality of eggs may be depreciated are cited:—In one case it was found necessary, because of a muddy poultry run, to wash every egg. The washing was well done, stains were removed with an odourless sandsoap, and the eggs were clean when packed; but unfortunately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

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

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

CHANGES OF ADDRESS.

Subscribers are asked to kindly notify changes of address to this Department without delay.



Poisoning "Weed Trees" and Undergrowth.

THE advantages of arsenic pentoxide as a plant poison, as an alternative to sodium arsenite, which was formerly used, have received full recognition in recent years. With sodium arsenite, the preparation of the solution involved the mixing of either washing soda or caustic soda with the white arsenious oxide to convert it into an active plant poison agent. Arsenic pentoxide, on the other hand, is soluble in cold water, and no time or labour is wasted in its preparation. For the eradication of practically all species of undergrowth and green timber it is both cheap and effective.

As arsenic pentoxide has a corrosive action on iron and tin containers, either wooden, copper, or lead-coated vessels must be used. The day's mixture should be prepared overnight in order to allow it to dissolve fully. The liquid, which should be practically colourless, must be stirred before using. If it is to be used as a spray, half a pint of molasses should be added as a sticker, or spreader, per gallon of poison. The most effective mixture is 2 lb. of arsenic pentoxide per gallon of water. For spraying tender foliage or suckers, ½ lb. per gallon is sufficient.

Two operators are necessary in dealing with undergrowth, one using a brush hook and the other following closely with the swab or spray, according to the area to be treated. The cuts should be made as near to the ground level as possible. Small areas up to several acres can be most economically treated by swabbing. Large areas require a quicker method, and for this purpose a lead-coated knapsack spray pump is recommended. The spray pump requires to be equipped with a nozzle designed to throw a fine cone of spray, and the inclusion of an auto-pop shut-off valve permits the operator to control the flow of spray by thumb pressure.

Another method is to cut the undergrowth and, after allowing it time to dry, burn it. A new growth will soon appear, but before these shoots attain a length of twelve inches they should be sprayed with the weaker mixture. The shoots are easily killed, and enough poison is absorbed to kill the roots and stump.

Tall timber can be effectively poisoned by frilling—a process somewhat similar to ringbarking. The only difference is that the cuts are downwards deep into the wood, and the bark is not removed. The mixture (2 lb. per gallon) is poured into the open cut. Most trees are easily killed in this way, but care must be taken with gums and ti-tree to prevent suckering. Box is most difficult to kill, and calls for special attention.

To obtain the best results, and reduce suckering to a minimum, poisoning should be performed in the late autumn or early winter when the sap flow is less vigorous. As arsenic pentoxide is a very dangerous poison, great care must be exercised in handling it, and precautions must be taken to prevent stock having access to it.

Arsenic pentoxide may be obtained from the Prickly-pear and Noxious Weeds Section, Lands Department, Brisbane, at the concession rate of 5s. per 20-lb. tin, f.o.r.

PASTURE RENOVATION.

Milk is intended by nature as food for the calf until it reaches an age when it can forage for itself. As milk has been valued from time immemorial as food for man, a process of selection has been used whereby the yield from the dairy cow has been greatly increased so that the surplus is available for human consumption.

The mineral content of milk is remarkably regular, no matter from what type of cow it is obtained or what type of pasture is being grazed. If the pasture is lacking in any essential constituents, the cow will draw on her body reserves or her own frame even, in an attempt to produce a milk of even composition. When these body reserves are being utilised the animal produces less milk rather than milk of a lower food value.

As lime and phosphoric acid together constitute about 50 per cent., and potash a further 20 per cent., of the mineral matter in milk, it is not surprising that long-continued grazing gradually reduces the fertility and carrying capacity of the pastures. This is because the mineral and other constituents removed in the milk are never returned to the soil but are utilized by man or other animals in the form of milk, cream, separated milk, buttermilk, cheese, whey, and other products.

A cow yielding 200 lb. of fat in a year removes in the milk about 7 lb. each of lime and phosphoric acid. When animals are sold for any purpose they take away with them the plant foods which have been utilized in building their own frames. Other losses would probably bring the total losses to from 10 to 15 lb. of both lime and phosphoric acid per animal per year. About the same amount of potash would also be removed by each animal. Twenty such cows would therefore remove from 200 to 300 lb. of each of these essential plant foods every year. This is equivalent to between 10 and 15 cwt. of bone dust or superphosphate, and 5 to 7 cwt. of sulphate or muriate of potash.

As most Queensland soils, particularly in the coastal districts, are deficient in essential plant foods, it follows that unless these are added to the pastures in some way, the carrying capacity of the land and the milk yield of the cows will be seriously reduced. In the case of extreme mineral deficiency the animals will resort to bone chewing and other depraved habits, and dairying will become unprofitable.

Grazing lands, therefore, require fertilizing just as do cultivated lands, and regular top dressings of appropriate fertilizers should be made. In addition, the droppings of the animals should be regularly distributed over the pastures by means of harrows. When the animals are fed on mineral rich supplements the droppings will be relatively rich in minerals, and their extra fertilizing value is, of course, used to the best advantage when the dung is properly spread.

GOOD SEEDS ENSURE CROP QUALITY.

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

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

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

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

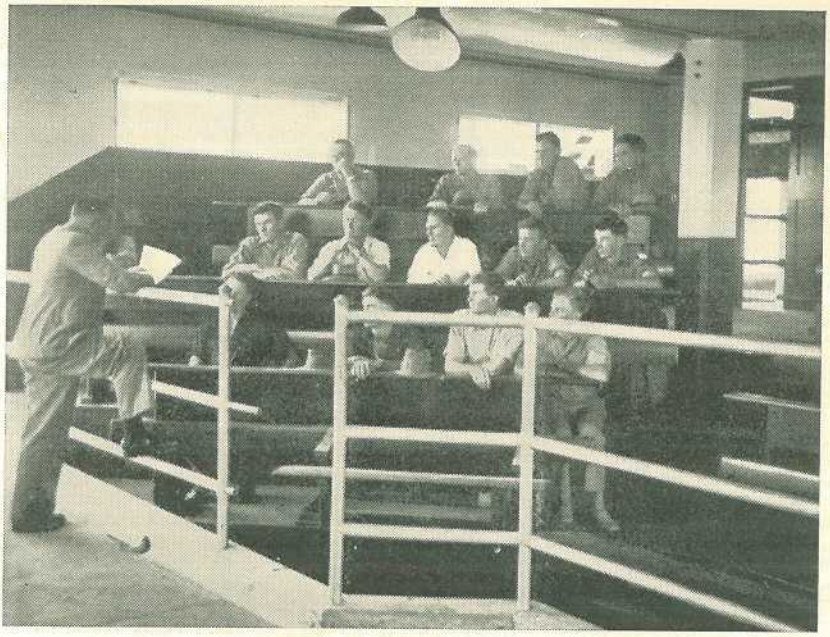


Plate 83.

ATTENTIVE LISTENERS AT THE 1941 SUGAR SCHOOL AT THE QUEENSLAND AGRICULTURAL COLLEGE.—The subject was rubber tyres for tractors.

Plate 84.

A TRACTOR GROUP AT THIS YEAR'S SUGAR SCHOOL AT GATTON.—The "taking down" and re-assembling of a power unit was a job well done.

THE CASE FOR CONCRETE.

Concrete is invaluable on the farm for making silos, troughs, fence posts, and for other jobs. First costs are the only costs and, as a rule, there are no maintenance charges required for the upkeep of a concrete structure. In fact, concrete improves with age, growing stronger over a long period of years; once having attained its maximum strength it maintains it indefinitely. It is very obvious that there will be a considerable saving in time and money where durability is a major factor in structures which are subjected to severe wear and tear.

As concrete, more than any other building material, may be moulded into any shape and adapted to almost any kind of construction, it is particularly suitable for an infinite variety of uses in and around the farm and station.

Provided the user of cement and concrete adheres closely to ordinary methods governing the mixing, placing, and maturing of good concrete, no special knowledge is required.

A study of the losses occurring in the agricultural and pastoral industries of this and other countries as a result of fire emphasises the need for fireproof construction in farm and station buildings.

Where fences and buildings have been constructed of materials which will not burn or assist the flames to spread, fire risks are reduced to a minimum. Concrete is essentially a fireproof material and, where possible, should be used in the construction of buildings in which incubators requiring heating apparatus will be housed or in which inflammable products will be stored. In addition, this material builds up property values because of the improved appearance and increased usefulness of the farm structures.

With the increased demand for ordinary fencing posts brought about through the subdivision of large holdings for closer settlement, there is frequently insufficient timber to meet necessary replacements. Concrete is an excellent substitute and will certainly be used more extensively for this purpose in the future. Concrete posts are maintenance-free. They do not rot or burn and are not injured by insects or fungous growth. Good fencing is essential. Constant attention, time, and money are required to keep wooden fence posts in serviceable condition, and this expenditure may be largely avoided by using concrete fencing posts.

Detailed instructions for making silos, troughs, tanks, wells, roofing tiles, fence posts, &c., can be obtained from cement manufacturers.

SEEDS OF NATIVE GRASSES.

Within recent years intenser interest has been shown, both by pastoralists and by dairymen, in the sowing-down of pastures of drought-resistant native grasses. Many graziers who have sought information about the availability of native grass seeds desire seed for the artificial reseeding of natural pastures which have been thinned out by drought. Numerous other sheep and cattle raisers are eager to sow-down on their own properties drought-resistant native grasses from other parts of the State. Many dairy farmers also desire to test out the best of the native pasture grasses under local conditions.

Grasses most in demand by pastoralists are the Mitchell grasses. There are four distinct types of Mitchell grasses—Curly Mitchell, Hoop Mitchell, Barley Mitchell, and Blue Mitchell—and of these, perhaps, the best one for general purposes is the Curly Mitchell.

Seed of Curly Mitchell is now being collected in large quantities for commercial purposes. If sown broadcast about 4 lb. an acre should suffice to give a good stand; and this quantity may be reduced by half if the seed is sown in drills with a combine.

In some circumstances, one or more of the other three types of Mitchell grasses are to be preferred to the Curly Mitchell, but, so far as can be ascertained, no seeds of these types are yet available.

While the purchaser of Mitchell grass seed has at present little choice in the matter of the origin of the seed (practically all of the seed being harvested in northern New South Wales), he should bear in mind that seed collected in his own district, or in a district with similar climatic conditions, is likely to be better for local sowing than seed from other sources.

Seed of Australian blue grass has been on the market for many years. This, also, is harvested in New South Wales, and, consequently, may not be as valuable as locally-collected seed for sowing in Queensland.

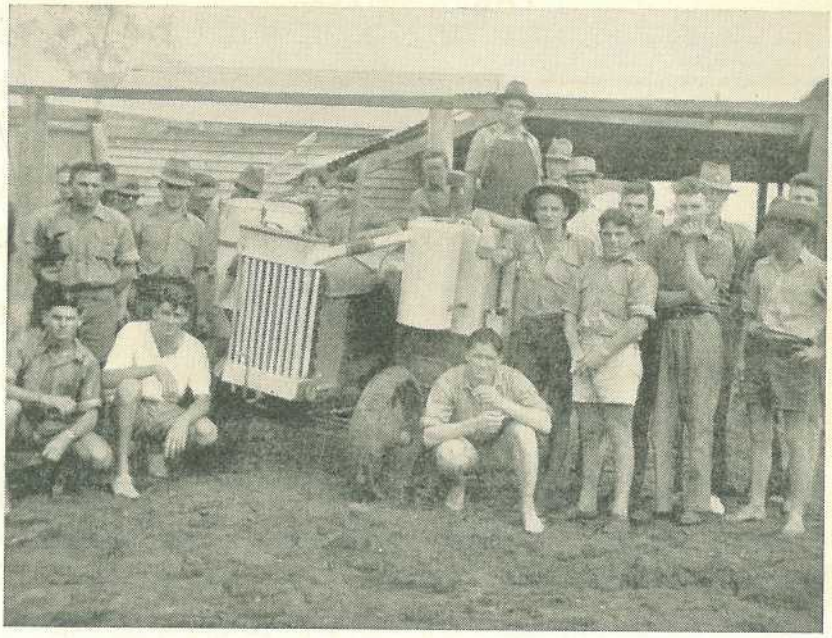


Plate 85.
"GAS FROM GUM TREES"—A college tractor fitted with a gas producer by the tractor group at this year's Sugar School at Gatton.

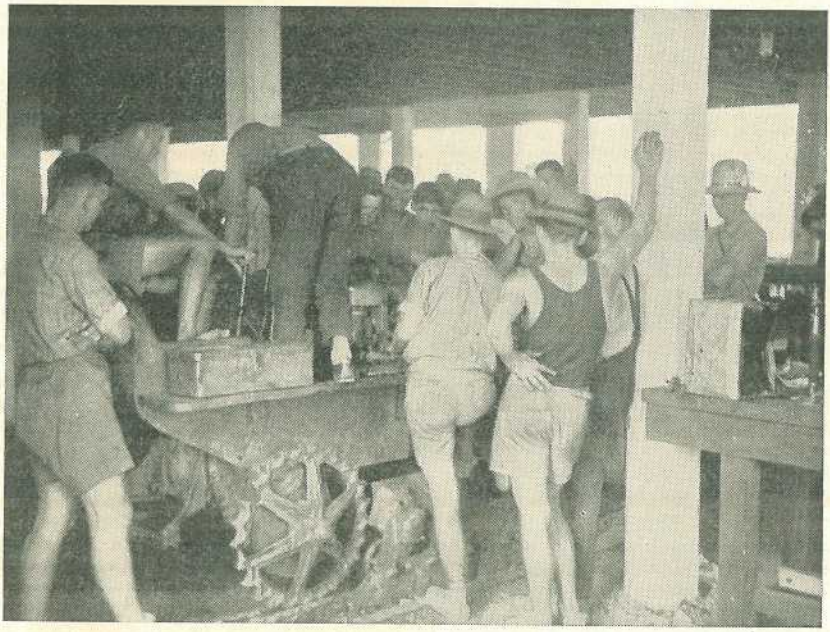


Plate 86.
THE SAME GROUP AT WORK ON A DIESEL TRACTOR.

FARM GATES.

On practically every holding there is a lot of work to be done during slack periods, such as fencing repairs, the making and hanging of gates, the painting of buildings, and the overhauling of machinery, implements, and harness. Some of these jobs can be done during dry weather, and others are better reserved for rainy periods.

It is advisable to give attention to the outside jobs first and, of these, the erection and repair of gates is important. It is indeed, surprising to find so many make-shift gates on the farm when strong, light gates can be made or purchased at very reasonable prices.

Of the different types on the market the wooden gates are the best, as those having a steel pipe frame, if once bent out of shape, are difficult to straighten, whereas a broken rail or two can readily be replaced. The self-opening types are favoured by some farmers, but these are more expensive and more liable to get out of order than the simpler kind.

Gates should always be swung independent of the fence on good heavy posts placed 4 feet in the ground with a sill log in between. The hinges, which should be strong, are generally placed in a vertical line. Occasionally, it is desirable that the foot of a gate should lift when opened, and this can be arranged by placing the lower hinge half an inch off the plumb in the opening direction.

The following materials are required to make a double, five-barred bolted gate for a 12-foot opening without any morticing:—

112 running feet of 3-inch by 1-inch or 4-inch by 1-inch timber;

3 lb. of 3½-inch by ⅝-inch bolts and washers;

2 pairs hook and eye hinges 2 feet by 2 inch by 5/16 inch.

Butts and heads should be cut 4 feet long and should be double—that is, placed on each side of the bars. The bottom of the first rail should be 3 inches from the bottom of the upright. The distance between the first and second rails should be 6 inches; between second and third, 6 inches; between third and fourth, 7 inches; and between fourth and fifth, 8 inches. There should be two double stays on either side of rails on each gate running from the bottom of the butt to the top of the head.

When hinges are being placed in position, small pieces of 3-inch by 1-inch timber should be inserted against the rails for packing purposes. A sliding piece of 3-inch by 1-inch timber along the third rail between the stay and the head makes an excellent fastener.

Gates are not completed until they have been painted, and, if the first two coats are given before the gates are put together, a considerable amount of time will be saved.

SUDAN GRASS IN THE SOUTH-WEST.

Sudan grass is outstanding as a hay and grazing crop for the drier farming areas, as is indicated by its popularity on the Darling Downs and in the Maranoa district. Lack of harvesting machinery and implements, such as the reaper and binder, or mower and rake, on many stock farms is often the retarding factor so far as the conservation of hay is concerned.

With the more extensive use of blue panic and Rhodes grass, the conservation of Sudan grass as hay and silage, and the more widespread utilisation of winter fodders, such as wheat and barley, it should be possible to carry on dairying in the drier country away from the coast right through the winter, even in the Maranoa. At present, many dairy farmers in those regions dry the cows off during the autumn and may not milk again until the spring.

In recommending Sudan grass as a grazing crop the risk of fatalities as a result of hydrocyanic acid-poisoning must be kept in mind. By taking reasonable precautions in feeding, many farmers have utilised Sudan grass in all stages of growth as a grazing crop without ill-effects. An effort should be made to procure pure seed, free from admixture with sorghum or Johnson grass hybrids. Full information regarding the cultivation of Sudan grass can be obtained from the Department of Agriculture and Stock, Brisbane.

Avocado Culture.

THE avocado seems to be adapted to a variety of soils, the chief requisite being perfect draining—stagnant water at the roots is fatal. The heavier soils seem to be more favourable to the growth of the tree than light sandy loams, but where possible moist medium loams should be selected for the crop.

The climatic conditions of the north and south coastal foot-hill districts of Southern Queensland are generally considered saisfactory for avocado culture. Up to the present, it has not been the general custom to irrigate avocado trees. However, a wet spring is usually followed by a good crop and a dry spring by a poor crop. During the present season only those orchards in which watering was practised have yielded good crops. The question of supplying water to the trees during dry springs should therefore receive consideration.

Avocado trees will only thrive in frost-free, well sheltered, warm situations. In districts where the prevailing winds are such as to interfere with the normal growth, belts of standing scrub should be retained as a protection to the orchard. As an alternative, artificial wind-breaks may be required. The site should be an area of unbroken land, nearly level or with a gentle slope. Steep hillsides should be avoided on account of the danger of sustaining irreparable losses by soil erosion.

The preparation of the land should be thorough. All stumps and roots should be removed to a depth sufficient to ensure that they do not impede cultivation. The land should then be skim-ploughed and then cross ploughed and harrowed. Rubbish and roots can thus be collected and burnt. When the weeds are eliminated, the land should be cultivated as deeply as possible, and the soil worked down to a fine tilth. Where practicable sub-soiling is desirable as it facilitates root development.

In Queensland, it is usual to plant on the square system, though on hillsides a form of contour planting is preferable. The trees are spaced 25 feet apart, which permits of 70 being planted to the acre. The young trees should be planted so that the point of union between the bud and the seedling stock is slightly above the soil level.

A liberal watering is necessary after planting. The ground around the young trees should be kept liberally mulched with any coarse material which is not liable to pack and form a layer impervious to air and water. Spring planting is customary, though trees planted towards the end of the wet season (February to March) after the hottest period of the year, have done equally well.

Numerous varieties have been introduced into Queensland, but many have been discarded for various reasons. Trial plots have recently been planted, and those varieties which promise to be suitable are being worked up and kept under observation. Although at present no definite recommendations can be made, intending planters should confine their selection to varieties such as Blakeman, Grande, Goodwood, Queen, Spinke, and Wilsonia, which, from the data at present available, appear suitable for coastal foothill plantings in Southern Queensland.

THE QUEENSLAND NUT.

Where it is proposed to plant an area of the Queensland Nut on open or forest ground, the land should be prepared in plenty of time. Thorough deep ploughing of the area will be necessary to give the young trees a sufficient depth of a free soil in which to make a good root system. Subsoiling, if practicable, is also desirable.

When planting the young trees, a good hole, at least two feet across and eighteen inches in depth, should be dug so that the tap root—which is comparatively long—can be properly set vertically into the ground, and the secondary roots distributed evenly around the plant.

In digging the trees from a seed bed, care must be taken to remove them as carefully as possible, and to get a good length of the tap root with the plant. If the tap root is injured during digging, care should be taken to cleanly prune off the injured portion above the point of mutilation. If the tap root is too long, it can be pruned back.

It is advisable to soak the bed thoroughly the day before lifting the young trees, as this will make it easier to extract them from the ground without breaking the roots. Loosening the soil, by making a trench alongside the rows, will simplify digging.

The trees should be planted in the ground at the same level as they were in the nursery bed, or perhaps a little deeper. Excessively deep planting should, however, be avoided.

The young trees should be well watered at the time of planting, and also subsequently, should the weather be dry.

On open land, shade should be provided by driving sufficient stakes into the ground around them to support a good hessian or bag cover.

Very often the main stem of the tree is allowed to grow too high before the top is pruned off. This will result in an ungainly, lanky tree. With the Queensland Nut, as with fruit trees, pruning should aim at producing a sturdy-set tree, well-balanced and fairly open.

The young trees should not be allowed to grow beyond two feet in height on a single stem before the top is pruned off. Three side-shoots nicely placed are later trained to make the framework of the tree.

Many young trees do not come away well on a single stem, this failure being due to a variety of causes, and a cluster of base shoots may arise as a consequence. It will then become necessary to select the strongest and best-situated shoot to form the tree, the others being cleanly cut away.

No matter whether the trees be planted amongst bananas, pineapples, or other fruits, or in the open, a good stake should be driven alongside each tree, both to protect and support it. Many young trees are destroyed or permanently misshapen by injuries caused during cultural operations, and some protection is clearly necessary.

Where young trees have grown very densely through too many low shoots having been permitted to grow, a certain amount of thinning out of surplus main branches, or of the secondary growths, will be necessary to open up the trees to light and air.

SELECTION OF BANANA SUCKERS.

In planting a new area of bananas it is advisable to make a good selection of suckers. In every banana plantation there are stools which are above the average, and it is from these that growers should select material for future plantings. Some stools are outstanding in growth and quality production. For example, they may have remained free, or nearly so, from borer attack, or they may have benefited from better soil, greater amount of moisture and other conditions in their immediate vicinity.

It is advisable for growers to mark these outstanding stools for use at planting time, noting the quality of the fruit which has been recently cut from them or which they are still bearing. This can be done by placing a stake against the selected stools or some other suitable means of easy identification at the time when planting material is required.

If by selection it is possible to produce a more open bunch of the Cavendish variety, it will be of benefit in so far that the harbourage for skin blemishing insects is lessened, that the bracts are permitted to fall more freely from the bunch, and that individual fingers fruits are more exposed to sunlight—thus ensuring uniform development of the bunch.

PACKING SHEDS AND EQUIPMENT.

Some fruitgrowers carry on, season after season, with makeshift equipment, when, for a little time and a small expenditure of money, a properly-equipped packing shed could be provided.

Packing stands, nailing-down presses and benches, sizing-machines, hammers, stencils, &c., should all be gone over and restored to a high state of efficiency. Simple designs for packing stands, nailing-down presses, and case-making benches can be procured, and are not hard to follow by anyone who is useful with a hammer and saw. Simple forms of sizing machines can also be made at home, while those growers who have commercial machines should overhaul them thoroughly, tightening up all screws, bearings, &c., and, if necessary, renewing the padding in the bins and feed channels. Broken parts should be replaced and power plants overhauled. Broken handles in working tools should be renewed. Case-end scrapers, packing needles, &c., should be sharpened and greased and packed away until required next season.

Complete sets of new stencils can be cut. A sheet of thin zinc, a small chisel, round and flat fine-grain files, a hammer, and a piece of end-grain hardwood are the necessary tools. The designs of the letters to be cut can easily be made by obtaining stencils, and copying them on to the zinc in the design wanted. The stencilled letters are then cut out of the sheet of zinc with hammer and chisel, and, in that way, an excellent stencil is made. Stencils are easily obtained, and there is no need to use blue crayon for marking cases.

When the overhauling of plant has been completed, growers should turn their attention to the cleanliness of the packing shed. Old cases and picking-boxes should be repaired or burned, a close inspection of the cracks and crevices being made for pupating insects, such as codling moths. Any shed-stored fruit, which has rotted in the cases, should be removed and destroyed and the cases thoroughly sterilized by completely immersing them in a 5 per cent. solution of formalin for at least one minute. Floors and other parts of the building affected by juice from rotted fruit should also be treated.

Close attention to these details will enable growers to make a clear start at the following harvesting period.

WINTER WORK IN THE ORCHARD.

Now that the weather is becoming cooler, it would be well to give some thought to a work programme for the winter. Among the jobs suggested are:—

Clean up all orchards and vineyards, destroy all weeds and rubbish around the trees likely to harbour pests of any kind, and keep the surface of the soil well stirred, so as to give the birds and predaceous insects every chance to destroy any fruit-fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Pruning can be started on fruit trees which have shed their leaves towards the end of the month, as it is a good plan to get this through as early in the season as possible instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines. (The later vines are pruned in the season the better in the Granite Belt district, as the late-pruned vines stand a better chance of escaping injury by late spring frosts.) All worthless, badly-diseased, or wornout trees that are no longer profitable, and which are not worth working over, should be taken out and burnt, as they are both valueless and a harbour for pests.

Land intended for new orchards should be got ready. The preparation of the land should be thorough. All stumps and roots should be removed to a depth sufficient to ensure their not impeding cultivation by coming in contact with implements. The preliminary cultivation should consist of a light ploughing to a depth sufficient to turn the weeds or grasses so that their roots are exposed, followed by cross ploughing and harrowing, whereby light roots, &c., are collected and removed. When perennial weeds, of which couch grass is a fair sample, are eliminated, the land should be ploughed and cross ploughed as deeply as possible, and the soil reduced to a fine tilth. Where subsoiling can be practised it is a decided advantage in admitting root penetration and conservation of moisture.

LADY FINGER BANANAS.

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

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

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

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

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

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

Cultivation should be shallow to avoid destroying the root system.

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

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

THE VALUE OF HUMUS IN THE CITRUS ORCHARD.

Humus is an organic compound formed by the decay of vegetable matter in the soil, and is of great value in the citrus orchard.

Comparatively small amounts of humus are present in hot, dry localities on account of the higher temperatures. In such areas, the humus is burnt out of the soil rapidly and does not accumulate to the same extent as it does in a moist or cool climate. Humus possesses the power of retaining moisture in the soil, whilst other advantages are that it makes heavy soils more porous, and sandy soils more cohesive.

It is possible to maintain a high humus content in the soil by annually working in vegetable matter—such as stable manure, green cover crops, leaves, and weeds—for these, if used, supply decaying vegetable matter to the soil.

When the humus content is low, sandy soils lose water quickly, and heavy soils become hard and baked after heavy rains. Under such conditions, trees make poor growth, and the tops of the trees become thin. Small fruit may be formed, and it is subject to sunburn and splitting.

It is, unfortunately, difficult to obtain anything like adequate supplies of stable manure or similar material of a humus-forming nature, and, in order to make up the deficiency, the growing of green manure crops between the trees at times to correspond with the rainy season is recommended. Growing cover crops during dry periods is not desirable, because trees must not be deprived of the available soil moisture at such times. Under average conditions, green crops should be planted in citrus orchards about February and may be turned under about June.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

SUMMER fruits are now off the market, and citrus fruits of excellent quality are now in full supply. To maintain prices, growers are advised to keep up the quality and maturity of their consignments now coming forward. Once again the folly of sending immature fruit to southern markets is stressed. Only good quality fruit, for which prices satisfactory to the producer will be willingly paid, should be sent south, therefore strict observance of maturity standards is strongly advised. Cold weather in the southern cities will obviously not help in the ripening of tropical fruit, consequently it is necessary that custard apples, pineapples, papaws, avocadoes, and other fruits shall have attained the right stage of ripeness before despatch.

Prices during the last week of April were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Smalls, 6s. to 11s.; Sixes, 8s. to 13s.; Sevens, 8s. to 15s.; Eights, 8s. to 15s. 6d.; Nines, 8s. to 14s. 6d.; Bunches, 1d. to 6½d. dozen.

Sydney.—Cavendish: Sixes, 10s. to 15s.; Sevens, 15s. to 18s.; Eights and Nines, 18s. to 21s.

Melbourne.—Cavendish: Sixes, 12s. to 15s.; Sevens, 14s. to 17s.; Eights and Nines, 16s. to 20s.

Brisbane.—Lady Fingers: 1d. to 7½d. dozen.

Brisbane.—Sugars: 2½d. to 4d. dozen.

Pineapples.

Brisbane.—Smoothleaf, 3s. to 7s. case; Loose, 1s. 6d. to 5s. dozen; Roughs, 3s. to 8s. case; 1s. 6d. to 6s. dozen.

Sydney.—Smoothleaf, 7s. to 12s. case.

Melbourne.—Smoothleaf, 6s. to 11s. Water Blister prevalent.

Papaws.

Brisbane.—Yarwun, 8s. to 11s. tropical case. Gunalda, 7s. to 8s. bushel. Locals, 5s. to 7s. bushel.

Sydney.—10s. to 16s. tropical case.

Melbourne.—16s. to 20s. tropical case.

Custard Apples.

Brisbane.—3s. to 4s. 6d. half bushel.

Sydney.—3s. to 6s. half bushel.

Melbourne.—6s. to 8s. half bushel.

Rosellas.

Brisbane.—1s. 6d. to 2s. 6d. bag.

Avocadoes.

Brisbane.—6s. to 8s. Specials higher

Sydney.—4s. to 12s. half bushel.

CITRUS FRUITS.

Oranges.

Brisbane.—Navels, 7s. to 11s. bushel; Commons, 6s to 9s. bushel.

Grapefruit.

Brisbane.—5s. to 9s. bushel.

Sydney.—Gayndah, 8s. to 14s.; Others, 4s. to 8s.

Melbourne.—14s. to 18s.

Mandarins.

Brisbane.—Fewtrills, 8s. to 10s.; Emperors, 9s. to 12s. Only the choicest of fruit will sell readily on southern markets.

Lemons.

Brisbane.—7s. to 15s. bushel.

Sydney.—Gayndah, 9s. to 15s. bushel.

Melbourne.—10s. to 15s. bushel.

Passion Fruit.

Brisbane.—Firsts, 10s. to 14s. half bushel. Seconds, 6s. to 9s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Stanthorpe Granny Smith, 6s. to 7s. Others, 5s. 6d. to 8s. 6d.

Pears.

Brisbane.—Southern, 5s. to 11s. bushel.

Grapes.

Brisbane.—Stanthorpe Comiton, 9s. to 11s. Walthams, 6s. to 10s. half bushel. Others, 3s. to 6s. half bushel.

Tomatoes.

Brisbane.—Ripe, 2s. to 3s. 6d. Coloured, 2s. 6d. to 5s. Stanthorpe, green, 1s. 6d. to 2s. 6d. Local, green, 2s. to 4s.

Sydney.—4s. to 8s. half bushel.

VEGETABLES.

Beans.—Brisbane: Stanthorpe, 3s. to 5s.

Peas.—Brisbane: Stanthorpe, 6s. to 8s. bag.

Cabbages.—Brisbane: Stanthorpe, 4s. to 7s. Locals, 1s. to 5s. dozen.

Cauliflowers.—Brisbane: Stanthorpe, 10s. to 14s. chaff bag.

Carrots.—Brisbane, 4s. to 1s. 3d. bundle.

Lettuce.—Brisbane, 6d. to 2s. dozen.

Beetroot.—Brisbane, 4d. to 1s. dozen.

Marrows.—Brisbane, 1s. to 3s. dozen.

Pumpkins.—Brisbane, 3s. to 4s. bag.

Rhubarb.—Brisbane, 9d. to 2s. bundle.

Cucumbers.—Brisbane, 6d. to 1s. dozen; 3s. to 5s. bushel.

Chokos.—Brisbane, 2d. to 4d. dozen.

Plate 87.

WESTERN-BRED MERINO WETHERS ON BRIGALOW COUNTRY IN THE TARA DISTRICT, S.Q.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Ayrshire Cattle Society, production charts for which were compiled during the month of March, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
Mature Cow (Standard, 350 lb.).				
Alfa Vale Model 2nd	W. H. Thompson, Alfa Vale, Nanango	16,792·2	813·860	Reward of Fairfield
Alfa Vale Doris	W. H. Thompson, Alfa Vale, Nanango	15,828·05	701·120	Reward of Fairfield
Faversham Pixie	R. J. Couchman, Warra	11,526·25	463·63	Greyleigh Songster
Fairlie Princess 19th	C. B. Mitchell, Fairlie, Rosenthal	8,209·69	409·491	Fairlie Minor
Trevor Hill Twinkle	Geo. Gwynne, Umbiram	11,027·44	402·378	North Glen Emblem
Pilton View Duchess	P. D. Fiechtner, Pilton View, via Greenmount	9.774·00	390·602	Navillus Venie's Sheik
Merravale Sweetheart	W. Soley, Malanda	11,533·8	373·39	Greyleigh Honorarium
Senior, 4 Years (Standard, 330 lb.).				
Fairlie Chrissie 12th	C. B. Mitchell, Fairlie, Rosenthal	11,000·49	459·395	Rosenthal Peggy's Admiration
Evansvale Beattie 4th	J. F. Evans, Malanda	8,918·85	354·185	Malanda of Glenore
Springlands Lady Primrose (215 days)	V. A. Wyvill, Yarralea, Upper Yarraman	8,479·75	342·545	Osiris of Greyleigh
Alfa Vale Lovely 10th	J. E. Heath, Springlea, Merlwood, Murgon	9,352·15	332·553	Reward of Fairfield
Junior, 4 Years (Standard, 310 lb.).				
Cedargrove Ivy 22nd	E. Giles, Nerang	9,741·3	374·890	Cedargrove Winlad
Senior, 3 Years (Standard, 290 lb.).				
Alfa Vale Gem 10th	W. H. Thompson, Alfa Vale, Nanango	14,688·95	524·193	Reward of Fairfield
Senior, 2 Years (Standard, 250 lb.).				
Alfa Vale Pansy	W. H. Thompson, Alfa Vale, Nanango	12,965·95	568·628	Reward of Fairfield
Balcarres Primrose 9th	E. E. Reeve, Balgowan, Muldu	8,348·35	372·341	Mordern Signal

	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Blacklands Gentle Lady	W. J. Freeman, Rosewood	7,871·4	345·949	Blacklands Security
Pilton View Dinah	P. D. Fiechtner, Pilton View, via Greenmount..	9,475·5	345·554	Navillus Venie's Sheik
Navillus Daphney 2nd	Con. O'Sullivan, Navillus, Ascot, Cambooya ..	7,322·00	295·512	Navillus Vice Regal
Happy Valley Marie	Reg. R. Radel, Happy Valley, Coalstoun Lakes	6,630·55	294·597	Sunny View Artist
Oak Vale Cinderella	Con. O'Sullivan, Navillus, Ascot, via Cambooya	15,188·5	282·765	Raleigh of Chatham
Yarralea Jewel	V. H. Wyvill, Yarralea, Upper Yarraman ..	6,444·00	272·198	Trevlac Alert
	JERSEY.			
	MATURE COW (STANDARD, 350 LB.).			
Oxford Vita	W. A. Berderow, Fairney View	7,486·00	371·312	Oxford Rivoli
	SENIOR, 4 YEARS (STANDARD, 330 LB.).			
Trecarne Rosella 8th	T. Petherick, Trecarne, Lockyer	6,732·1	396·056	Trinity Some Officer
Mornmoot Starbright 3rd	Farm Home for Boys, Westbrook	8,057·55	377·879	Werribee Warrior
	SENIOR, 3 YEARS (STANDARD, 290 LB.).			
Glenmore Diana	S. H. Caldwell, Walkers Creek, Bell	9,118·81	517·846	Wheatlands Jester
Kathleigh Sylvia	G. C. Schroder, Warra	7,807·53	462·109	Kathleigh Royal Flyer
Trecarne Chimes 3rd	T. A. Petherick, Trecarne, Lockyer	7,500·5	392·578	Trinity Some Officer
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Rosalie Dream Girl	G. V. Tilley, Beaudesert	6,133·3	338·111	Oxford Rivoli
	JUNIOR, 2 YEARS (STANDARD, 230 LB.).			
Strathdean Floss	S. H. Caldwell, Walkers Creek, Bell	5,292·82	290·972	Langside Noble Dreamer
Bellgarth Lorraine	D. R. Hutton, Bellgarth, Cunningham	4,987·98	286·042	Trecarne Renown II.
Lermont Clara Bell	J. Schull, Lermont, Oakey	4,419·85	242·160	Woodside Golden Volunteer
Rosemount Marie	W. A. Berderow, Fairney View	4,775·25	231·807	Oxford Royal Remus
	AYRSHIRE.			
	SENIOR, 2 YEARS (STANDARD, 250 LB.).			
Benbecula Coral	M. J. Brownlie, Fairhill, Oakey	6,181·9	307·562	Benbecula Brian 2nd

In Memoriam.

ERNEST GEORGE EDWARD SCRIVEN

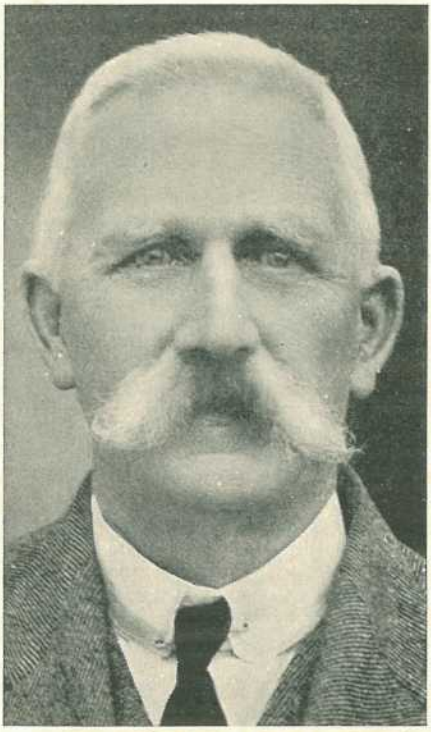


Plate 88.

Mr. E. G. E. Scriven, formerly Under Secretary of the Department of Agriculture and Stock, died in Brisbane on 14th April at the age of 84 years. The last of the old school of Under Secretaries, Mr. Scriven retired from the Department of which he had been the permanent head for twenty years in December, 1924. He was one of the most capable and beloved men in the Public Service of the State and throughout his long official career, maintained the highest traditions of public administration.

Until 1888 agricultural affairs in Queensland were administered by a sub-department of the Department of Public Lands with a staff of two, Peter McLean and Ernest Scriven. When the Department of Agriculture was separated from the Lands Department in that year, Mr. McLean was appointed Under Secretary with Mr. Scriven as his chief clerk. On Mr. McLean's appointment as Director of Agriculture in 1904, he was succeeded by the late Mr. P. J. McDermott, and when Mr. McDermott became Principal Under Secretary, Mr. Scriven succeeded him as Under Secretary and remained in that position until his retirement.

The late Mr. Scriven was born in Stratford-on-Avon, Warwickshire, England, in 1856. As a boy of fifteen he was at school in Paris in the days of the Commune in 1871, and was among those who had to take refuge in the British Embassy. Coming to Queensland as a young man in the early 'eighties, he gained "colonial experience" as a jackaroo on Eton Vale Station, near Cambooya, then owned by the late Sir Arthur Hodgson. He afterwards gained further land experience in North Queensland which was followed by a term of service with a trigonometrical survey party, in the course of which he travelled throughout the State. Returning to Brisbane, he joined the agricultural administration and became a co-founder of the Department of which he was eventually to become the chief. Ability, foresight, earnestness, energy, enterprise, and strict integrity—in which were united a charming courtesy and kindly regard for others in all his personal contacts—characterised his administration during nearly 40 years of remarkable agricultural progress and land settlement in Queensland. Mr. Scriven served under no fewer than seventeen Ministers of Agriculture and his name will ever be associated with the history of primary industrial progress in this State. During his time in the Service, every man on the land knew Mr. Scriven personally, by repute, or by correspondence, and he was a friend to them all. He is survived by two sons and two daughters to whom sympathy is extended in their bereavement.

General Notes

Staff Changes and Appointments.

Dr. Montgomery White, M.Sc. (Qld.), D. Med Sc. Biochem. (Lond.), who has been carrying out the duties of Biochemist, Department of Agriculture and Stock, has been appointed Agricultural Chemist in the Department.

Mr. S. A. Green, Inspector, *Diseases in Plants Acts*, has been transferred from Wallangarra to Warwick, and Mr. C. Schindler, Inspector, *Diseases in Plants Acts*, now stationed at Warwick, will be transferred to Wallangarra.

Mr. G. Minchin Smith, of Amalgamated Sugar Mills Ltd., Pleystowe, has been appointed millowners' representative on the Pleystowe Local Sugar Cane Prices Board in succession to Mr. W. F. Clarke.

Mr. T. W. Kite, relieving Clerk of Petty Sessions at Proserpine, has been appointed chairman of the Proserpine Local Sugar Cane Prices Board for the period Mr. H. A. Galloway, Clerk of Petty Sessions, is absent on recreation leave.

Mr. Wm. Bell, Department of Public Lands, has been appointed deputy member of the Rural Development Board during the absence on recreation leave of Mr. J. L. Callaghan, member and deputy chairman of the Board.

Mr. H. E. Perry, Miskin street, Toowong, has been appointed an honorary ranger under *The Native Plants Protection Act* and an honorary protector of fauna.

Mr. L. F. Mandelson, B.Sc., Research Officer, Agricultural Section, Division of Plant Industry (Research), Department of Agriculture and Stock, has been transferred from Inglewood to Brisbane.

Mr. C. Schindler, inspector under *The Diseases in Plants Acts*, Wallangarra, has been appointed also an inspector under *The Diseases in Stock Acts*.

Mr. J. A. Franzman, Acting Clerk of Petty Sessions, Mossman, has been appointed chairman of the Mossman Local Sugar Cane Prices Board, vice Mr. J. Gaffney, on leave.

Messrs. F. C. West (Rockhampton) and H. H. H. Hodges (Manly) have been appointed inspectors under *The Diseases in Stock Acts*, *The Slaughtering Act*, and *The Dairy Produce Acts*, Department of Agriculture and Stock.

The following transfers of inspectors under *The Diseases in Stock Acts*, *The Slaughtering Act*, and *The Dairy Produce Acts*, have been approved:—

Mr. C. Caswell, from Oxley Bacon Factory to Doboy Bacon Factory;

Mr. J. A. L. Rheuben, from Doboy Bacon Factory to Oxley Bacon Factory;

Mr. A. H. Strohfeldt, from Doboy Bacon Factory to Jandowae;

Mr. V. J. Brimblecombe, from Monto to Toowoomba; and

Mr. D. S. Robertson, from Murarrie to Monto.

Northern Pig Board Levy.

The Northern Pig Board's administrative levy regulations, which have been in force since May, 1937, have been further extended until 31st December, 1943, and shall apply to all growers delivering pigs to the Northern Pig Board. The levy is at the rate of sixpence per pig delivered to the board.

"THE DAIRY PRODUCE ACTS, 1920 TO 1939."

An examination will be held for Certificates of Proficiency in the subjects of Milk and Cream Testing and Milk and Cream Grading on Saturday, 19th July, 1941, and in the subjects of Butter Making and Cheese Making on Saturday, 26th July, 1941, in centres that will, as far as possible, be arranged to suit candidates, who should notify the undersigned not later than the 20th June.

Entrance fee 5/- for each subject should accompany the application.

Candidates must be not less than eighteen years of age on the day of the examination.

R. P. M. SHORT, Under Secretary,
Department of Agriculture and Stock,
Brisbane.

Open Season for Duck and Quail.

An Order in Council issued under "*The Fauna Protection Act of* 1937," provides for an open season for duck and quail in Queensland.

The effect of this Order in Council is to fix the open season for duck and quail in Southern Queensland from 1st May, 1941, to the 30th September, 1941, both inclusive, and in Central and Northern Queensland from 1st July, 1941, to the 30th November, 1941, both inclusive.

The attention of shooters is drawn to an Order in Council which prescribes that twenty (20) duck and twenty-five (25) quail are the maximum numbers, respectively, which any one person may take during a period of twenty-four hours.

Size Standard for Grape Fruit.

An amendment of *The Fruit and Vegetable Grading and Packing Regulations*, which are enforced under "*The Fruit and Vegetable Acts*, 1927 to 1939," provides for an alteration of the minimum size standard for grape fruit from 3½ inches to 3 inches.

In Memoriam.

FREDERICK RICHARD DUNN

Plate 89.

The passing of Mr. F. R. Dunn, Metropolitan District Inspector of Stock, on 8th April, after a brief illness, is recorded with deep regret.

Born at Ipswich, Queensland, in May, 1892, the late Mr. Dunn received his early education in that city. In 1906 he gained first place in a bursary awarded by the Department of Public Instruction and tenable at the Queensland Agricultural College. On graduation from the College he engaged in farming in the South Burnett District, and afterwards obtained a high pass in an examination for appointment as a stock inspector. On the outbreak of the first world war he enlisted for active service abroad and was drafted to the 7th Army Veterinary Corps and served with the A.I.F. Mounted Division in Egypt and Palestine until the Armistice. One of his brothers, who also was in the A.I.F., was killed in action at Gallipoli.

On his return from the war, Mr. Dunn was appointed Stock Inspector at Muttaburra and as District Inspector of Stock was stationed subsequently at Cooyar, Pittsworth, Barcaldine, Winton, and Cloncurry. Imbued with a fine sense of citizenship, he became identified with the progressive movements and social services of every community in which, for varying periods, his lot was cast. In returned soldiers' organisations, he was an acknowledged leader. In expressing his keen regret at the untimely loss of such an excellent officer, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, said: "The death of Mr. Dunn has removed from the service of the Department one of our most brilliant and conscientious officers. Mr. Dunn, who had served in various parts of the State, was one of our most experienced officers. His passing is a great blow to the branch to which he was attached. I extend my sincere condolence to his wife and family."

Animated by the real A.I.F. Digger spirit, especially during his last illness, which probably had its origin in the rigours of desert campaigning, and possessing a cheerful, tolerant disposition and other fine qualities of heart and mind, Fred Dunn is greatly missed by his colleagues and a wide circle of friends, especially in the country districts in which he was so well known and esteemed.

For his sorrowing widow and young family of three sons and a daughter, and also for his father, deep sympathy is felt.

Answers to Correspondents

BOTANY.

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

Carob Bean.

W.S.F.R. (Mondure)—

The Carob Bean does well in the cooler parts of the State, and should grow well at Mondure. Seeds are best sown about April. They germinate readily enough, but if you have any difficulty with them try pouring hot water over the seeds, allowing the water to cool and the seeds to remain in soak for about twelve hours.

The trees bear in about seven years, sometimes earlier, before a fair-sized crop is available. The nutritive value of the pods is very high. A thousand pods is a very good crop for a single tree.

The trees are male and female, although sometimes hermaphrodite flowers occur, and sometimes the female will bear pods without the presence of the males. Male trees bear only male flowers and, of course, no pods.

Wild Sunflower. Wild Zinnia. "Poverty Grass."

A.L.P. (Kingaroy)—

1. *Verbesina encelioides*, the Wild Sunflower. This plant is very common in Queensland, especially as a regrowth on the brigalow scrub areas in the Darling Downs and Maranoa districts. Feeding tests have shown that it is poisonous to sheep, producing in them symptoms resembling those of pneumonia.
2. *Zinnia pauciflora*, Wild Zinnia, a native of tropical America, now a naturalised weed in Queensland. It has become very common in parts of the State, especially on the Darling Downs and in the Lockyer District. It is not known to possess any poisonous or harmful properties; nor is it a particularly aggressive weed, although fairly common.
3. *Eremochloa bimaculata*. The only local name we have heard applied to this grass is Poverty Grass. It generally grows on rather poor country, and our experience is that it is not particularly valuable as a fodder. We have, however, no analysis of it.

Gomphrena Weed.

J.B. (Ipswich)—

The specimen is the Gomphrena Weed (*Gomphrena decumbens*), a native of tropical America. This plant made its appearance about Townsville some years ago, and since then has become very widely spread in the State. It belongs to a wholesome family (Amarantaceæ), and theoretically should be a very good fodder. We are interested therefore in your report that cattle were eating it freely. We also have had a report to the effect that horses were very fond of the seed heads. Personally, though we have seen a lot of the plant, we cannot say we have seen stock take to it to any extent. It is not a clover, and is not related to the clovers. It is not a cross between Khaki Weed and Pig Weed, although it belongs to the same family as the former (Amarantaceæ). It is possible to cross one plant with another, but they must be closely related botanically.

An Acclimatized Plant.

L.C. (Gayndah)—

The specimen you sent is *Phaseolus lathyroides*, a native of tropical America, naturalised many years ago in Queensland as a fodder. The plant is not known to possess any poisonous or harmful properties, but so far as our experience goes, stock do not take readily to it. We have received reports on several occasions, however, from farmers, to the effect that cattle, and especially horses, ate it once they had acquired a taste for it. I have not heard a common name applied to the plant.

" Wild Sage."

C.M. (South Townsville)—

The weed *Hyptis suaveolens* is sometimes called Wild Sage or Wild Mint. It is a strongly scented herb, growing 2 to 6 feet high. The stem and leaves are hairy, the leaves are opposite, and the flowers blue and borne in whorls in the upper part of the plant. This plant is quite common about Townsville and some other places in North Queensland, and if you send us a specimen we shall let you know whether it is the right plant. It is sometimes burnt by fishermen to drive away mosquitoes and sandflies.

We would be pleased to report on any specimens of weeds you care to send. Small pieces of the plant, bearing, if possible, flowers or fruits, would suffice.

" Wild Millet."

P.R. (Pittsworth)—

Your specimen is *Echinochloa crus-galli*, commonly called Wild Millet, though this name is applied to a number of grasses in Queensland. It is very widely spread over the warm temperate regions of the world, and the form you send is one that is fairly common as a weed of cultivation in Queensland. It is quite a good fodder, relished by stock, and is very closely allied to such well-known cultivated fodders as Japanese Millet and White Panicum.

Saffron Thistle.

A.M.R. (Toowoomba)—

The specimen is *Carthamus lanatus*, the Saffron Thistle, a native of the Mediterranean region, now a very common weed in Australia. It is much more abundant in the Southern States than in Queensland. It has been gazetted a noxious weed throughout this State. It is not known to possess any poisonous or harmful properties, but is of little or no use as a fodder. In spite of its spiny nature, it is sometimes eaten in its young stages by stock.

Crowfoot Grass.

H.McB. (Millmerran)—

The specimen is the Crowfoot Grass (*Eleusine indica*). This grass is, of course, not to be confused with the herbage commonly known as Crowfoot. It is very common on parts of the Darling Downs and Maranoa in certain seasons. This grass in very widely spread over the warmer regions of the world, and in Queensland mostly grows as a weed of cultivation, or around cowyards, &c.—in fact, anywhere where the ground has been disturbed, or broken. It is readily eaten by stock, but, like sorghum and some other plants, contains a prussic-acid-yielding glucoside. Recent tests by the Agricultural Chemist show that most of the poisonous principle resides in the seeds. The plant is very common in the coastal parts of the State, and rarely causes any trouble.

Coffee Senna. Wilga.

W.A.K. (Clermont)—

The specimen is, as you suspect, *Cassia occidentalis*, the Coffee Senna.

Wilga Trees: Although we have been through a great deal of Wilga country, we do not remember ever seeing seedlings under the trees, and do not think they sucker. People tell us that they have had trouble in germinating the seeds. We should think the best plan would be to get the seed perfectly fresh, and sow in flats or boxes in fairly sandy soil, and keep them moist. Under these conditions they should germinate within two or three weeks. They could then be pricked off into tins or other boxes, and eventually transferred to their permanent positions. I think they should transplant fairly well. It certainly is a beautiful tree, and would make an excellent small street tree for much of Western Queensland.

" Balloon Cotton."

E.N. (Rannes)—

The specimen is the White Cotton or Balloon Cotton (*Asclepias fruticosa*), a native of South Africa, now a naturalised weed in Queensland. It is sometimes grown as an ornamental bush, but has the possibilities of becoming a very serious weed. We have seen some farms almost overrun by it. When it makes its first appearance—as it has on your property—the best way to get rid of it is to pull it up before the plants start seeding.

Carpet Grass. Buffalo Couch.

D.C. (Beenleigh)—

The narrower-leaved grass is Carpet grass (*Axonopus affinis*). This grass is very common in parts of Queensland and New South Wales, and has some value on second-class country. It has caused considerable concern, however, in recent years because of its invading better class Paspalum, Rhodes, and Blue Couch pastures, and seriously reducing their carrying capacity. If you have only a small patch, we would feel inclined to cut it out if at all possible, or plough and replant with Paspalum or Blue Couch cuttings, whichever is doing better on your place.

The broad-leaved grass is the Buffalo Couch (*Axonopus compressus*). This grass is very similar to the Carpet Grass, but on the whole is somewhat superior.

A "Native Flax." "Nut Heads."

F.H.D. (Kuranda)—

The plant of narrow upright growth is *Pimelea cornucopia*, one of the several plants known as Native Flax. It is very common in North Queensland. Several species of Pimelea have been accused of poisoning stock, but no feeding tests have been carried out with the present species. It has not come under suspicion, but we cannot say we have ever seen stock eat it, at least to any extent.

The plant of more spreading habit is *Epaltes australis*, commonly known as Nut Heads because of its little brown seed heads. It is very common as a weed in coastal pastures. It is eaten to a limited extent. It is not known to possess any poisonous or harmful properties, but we should say was of no particular consequence in the pasture.

"Josephine Burr."

S.C. (Barcaldine)—

The specimen is the Josephine Burr (*Josephinia Eugeniæ*), a native plant with a fairly wide distribution in the Central West. The burrs are sometimes a common infestation in wool. If only a few plants are on the property it would be as well to cut them out before the burr gets too much of a hold.

Tridax Weed. Leafy Panic Grass.

N.R.K. ((Grantham)—

1. *Tridax procumbens*, Tridax Weed. This weed is very common in Queensland in the northern parts of the State, and in recent years has spread to the more southern parts, though it does not seem to become such a pest as in the warmer localities. It is not known to possess any poisonous or harmful properties, and we have seen stock eat it readily enough at times when grass was very short. If you have a small area of it, however, it would be as well to cut it out if practicable.
2. *Brachiaria foliosa*, Leafy Panic Grass. This is quite a good grass for dairy cattle. Though a native grass, it occurs most frequently in country where the ground has been broken or disturbed, such as old cultivation paddocks. It does not often form a permanent sward, though we have seen it doing so on sandy alluvial flats.

A Love Grass.

W.B. (Chinchilla)—

The specimen is one of the Love Grasses (*Eragrostis sororia*). The Love Grasses are very common constituents of the average native mixed pasture. The one you send is one of the commonest. Though not particularly important in themselves, the Love Grasses can be regarded as good secondary grasses in the mixture.

In reply to your inquiries—

1. Is it good for sheep or cattle?—A good secondary grass.
2. Is it fattening?—Not particularly so.
3. Is it good feed when the winter comes after frost has been on it?—It stands the winter moderately well, but, like most of the native grasses, loses a lot of its nutritive value after it has grown and seeded, say, in late summer or early autumn.
4. Is it a hardy grass?—Yes.

A Common Yam.

A.H.F. (Miriam Vale)—

The common yam dug up in cultivation paddocks about Baffle Creek is a native Grape (*Vitis opaca*). This is of a very stringy, fibrous nature, and is often pink-fleshed.

There are other vines, of course, and there is a *Dioscorea* common about Baffle Creek (*D. transversa*). A portion of the dead vine, particularly if a few shrivelled leaves could be found, might have enabled us to identify the plant more accurately.

We do not think the Native Grape yam has any value as a pig and poultry food, but the *Dioscorea*, of course, has; as a matter of fact, some people eat the the *Dioscorea* bulbs, and say they are quite pleasant and palatable.

Brookfield Plants Named.

J.McL. (Brookfield)—

1. *Vicia sativa*, the common Vetch. This plant, a native of Europe, is now widely spread over most of the temperate regions of the world. It belongs to the family Leguminosæ, and is regarded as quite a good fodder.
2. *Amarantus viridis*, Green Amaranth. This plant is a very common weed in Queensland. The leaves may be used as a substitute for spinach.
3. *Verbena venosa*, Wild Verbena, a native of South America, now a naturalised weed in Queensland.
4. *Soliva anthemifolia*, Soft Burr. This plant is a fairly common farm and garden weed in Queensland, but is not particularly aggressive.

VETERINARY ADVICE.

(Selections from the outgoing mail from the office of the Director of Veterinary Services.)

Disease in Fowls.

W.E.C. (Chinchilla)—

From your description, your fowls are suffering from spirochaetosis, a disease transmitted by fowl ticks and red mites. Although you state that there are no ticks on the fowls infected, this may not be so as fowl ticks are very hard to detect when present in only small numbers. Examination of the fowls is only successful at night, when the parasites are feeding.

The only method of dealing with the disease is to eradicate the ticks and mites which spread it. Treatment of the disease itself does not pay, as it would cost considerably more than the value of the bird.

In the case of old fowlhouses, where the timber is rotten and infested with white ants, the best thing to do is to burn them and rebuild with sawn timber. Disinfection can be done by spraying with kerosene emulsion or sheep dip. Special attention should be paid to crevices and joints in the timber.

Kerosene emulsion is made by preparing a stock solution by dissolving one pound (1 lb.) of washing soap in one gallon of water. Then pour in slowly one gallon of kerosene, stirring to a creamy consistency. Use one gallon of this solution to eight (8) gallons of water for spraying. This should be repeated every five days until the ticks have been eradicated.

Perches should be hung on wire passing through a cup of kerosene. Old whitewash should be removed before spraying as the scales form a hiding place for the parasites.

Colostrum.

G.R.W. (Woodford)—

There is no real substitute for colostrum and, provided the calf has two or three feeds of colostrum from the mother, no more would be required. In the event of getting no colostrum whatever, the calf can be allowed whole milk to which has been added two tablespoonsful of lime water.

Colostrum should not be mixed with ordinary milk as it would certainly lower the grade of cream.

Rural Topics

Carrots for "Denis."

New Zealand farmers have come to appreciate the fact that carrots are a first-class feed for pigs, and that with a reasonable amount of attention in the early stages of growth to keep down fast-growing weeds, heavy tonnages can be produced from a carrot crop.—*The New Zealand Farmer Weekly.*

How Ensilage is made in Argentine.

According to a letter received recently from Argentine, the long-trench method of making ensilage has solved the problem of economically conserving supplies of winter fodder by Argentine farmers. The writer says that Argentinians usually employ two methods—that is, stacks or long trenches similar to those farmers use around Pittsworth and other places on the Darling Downs. The usual procedure to offset cartage and handling of the freshly-cut material intended for ensilage-making—which, in South America, is lucerne as a rule—is to select sites for stacks in different positions in the paddock and cut all available lucerne around the site of the stack.

Two stacks are invariably built at the same time on each site, working alternate days or half-days on each stack, so as to allow the freshly-stacked green lucerne to settle down and to prevent the stacked material from slipping. On big farms only medium-height stacks are built on foundations where the earth has been dug or excavated to a depth of about 2 feet. When the stack is settling, a portion of the excavated earth is taken and stacked on top to assist the settlement of the mass of material by the additional weight of the "spoil," and when the stack has settled, the sides are earthed up to the eaves of the stack of fodder and the whole stack is covered completely with earth, with the exception of corner apertures for drainage and moisture to escape from the green ensilage material.

The same principle is adopted on many farms, but by excavating a long trench from 10 to 12 feet wide, about 2 feet deep, and up to 150 feet long, sloping at each end to permit of the wagon or sweeps carrying the freshly-cut lucerne to be carted right over the top of the trench stack, and, when finished, covering the trenched material with clay.

Ensilage produced under this method is said to last indefinitely, as long as the outside covering of earth is renewed regularly to prevent the contents of the stack from coming into contact with the outer air.

Lucerne an Adaptable Crop.

Years ago, no one ever dreamt of lucerne as a fodder crop on any land except rich alluvial flats. It was believed that without plenty of soil it would not grow successfully. Now we know much more about this remarkable fodder plant, and especially of its adaptability to many types of soil and different climatic conditions. In its search for water it puts up some remarkable performances. For instance, on a Queensland farm recently lucerne roots were traced for 70 feet in their hunt for water.

In lamb-raising country it has done well, even under adverse seasonal conditions. Queenslanders will be interested particularly in a report from the edge of the Mallee country in Victoria, where the rainfall is under 15 inches in normal years and which describes the experience of a farmer who has 500 acres of lucerne sown with wheat in rotation. He started very cautiously five years ago by planting 6 oz. of lucerne seed to the acre. Now he uses three times as much. After putting in his wheat and fertilizer (about a quarter of a hundredweight of superphosphate to the acre) he sows his lucerne seed, which passes through the grass-seed box on the drill.

During a very dry time about three years ago—the local rainfall for that year was only 8 inches—sand silted over some of the plants, but in many parts of the paddock the lucerne held back the drift. In the summer of 1938-1939, sheep were getting a short green bite on the ridges. On this property the lucerne normally carries two sheep to the acre. One paddock has been in use for experimental wheat crops. It was ploughed after being under lucerne for three years and planted with wheat without having been fallowed. The wheat yield from this paddock was not only as good as that from the fallowed fields, but it failed to kill the lucerne, which afterwards came on vigorously.

Pumpkins as Stock Food.

Farmers in the Hawkes Bay district in New Zealand have been getting excellent results from their pumpkin crops as pig feed. Commenting on this, one farmer had this to say in the local paper:—"Excellent as they are for finishing pigs, pumpkins are even better in combination with hay as a fattening feed for lambs."

Co-operation.

A co-operative association is not operated to make a profit on invested capital above the usual rate of interest, but to profitably market the products of its members at the lowest possible cost.—*The New Zealand Farmer Weekly.*

Tractor Fuel Substitute.

A gas producer unit suitable for transport vehicles with a carrying capacity of from 1 to 5 tons, and which might well be fitted to farm tractors, has been successfully demonstrated in England.

By means of this plant imported fuels (both petrol and kerosene) are dispensed with and the truck or tractor is run from the products of charcoal, low-temperature coke, coal, or a mixture of these fuels. In efficiency, the fuel is stated to be equivalent to petrol, and its cost 4½d. to 5d. a gallon.

The plant weighs only about 3 cwt.

A Crop Rotation Experiment.

Maize and oats are two important commercial crops in the New England district of New South Wales. With these crops a crop rotation is now in progress at the district experiment farm. The plan of the experiment is twofold—yield and soil fertility. Greater interest is centred on the more spectacular achievement with acre and period production of the cereal crops—maize and oats—by rotation cropping. The work on soil fertility has not gone far enough yet to permit of definite conclusions.

The experiment, which has been in progress for about nineteen years, has already shown that greater acre yields, greater period production, less labour and expense, and increased profits will be obtained with the inclusion of perennial red clover in a rotation.

Marketing "Frosted" Meat.

A new step in marketing "frosted" meat and other perishable products was inaugurated in New York State recently. The foodstuffs are packed in insulated paper-bags with a piece of "dry ice" sufficient to maintain a low temperature during delivery over distances of as far as 50 miles.

Cattle Fattening on Wet Coastal Country.

To determine the real value of introduced grasses for topping-off cattle on wet country in the North, where the rainfall is usually measured with a foot-rule, regular weighing of experimental cattle is carried out on a Tully River property. The results of one weighing show that phenomenal gains in weight were recorded. One lot of cattle gained as much as 71 lb. in weight in three weeks. The actual average of this mob in increased weight was 71.2 lb. a head. Another experimental mob gained 40.5 lb. a head; so the average gain of all the cattle during a three-weeks period was approximately 50 lb. a head. These results are very interesting and indicate what can be done in the way of fattening on introduced pastures on the wet tropical coast. With well-established improved pastures and improved classes of cattle, the possibilities of this new practice are obviously immense.

Lambing Percentages.

A practice which should be more general, and which would increase lambing percentages—a very important matter these days—is the re-joining of rams with dry ewes at lamb marking time. This, of course, depends on prevailing seasonal conditions.

Pigs in the Orchard.

A dozen unringed pigs let loose in the orchard for a fortnight will not only clean up everything in sight, but they'll do a thoroughly good job of cultivation as well. That is the opinion of a fruitgrower on the North Coast. Discussing the pig-fruit combination the other day, he said that pigs are great workers in the orchard. They clear the ground of windfalls, root around the base of the trees, just like a gardener with a fork, and then work outwards to cover the whole area.

Fowls also earn their keep in a fruit garden.

The Plough a Weapon of War, as well as a Weapon of Peace.

The plough is as necessary a weapon of war as any instrument of destruction. It is helping the ship to carry munitions instead of foreign food. It is warding off danger from these shores. But, unlike the gun or the aeroplane, the plough is a weapon of peace. It is creating wealth for the future and wealth that the country will always need. For, after this great war effort, there can be no question of drifting back, as we drifted back in the years after the last war. Having seen the value of the land in time of stress, we must never waste it again in the days of peace.

—*The Farmer and Stock-Breeder* (England).

The "Topato."

The crossing of potatoes with tomatoes for the production of a crop above and below ground from the one plant has long been a stock joke at show dinners, but it can be done and has been done, according to a report by research workers in the United States. This is how they did it: Tomato tops were successfully grafted on to potato roots and, in due course, the top of the plant produced tomatoes and the roots potatoes. The potato produced is starchless, and, the report says, "hailed as a boon to stout women who like potatoes, but shun them for fear of excess poundage." The name of the new product is "topato."

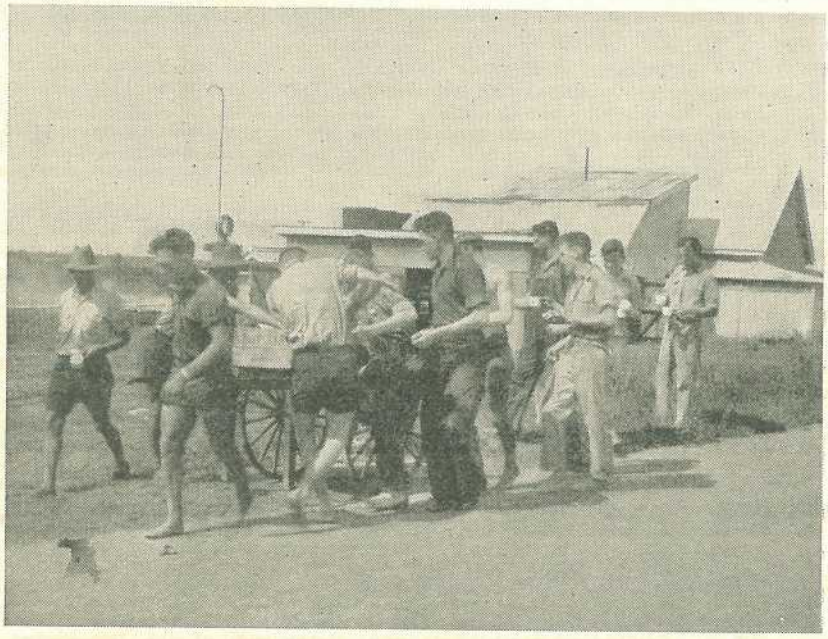


Plate 90.

AT THE SUGAR SCHOOL AT GATTON THE "SMOKO" CART WAS ALWAYS POPULAR.

Farm Notes

JUNE.

THE wheat planting season normally extends from April to July, with the main Darling Downs sowing during June. Well-prepared fallows should contain enough moisture to permit of sowings after light showers, but on recently ploughed lands it will be necessary to await substantial rains or commence sowing dry when the surface soil has dried out sufficiently to avoid the malting of grain. Farmers unfamiliar with the characteristics of the different varieties of wheat should remember that, in general, early-maturing varieties should be sown late, and slow-maturing varieties sown early.

Of the varieties in general cultivation at present, Florence, Novo, and Seaspray are early maturing, while Currawa and Cleveland are slow maturing.

All others are classified as medium, early, or mid-season, with little difference in the number of days taken to mature under identical conditions.

All seed wheat should be treated for the prevention of ball smut, using copper carbonate or either of the mercury dusts "agrosan" or "ceresan."

Where dry conditions have prevented the earlier seasonal sowings of oats, barley, wheat, field peas, and other field crops, there is still time to profit by so doing, choosing early-maturing varieties which will make satisfactory growth before the normal warm, dry spring conditions commence.

With all fodder crops for grazing, greater value is obtained from a number of small paddocks which may be grazed in rotation.

Land intended for maize should now be ploughed to a depth of at least 9 inches, and allowed to lie in the rough until early spring, the action of frost and rain having a mellowing effect on the soil.

Paddocks set aside for the July and August planting of potatoes should also receive attention, as adequate preparation of land is one of the most important factors in successful agriculture.

Farmers desirous of destroying useless green timber or undergrowth with arsenic pentoxide are reminded that the April to July period is probably the most effective time for carrying out this work. Frill ringing and poisoning of trees with a 20 per cent. solution of arsenic pentoxide has proved very satisfactory, combined with the felling and swabbing of butts to destroy suckers and undergrowth. Shelter belts and shade trees should always be reserved when planning poisoning or ring-barking operations.

Winter is generally the best time to undertake the laborious work of ring-barking, clearing, fencing, and roadmaking.

Recently harvested maize grain should be allowed to dry out completely before being shelled, otherwise heating in the bags may occur.

Grain not required for immediate use or sale can be stored indefinitely at no great cost, other than the initial outlay for tanks and occasional fumigation to destroy weevils.

THE VALUE OF MITCHELL GRASS.

Where it has spread in the north-western districts of New South Wales, Mitchell grass is said to have added one-third to the value of the land, and that is regarded as a conservative estimate. In the last ten years it has spread remarkably and has made a big difference to large areas of pastoral country in the north-west of the neighbouring State. Mitchell grass seed from the district has been sold as far afield as the Kimberleys, in Western Australia, and South Africa.

To Queenslanders, of course, the value of Mitchell grass need not be told. It is one of our greatest pastoral assets and science men of the Department of Agriculture and Stock are already keenly on the job of preserving it and extending its growth.

Orchard Notes

JUNE.

THE COASTAL DISTRICTS.

IF the weather is dry, citrus orchards should be kept in a good state of tilth and winter green manure crops turned under. Old worn-out trees may be dug out and burnt. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes very cold, or if immature fruit is sent South, the fruit is apt to turn black and become valueless. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

The pineapple plantation should be shallow-worked and kept free from weeds. The fruit takes longer to mature at this time of the year, consequently it may remain on the plant until partly coloured before gathering for the Southern markets.

Banana plantations also should be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now may mean small fruit later on. Bananas should be allowed to become full before the fruit is cut. The necessity of proper handling, grading, and packing of the fruit should be kept in mind. Land intended for planting with bananas or pineapples during the spring should be prepared now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall, they should be watered regularly. Where not already done, vineyards should be cleaned up ready for pruning. It is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt. Thin out young trees properly, and cut them back hard. Many good trees are spoilt by insufficient or wrong pruning during the first three years. If in doubt as to the cofrect method of pruning, consult the district instructor in fruit culture. In old orchards, do not have too much bearing wood; cut out severely, especially in the case of peaches. Planting may be commenced where the land is ready, as early-planted trees become well established before spring, and thus get a good start. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour or badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or phosphates—may be applied now, as they are not liable to be washed out of the soil, and will be available for the use of the trees when they start growth in spring. Lime may also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees may be pruned now, and vines also may be pruned in any district where there is no risk of late frosts. Prunings should be gathered and burnt, and the vineyards ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls. The moisture can be kept in the soil by cultivation afterwards.

Citrus fruits will be at their best in the western districts. The trees should be watered if they show signs of distress; otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should have been picked by this time.

Maternal and Child Welfare.

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

BABY'S HEALTH: NATION'S WEALTH.

THE CARE OF BABY'S FEET.

"Ten little fingers and ten little toes." With what admiration does the young mother touch the tiny hands and feet of her baby as he lies kicking in the sun—and rightly so, because in babyhood the human foot is one of the most beautifully shaped parts of the body. Not only is the normal foot of the baby beautiful in form, but it is extremely supple. Watch baby for a few moments as he alternately curls up and stretches every part of his foot and you will realise that the range of movement almost approaches that of the hand. Surely the mother should try to understand and appreciate the value of this particular gift of Nature to her child and take great care not to spoil it. "But how can I spoil it?" she may ask. I would advise her to go down to any of our beaches and watch not the bright faces and well-shaped figures of the bathers as they pass her by, or the patterns of their swim suits, but the shape of their feet. What a sorry sight most of them are, especially the women's feet with their distorted and misshapen joints telling the story of loss of function and unnecessary suffering caused by the neglect or ignorance of the parents and others who cared for these people in their childhood. Unfortunately this lack of knowledge will make it impossible for the nothers of to-day ever to attain a perfect foot, but we shall now think for a few minutes about the feet of the babies of to-day and see whether we can help to preserve their beauty right into adult life.

The Structure of the Foot.

We have noted the beauty and suppleness of the foot, now let us think of the wonderful structure of it. To help us to do this we can make a mental picture of the grace of the ballet dancer or the athlete lifting heavy weights, with his feet supporting not only his own body, but the hundreds of pounds he is lifting, or the runner dashing down the hundred yards in less than ten seconds, and we will surely

marvel at the combined strength and flexibility and the absolute perfection of the feet for the work they are designed to do. The foot is a remarkably complicated structure. It is arranged in the form of two arches—a long one starting from the heel to the toes, a short one from the inside to the outside of the foot. The formation may be compared to a dome. Normally the weight of the body is borne by the strong bone at the top of the long arch, and is passed on through the rest of the bones forming this dome-like part of the foot to heel and toes. It is the very strength of the feet that makes them so troublesome when they are mistreated or get out of order. They were designed to be a powerful ally when a man hunted his game or ran from his enemy, and were made for speedy action and almost unlimited endurance, but they were also made to be free and should be so as much as possible.

Let us now consider what often happens to baby's feet to prevent their being used as Nature intended them to be. Right from birth they are usually encased in knitted woollen bootees, made perhaps by a friend who wishes to present what she thinks will be a useful gift to the newborn baby. Normally the well-meaning friend has no knowledge of the form of the foot and its importance and the bootees are made to end in a point at the toe instead of being square and loosely fitting. Their immediate effect is the bunching together of the toes and interference with those free and natural movements we mentioned earlier in this talk. The bootees require frequent washing and being made of wool they shrink, becoming smaller and smaller. At the same time baby's tiny feet are growing at a surprisingly rapid rate with the result that week by week the deforming influence of the bootees is slowly but surely at work. By the time baby is old enough to wear shoes the power to use the important muscles of the feet is weakened and the feet are gradually becoming more rigid and out of shape. Now the feet are fitted with socks, the toes of which in many instances are also pointed, and these, if closely woven and tightly fitting as they often are, cause further cramping of the feet. As the child grows older he is made to wear shoes of a more rigid type, usually not built to the shape of the natural foot and so the deforming influence continues. Long before the shoes are worn out the child outgrows them and from motives of economy his feet may be forced into his shoes. It is better that a child should go barefoot than that he should be made to walk in shoes that are too short for him just because they are not worn out.

A Common Error.

A common error is the wearing of shoes much too short for the feet. When fitting on shoes allow baby to stand in them and see that there is about a quarter of an inch to spare beyond the limit of the great toe. If this is not done the toes become bent up and permanently deformed. By the time the child reaches his or her teens, fashion begins to play its pernicious part. The young man often selects a shoe which is too narrow across the foot and pointed at the toe. Ingrowing toe nails, painful corns, painful joints, callosities and stiff toes are some of the disabilities which so often occur even in the feet of young men, but it is in the young women that one finds the most disastrous results of the wearing of ill-fitting and badly-shaped shoes. Many girls to-day at the age of fifteen or sixteen years are not content with wearing a properly-fitting shoe with a broad flat heel and ample toe-room but must imitate older sisters and cram their feet into shoes with high heels of court style much too short, narrow, and pointed. Cramped into them like vices the young feet are compelled to complete their growth, moulded to the shape of the shoes. The result is that extensive operations require to be carried out in a number of cases to correct the crippling which has taken place. Specialists who have made a careful study of the subject maintain that no heel should be higher than 1½ inches, and for every quarter of an inch added the foot is going to suffer proportionately. Most women's shoes have heels in the region of 2 inches high, and many are higher, and unfortunately one becomes accustomed these days to see women tottering about in an ungainly manner—all the natural grace and balance of the body lost. We have no cause to smile at the Chinese parents of earlier generations who permitted their daughters' feet to be deformed by binding them in infancy, when we in our modern civilisation allow our children's feet to be deformed as surely by the wrong kind of footwear. The effect of wearing a high heel is to shorten the strong tendon (tendo Achilles) at the back of the heel, so that many women are unable to flex their feet to more than a right angle. Further, the weight of the body is thrown more on to the balls of the toes, which, in time, become very painful. Most shoes are too narrow and many are too short—consequently, we find that certain of the bones are forced out of position, all kinds of deformities occur, and standing and walking becomes increasingly painful and

difficult. We appeal to mothers, and fathers also, to see that right from infancy baby's footwear is fashioned to fit the foot, and not the foot to fit the shoe or stocking, that the heels of shoes should be low and broad, and the toes square, or at least well rounded, and that the soles have flexible welts, not hard, rigid soles or pump soles. In addition, parents, and teachers, too, should teach children, not only to care for their teeth and their hands, but to realise the wonder and beauty of the structure of their feet, to cultivate a proper pride in preserving the strength and shapeliness of this most ill-used of our members.

In our talk next month we shall tell you about certain deformities which may occur as a result of conditions which arise before birth, and which will require special care and attention during childhood.

You may obtain information on this and other matters concerning infant and child welfare by visiting the nearest Maternal and Child Welfare Centre, or by addressing a letter to "Baby Clinic, Brisbane." Such letters need not be stamped.

IN THE FARM KITCHEN.

THE HOMELY SAUSAGE.

There are other ways of cooking sausages besides frying and grilling. Here are some of them:—

Sausage Surprise.

Prick 1 lb. pork sausages with fork or skewer and place in boiling water and simmer very gently for 6 or 7 minutes. Drain and allow to cool a little, then skin. In the meantime, fry 4 oz. rice in a little butter or good dripping until a fawn colour; with 1 tablespoon minced or grated onion, add 2 cups well-flavoured stock, tomato puree, or 1 cup water and ½ lb. skinned and chopped tomato. Add pepper and salt to taste and cook until rice is tender and moisture absorbed. Mix rice well to a mush, then spread on to a dish to cool. Cut sausages in halves and roll round enough rice to cover thoroughly. Now dip in egg, then in fine breadcrumbs. Fry in boiling fat until a golden brown. Drain well and serve with mashed potatoes and a well-flavoured tomato sauce.

Sausages Au Gratin.

Skin sausages in the same way as preceding recipe and place them in a flat, well-buttered ovenproof dish. Cover sausages with very thin slices of potato and cover with the following sauce:—Melt 1 tablespoon butter or good dripping in a saucepan, add 1 tablespoon flour, cook a little, then add 2 cups milk or 1 cup vegetable stock and 1 cup milk, and stir until mixture boils. Simmer for five minutes, add pepper, salt, and a little cayenne and 2 tablespoons grated cheese. Pour over sausages, &c., sprinkle with a little more grated cheese, and bake in a moderate oven until well browned.

Devilled Sausages.

Mix together 2 cups fairly thick brown sauce, 1 teaspoon made mustard, 1 tablespoon Worcestershire sauce, 2 tablespoons tomato sauce, and a dash of cayenne. Skin sausages as previously directed and spread with sauce. Place under griller and brown or put them in a hot oven for about 15 minutes. Serve with grilled tomatoes and saute potatoes.

Grilled Sausages and Pineapple.

Boil as many pork sausages as directed, then grill in the usual way until well browned. Roll edge of pineapple (tinned or fresh), cut into ½-inch slices, in a little sugar tinted red with cochineal, and fry quickly until a nice brown. In the meantime, scrape and cut as many carrots as are needed into cup shapes, using a vegetable scoop to cut out the centres. Boil in salted water until almost cooked, then drain and add 1 dessertspoon butter and 2 teaspoons brown sugar. Continue to cook until tender. Cook 1 lb. peas until tender, then rub through a sieve. Add pepper, salt, and a little butter, then fill carrot cups. To dish up, place a little mashed potato in the middle of dish, pile up sausages neatly, then place pineapple slices neatly round. In the centre of pineapple place a prepared carrot cup. A roll of bacon may be placed on top of peas or round sausages.

Sausages Florentine.

Cook 1 or 2 bunches of spinach, drain well, and chop very finely or rub through a sieve. Season with pepper, salt, and a little grated nutmeg. In the meantime, peel and slice 1 lb. onions and fry until brown in a little butter or good dripping. Season with salt and pepper. Grease a fireproof dish and add a layer of spinach, then a layer of onions, and 1 lb. sausages, previously boiled, skinned, and cut through the middle lengthwise. On top of these place another layer of spinach, then a thick layer of skinned and thickly-sliced tomato. Sprinkle with pepper, salt, and coarse breadcrumbs. Dot with a little butter or good dripping and bake in a medium oven for 45 minutes.

Grilled Pork Sausages with Glazed Sweet Potato.

Boil and skin as many sausages as required and put in a baking dish with a little melted butter and about 1 tablespoon top milk or cream. Place under griller and cook until a nice brown all over, taking care to turn them well during the cooking. Parboil sweet potatoes (large), allow to cool a little, then cut in halves. Place in a greased baking dish or fireproof dish and cover with the following:—Melt 1 tablespoon butter with 1 tablespoon brown sugar and 1 tablespoon water in which the potatoes were boiled. Add a little ground cinnamon and boil for a few minutes. Bake in hot oven until tender, basting well with the syrup during the cooking. Dish sausages in centre and surround with potatoes. Garnish with rolls of crisp bacon.

Sausage Omelet.

Skin and cook 1 lb. sausages as directed, cut into thin slices or dice. Beat eggs slightly (allow two per person), add pepper, salt, and a little chopped parsley. Melt a little butter or good dripping in an omelet pan, pour in egg, then enough sausage slices to cover egg. Stir well over moderate gas until almost set, then push mixture to one side of pan cushion shape and allow to brown. Carefully turn and brown the other side without allowing omelet to become overcooked. Dish up and serve at once with crisp grilled bacon.

OTHER DISHES.

Savoury Fritters.

Make a mixture as follows:—Place 1 oz. butter in saucepan with ½ cup water and bring to boiling point. When butter is quite melted, add 2 oz. plain flour and stir over gas until it leaves the sides of saucepan clean. Allow to cool a little, then beat in 2 whole eggs, one at a time, and beating well after each egg is added. Add pepper and salt to taste, and, if liked, a little chopped parsley. Drop in dessertspoonfuls in very hot, but not boiling, fat and cook over a moderate gas until well risen, brown, and crisp. Take up and drain. Fill with any left-over meat, vegetable, &c., finely chopped and well flavoured, and mixed with enough sauce to bind mixture together. Make hot before filling puffs, then serve at once with a well-flavoured sauce.

Rice Cakes.

Fry 1 medium-sized finely-chopped onion in a little good dripping until soft, but not brown, then add 1 cup rice and cook until a fawn colour, stirring all the time so it will not burn. Add 2 cups stock (any left from cooking vegetables will do) and cook until rice is tender and moisture absorbed. Add 1 dessertspoon shredded and fried bacon and mix well. Form into flat cakes and place on a well-greased baking tin. Sprinkle with buttered breadcrumbs and bake in a hot oven until brown. Dish up on a round of buttered toast the same size as rice. On top of rice put a slice of grilled tomato.

Apple Cottage Pudding.

Sift 1½ level cups plain flour with 2½ level teaspoons baking-powder and ½ level teaspoon salt. Cream 2 oz. butter until light and gradually add 1 level cup sugar and beat well. Add 1 egg and a little lemon essence. Add flour alternately with a little more than ¾ cup milk, but not quite a cupful. Mix until smooth, then add 1 or 2 grated apples. Melt 4 level tablespoons brown sugar with 1 level tablespoon butter and pour in the bottom of a round cake tin. Sprinkle over enough raisins to cover bottom, then cover raisins with peeled, cored, and sliced apples. Add batter and bake for about 45 minutes. Turn out and serve.

ASTRONOMICAL DATA FOR QUEENSLAND

JUNE, 1941.

By A. K. CHAPMAN, F.R.A.S.

SUN AND MOON.
AT WARWICK.

June.	SUN.		MOON.	
	Rises.	Sets.	Rises.	Sets.
	a.m.	p.m.	a.m.	p.m.
1	6.35	5.5	10.57	10.28
2	6.35	5.5	11.38	11.26
			p.m.	
3	6.35	5.4	12.19	nil
				a.m.
4	6.35	5.4	12.59	12.27
5	6.36	5.4	1.42	1.28
6	6.37	5.4	2.27	2.31
7	6.37	5.4	3.14	3.36
8	6.37	5.3	4.6	4.42
9	6.38	5.4	5.2	5.48
10	6.39	5.4	6.1	6.52
11	6.39	5.4	7.1	7.52
12	6.39	5.4	8.2	8.46
13	6.39	5.4	9.2	9.36
14	6.40	5.4	10.0	10.21
15	6.41	5.4	10.55	11.1
16	6.41	5.4	11.48	11.38
				p.m.
17	6.41	5.4	nil	12.13
			a.m.	
18	6.42	5.5	12.39	12.48
19	6.42	5.5	1.31	1.23
20	6.42	5.5	2.22	1.59
21	6.42	5.5	3.13	2.37
22	6.42	5.5	4.5	3.17
23	6.43	5.5	4.55	4.1
24	6.43	5.6	5.46	4.48
25	6.43	5.6	6.37	5.38
26	6.43	5.6	7.26	6.32
27	6.43	5.7	8.12	7.27
28	6.43	5.7	8.57	8.23
29	6.43	5.7	9.39	9.21
30	6.43	5.8	10.20	10.20

Phases of the Moon.

3rd June, First Quarter, 7.56 a.m.
9th June, Full Moon, 10.34 p.m.
17th June, Last Quarter, 1.45 a.m.
25th June, New Moon, 5.22 a.m.

MIDWINTER.

ONCE again the whirligig of time has brought winter to all the Southern Hemisphere. On 22nd June the sun will have reached the Tropic of Cancer—his farthest north—on his annual excursion to take summer to the lands north of the equator. The sun moves very slowly when approaching either tropic, and for a few days seems to stay there before commencing to return. This is why the word "Solstice" is used—for this word means "Sun to stand."

Mercury may be seen in the twilight about 6th June, when the planet will be 24 deg. east of the sun. It is a little far north, but in spite of that the planet will not set for one and a-half hours after the sun, and should be quite visible, although the moon is nearing its full. We see Mercury much better here than it is seen in England, where it is often looked for in vain.

Venus is the Evening Star, but it is still low in the twilight, setting about 50 minutes after the sun. Those with a clear western horizon may see Venus and Mercury near each other on 20th June, setting nearly an hour after the sun.

EARTH'S TWIN SISTER.

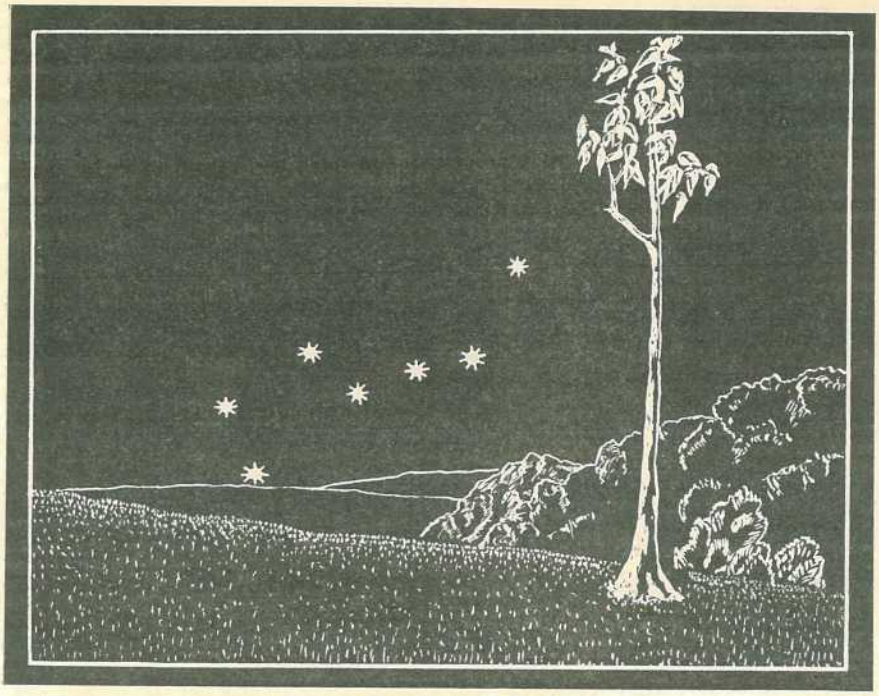
Venus is often called the earth's twin sister, as it is so near the earth in size. The fair planet is 7,600 miles in diameter, while the earth's polar diameter is 7,900. Its density also is but a little lower than that of the earth. It may seem strange that we know so little about the surface conditions of our neighbour, but it is so girt about by dense clouds that we cannot even tell the length of the Cytherian day, or if there are days there. It is thought by some that Venus always keeps one face to the sun as the moon does to the earth.

Mars now rises before midnight, and may be found in the rather dark constellation of Aquarius. When Mars is well up, the Great Square of Pegasus will be seen a little north of it. Also, the moon will be near it on 16th June. On 1st June the Red Planet will be 91,725,000 miles from us—nearer than the sun. It is interesting to watch the slow motion of the planets as they move among the "fixed stars." When the comet appeared near the Scorpion in January, Mars was in that constellation; since then it has moved to its present position, far to the eastward. No wonder planets were once called "Wandering Stars"!

MAREEBA METEORITE.

If one is abroad on almost any clear, moonless night, a few shooting stars or meteors are nearly always seen. Usually they are quite small, or one may light up the landscape, but occasionally a large one may fall to earth, when it is called a meteorite. Such a one was reported to have fallen near Mareeba on the evening of 3rd April. It must have been large and passed near, as the thunder of its descent was such as to shake houses. As sound travels about 12 miles per second, some estimate might have been made of its distance had the time been taken between the appearance and the sound. The solid meteorite would have been very many times smaller than the brilliant envelope of highly heated air which surrounded it and, no doubt, formed a long tail behind. The change of colour from bluish to red may be due to changing temperature, as the velocity of a meteorite is slowed up as it traverses the denser air. Were it found, it would be a most interesting object, not of this world, and from whence no one knows. It would most likely be composed of stone; possibly iron, glazed as if varnished by the melting heat to which it had been subjected by the friction with our atmosphere as it crashed through it. Below the surface it still would have been deadly cold—far below zero—and, if a large one, hoar frost or ice may have formed upon its surface, even though the night was hot at Mareeba.

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



THE GREAT BEAR OF THE NORTH.

In the early evenings of June the Southern Cross stands upright in the sky. It is only at such times that the Cross appears directly above the south point on the horizon. At all other times the Cross is either east or west of south. Whenever the Southern Cross is seen upright it is the best time to face the north and look for the Great Bear, which all those who came from the Old Country know so well. The sight of these seven stars, all of which are visible above the northern horizon a little north of Warwick or Brisbane, brings a thrill and thoughts of long ago to those who spent their childhood in Great Britain. There the Bear is a circumpolar constellation and, therefore, visible on every clear night of the circling year; just as the Southern Cross is a little farther south. Chiefly for that reason it is the most universally known constellation of the north.

THE WAGGON AND HORSES.

To the country folk of Somerset, the Bear is known as the "Waggon and Horses." In other places it is called the "Plough," the "Wain," or the "Waggon." In America it is known as the "Dipper." In early times it seems to have been called a "Chariot." However, it was known as the Great Bear from the remotest ages. In ancient Greece the Bear was spoken of, and still earlier in Babylonia. Aratus, in the second century B.C., said of the celestial pole: "Two Bears called Wains move round it, either in her place."

It requires a great stretch of the imagination to see a Bear in this constellation, although there are a great many more stars in it than the seven bright ones. According to the old star maps, the curve of stars represents the Bear's tail. Bears have no tails to-day; perhaps they had when this one was young!

At Warwick, with a clear northern horizon, most of the seven stars can be seen, but the lowest star, Dubhe, never rises above the horizon. At Brisbane Dubhe rises just above the horizon, but is still too low to be seen. People from the Old Country are surprised that we see "Their" Great Bear so far south. It may surprise them more to know that all "Their" star-groups appear upside down here. The Bear is a large constellation, and the great curve of five bright stars are conspicuous for the few hours while they are above the horizon at Brisbane; the farther north one goes the higher the Bear appears in the sky.

POINTERS TO THE NORTH STAR.

The two stars to the left of the picture—the most westerly—are Alpha or Dubhe, which means "the Bear," near the horizon, and Beta or Merak. These two are the famous pointers to Polaris—the North Star—which is, of course, always far below the horizon of Australia.

Of late years, since astronomers have been able to calculate the proper motions of some of the stars, it has been found that usually the direction and velocity of stars in the same group are so different that it may be seen at once that they are not related. In the Great Bear, however, the velocity and direction of its members are very similar indeed—all moving like a flock of birds, excepting Alpha, the star near the horizon, and Eta, the star at the end of the tail. These two stars are moving in a direction almost opposite to the others, which shows that they are not related to the other members of the group.

An interesting star is Mizar, the second star from the end of the tail. When the Bear is high enough to be well seen, it is a naked-eye double; the small companion star is called Alcor. With a telescope, Mizar itself is found to be double, and the spectroscope shows that one of the components is also double. Therefore, Mizar is really a multiple star system, although appearing as a single star to us.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1941 AND 1940, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of years' records	Mar., 1941.	Mar., 1940.		Mar.	No. of years' records	Mar., 1941.	Mar., 1940.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	9·11	40	14·95	20·36	Gatton College ..	3·29	42	5·64	4·26
Cairns	18·37	59	17·39	41·19	Gayndah	3·04	70	7·00	4·32
Cardwell ..	15·84	69	22·26	22·42	Gympie	6·21	71	6·42	6·81
Cooktown ..	15·47	65	13·28	25·89	Kilkivan	3·95	60	3·61	5·26
Herberton ..	7·97	55	12·11	13·70	Maryborough ..	5·99	70	4·48	8·88
Ingham	16·30	49	13·28	25·62	Nambour ..	9·58	45	8·98	11·74
Innisfail	26·99	60	35·06	44·06	Nanango	3·37	59	5·48	4·63
Mossman Mill ..	18·90	28	23·80	38·97	Rockhampton ..	4·50	70	5·97	5·68
Townsville ..	5·71	24	15·82	5·51	Woodford ..	7·84	54	10·07	10·38
Central Coast.					*Central Highlands.*				
Ayr	6·31	54	14·07	3·13	Clermont ..	3·09	70	11·40	5·41
Bowen	5·76	70	8·99	4·34	Gindie	2·66	42	7·43	4·96
Charters Towers ..	3·75	59	4·16	3·80	Springsure ..	2·96	72	4·19	4·77
Mackay P.O. ..	12·27	70	14·83	16·46	*Darling Downs.*				
Mackay Sugar Experiment Station	11·33	44	9·16	14·94	Dalby	2·73	71	4·92	3·25
Proserpine ..	12·48	38	10·52	12·65	Emu Vale ..	2·40	45	3·57	3·18
St. Lawrence ..	4·24	70	10·32	15·55	Hermitage ..	2·26	35	..	3·19
South Coast.					Jimbour	2·41	62	4·44	3·32
					Miles	2·71	56	5·51	3·73
					Stanthorpe ..	2·62	68	1·79	2·57
Biggenden ..	4·04	42	5·09	6·17	Toowoomba ..	3·78	69	5·02	4·44
Bundaberg ..	5·33	58	8·77	7·35	Warwick ..	2·58	76	2·88	3·60
Brisbane ..	5·79	89	5·52	8·72	*Maranoa.*				
Caboolture ..	7·93	65	6·56	9·71					
Childers	4·91	46	6·09	8·23					
Crohamhurst ..	11·28	48	11·84	17·13	Bungeworgoral ..	1·85	27	..	2·72
Esk	4·73	54	6·35	5·36	Roma	2·68	67	7·71	3·04

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MARCH, 1941.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points	
Cooktown	..	87	77	95	13	73	31	1,328	22
Herberton	..	80	66	85	16	59	4	1,211	19
Rockhampton	29·94	87	71	96	6	59	24	597	14
Brisbane	29·99	81	67	92	5	58	24	552	15
Darling Downs.									
Dalby	..	82	62	92	4, 5	47	24	491	13
Stanthorpe	..	76	56	87	4	36	24	179	9
Toowoomba	..	75	60	85	5	50	23, 24	502	12
Mid-Interior.									
Georgetown	29·86	92	73	98	1, 2	68	23	1,040	14
Longreach	29·91	90	68	99	6, 12	55	23	773	14
Mitchell	29·95	84	63	92	4	47	24	576	11
Western.									
Burketown	..	89	76	97	15	73	22,23,24	684	17
Boulia	29·91	90	70	107	2	62	23	946	12
Thargomindah ..	29·94	84	65	93	17, 18	55	23	356	5